SANDBOX
VEGETATION MANAGEMENT
ENVIRONMENTAL ASSESSMENT

La Grande Ranger District
Wallowa-Whitman National Forest

Chapter I: Purpose of and Need for Action

A. Introduction

The purpose of this Environmental Assessment (EA) is to evaluate and disclose the environmental impacts of proposed activities designed to restore and enhance ecosystem processes and enhance overall resiliency of forests within the Sandbox Vegetation Management project area.

B. Background

The 16,134 acre Sandbox Vegetation Management project area is located in three watersheds and seven subwatersheds. The Big Creek and Eagle Creek Watersheds are in the Powder River subbasin and the Upper Catherine Creek Watershed is in the Grande Ronde River subbasin. The Middle Big Creek, Upper Big Creek, Beagle Creek, and West Eagle Creek subwatersheds have few project acres compared to the size of the subwatershed. The Middle Big Creek, Upper Big Creek, and West Eagle Creek portions of subwatersheds within the project area do not contain any stream channels or associated RHCAs. The portion of the Beagle Creek subwatershed within the project area includes approximately one mile of a Class III stream (perennial non-fishbearing). Approximately five percent of the Beagle Creek subwatershed is in the project area. Therefore, discussions will be primarily focused on the Upper Catherine Creek watershed.

Existing conditions based on vegetation stand exams, and field reconnaissance completed during the summer of 2011 indicate the project area has a considerable number of stands where natural disturbance processes and associated forest structure and composition are out of balance with historic regimes and conditions.

Insects
Mountain Pine beetle and Western Pine Beetle are generally at endemic levels within the project area at the present time with variable degree of damage which is based on factors such as species composition, tree size, tree vigor and occurrence of root/bole decays. Mountain Pine Beetle, Ips Beetle, Western Pine Beetle, Douglas-Fir Beetle, Fir Engraver, and Balsam Wooly Adgelid populations have shown an increase in activity the last few years. Stands across the project area exhibit pockets of beetle kill and and elevated level of recent attacks.

A full analysis of the implications of insect epidemics, drought, and past management activities can be found in "Blue Mountains, Forest Health Report: New Perspectives in Forest Health" (1991).

Diseases
Tree diseases cause reduce growth rates, mortality, defect and decay. Incidence and severity of diseases in the Sandbox area are a combination of vegetation, successional stage, and disturbance (Schmitt, 1994). Major diseases in the area include root diseases, Indian paint fungus, lodgepole cankers, heart rots and dwarf mistletoes. Infected trees can have a reduction in growth, topkill, premature mortality, predisposition to other biotic agents and predisposition to crown fire (Schmitt, 1996).

Ecological Departure from Historic Conditions
Analysis of the existing condition for the Catherine Creek Watershed Analysis (1999) and field reconnaissance completed for this project during the summer of 2011 indicated that the project area includes a considerable number of stands where natural disturbance patterns are out of balance with historic regimes.

The landscape in the Sandbox project area is currently outside of the desired range of variability for some late and old forest structure, as well as desired levels of snags, down woody material, and big game cover. Analysis indicates that long-term restoration needs exist within the area.

C. Desired Condition

Vegetative Structures and Forest Health

The desired future vegetative condition is to have a mosaic of structural stages across the Sandbox project area characteristic of the historical range of variation. Stand structures and species composition will be consistent with historical disturbance patterns with consideration for the future effects of climate change and managed at levels to reduce the risks of epidemic insect and disease outbreaks.

Stands will exhibit ecologically appropriate structures and compositions providing a mixture of forage and thermal cover areas for big-game, and late-seral structures for old-growth dependent species. Large diameter (greater than 20 inches) down woody debris and standing snags will be distributed across the landscape at levels that provide for habitat and long term site productivity needs. Small diameter standing and down woody debris will be managed at levels to provide for soil productivity and reduced risk of uncharacteristic high-intensity or severity fires.

Old forest (OF) stands are connected by forest habitat that facilitates movement and interchange of genetic material between OF associated species (wildlife, plants, and invertebrates) inhabiting distant habitat patches. Stand structures and species compositions will be within the historic ranges that are sustainable and ecologically appropriate for the site and lead to increased resiliency to natural disturbances.

Riparian Habitat Conservation Areas

It is desired to provide water quality that supports stable and productive riparian and aquatic ecosystems. Riparian management objectives will facilitate restoration of properly functioning conditions and maintenance of high water quality and riparian habitat.

Fire Return Intervals and Regimes

The desired condition for this project area would be a mosaic of stand structures reflective of the vegetation structures and fuel loadings historically found when fires played a more frequent and natural role in the area. The desired fuels condition include a mixture of stands with moderate densities of understory conifers and ladder fuels intermixed with other stands exhibiting low densities of small conifers and other ladder fuels, lower canopy densities (less dead standing trees and live individual tree crown overlap), and increased distances from surface fuels to tree crowns. Surface fuels (small trees, shrubs, and dead and down vegetation) and overall canopy density would be a mosaic of open and closed crowns with surface fuel loadings ranging from 5 to 15 tons/acre across the project area. The desire would be to manage fuels such that fire starts in the area would generally exhibit ground fire behavior with occasional torching leading to reduced potential for a surface fire to transition into an active crown fire.

The desired condition class within fire regimes 1, 2, and 3 within project area is condition class one. Fire would continue to play an important role in shaping and maintaining the vegetative communities and wildlife habitat across the landscape. Maintaining these low and mixed severity fire regimes over time would minimize the loss of Old Forest and wildlife habitat for the vast majority of species that evolved within the historic fire regimes. Fuel loadings would provide for adequate duff and coarse woody debris (CWD) to minimize soil exposure and maintenance of long term site productivity.

Wildlife Habitat

Stands of different sizes and ages will be dispersed across the landscape to provide a mixture of forage and sustainable security cover for big game. Motorized access is managed to provide reasonable access while providing areas of low disturbance for big game security habitat. Large diameter (greater than 20 inches) down woody debris and snags exist in densities to support reproductive populations of dependent species. Down woody material exists at levels providing for the needs of wildlife species dependent on this habitat component. OF is within the historic range of variation and is well connected to facilitate movement of wildlife species between distant OF patches. Unique and sensitive habitats occur in context with surrounding vegetation that allows for their use by associated wildlife species. Wildlife nests and den sites contain the structural and security characteristics necessary for successful reproduction and rearing of young to dispersal age.

D. Purpose and Need

The purpose of this project is to maintain and enhance forest resiliency to natural disturbance process, modify fire behavior potential, improve future fire management opportunities, improve firefighter and public safety, and protect natural resources at risk to elevated occurrence of insects, disease, and wildfires. The need for this project is tied to the altered vegetation and fuel conditions across the landscape resulting from decades of fire suppression and past forest management that has resulted in overstocked stand conditions, hazardous fuels build-up, and increased risk to firefighters.

The purpose and need represents the difference or “gap” between the area’s existing condition and its desired condition based on management direction in the WWNF Forest Plan (1990) as amended and the National Fire Plan (2005). This gap is described below.

Forest Resiliency and Health

In 2002, the Wallowa-Whitman Forest Leadership Team established a watershed restoration strategy with the overall goal to achieve Forest Plan direction and maintain or improve the baseline condition and health of all watersheds across the forest. The watershed restoration strategy was developed to assist in prioritization of restoration needs, aide in cumulative effects analyses, and display how projects improve or maintain baseline conditions over time.

The Prioritization of Watershed Restoration Process (POWR) is based upon the concept of “stressors and indicators.”

> **Stressors** are effectors that push the ecosystem to the outer limits of the Historical Range of Variability (HRV). Ecosystems with high stressor values are more likely to experience large-scale re-adjustments from uncharacteristic events or disturbances.
>
> **Indicators** are values that provide a relative indication of a watershed’s ability to maintain or restore viable populations of threatened, endangered or sensitive species. The indicators were chosen to represent a relative indication of watershed health. Low indicator values are often associated with a system that is under stress.

Four stressors represent the primary factors or processes affecting watersheds in the project area. The stressors include fire risk, forest insect and disease, roads, and noxious weed invasion. While other stressors exist, these four are considered the most influential at this time.

Four indicators were selected to evaluate ecosystem health including aquatic (fish habitat), vegetation (HRV and structural stage departure), terrestrial (TES species, old growth, big-game and road density), and watershed (water quality, stream channel characteristics, and soil hydrologic function).

The watershed rankings for Catherine Creek are applicable to the Sandbox project and are as follows:

Stressors	Indicators
Fire – Moderate	**Aquatics** – High
Insects and disease – Moderate	**Vegetation** – High
Roads – Moderate	**Terrestrial Wildlife Habitat** - High
Noxious weeds - Low	**Watershed** - High

The Sandbox analysis area has been harvested several times historically with the most recent harvests (early to mid 1990's) occuring as part of the Hazard Tree III, Middle Buck, Prong Salvage, Huckleberry, Collins Creek Blowdown, and Collins Creek Timber Sales. Currently, many past harvested stands exhibit overstocked conditions with low vigor due increased competition. Many stands that were not harvest during the 1990's are also overstocked and exhibit high fuel loadings due to effective fire suppression over several decades that has interrupted natural disturbance processes. Suppressed, overstocked stands are more susceptible to insect and disease attacks and higher levels of mortality increasing the hazardous fuels conditions. The project area is displaying signs of endemic populations of beetles and the potential exists for increased insect populations and tree mortality.

Old forest stand structure in the project area is currently 3 to 27% above the high end of the historic range of variation (HRV) percentages for multi-stratum (OFMS) structures for each vegetation group. Old forest single stratum (OFSS) is either completely deficit within the project area or 9-35% below the low end of the historic range of variation percentages for OFSS.

Desired Condition

Desired stand conditions include ecologically appropriate species compositions and structures that promote resilient stand conditions resistant to insect and disease infestations and likely continued occurrence of wildfires. Landscape conditions reflective of the historic range of variation for stand structure, composition, and fuel levels are the desired condition and focus for proposed activities.

There is a need to develop forest structures toward historic ranges, especially in the OFSS structure (Regional Forester Forest Plan Amendment #2). Structural stages in the Sandbox area are disproportionately at younger understory reinitiation stages or outside (above) the historic ranges in OFMS stands (particularly in dry vegetation groups) when compared to historic ranges due to fire exclusion, insect and disease activity, and past logging practices. The OFMS HRV range for dry vegetation groups is 5-15%; however, currently 45% of the stands in the project area are in this structure stage. Conversely, the OFSS HRV range for dry vegetation groups is 40-60% and only 5% of the project area is currently within this structure stage.

Landscapes that reflect the HRV generally provide connectivity and dispersal need of wildlife species associated with different structural stages including a distribution of late and old forest structures across the landscape.

Proposed restoration efforts would reduce the risk of fire, insects, and disease (Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin – ISAEM – p. 113) and meet the goals and objectives of the Wallowa-Whitman National Forest Plan as amended. Restoration would promote and maintain preferred seral species of western larch and ponderosa pine. These are fire tolerant species that have developed historically under frequently reoccurring ground fires. Post harvest prescribed burns should help to maintain the sustainability and diversity in the dry potential vegetation groups (PVG).

Fire Behavior

The Wallowa-Whitman National Forest (WWF) has one of the highest wildfire occurrence rates in Oregon and Washington. The fire occurrence rate for the Sandbox project area is 33 percent higher than the entire Wallowa-Whitman National Forest. There has been one large fire within the analysis

area in the past 40 years. The Mule Peak fire (1,400 acres) in 2005 was a high severity, stand-replacing event.

Past management actions (vegetation management and aggressive wildfire suppression) combined with insects and diseases (reference silvicultural existing condition report) within the project area have influenced existing fuel conditions. Fuel build-up is accumulating in the form of dead and down trees, small diameter trees growing into the overstory, and dense crown conditions. These conditions have increased the potential for a ground fire to transition into a crown fire. Heavy accumulations of surface fuels and/or crown fires increase the potential for spotting to occur (spotting occurs when sparks or embers are carried by convection columns and/or wind or gravity starting new fires beyond the main fire). With the current fire behavior potential the project area lacks defensible strategic (ridge tops, near ridge top roads) areas to initiate suppression operations, and effects of future fires are expected to be outside of the natural range associated with historic disturbance processes.

Desired Condition

The desired condition for this project area would be a mosaic of stand structures reflective of the vegetation structures and fuel loadings historically found when fires played a more frequent and natural role in the area. The desired fuels condition include a mixture of stands with moderate densities of understory conifers and ladder fuels intermixed with other stands exhibiting low densities of small conifers and other ladder fuels, lower canopy densities (less dead standing trees and live individual tree crown overlap), and increased distances from surface fuels to tree crowns. Surface fuels (small trees, shrubs, and dead and down vegetation) and overall canopy density would be a mosaic of open and closed crowns with surface fuel loadings ranging from 5 to 15 tons/acre across the project area. The desire would be to manage fuels such that fire starts in the area would generally exhibit ground fire behavior with occasional torching leading to reduced potential for a surface fire to transition into an active crown fire.

There is a need to reduce fuel loadings and reintroduce fire as a disturbance process within the area to achieve the desired condition. There is a need to reduce surface fuel loadings as well as ladder fuels and canopy bulk densities developed over the years in the absence of regular fire return intervals in the area. In addition, there is a need to establish strategic fuel breaks (along the 7700, 7787, 7787700 roads as well as ridge top treatments) that promote lower fire intensities with reduced flame lengths and rates of spread. Fuels treatments along strategic locations would help break up fuel continuity across the landscape and provide a defensible zone for suppression forces to safely use direct and indirect suppression tactics. Without management, fuels would continue to accumulate and be contiguous across the landscape limiting suppression opportunities.

Public Safety

Danger trees exist along all forest roads within the project area. A danger tree is a standing tree that presents a hazard to people due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem, limbs and the direction of the lean of the tree, which would allow that tree to reach the roadway if it fell (FSH 6709.11, Glossary).

The desired condition is to provide the public with a safe experience when traveling National Forest System roads. There is a need to provide for public safety (and comply with Regional Direction R6 supplement to FSM 7733) along the roads within the project area by the treating (falling/removal) of roadside danger trees throughout the project area.

Economics

In addition to the resource management needs above, the Forest Plan (page 4-3) also identifies a goal that National Forest System lands will provide wood fiber to satisfy National needs and benefit local economies consistent with multiple resource objectives, environmental constraints, and economic efficiency. The products and income generated by this project would contribute to family wage earners

and local industries, which in turn support other local businesses, hospitals, and services contributing to the overall economic vitality of the County and northeast Oregon community. The need to produce products and woody biomass from this project would not only support local industries, but, when added to the wood products being removed from other private and corporate lands, would contribute to the overall viability and sustainability of local industries and businesses.

There is also an opportunity to achieve fuel reduction objectives while meeting the demand for fuelwood within the communities near this project area. There is a need to explore fuelwood removal opportunities within the project area to meet this demand.

Watershed Health and Restoration

The Sandbox project area primarily lies within the Grande Ronde River subbasin which is part of the larger Snake River Basin, a tributary of the Columbia River basin. One of the primary reasons the Interior Columbia Basin Ecosystem Management Project (ICBEMP) was initiated was to develop management strategies using a comprehensive, “big picture” approach, and disclose interrelated actions and cumulative effects using scientific methods. With completion and release of the Integrated Scientific Assessment and the FEIS, new information became available which was considered during the development of this project.

The preferred alternative in the FEIS for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) identifies the Grande Ronde River as a High Restoration Priority subbasin for landscape, economic, tribal, and aquatic components.

The intent of landscape restoration is to re-pattern vegetation patches and succession/disturbance regimes and to restore watershed and streams to a condition more consistent with landform, climate, and biological and physical characteristics of the ecosystem. Restored ecosystems would be more resilient to disturbances, more predictable, and would provide the range of habitats needed by aquatic and terrestrial specials. Scarce habitats would be conserved in the short term while expanding these habitats through restoration in the long term.

Landscape restoration also includes Old Forest Habitat as a priority. The intent of restoration for these habitats is to focus on the vegetation cover types and structural stages that have declined substantially in geographic extent from the historical to the current period. Restoration would increase the geographic extent and connectivity of these source habitats and over time provide a framework for well-connected networks of source habitat for terrestrial species.

Aquatic restoration would reestablish watershed functions, processes, and structures, including natural diversity. The intent of management for watershed restoration would include: recognition of the variability of natural systems while securing existing habitats that support the strongest populations of wide-ranging aquatic species and the highest native diversity and integrity; extending favorable conditions into adjacent watersheds to create a larger or more contiguous network of suitable and productive habitats; and restoring hydrologic processes to ensure favorable water quality conditions for aquatic, riparian, and municipal uses.

The social-economic-tribal restoration component highlights areas where restoration activities directly influence human community economic, social, and cultural needs. Design and implementation of restoration activities should promote workforce participation, serve demands for commodity production at various levels, encourage intergovernmental collaboration, and consider tribal needs and interests.

E. Proposed Action

In order to meet the purpose and need the following actions are proposed for the Sandbox Vegetation Management project area. The proposed treatments are prescribed to address needs within the project area for the next 10+ years. For more detailed information and specifics related to the action alternatives carried

forward refer to Chapter Two of this document as well as the maps and tables for site-specific activities, locations and definitions in appendix B.

Fuels Reduction

The current vegetation/fuels profile in many of the stands within the Sandbox project area will require mechanical manipulation ahead of prescribed burning in order to restore and maintain vegetation and wildlife habitat diversity associated with historic fire regimes.

Fuels treatments proposed under this project are designed to move stands from their current structure and development trajectory to conditions more indicative of natural disturbance regimes under pre-Euro-American influences. Strategies for restoring forest structure and function include thinning live trees, and burning surface fuels to reduce the risk of severe crown fires. Objectives in all units include: reduce stand densities in overstocked stands, reduce fir encroachment in pine dominated stands, remove ladder fuels, create defensible fuel profile zones in strategically sound locations, return fire as a disturbance factor at the landscape level, and promote healthy fire resilient stands. This would be accomplished with 420 acres of non-commercial fuel reduction treatments (FFU), 5 acres of commercial fuels reduction treatments (HFU), and 7,465 acres of prescribed burning.

Timber Harvest

Commercial harvest treatments are proposed on approximately 2,106 acres in the Sandbox project area using commercial thinning, improvement, shelterwood, overstory removal, and patch opening prescriptions. These treatments are proposed to reduce stocking densities, remove diseased and poor growing trees, and promote stands with multi/single story large tree characteristics. An additional 125 acres would be precommercially thinned (PCT) to improve tree growth on desirable tree species selected for retention and long-term management. Commercial harvest removal would be accomplished with skyline (510 acres) and tractor (1,647 acres) yarding systems.

Mechanical treatment of slash (slashbusting, grapple piling) would be accomplished where needed to meet fuel loading objectives for all harvest treatment units, excluding skyline units in which hand treatment of slash would be utilized where needed. Harvest created slash within commercial treatments units would either be treated using a slash buster or grapple piling. Depending on the amount of slash generated, piling and burning slash piles may be required to address fuel accumulations. Pile burning would occur outside of riparian habitat no activity buffers.

Approximately 993 acres of treatment in old forest multi-strata (OFMS), is proposed for treatment to restore old forest single strata (OFSS) which is deficit and well below HRV within the project area, promote seral species, and emulate historic disturbance patterns.

There will be no net loss of Old Forest (OF), but a redistribution of some OFMS to OFSS old forest conditions and maintenance of remaining OFMS conditions. Proposed treatments would return 158 acres of OFMS to OFSS and 835 acres of treatments in OFMS would maintain the OFMS structure. An additional 214 acres of stands with OFSS structure would be treated to reduce fuel loadings and improved stand health and vigor while maintaining their structure resulting in no net loss of old forest.

Riparian Habitat Conservation Areas (RHCAs) –With the exception of hand thinning (i.e. use of chainsaws), PACFISH RHCA widths would be used as no activity stream buffers and incorporated into all mechanical treatments units. Minimum no-activity buffers for hand thinning would be 10 feet wide along both sides of (class IV) intermittent non-fish bearing stream channels and wetlands less than one acre; 30 feet wide along both sides of (class III) perennial non-fish bearing stream channels and wetlands greater than one acre; and 50 feet on both sides of (class I) perennial fish bearing streams. All slash would be piled and burned by hand, outside of no activity buffers. Piles would be placed to avoid damaging or killing overstory trees during burning operations.

Treatment within Buck Creek Campground and Trailhead would primarily be lodgepole thinning within the campground including removal of hazard/safety trees. Stumps will be flush cut within the campground. Thinned tree boles would be bucked into firewood lengths and stacked within the campground with the remainder of the slash (branches and needles) hand piled outside of the campground and burned.

Roadside hazard trees that present a hazard to people due to conditions such as, but not limited to, deterioration or physical damage to the root system, truck, stem, or limbs and the direction of the lean of the tree would allow that tree to reach the roadway if it fell. Roadside danger trees will be cut along all haul roads (approximately 15 trees/mi). If the trees are within no-activity RHCA buffers as described previously or needed to meet down wood requirements they will be cut and left on site. If they are outside of those areas or not required to be retained for other resource needs and are of commercial value, they may be removed with this timber sale.

Fuelwood removal along Roads 7700770, 7700772, 7700860, 7700900, 7700890, and 7700912 would be emphasized to the public for firewood gathering from May 1 – November 30 for a period of one year. Firewood gathering may occur within 300' of the roads listed above as described on the WWNF fuelwood gathering permit.

No new permanent road construction is proposed with this project. Temporary road construction is proposed to facilitate harvest systems. Temporary roads would be treated after use by implementing some or all of the following activities: installation of erosion control devices, ripping to reduce soil compaction, seeding, and camouflaging roads to discourage further use. Any road currently closed by gate or barricade to be re-opened and used to facilitate harvest/fuel reduction activities would be re-closed in the same manner at the conclusion of harvest activities within the units they access.

The following roads have been identified in the Forest Minimum Roads Analysis and confirmed by the District interdisciplinary team as creating resource damage and no longer needed for future management of the National Forest System lands within the Sandbox project area. The following lengths of these roads would be decommissioned either at the completion of this project or when funds come available.

Road 7700742 - 0.6 miles
Road 7700732 - 0.8 miles
Road 7700635 - 0.4 miles
Road 7700950 - 0.3 miles
Road 7700908 - 1.2 miles

F. Decisions to be Made

The District Ranger of the La Grande Ranger District is the official responsible for deciding the type and extent of management activities in the Sandbox analysis area. The responsible official can decide on several courses of action ranging from no action, to one of many possible combinations for treating the area, while deferring treatment of others.

The decision will also determine if the proposed action or alternatives to the proposed action might cause significant effects requiring analysis in an Environmental Impact Statement.

Decision points to be chosen from in this document include the following:

1. Determine whether to implement one of the action alternatives described in this document to meet the purpose and need of this proposal or to select the no action alternative and defer management activities described in this analysis.

2. Specific points to be decided under each of the alternatives include but are not limited to:

    - In which stands will management be initiated and to what intensity to achieve fuel reduction goals?

- In which stands and to what level should density and stand composition management be conducted to provide for long term vegetative health needs?
- What are the access needs (roads, trails, corridors) of the project area during and after project implementation?
- What type of logging system is suitable to the needs of the objective in this project?
- How much prescribed burning and what prescriptions should be re-introduced into the project area?
- Should vegetation be managed in areas where it is not economically feasible?
- Should management activities occur within riparian habitat conservation areas?
- Should roads be decommissioned which are no longer needed for access for management of natural resources?
- Should firewood areas be established within this project area?
- Should stand treatments occur in campgrounds and at trailheads?

G. Project Area Description

The Sandbox project area encompasses approximately 16,134 acres primarily of the Upper Catherine Creek watershed in the Grand Ronde River subbasin in the geographical province of the Blue Mountains, including sections within T.5 and 6S, R.41 and 42E, Willamette Meridian. The Sandbox analysis area (refer to Vicinity Map) consists primarily of the National Forest system lands beginning at Catherine Creek Summit, following the 7700900 road east, heading north at Scout Creek to FS road 7785 (North Fork Catherine Creek), east on FS road 7787 (Buck Creek), continuing toward the Buck Creek campground, then heading southeasterly toward Taylor Green, turning west following the ridge top just south of FS road 7700, continuing toward Highway 203 (Catherine Creek Summit).

Forest Plan Management Direction

This environmental assessment is tiered to the Final Environmental Impact Statement (FEIS) for the Wallowa-Whitman National Forest Land and Resource Management Plan, as amended. Major plan amendments relevant to this project include:

- *EA on Continuation of the Interim Management Direction Establishing Riparian, Ecosystem, and wildlife Standards for Timber Sales, as signed on May 20, 1994,* which provides additional standards and guidelines (USDA, 1994, and commonly known as the Screens);
- *Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California*, as signed in 1995, which provides additional standards and guidelines (USDA, 1995, and commonly known as PACFISH). Refer to guidelines described on page 42 of the EA for specific PACFISH direction.

The Forest Plan, as amended, includes management goals and objectives and standards and guidelines, both forest-wide and specific to land allocations.

The project area is allocated under the Wallowa-Whitman National Forest Plan and its Environmental Impact Statements (as amended) to the following management areas (refer to map in Appendix C). All applicable management direction specific to the following management areas apply to this project area:

MA1 – (14,175 acres). Emphasizes wood fiber production on suitable timberlands while providing relatively high levels of forage and recreational opportunities.

MA3 – (1,408 acres). These management areas provide a broad array of forest uses and outputs with emphasis on timber production. However, timber management is designed to provide near-optimum cover and forage conditions on big game winter ranges.

MA15 – (551 acres). These areas are intended to maintain habitat diversity, preserve aesthetic values, and to provide old growth habitat for wildlife. Evidence of human activities may be present

but does not significantly alter the other characteristics and would be a subordinate factor in a description of such a stand.

H. Key Issues

This section identifies the issues and concerns associated with the proposed action. The interdisciplinary team of Forest Service resource specialists developed this list of issues and concerns with input from public scoping. *Specific issues brought up by the public can be found in italics in the key issues and other issues sections below*. The issues and concerns are the basis for subsequent steps of the analysis in formulating alternatives or developing constraints and mitigation measures.

Issues

Key issues were identified and subsequently used to develop a range of alternatives. The following section describes the key issues identified for this analysis and the key indicators used to evaluate each key issue.

Issue: Improvement of Long Term Forest Health Conditions

Past management activities and exclusion of fire has led to an increase in stocking levels, fuel loadings, and dense understories. Overstocking, insects, and disease are threatening the health and vigor of many stands within the project area. Stands are not growing to their site potential and if left untreated in the proposed action, stand development could remain stagnated and increase the risk for further loss from insect mortality and wildfire.

Forested stands within the project area can be classified by the following biophysical environments: Moist Upland, Dry Upland, and Cold Upland.

Moist Upland Forests are the most productive in the Blue Mountains and occupy approximately 9,577 acres of the project area. The degree of damage from insects is variable and depends upon factors such as species composition, tree size, tree vigor and occurrence of root/bole decays. Existing condition in these stands are a mix of species of all sizes. The forest vegetation database (EVG) indicates that there are approximately 6,355 acres with overstocked conditions, poor live crown ratios and/or poor understory stocking within the project area. Of the areas evaluated on the ground, nearly 50 percent were confirmed as overstocked. The structural stages in this biophysical group in the project area are dominated by multi-storied old forest (30%) and understory re-initiation (46%). Stand ages are between 64 years and 326 years and average 150 years old.

Dry Upland Forests are low to moderate in productivity and occupy approximately 4,640 acres of the project area. Past activities and fire exclusion have led to an increase in stocking, fuel loadings and understory components of these stands. Historically, many of these stands were dominated by shade intolerant species maintained by fire. Dwarf mistletoes exist in some stands and spread is likely to continue. The forest vegetation database (EVG) indicates that there are approximately 1,691 acres with overstocked conditions, poor live crown ratios and/or poor understory stocking within the project area. Of the areas evaluated on the ground, nearly 78 percent were confirmed as overstocked. The structural stages in this group consist mostly of multi-storied old forest and understory re-initiation. Stand ages are between 71 years and 251 years and average 149 years for the dominant stand layer. Natural disturbance regimes would have created stands dominated by large diameter seral species with scattered groups of seedling and saplings in the understory.

The Sandbox area Mountain Pine Beetle, Ips Beetle, and Western Pine Beetle, Douglas-Fir Beetle, Fir Engraver, and Balsam Wooly Adgelid populations are generally at endemic levels; however, populations have shown an increase in recent years with many stands showing pockets of mortality and recent attacks. The degree of damage from insects is variable and depends upon factors such

as species composition, tree size, tree vigor, and occurrence of root/bole decays. Overstocked stand conditions increase the risk of further insect and disease activity. A full analysis of the implications of insect epidemics, drought and past management activities can be found in "Blue Mountains, Forest Health Report: New Perspectives in Forest Health" (1991).

Public feedback from the Proposed Action varied from support of commercial timber harvest within the area as a tool to meet project objectives to support of thinning only prescriptions with diameter limits and prioritizing treatment of dense young stands over medium and large trees. A forest that is self-sustaining in terms of ecosystem function would contribute to reducing the global climate changes now being experienced. One commenter suggested that thinning be confined to areas accessible by existing roads. Several commenters questioned the use of regeneration prescriptions in this project area and whether they made sense in terms of the ecological restoration due to the removal of large tree structure in an area where it is in short supply.

Key Indicators:

- Percent of overstocked stands treated within the project area
- Acres of overstocked stands treated within the project area

Issue: Old Growth

Old Forest Single-storied (OFSS) structural conditions, particularly in the dry vegetation types, is underrepresented in the project area for old-growth associated species.

The Sandbox project area is deficient in OFSS and below the historic range of variability (HRV) for this type of structure in all biophysical environments. Analysis of the project area shows that some of the multi-stratum old forest (OFMS) areas are in biophysical environments that should be or were historically OFSS. While there is an opportunity to treat these areas and restore OFSS conditions, there is concern associated with the treatment of any old growth in the proposed action.

An analysis of the historical range of variability (HRV) was done to assess how current forest conditions compared to what ecologists believe existed during the pre-settlement era (Sandbox Analysis File). The Sandbox project area was used as the landscape scale to determine the amount and distribution of old forest habitat. This is an appropriate scale to analyze HRV and is meaningful in terms of landscape patterns as they relate to the distribution of wildlife habitat. HRV is important to wildlife populations because the distribution, quality and quantity of habitat largely determine the potential for a wildlife species to exist at viable levels. As habitat was converted, fragmented, and opened to motorized access, many species were reduced in number and others were precluded from portions of their geographic range altogether. The following table compares existing old growth acres to the HRV in the project area.

Table 1.1 - Comparison of existing old forest to HRV by potential vegetation group (PVG) in the Sandbox project area

PVG	Existing Acres	% of PVG	Historical Range %
Old Forest Multi Stratum (OFMS)			
Moist upland	2,906	30%	15-20%
Dry upland	2,083	45%	5-15%
Cold upland	124	32%	10-25%
Old Forest Single Stratum (OFSS)			
Moist upland	152	2%	10-20%
Dry upland	229	5%	40-60%
Cold upland	0	0	5-20%

The table above illustrates large deficiencies in OFSS for moist, dry, and cold upland sites. OFMS levels are above HRV in all potential vegetation groups. The greatest opportunities to move stands toward OFSS structure exist in dry and moist upland sites that are currently classified as OFMS. There are 551 acres of dedicated old growth areas (MA 15) in the project area, none of which is proposed for treatment.

Some of the public input on the Proposed Action related to Old Forest did not support the restoration of OFMS to OFSS with commercial harvest because they felt that this action was not meeting the intent of the Eastside Screens and that all trees with old growth characteristics should be retained regardless of their diameter. They also indicated that treatments should be focused on ecologically appropriate dry plant association group forests and not in moist old forests which they state are not outside of their historical pre-fire suppression conditions. They advocated for the reintroduction of variable severity fire to the area. Other public input supported the treatment within these stand structures, including the removal of trees with a dbh greater than 21 inches and felt that this treatment was appropriate.

Key Indicators:

- Acres of OFMS restored to OFSS

Issue: Fire Behavior

The Sandbox project area is outside of the historic fire return intervals and could experience higher risk to loss from wildfire, and is experiencing continued condition class changes resulting in further departure from their historic ranges in many frequent fire regimes. The project area is immediately adjacent to inventoried roadless areas and the Eagle Cap Wilderness and at risk to fired coming out of or going into the Wilderness area. Mechanical treatment of fuels in the proposed action raises the concern over the potential for short-term increases in fuel loadings/fire hazard due to logging slash and the drying effects of increased light reaching the forest floor in treated stands.

Fire exclusion policies since the turn of the century have resulted in vegetation changes including changes if forest structures and compositions as well as fuel levels. High surface fuel loadings due to past stand mortality and fir encroachment into historically pine-dominated stands increase the likelihood of uncharacteristic wildfire. As densities increase, surface and ladder fuels increase, increasing the probability of high intensity fires (W-W Land and Resource Management Plan, 1990).

Historically, fire was a dominant disturbance process in the Blue Mountains. Low intensity fires crept through the drier forests and grasslands every 7 to 35 years. Moister sites generally experienced fire every 40 to 150 years. The results were a mosaic of vegetation patterns resulting from a combination of hot, intense fires, and light surface fires. While there is little historic data of what fuel levels were in the Blue Mountains, it is evident that fuel levels were lower and maintained by fire as a natural disturbance process. Fire regimes are a predicted frequency cycle for fire return intervals within a particular vegetation profile and described in the table below.

Table 1.2 – Fire Regime Groups with Historical Fire Return Intervals

Fire Regime Group	Vegetation Types	Frequency (Fire Return Interval)	Representative Potential Natural Vegetation Group (PNGV)	Severity
1	All ponderosa pine types; Dry-Douglas fir/ pine grass; and grand fir/pine grass.	0 – 35 years	(PPDF1) Ponderosa pine Douglas-fir Inland Northwest	Low severity
2	True grasslands	0 – 35 yrs	(MGRA1) Mountain Grassland	Stand replacing, high severity
3	Mixed Conifer	35 – 200+ yrs	(GFDF) Grand fir – Douglas-fir	Mixed severity
4	Lodgepole pine, western larch, spruce	35 – 200+ yrs	(SPFI5) Interior West Lower Subalpine Forest	Stand replacing, high severity
5	Wet meadows, discontinuous grass scabs on ridge tops	Greater than 200 years	(RIPA) Riparian	Mixed severity

Fuel conditions are an important factor in wildland fire behavior. Heavy fuels, lying under a dense canopy of tree crowns, create optimum conditions for stand replacement fire events, and further change in forest conditions including likely loss of old forest. Higher levels (over 10 tons per acre) of 0-3" fuels increase the potential for intense, high severity fire behavior.

The following tables display acres for each of the condition classes found in the Sandbox Analysis area by fire regime and the percent of the total acres rated as fire regime 1-5..

Table 1.3 – Condition Class Acres by Fire Regime Group

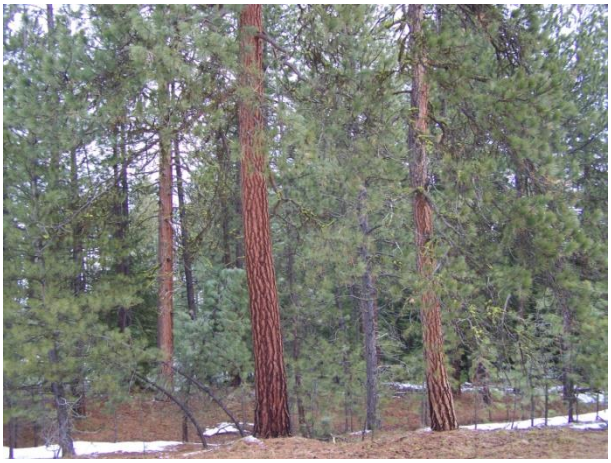
Sandbox Project Area Fire Regime and Condition Class				
Fire Regime	Condition Class 1 (acres)	Condition Class 2 (acres)	Condition Class 3 (acres)	Fire Regime Total (acres)
I	11	320	3,570	3,901
II	0	964	0	964
III	9	1,181	7,824	9,014
IV	928	89	595	1,612
V	17	0	0	17
Condition Class Total	965	2,554	11,989	15,508
Percent (%)	6%	17%	77%	100%

*Fire Regime 0 represents 85 acres, and 256 acres of Private and BLM lands, and 267 scattered acres which have no fire regime or condition class rating.

Table 1.4 – Condition Class Descriptions

Condition Class	Description
1	Fire regimes are within or near historical ranges, and the risk of losing key ecosystem components is low. Vegetation conditions in terms of species composition and structural stage are intact and functioning within the historical range.
2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more interval returns (increased or decreased). This results in moderate changes to one or more of the following: Fire size, Intensity and Severity, and Landscape patterns. Vegetation conditions in terms of species composition and structural stage have been moderately altered from historical conditions.
3	Fire regimes have significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: Fire size, Intensity and Severity, and Landscape patterns. Vegetation conditions in terms of species composition and structural stage have been significantly altered from historical conditions.

Example of Fire Regime 3, Condition Class 3



Example of Fire Regime 1, Condition Class 3

Current Condition classes represented within the Sandbox project area are the result of both natural and human activities. The project area overall has a deficit in late and old structure; and a surplus of Stand Initiation (SI) and Understory Re-initiation (UR). Past timber harvest activities and fire exclusion have contributed to these conditions. Approximately 85% of the project area is within condition classes 2 or 3 (moderate to high departure from their historic ranges). High and moderate departures for the project area are primarily experienced in fire regime groups 1-3, with a stand structural stage of under story re-initiation. These are generally overstocked, have a ladder fuel component of shade tolerant fir, and /or have heavy concentrations of standing dead and down fuels.

High and moderate departures are also common in stand initiation structural stage in fire regimes 1 and 3. Within the next 10 to 15 years these stands are at risk of developing into a suppressed condition with a higher risk to insects, disease, and stand replacing fire due to high levels of crown bulk densities.

Feedback on the Proposed Action indicated support for the use of prescribed fire, especially in fire adapted ecosystems. There was also support for the use of mechanical fuels reduction (timber harvest) as a pre-treatment or fuels reduction treatment when the treatment focuses on areas accessible from existing roads. One commenter asked that mechanical treatment be considered at all times before burning, because industry could use the fiber. Another commenter suggested that fuel reduction focus on the removal of small diameter trees using a diameter limit and retaining overstory. There was concern over the potential to increase fuel hazards in the area from logging slash and drying of the site from increased exposure to sun and wind. The effectiveness of thinning as a fuels reduction tool was supported by one commenter in warm/dry biophysical environments, but the same commenter questioned thinning in cool/dry biophysical environments because it cannot emulate the mosaic pattern of this fire regime. Comments were also received advocating for the treatment of riparian areas in order to reduce fuel loadings and protect these sensitive areas in the event of a wildfire.

Key Indicators:

- Fire Regime Departure - Number of acres treated within fire regimes one or three that are in a condition class two or three
- Changes in Fire Behavior Potential – measured in crown fire potential (torching and crowning index), fire type (Crown or Surface), fire intensity (flame length in feet), and Rate of Fire spread (chains per hour).

Issue: Economics

There is a concern over the cost efficiency of timber harvest to achieve management goals while protecting resource values.

One of the goals of the Wallowa-Whitman Forest Plan is to provide for the production of wood products to satisfy National needs and benefit local economies consistent with natural resource objectives, environmental constraints, and economic efficiency. There is an opportunity through project design of the Sandbox project to meet the purpose and need within the project area and produce an efficient timber sale offering that will benefit local economies.

Factors which relate to cost efficiency include silvicultural prescriptions, stands selected for treatment, size of harvest units, size of material to be removed and degree of merchantability, miles of road needed in relation to selected stands, yarding systems, and fuel treatment measures. All these factors have the potential to increase the cost involved with accomplishing management in this area.

To meet the projects need for desired stand health, structure, and reduced fuel loadings the treatments often call for removal of low value, low volume, small diameter materials. The costs associated with removing smaller diameter live trees can be quite high while the economic return is low, this could possibly produce a deficit or marginal timber sale offering.

Principal industries in Union County are agriculture, lumber, and education (Oregon Employment Department) with the largest employers being crop production and Boise Cascade. Although products from this proposed project alone would not support the local mills, these products could contribute to the overall wood products supply being produced from other private and corporate lands. In conjunction with these other supplies of wood products, material harvested as part of this project would contribute to the overall viability and sustainability of local mills and businesses.

Public comments on scoping for the proposed action questioned if the scale of the project is appropriate because if a larger landscape were considered or more acres treated the project might have a better potential to be economically viable by reducing planning unit costs. They also supported having this project provide wood products and jobs to this distressed area as a goal for the project.

Key indicators:

- Predicted High Bid in dollars/CCF
- Present Net Worth in dollars
- Number of Jobs

H. Other Issues

Some issues, concerns, and opportunities raised during the scoping process were not considered to be significant in relation to the proposed action. They are, however, considered important in achieving the goals and objectives of the proposed action and in meeting the intent of its purpose and need and are covered in this section.

One commenter raised concern over how the Forest Travel Management Plan (TMP) project will affect the timeline of this project. Because the TMP project is currently on hold it will not impact the timelines for the completion of the planning on this project.

Unless otherwise noted in the following narratives, the issues, concerns, and opportunities outlined below will

be addressed in Chapter II, under Management Direction Common to All Action Alternatives, Management Requirements, Constraints, and Mitigation Measures, and/or in management direction for each action alternative. Potential environmental consequences will be disclosed in Chapter III. In general, all issues brought up during scoping for this project were covered as described above.

1. Indian Treaty Rights and Trust Responsibilities

The Forest Service manages ceded tribal lands under trust responsibilities as described in tribal treaties. Forest Service policy includes the establishment and maintenance of government-to-government relationships with the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) for the purpose of building stable, long-term relationships, which result in positive, mutually understood, and beneficial solutions to common situations.

Consultation between the La Grande Ranger District and the CTUIR Tribe for this project has occurred and is on-going coordination in an effort to maintain the trust responsibilities established through public law and treaties and provide for mutual understanding of resource management objectives.

2. Water Quality and Fisheries

The Sandbox project area is located in three watersheds and seven subwatersheds. The Big Creek and Eagle Creek Watersheds are in the Powder River subbasin and the Upper Catherine Creek Watershed is in the Grande Ronde River subbasin. The Middle Big Creek, Upper Big Creek, Beagle Creek, and West Eagle Creek subwatersheds have few project acres compared to the size of the subwatershed. The Middle Big Creek, Upper Big Creek, and West Eagle Creek portions of subwatersheds within the project area do not contain any stream channels or associated RHCAs. The portion of the Beagle Creek subwatershed within the project area includes one Class III stream (perennial non-fishbearing) approximately 1.1 miles in length. Approximately five percent of the Beagle Creek subwatershed is in the project area. Therefore the existing condition at the subwatershed scale will not be included for the above subwatersheds.

Stream surveys have been completed on Buck Creek, Bottle Creek, Collins Creek, Corral Creek, North Fork Catherine Creek, Pole Creek, South Fork Catherine Creek, Prong Creek, Sand Pass Creek, and Buck Creek. Scout Creek is in the Catherine Creek-Milk Creek subwatershed, and the North Fork of Catherine Creek and Buck Creek are in the North Fork of Catherine Creek subwatershed. All other Class I streams are in the South Fork Catherine Creek subwatershed. No fish habitat surveys have been conducted on Camp Creek, a tributary to the South Fork of Catherine Creek. Camp Creek is fishbearing for an approximate 0.2 miles.

Instream Habitat – All of the surveyed streams are below the Riparian Management Objective (RMO) for pools/mile. Of the 10 streams surveyed within the project area, two (Pole Creek and Sand Pass Creek) met the PACFISH width to depth ratio of <10. The width to depth ratios for the remaining eight streams surveyed within the project area exceeded the PACFISH width to depth ratio of <10. However, the width to depth ratios for these eight streams is within the expected range of Rosgen stream types (Rosgen, 1996).

All streams monitored exceeded the temperature standard for bull trout spawning and rearing in all years monitored. Collins Creek and upper South Fork of Catherine Creek (at Pole Creek) came close to meeting the temperature standard in 2008 and 2010. No stream temperature monitoring has been conducted in Scout Creek, Bottle Creek, Camp Creek, Corral Creek, Sand Pass Creek, Buck Creek or streams in the Beagle Creek subwatershed.

Seven of the 10 streams with fish habitat surveys have high percentages of streambank stability ranging from 89% to 100% stable streambanks. Seven of the 10 streams surveyed within the project area exceeded the standard of > 20 pieces of large wood per mile. Three streams, Buck Creek, North Fork of Catherine Creek, and Scout Creek had less than 20 pieces of large wood per mile.

Water Quality - The Oregon Department of Environmental Quality (ODEQ) water quality standards for temperature are based on the maximum 7-day running average. Temperature standards were developed based on temperature requirements of salmonids during different seasons and life stages. There are two standards applicable to streams within the Sandbox project area. In the North Fork Catherine Creek, South Fork Catherine Creek, and Catherine Creek-Milk Creek subwatersheds water bodies must not be warmer than 53.6°F for bull trout spawning and rearing. The temperature standard for Beagle Creek subwatershed is that water bodies must not be warmer than 68.0°F.

A TMDL Water Quality Management Plan (WQMP) has been developed for the Upper Grande Ronde Subbasin, and was approved By EPA in May of 2000. With the approval of a TMDL the ODEQ 303 (d) list no longer applies. Once the TMDL is developed and approved all management activities on federal lands managed by the USDA Forest Service will continue to follow standards and guidelines (S&Gs) as listed in PACFISH, the Wallowa-Whitman N.F. Forest Plan, and Best Management Practices (BMPs) as defined in the Implementation Plan for 208 (Water Pollution Control Act, PL 92-500, as amended). Additionally, specific SMU Constraints and Mitigation Measures are identified in the Wallowa-Whitman Watershed Management Handbook, which is used when various situations are encountered during project layout.

Powder River Subbasin (Beagle Creek Subwatershed) **-** The ODEQ assigns specific standards for water quality parameters based on beneficial uses. Water bodies that do not meet State standards are generally listed as water quality-limited streams under section 303(d) of the Clean Water Act. There are no streams listed on the ODEQ 303 (d) list as water quality limited in the Beagle Creek subwatershed. A TMDL Water Quality Management Plan (WQMP) is in the process of being developed for the Powder Basin.

Roads provide a substantial source of sediment and a mechanism for delivering sediment to the stream systems. The amount varies by density, location and condition of roads. There are approximately 31.1 miles of open and closed roads within RHCAs and 227 stream crossings in the project area. This includes Class I (fish bearing), Class III (perennial non-fishbearing), and Class IV streams (intermittent non-fishbearing). Closed roads consist of 18.2 miles of the 31.1 miles of open and closed roads in RHCAs. There are 1.1 miles of foot trail within RHCAs and 0.2 miles of motorized trails within RHCAs in the project area.

The Milk-Catherine Creek subwatershed has an open road density of 1.3 miles per square mile (mi/sq.mi) of subwatershed, and total (open and closed) road density of 2.5 miles per square mile of subwatershed. The North Fork of Catherine Creek subwatershed has total road density of 1.8 mi/sq.mi and 0.7 mi/sq.mi while the South Fork of Catherine Creek subwatershed has 2.7 mi/sq.mi total road density and 1.3 mi/sq.mi of open road density. *Temporary road construction was identified in the public comments as a concern for water quality and resource protection.*

Fisheries - There is approximately 18.6 miles of fish bearing stream within the project area. Fish bearing streams in the project area are within the Milk Creek-Catherine Creek, North Fork Catherine Creek, and South Fork Catherine Creek subwatersheds.

Fish species and designated critical habitat within the project area include spawning and rearing habitat and Designated Critical Habitat for Snake River summer steelhead (*Oncorhynchus mykiss*), listed as threatened on August 11, 1997; spawning and rearing habitat and Designated Critical Habitat for Snake River Basin spring Chinook salmon (*O. tshawytscha*), listed as threatened on May 22, 1992; spawning and rearing habitat and Designated Critical Habitat for Columbia River Basin bull trout (*Salvelinus confluentus*), listed as threatened on June 10, 1998; and spawning and rearing habitat for redband trout (*O. mykiss gibbsi*), which are on the Regional Forester's Sensitive Species List. The Service issued a Final rule for bull trout critical habitat for the coterminous United States on October 18, 2010.

There are five culverts within the project area that are partial or complete barriers to the upstream migration of fish. The culverts are located on Buck Creek, Corral Creek (three culverts), and Bottle Creek. The three culverts on Corral Creek will be removed under the future Corral Creek Road Relocation Project. With the relocation of the 7700620 road, currently located adjacent to Corral Creek,

the three culverts would no longer be needed and the removal of the culverts would restore fish passage throughout Corral Creek.

This project would be designed in such a way that there will be a very low probability that there will be an adverse effect on fish species in the project area. In particular project design features would ensure there are no measurable increases in stream sediment delivery in this subwatershed and efforts will be made to reduce the existing sources of non-natural sediment. Large woody material would be retained in all stream channels. New roads that cross-streams or enter RHCAs should not be constructed unless absolutely necessary.

Several public commenters recommended the use of buffers to protect the streams and large wood while others advocated for treatment within RHCAs.

3. Soil Quality and Productivity

Many of the proposed mechanical treatment units were previously logged utilizing both rubber tired and tracked skidders. However, if compaction was present in units following harvest, most evidence (plated surface soils) has been ameliorated by freeze thaw processes and the established root systems of pine grass, arnica, various clovers, yarrow, woods strawberry, huckleberry, snowberry, and conifers. The entire project area displays very little evidence of extensive rutting or compaction. There are isolated areas of concern where rutting of existing roads occurs near springs or seasonally wet areas.

Surveys within each stand proposed for treatment in the Sandbox project area indicate that all of the units are below the 20% detrimental soil condition (DSC) threshold set in the Forest Plan. In the Sandbox project area harvest and fire have been the main forms of disturbance. However, very few areas display evidence of detrimental soil conditions. Harvest units currently exhibit minor evidence of DSCs (≈ 6%). DSCs in all units are below the 20% affected-area threshold as required by Region and Forest Plan standards and project design features will keep DSC below 20%.

4. Air Quality and Smoke Management

The Sandbox project area is located near the following smoke sensitive communities/areas: Union, Cove, the Baker Valley, and the Eagle Cap Wilderness (Class I Airshed). The concern is to maintain air quality within the National Ambient Air Quality standards (NAAQs). All smoke generating activities will need to fully comply with the Clean Air Act (Public Law 95-95).

Prescribed burning would be carefully coordinated with Oregon Smoke Management to prevent smoke related problems.

5. Invasive Species

The area has existing invasive plant infestations that would either be treated or avoided during project implementation to avoid their spread or introduction.

The Pacific Northwest Region Invasive Plant Program Record of Decision (ROD) (USDA 2005) and the Wallowa-Whitman National Forest Invasive Plants Treatment Program ROD (USDA 2010) mandate prevention and management of non-native species under all planning efforts.

There are 31 known noxious weed locations for 8 noxious weed species within the Sandbox planning area. Diffuse knapweed, spotted knapweed, Canada thistle, whitetop, Nodding plumeless thistle, gypsyflower, stinking willie, and Scotch cottonthistle are the weed species represented within these infestations (refer to the GIS Noxious Weed layer for locations). These species are rated as high priority weeds because they are invasive, persistent, and prolific reproducers. They displace desirable vegetation, and presently occur in infestations at scales that are feasible to treat. Project design and activities would take these populations into consideration to ensure that they are not spread further throughout the project area. *Public comments supported proactive steps to avoid the spread of noxious weeds.*

6. Range and Livestock Management

The boundaries for the Sandbox project include portions of the Big Creek, Pole Creek, Catherine Creek and Frazier Mountain allotment on the La Grande Ranger District. There are fewer than 12 total acres of the Frazier Mountain and Catherine Creek allotments in the project area. It is important that activities associated with this project do not impact pasture rotations or compromise the integrity of range improvements necessary for management of rangeland resources on the allotments. Improvements and trails would be restored to their original condition to facilitate movement of livestock within the pastures, gates would be closed, and problems coordinated with the Rangeland Managers to ensure immediate resolution.

Public comments indicated that impacts from grazing must be analyzed as a part of the cumulative effects from this project on natural resources.

7. Cultural Resources

Public law requires federal agencies to identify and protect natural, cultural, historical, and archeological resources and sites and to consult with interested parties on the effect of proposed actions.

Cultural sites located within and adjacent to the analysis area would be protected throughout project implementation to prevent damage to these resources.

Specific mitigation measures designed to protect the culture resources are discussed in more detail in chapter two and three of this document.

8. Management Indicator Species (MIS) and Proposed, Endangered, Threatened, and Sensitive Species (PETS) - Wildlife and Plants

The management indicator species (MIS) of the Wallowa-Whitman National Forest and the habitat or habitat component that they represent are shown in the table below. All the species in this table are known or suspected to inhabit the analysis area or in areas adjacent to the project area.

Table 1.5 - Management Indicator Species.

Species	Habitat
Pileated woodpecker (*Dryocopus pileatus*)	Old growth and mature forests
Primary cavity excavators *	Snags
Northern goshawk (*Accipiter gentiles*)	Old growth and mature forest
Rocky Mountain elk (*Cervus elaphus*)	Cover/forage
American marten (*Martes americana*)	Old growth and mature forest

*Northern flicker; black-backed, downy, hairy, Lewis', three-toed, and white-headed woodpeckers; red-naped and Williamson's sapsuckers; black-capped, and mountain chickadees; and pygmy, red-breasted, and white-breasted nuthatches

Management indicator species (MIS) serve as indicators of the effects of management activities by representing a broad range of other indigenous wildlife species. The management indicator species that may be impacted by this project include: the primary cavity excavators (including pileated woodpecker), elk, American marten, Rocky mountain elk, and northern goshawk.

The Sandbox project area contains source habitat for pileated woodpeckers, northern goshawks, elk, and American marten. Calling surveys were conducted specifically for northern goshawk and pileated woodpecker within the project area. No goshawk or pileated nests were found during field surveys conducted in the project area. Surveys conducted for American marten did not result in any sightings within the project area.

Public comments indicated a desire to have this analysis take a hard look at viability of MIS species within the project area and to protect marten habitat.

PETS species and their habitat would be considered and protected during all proposed activities. Suitable habitat and wildlife PETS species known or suspected to occur within or immediately adjacent to the analysis area have been identified in the Sandbox Biological Evaluation and Biological Assessment documents in the analysis file.

Sensitive plant species are known to occur within the analysis area. A list of these plants and their location is provided in the Botany report, residing in the project analysis file. Project design and monitoring criteria would provide for protection of known sites. No known location or habitat for any Threatened or Endangered plant species exists within the project area. There is habitat and potential for the occurrence of R-6 Sensitive plant species within the project area. Surveys have been conducted at the appropriate time of year to determine species occurrence within the project area.

9. Prescribed Burning and Big Game/Migratory Birds

Experience on the district indicates the greatest potential for impacting new born calves and deer fawns occurs during post sale slash treatment activities in the spring season. Calving and fawning typically occurs in elevations less than 4,000 feet, areas of low disturbance, gentle topography, and near water sources. The majority of calves and fawns are born between May 15 and June 15.

In 1990, the National Fish and Wildlife Foundation proposed an initiative for the conservation of migratory land birds that breed in North America and winter in neotropical countries. Recent analyses of local and regional bird population counts, radar migration data, and capture data from banding stations show that forest-dwelling bird species, many of which are neotropical migrants, have experienced population declines in many areas of North America (Finch 1991). Factors contributing to population declines include forest fragmentation on the breeding grounds, deforestation of wintering habitats, pesticide poisoning, or the cumulative effects of habitat changes.

Specific mitigation measures designed to protect Big Game/Migratory Birds are discussed in more detail in chapter two and three of this document.

10. Access and Travel Management (A&TM)

The road system in the Sandbox analysis area is now serving two major users. The most frequent use of the road system is for recreational purposes including firewood gathering. Another major road user of the Sandbox analysis area is by resource managers and their project personnel monitoring and carrying out activities associated with resource management. The La Grande District has a District Access and Travel Management Plan (A&TM) which is a reflection of previous decisions focused on managing a road network appropriate for access and upkeep on the District and maintaining forest road densities to within Forest Plan guidelines. Access and travel management implementation has been on-going over the years within the Sandbox project area. Monitoring indicates that some of the closures have not been completely effective due the method of closure, topography and the location of the closure device, however, the overall plan for the area is appropriate.

The project area includes very small portions (0.3 to 2.5 acres) of the Middle Big Creek, Upper Big Creek, and West Eagle Creek subwatershed. Therefore, this portion of the project area was considered by the ID Team; however, because the existing road management plan is appropriate and no new road construction is proposed within these areas, these subwatersheds were removed from the calculations and will not be analyzed further in this EA for access management.

Due to the location of the project area boundary, the Beagle Creek subwatershed portion is just over one acre in size and the MA3 portions of the Milk Creek-Catherine Creek subwatersheds, North Fork and South Fork Catherine Creek subwatersheds are near to or less than one acre in size. Because these

portions of these subwatersheds result in a very small number of acres being analyzed within each management area which results in skewed road densities due to the inappropriate scale of the analysis area for an evaluation of this type resulting in figures which do not provide useful information (WWNF Forest Plan, page 4-35).

Transportation system management is important because in addition to big game disturbance, roads can be a source of sediment, intercept groundwater flow, increase the drainage network, reduce large shade-producing trees, and confine stream channels preventing lateral stream movement.

Project activities would be directed to maintain the planned road density levels, improve closures where possible, address watershed/aquatic habitat concerns and not exceed road density level guidelines established by the Forest Plan. *One commenter requested that only the highest priority roads for resource protection be decommissioned while using barricades on lower priority roads to provide for future management needs. Another commenter asked that no roads be closed with this project.*

Table 1.6 – Forest Plan Open Road Densities

SWS	Management Areas	Project Area (sq. mi)	Open Road Density (mi./sq. mi.)	Forest Plan Road Density Guideline
Beagle Creek	1 3	372 343	5.19 1.08	2.5 1.5
Milk Creek- Catherine Creek	1 3	1,498 1	3.38 6.57	2.5 1.5
North Fork Catherine Creek	1 3 15	2,757 844 8	2.15 1.33 0	2.5 1.5 N/A
South Fork Catherine Creek	1 3 15	9,543 219 543	2.24 0 0.46	2.5 1.5 N/A

11. Safety

Standing dead trees near areas of concentrated public use, such as recreation sites or main traveled roads, represent a public safety hazard. Log haul on high recreation use roads could create conflicts with public users and a potential safety hazard.

Specific safety measures designed to protect the public are discussed in more detail in chapter two and three of this document.

12. Recreation and Scenery

Recreation is an important activity within the Sandbox project area and is primarily focused on day trip activities such as snowmobile riding, cross-country skiing, firewood gathering, hiking, hunting, mushroom and huckleberry picking during the summer months. Access to several developed campgrounds is provided by the roads within the project area. The highest use in this area is experienced during the big game hunting seasons when hunters occupy many of the dispersed campsites and heavily use the roads within the area. This project needs to maintain an appropriate level of recreation opportunities for the users within this area.

The 7700 road and the 7785 roads have high visual sensitivity ratings in the WWNF Forest Plan. Thick and unhealthy vegetation in the foreground detracts from the historic character of these areas and put the trees in the area at risk to mortality from insects and disease. Proposed treatments along these corridors need to be sensitive to their levels of recreational use.

Many users of the area desire the roaded natural experience. They desire natural appearing settings, few encounters with other people and low level of administrative control. Many people value the ecological integrity of the area and desire the area to be impacted only by natural processes. It is important to recognize the values of all constituents and manage with all aspects in mind.

13. Inventoried Roadless Areas (IRAs)

Inventoried roadless areas are immediately adjacent to this project area. These areas were identified in the 2001 Roadless Area Conservation Rule in a set of IRA maps, contained in the Forest Service Roadless Area Conservation Final Environmental Impact Statement, Volume 2, dated November 2000, which is located at the National headquarters office of the Forest Service, or any subsequent update or revision of those maps (36 CFR 294.11). These areas were set aside through administrative rulemaking and have provisions, within the context of multiple use management, for the protection of IRAs. Most IRA boundaries are substantially identical to those identified as “Roadless Areas” referred to in the 1982 planning rule (36 CFR 291.17) and identified by the Forest Plan, FEIS, Appendix C; however some localized, minor difference in boundaries may exist.

The Sandbox project area is immediately adjacent to the eastern side of the Upper Catherine IRA and touches a corner of the Boulder Park IRA. All roadless areas were allocated to various management areas strategies as disclosed in the WWNF Forest Plan FEIS, Appendix C and described in the Record of Decision (pages 14-16) for the FEIS. Some management area strategies were intended to retain the undeveloped roadless character of the roadless area and some management area strategies were intended to develop the lands with timber harvest and road building activities. None of these areas are within the Sandbox project area.

Public comments asked if potential wilderness areas were located within the project area, if they would be impacted by the activities proposed in the proposed action and requested that these areas be protected in order to maintain their potential for future consideration as wilderness. Public comments addressed concerns about changing the character of undeveloped or roadless areas. There was public concern over the need to safeguard roadless forests and suggestions that these areas need proper management to provide wildlife connectivity.

Areas of potential wilderness identified using inventory procedures found in Forest Service Handbook (FSH) 1909.12, Chapter 71 are called potential wilderness areas. The inventory is conducted by the Forest Service with the purpose of identifying potential wilderness areas in the National Forest System. The National Forest System Land and Resource Management Planning Rule (currently the 1982 Rule, 36 CFR Part 219.17) directs that roadless areas be evaluated and considered for wilderness recommendation during the forest planning process.

Potential wilderness areas (PWAs) are not a land designation decision, they do not imply or impart any particular level of management direction or protection, they are not an evaluation of potential wilderness (Chapter 72), and lastly they are not preliminary administrative recommendations for wilderness designation (Chapter 73). The inventory of PWAs does not change the administrative boundary of any inventoried roadless area (IRA).

Typically, PWAs substantially overlap, and/or are contiguous with inventoried roadless areas and may also be contiguous with designated wilderness as is the case with the Boulder Park and Upper Catherine IRAs. PWAs overlap inventoried roadless areas only where those acres of land are consistent with the inventory criteria (FSH 1909.12 Chapter 71) and may extend beyond IRA and wilderness boundaries consistent with inventory criteria.

I. Summary of Scoping Process

The Sandbox Vegetation Management project was published in the Wallowa-Whitman Schedule of Proposed Actions (SOPA), a quarterly publication, in October 2010 and has appeared in each quarterly SOPA since then. This mailing is distributed to a mailing list of individuals, organizations, and agencies and is published on the forest web page.

A detailed description of the proposed action was mailed on March 26, 2012 to approximately 95 forest users and concerned publics soliciting comments and concerns related to this project. Six letters of response were received from interested parties, which are part of the Issues identified in this Chapter.

Members of the Union County Community Forest Restoration Board received a copy of the Proposed Action.

Scoping and consultation for the project was initiated and is ongoing with the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and ODF&W.

This project has been reviewed and approved by the State Historical Preservation Officer (SHPO).

A public field trip was sponsored to the project area by the District on August 6, 2013 to discuss existing conditions within the project area, proposed treatment recommendations, and public issues and concerns. Representatives from local government, industry, and environmental organizations participated in the trip.

An analysis file for this project is available for public review at the La Grande Ranger District. The analysis file includes specialist's reports, data specific to the project, public notifications and their responses, meeting notes, and miscellaneous documentation.

Chapter II: Alternatives, Including the Proposed Action

A. Introduction

This section describes a reasonable range of alternatives that address the purpose and need for action and respond to the issues identified during public scoping.

B. Alternative Development Process

The National Environmental Policy Act (NEPA) directs the Forest Service to use an interdisciplinary approach which will ensure the integrated use of natural and social sciences and the environmental design arts [NEPA, section 102(2)(A)].

An ID team developed alternatives based on the purpose and need of the project and the key issues and other concerns identified in Chapter 1 of this assessment. Forest Service management objectives are incorporated into alternatives by following standards and guidelines of the Wallowa-Whitman National Forest Plan as amended.

C. Alternatives Considered, but Eliminated from Detailed Study

The following alternative options were considered during the development of this analysis but were eliminated from detailed study as described below.

Alternative A – No Commercial Harvest:

An alternative not utilizing mechanical harvest and commercial removal of materials from the project area was considered by the ID Team. Only pre-commercial thinning, cleaning, prescribed burning, and road management as described in the proposed action were considered for implementation. Eliminating mechanical harvest and commercial removal of the wood products also reduces the amount of prescribed fire opportunities within the project area due to elimination of pre-treatment.

Under this alternative higher mortality is anticipated in remaining burn blocks due to lack of pretreatment fuels reduction activities. In general, mortality within the dominant canopy trees would range between 10-20%, codominants would experience and estimated 15-20% mortality and mortality of the seedling/sapling component would range between 50-75%. The level and arrangement of mortality would be random and not necessarily retain the best trees on site and would likely kill some of the most desirable and suitable retention trees.

This alternative eliminates stand density management of the overstory component and therefore could lead to increased risk to insect and disease activity within the project area. Many acres would continue to develop with high tree densities and heavy surface fuel loadings. Prescribed fire in many of these acres would be eliminated as a management option due to the higher risk of crown fire and likelihood of escape.

This alternative was eliminated from detailed study because it fails to adequately respond to the purpose and need elements and would not be consistent with forest plan direction, especially in Management Area 1 land allocations.

The need to reduce tree densities in overstocked stands would not be achieved in areas considered a high priority for treatment due to over-stocked levels of commercial size trees. These stands would remain over stocked and susceptible to insects and disease. Elimination of these acres would not meet the purpose and need of increasing standard changing condition classes to allow for successful reintroduction of fire.

Alternative B – No timber harvest, no road construction, and no herbicide treatment with glyphosate:

No timber harvest is described in Alternative A above and no road construction is analyzed under Alternative 3. No herbicide treatment is proposed in this project therefore, this alternative in its entirety will not be considered under this analysis.

Alternative C - No treatment in Inventoried Roadless or "undeveloped area" lands:

No treatments are proposed within inventoried roadless areas in this project. Undeveloped lands are defined as lands with not roads or timber harvest. The size of these areas meeting this definition range from less that one acre to over 2,000 acres. Not treating in any of these areas would make it impossible to meet the purpose and need for this project. Following the direction in Forest Service Handbook (FSH) 1909.12, Chapter 71 an analysis was completed for the Sandbox area and potential wilderness areas identified. Alternative 3 does not cut trees in lands classified as potential wilderness areas. Lands considered undeveloped by the commenter were considered and analyzed in Chapter 3 under "Potential Wilderness Areas."

Alternative D – Mechanically treat riparian areas to reduce fire risk and fuel loadings

An alternative which considered mechanically treating more acres of riparian habitat conservation areas (RHCAs) was considered but eliminated because additional RHCA treatments are not needed to meet riparian management objectives (RMOs) and to meet the purpose and need of this project. Precommercial thinning would occur, where appropriate, on 10 acres of RHCAs, fuel reduction treatments on 40 acres, and thinning treatments on 4.5-7.5 acres within RHCAs. No other RHCA treatment opportunities exist within the stands proposed for treatment within project area. During most fire situations, higher moister levels in RHCAs would keep fire intensities low, reducing fuel consumption and decreasing the chance of killing trees that provide stream shade. Most streamside vegetation would probably survive. However, under extreme wildfire condition the all vegetation within RHCAs could be lost.

Alternative E – No Commercial Harvest Treatments in OFMS in Moist Biophysical Environments

As described in Chapter 1, OFMS structure types are above the historic range of variability in all biophysical environments in this project area and 13% above the high end of the range for moist upland types while OFSS is 9% below the lowest level in this type at only 1%. Not commercially treating in these types would not only have the same impacts described in Alternative A above but would also restrict the potential to meet the purpose and need in this area by returning some of the OFMS stand type to OFSS for species dependent on this type of stand structure.

Eliminating commercial harvest from moist OFMS stands would greatly limit the ability to maintain and enhance the resiliency of moist OFMS forests and meet the purpose and need within this project area.

Reintroduction of fire into these types without any pre-treatment or only hand treatment of small diameter materials would be costly not only for the treatment but also for the impacts to natural resources as described in Alternative A above. This alternative was eliminated from detailed study in this EA because it would fail to adequately respond to the purpose and need.

D. Alternatives Considered in Detail

Elements Common to the Action Alternatives

1) Silvicultural Treatment Prescriptions/Objectives

Prescriptions/objectives:

The following describes the treatment objectives, methods and anticipated outcomes for the proposed vegetation management activities within the project area.

Stocking Levels for Forested Stands – Stand density ranges have been developed for each conifer plant association (PAs). See Powell et.al. (1999) for management zone basal areas. The range is based, in part, on the growing capacity (or site potential) of each plant association. Tree densities would be reduced to various basal area levels depending on management objectives. The range of basal area stand can be managed for are defined by the upper management zone and the lower management zones as described below:

Upper Management Zone (UMZ) – For the Sandbox project area the UMZ will be the level of tree stocking that maintains the maximum amount of sustainable tree cover. This level avoids development of suppressed trees and precludes significant amounts of density-related tree mortality.

Lower Management Zone (LMZ) – The lower limit of full site occupancy where a significant portion of site resources can be allocated as tree growth.

Treatment Priority Ratings:

High Priority – Stands were rated as a high priority for treatment if they were overstocked with basal areas near or above the UMZ. These stands are at higher risk to insect and disease infestations, as well as fire caused mortality in the event of a wildfire in the area.

Low Priority – While these stands are still a priority for treatment, they are considered of lower priority because their existing density is already near the LMZ and are expected to develop for the next 5-10 years without treatment with minor long term negative effects.

Connective Corridor Units:

The desired condition within these units is to maintain and enhance their cover and connectivity qualities such as medium to large trees as a common occurrence, canopy closure within the top 1/3 of site potential, and no less than 400 feet at the narrowest point.

Stocking levels would be managed to maintain the upper 1/3 of site potential except where tree quality and crown conditions are such that this is unattainable, in those areas, 20% of the stand would be retained in untreated clumps. Trees with down to 20% live crown would be retained where needed to meet the basal area objectives. All snags would be retained.

Down logs would be retained at the following levels within the Connective corridor Units:

200 lineal feet per acre
Minimum lengths of logs 20 feet or largest available
Minimum of 12” small end diameter logs or largest available

Prescriptions:

Sanitation harvest (HSA) prescription is designed to remove dead, damaged, or susceptible trees to prevent the spread of pests or pathogens.

Thinning harvest (HTH) prescription is designed to stimulate the growth of the desired residual trees.

Shelterwood harvest (HSH) prescriptions in which a stand of trees is established through a series of cuttings designed to facilitate establishment of a new cohort of trees. Due to site conditions, scattered overstory trees are retained to provide some shade or site protection for the regenerating stand beneath it. Once established, the overstory trees can be removed to promote maximum growth and development of the regenerated understory, or retained for structural or habitat needs.

Improvement harvest (HIM) thinning and removal of undesirable trees (poor form, damaged condition, ecologically inappropriate species etc.) within a stand for the purpose of improving the growth, composition and quality of the remaining stand.

Fuels Harvest (HFU) prescription in which trees creating ladder fuels and excess down dead woody material are removed offsite with the use commercial harvest methods.

Overstory Removal harvest (HOR) cutting that removes older trees that overtop a more desirable younger stand.

Patch Openings (HPO) are designed to reduce crown fuels and increase the presence of fire resistant and lighter crowned tree species, such as western larch or white pine. Prescription would create small canopy openings (4 to 6 acres) focusing on promoting pine and larch to improve stands resilience to wildfire and insect and disease outbreaks. Surface fuel loading would be reduced to the forest plan minimums through removal, mastication, grapple piling, or hand piling. Planting would be used in patch openings to supplement natural regeneration and meet stocking requirements.

Precommercial thinning (PCT) thinning of smaller diameter selected trees in a young stand to stimulate the growth of the remaining trees. May be accomplished by manual or mechanical (slash buster) methods.

Post-harvest follow-up:

Units would be monitored following harvest activity for site preparation, regeneration, or stand improvement needs. Reforestation work would be accomplished on sites that are below recommended stocking levels (180 – 300 trees per acre depending on the site) through planting or natural regeneration. Other post-harvest treatments may include precommercial thinning, site preparation and/or fuels reduction with fire, grapple/slashbuster manipulation of slash, and site preparation by whip felling.

2) <u>Riparian Habitat Conservation Areas (RHCAs)</u>

Riparian treatment units (refer to specific units under each alternative description) would be treated as follows within the riparian habitat conservation area.

Specific commercial and non-commercial harvest units would treat portions of the RHCA (refer to alternative descriptions for unit numbers) within their unit boundaries. The prescription and yarding method within the treated portion of the RHCA would be the same as the remainder of the unit. The remainder of the RHCA would remain untreated no activity buffers. For specific yarding

requirements refer to the Soil and Water mitigations under the Logging and Sale design section of Management Requirements, Sale Design, and Mitigation Measures in this chapter.

With the exception of hand thinning (i.e. use of chainsaws), PACFISH RHCA widths would be used as no activity stream buffers and incorporated into all mechanical treatments units.

In precommercial thinning units and non-commercial harvest units fuels reduction work would be completed by hand only (no mechanical treatment allowed). FFU units would receive ladder and ground fuels reduction treatments including precommercial thinning of live trees less than nine inches dbh to a spacing of 14 to 16 feet and pruning branches on trees up to six feet above ground. Slash would be piled by hand and burned outside of the RHCA. No mechanical treatment would be permitted within the RHCA. Minimum no-activity buffers for FFU and PCT treatments would be 10 feet wide along both sides of (class IV) intermittent non-fish bearing stream channels and wetlands less than one acre; 30 feet wide along both sides of (class III) perennial non-fish bearing stream channels and wetlands greater than one acre; and 50 feet on both sides of (class I) perennial fish bearing streams. All slash would be piled and burned by hand, outside of no activity buffers. Piles would be placed to avoid damaging or killing overstory trees during burning operations.

The expected result is accelerated recovery of riparian vegetation conditions - enhanced forage and resistance to fire. Improvements in vegetative conditions are expected to increase the number of high quality pieces of large woody material acting on the channels and floodplains in the future.

3) Fuels Reduction

Fuels treatments proposed under this project are designed to move stands from their current structure and development trajectory to conditions more indicative of natural disturbance regimes under pre-Euro-American influences. Strategies for restoring forest structure and function include thinning live trees, and burning surface fuels to reduce the risk of severe crown fires. Objectives in all units include: reduce stand densities in overstocked stands, reduce fir encroachment in pine dominated stands, remove ladder fuels, create defensible fuel profile zones in strategically sound locations, return fire as a disturbance factor at the landscape level, and promote healthy fire resilient stands.

General Mechanical Prescriptions:

Associated with harvest units the following activities would occur:

1. Treatments would reduce overstocking of trees >7" dbh to recommended stocking levels per biophysical group.
2. All snags ≥12" dbh would be retained.
3. Down wood would be retained at levels described under the Wildlife mitigation measures in this Chapter. All other materials >3" in diameter could be reduced to 3 tons or less per acre.

Fire/Fuels Units (FFU) – These non-harvest units (refer to alternative descriptions for unit numbers and acres) would receive a mechanical fuels reduction treatment designed to increase the effectiveness of the proposed prescribed burning. The following treatments may occur within the proposed FFU unit boundaries:

- Thinning/cleaning of trees less than 9" dbh
- Mastication (slash-busting) on slopes less than 30%
- Lopping and scattering thinning slash
- Pruning on leave trees
- Hand piling of thinning slash and natural fuels concentrations
- Grapple piling of thinning slash on slopes less than 30%

Prescribed Burn Units - Over the next 10 years, prescribed burning would occur when weather and fuel conditions are appropriate to meet the objectives for each unit. No more than 10% of the available forage within the project area would be burned per year. Existing plantations and

precommercial thinning areas would be avoided during burn layout and implementation. Control lines would include roads, natural barriers and brush removal rather than bare mineral soil line construction where possible.

General Prescribed Fire Prescriptions:

a. Fires would generally be low intensity (1-3 foot flame lengths).
b. Desired fuel loading would be as listed in the following table:

Table 2.1 - Fuel Size Class

Fuel Size Class	Desired Tons/Ac	Lineal Feet
0-3" Diameter	<3	0
3-9" Diameter	3	0
12" Plus Diameter	5-15	120-140

c. Trees ≤ 2" dbh would be reduced to desired levels.

With the exception of the RHCA hand treatment units described above, all other treatment units calling for the use of prescribed fire would not permit direct ignition within 300' of any Class I, 150' for class III stream channels and 50' of Class IV stream channels. Low intensity fire would be allowed to back into all RHCAs. Reducing these fuels will enhance forage habitat and increase overstory growth rates by making nutrients readily available after burning is completed.

Prescribed Fire Existing Conditions and Anticipated Results - The following Conditions are present in each burn block within the Sandbox analysis area. Each Condition is analyzed following mechanical treatments and application of prescribed burning to provide an estimate of how much of each block would actually be burned following these treatments since it is not the intent nor is it possible to have the entire area burned during prescribed burning activities.

Condition A (Fire Regime 3/Condition Class 3): Mechanical pretreatment (non commercial) would be a combination of thinning, cleaning, and piling to treat ladder fuels and down woody material to facilitate the use of prescribed fire. The prescribed burning would include jackpot burning/under burning or pile burning to further reduce fuels. The result would be a mosaic pattern of burned and unburned areas. Approximately 50% or less of the burn block containing this condition would actually be burned.

Condition B (Fire Regime 1/Condition Class 3): A combination of commercial and noncommercial thinning would be used to mechanically pre-treat fuels to facilitate the use of prescribed fire. On these drier sites, burning would likely result in random patches of burned and unburned areas with approximately 75% of the area being burned.

Condition C (Fire Regime 3/Condition Class 3): Harvest/Thinning treatments are designed to promote tree growth, discourage competition, reduce fuels in the form of litter, duff, and decadent grasses, thin suppressed thick clumps of regeneration, and enhance forage conditions. Canopy closure within these conditions would moderate fire behavior contributing to patchy burn patterns leading to greater than 50 % surface fuel consumption.

Condition D (Fire Regime 1/Condition Class 2): Following a light mechanical cleaning of this understory, a low intensity under burn would be implemented to reduce surface and ladder fuels. Approximately 75% of the area would be burned.

Condition E (Areas of sparse vegetation on ridge tops or south facing slopes): These areas consist of very sparse grasses with a small shrub component. No mechanical treatments or minimal burning would be prescribed within these areas.

4) Access and Travel Management – Roads Analysis

The road management plan objectives for this project area will reflect the objective maintenance levels described in the District Access and Travel Management Plan. In addition to the road decommissioning described under the rehabilitation work below, an objective open road network has been identified as well as an objective closed road network which would be available for fire suppression, permittee administrative needs, and future management options. Currently closed roads used in the implementation of this project will be closed following their use by either physical barricade or promulgated closure. No additional road closures are proposed with this project.

Several roads tributary to the 7700700 were originally designed to route traffic toward the 7785700 which historically followed the South Fork Catherine Creek drainage. The 7785700 was decommissioned to improve the health of the watershed. Therefore, the intersections on the 7700700 road will be realigned to allow timber haul toward the 7787 road to the east. The intersections affected are 7700719, 7700752, 7700708, and 7700720. Additionally, the intersection of 7700950 and 7700960 will be reconfigured to allow timber haul. Reconstruction activities will consist of excavation, clearing, rock placement, and drainage construction.

5) Snags

With the exception of an occasional snag removed for safety or construction clearing, no snags $\geq$12 inches dbh would be removed with this project.

Protect existing standing large snags (>12 inches, DBH) during firing operations through avoidance or fuels distribution requirements (FDR) as practical. If large trees are killed through project implementation they will be left for wildlife snags, unless they pose a safety hazard to roads, the public, or project personnel.

6) Roadside Hazard Trees

Danger trees (standing trees that present a hazard to people due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem, or limbs and the direction of the lean of the tree would allow that tree to reach the roadway if it fell) would be cut along all haul roads (approximately 15 trees/mi). If the trees are within RHCA's as described previously or needed to meet down wood requirements they would be cut and left on site. If they are outside of RHCA's or not required to be retained for other resource needs and are of commercial value, they may be removed with this timber sale.

7) Rehabilitation Work

Road Decommissioning - The following roads have been identified in the draft Forest Minimum Roads Analysis and confirmed by the District interdisciplinary team as creating resource damage and no longer needed for future management of the National Forest System lands within the Sandbox project area. These roads would be decommissioned either at the completion of this project or when funds come available.

Road 7700742 - Approximate length of the road segment is 0.6 miles. The road begins at the breaks of the South Fork of Catherine Creek, crosses one Class IV stream (intermittent non-fishbearing), and inclines down to the South Fork of Catherine Creek joining with the 7700702 road that has been previously decommissioned. The road has not been used in several years and is grown in. The culvert in the Class IV stream has been removed at some point in the past.

Road 7700908 - Approximate length of the road segment is 1.2 miles. This road is a draw bottom road for approximately 0.6 miles. The road is very overgrown and has not been used in several years.

The following roads were considered for decommissioning in the proposed action; however, during the roads analysis a need for these roads for future stand management and fire access into the area was identified and the decision was made to retain these roads as Maintenance Level (ML) 1 into the future.

Road 7700732 - Approximate length of the road segment is 0.8 miles. The road has not been used in several years and is grown in but will remain on the landscape as ML1 for future management needs.

Road 7700635 - Approximate length of the road segment is 0.4 miles. The road is located in a draw bottom road adjacent to a Class IV tributary stream (intermittent non-fishbearing) to the Pole Creek drainage. Further analysis and on the ground reconnaissance revealed that the road has already been successfully decommissioned.

Road 7700950 (from the junction of the 77000953 road to private land boundary) - Approximate length of the road segment is 0.3 miles. This road is currently open to vehicle traffic and is closed at the private land boundary. It will be a ML1 road available for administrative access in the future for fire suppression activities.

Alternative Descriptions

A) Alternative 1 - No Action

This alternative constitutes the "No Action" required by NEPA. Timber harvest and other management activities identified in the Sandbox Vegetation Management analysis would be deferred. This alternative forms the baseline for comparison of the action alternatives.

B) Alternative 2 – Proposed Action [Refer to map and data tables in Appendix A]

Alternative theme

Alternative two was designed to enhance stand condition and vigor, reduce fuel loadings across the landscape and along strategic road systems and ridgetops, and enhance Old Forest (OF) stand structures. In addition to the vegetative management and enhancement projects described under the Common Elements section and the alternative description below, access and travel management in terms of re-closing roads at the completion of the project and obliterating temporary roads to maintain/enhance wildlife, fisheries, recreation, and hydrology resources would occur. In alternative 2, nearly all of the stands (both high and low priority) identified as needing density management or fuel reduction would be treated.

Alternative two is driven by the following key issues: 1) Improvement of long term forest health conditions; 2) Deficiency in OFSS and departure from HRV; and 3) Modification of potential fire behavior; and 4) Economics.

Vegetation and Fuels Management:

Fuels Reduction:

Mechanical fuels prescriptions and prescribed fire prescriptions would be implemented as described under the Common Elements section above.

Table 2.2 – Fuel Treatment Prescriptions and Acres for Alternative 2

Fuel Treatment Prescriptions	Acres
Fire/Fuels Reduction/no removal (FFU) – ladder and ground fuels reduction treatments. No off site biomass removal would occur. Ladder fuels (< 9" DBH) would be reduced using precommercial thinning/pruning by hand or mastication by machine. Surface fuel loads would be reduced to appropriate levels by such means as hand pile/burn, grapple pile/burn, or mastication by machine.	431
Harvest Fuels Reduction/commercial removal (HFU) – ladder and ground fuels reduction treatment using commercial biomass removal to accomplish fuel reduction objectives. Canopy bulk densities would also be reduced using a commercial thinning from below prescription with additional post-harvest slashbusting, whip falling, or precommercial thinning to achieve fuels reduction objectives.	5
Prescribed Burning (RXB) – Over the next 10-15 years, prescribed burning in 8 burn blocks would occur when weather and fuel conditions are appropriate to meet the objectives for each unit. No more than 10% of the available forage within the project area would be burned per year. Existing plantations and thinning areas would be avoided during burn layout and implementation. Control lines would include roads, natural barriers and brush removal rather than bare mineral soil line construction where possible.	7,465

Prescribed Burn Units (RXB) - Not every acre within the burn blocks is expected to burn because of variable existing fuel loadings, topography, stand conditions, past management (thinning and planting), riparian areas, etc. The following table displays the total acres for each burn block and the estimated acres of direct ignition within those burn block boundaries.

Table 2.3 - Prescribed Burn Block Acres and Estimated Burned Acres

Prescribed Burn Block #	Acres	Estimated Burn Acres
601	731	615
602	2,149	375
603	1,340	600
604	2,507	1,500
605	2,273	1,700
606	1,953	1,000
607	2,168	1,000
608	2,694	675
Totals	**15,815**	**7,465**

Timber Harvest – Commercial harvest treatments would occur on approximately 2,193 acres of the Sandbox Project area, including 1,148 acres of commercial thinning (HTH), 680 acres of improvement cuts (HIM), 165 acres of shelterwoods (HSH), 5 acres of commercial fuels reduction (HFU), 55 acres of overstory removal (HOR), 24 acres of patch openings (HPO), and 116 acres of sanitation harvest (HSA). These treatments are proposed to provide one or a combination of the following: reduce stocking densities, remove diseased and poor growing trees, promoting stands with multi and single story large tree characteristics. Shelterwoods on 165 acres would remove poor growing, less vigorous trees while maintaining most of the larger component (trees larger than 18 inches dbh). The larger overstory component would remain and planting would ensure a healthy, viable understory of seral species. These stands are currently not LOS, however, treatment would accelerate them toward becoming Multi-stratum large tree (MSLT) structure stands over time. Their current condition precludes the use of intermediate treatment prescriptions. Shelterwood treatments are being proposed on <1% of the project area.

Precommercial Thinning - Approximately 128 acres outside of the harvest units would be precommercially thinned to improve tree growth and select desirable tree species.

Old Forest – Old forest multi-stratum (OFMS) forest conditions are over represented in this area due primarily to past suppression of wildfire in stands historically maintained in more open large tree dominated conditions by frequent, lower intensity fires. Approximately 1,321 acres in old forest multi-strata (OFMS), is proposed for treatment to meet the following objectives: 1.) manage for old forest single strata (OFSS) which is deficit and well below HRV within the project area, 2.) promote seral species, 3.) reduce fuel loadings with non-commercial treatments, and 4.) emulate historic disturbance patterns. There would be no net loss of Old Forest (OF), but a redistribution of OFMS to OFSS old forest conditions in any of the potential vegetation groups (PVGs).

Proposed treatments would return 727 acres of dry PVG OFMS to OFSS using the following prescriptions.

Affected units:

HTH - 5, 15, 17, 27, 30, 38, 42, 43, 49, 52, 65, 67, 74, 77, 79, 80, 83, and 84
HSA – 23, 33, 41, 66

Proposed treatments would treat 323 acres of moist OFMS, maintaining OFMS using the following prescriptions.

Affected Units:

HIM - 8, 24, 51, 53, 54, 60, 61, 62, and 85
HTH – 24, 51, 55, 56, 64, 81
HFU – 72
HPO - 68

Proposed treatments would non-commercially treat 271 acres of moist OFMS to reduce fuel loadings, maintaining OFMS using the following prescriptions.

Affected Units:

FFU - 101, 105, 107, 112, 114-116, 119, 120, 122-125, and 127-129

Stands with dry OFSS structure proposed for treatment in this project (217 acres) would have reduced fuel loadings and improved stand health and vigor while maintaining their structure resulting in no net loss of old forest.

Affected Units:

HTH - 1, 3, and 4
HIM - 2

Riparian Habitat Conservation Areas (RHCAs) – Refer to the description of RHCA treatments under the Elements Common to the Action Alternatives section in this chapter.

Mechanical commercial harvest treatments would occur on 7.5 acres in the following units:

Affected Units: 5, 72

Hand treatment within RHCAs would occur on 40 acres in the following units:

Affected Units: 107, 108, 109, 110, 112, 114, 120, 121, 122, and 124

Other Features of Alternative 2

Forest Plan Consistency - Review of Alternative 2 with respect to the Wallowa-Whitman National Forest Land and Resource Management Plan (Forest Plan) indicates that no amendments would be needed and that the project is consistent with Forest Plan standards and guidelines.

Connectivity Units – The goal within these units would be to maintain and enhance their cover and connectivity qualities such as medium to large trees as a common occurrence, canopy closure within the top 1/3 of site potential, and no less than 400 feet at the narrowest point. Stocking levels would be managed to the upper management zones for basal area except where tree quality and crown conditions are such that the upper management zone is unattainable, in those areas, 20% of the

stand would be in untreated clumps. Retain trees with down to 20% live crown if needed to maintain basal area levels.

Affected Units: 16, 25, and 105

Raptor Nest Site – The known historically active peregrine aerie located within the project area will have a seasonal haul restriction coordinated with the District Biologist if it is found active during project activities.

Treatment within Buck Creek Campground and Trailhead (Unit 116) - Treatments would primarily be lodgepole thinning within the campground including removal of hazard/safety trees. Stumps will be flush cut within the campground. Thinned tree boles would be bucked into firewood lengths and stacked within the campground with the remainder of the slash (branches and needles) hand piled outside of the campground and burned.

Fuelwood Removal Area – Roads 7700770, 7700772, 7700860, 7700900, 7700890, and 7700912 are currently open but have high down fuel loadings which would be emphasized for fuelwood removal to meet fuel reduction goals. Fuel reduction treatments along these roads would have materials left for one season within 300 feet of the roads to make them available to firewood cutters. Public firewood gathering would occur from May 1 – November 30.

Downed Logs – Downed logs would be retained at the following levels:

200 lineal feet per acre
Minimum lengths of logs 20 feet or largest available
Minimum of 12" small end diameter logs or largest available

Snags – With the exception of an occasional snag removed for safety or construction clearing, no snags $\geq$12 inches dbh would be removed with this project.

Roadside Hazard Trees - Danger trees would be cut along all haul routes. If the trees are within RHCA's, as described previously, or needed to meet down wood requirements, they would be cut and left on site. If they are outside of those areas or not required to be retained for other resource needs and are of commercial value, they may be removed with this timber sale.

Harvest System and Road Activity Summary:

Removal Systems Summary – Proposed harvest treatments are estimated to result in removal of approximately 6.62 million board feet of commercial material using the following yarding systems.

- Cable based yarding systems 487 acres
- Ground based yarding systems 1,706 acres

No new permanent road construction is proposed with this project. If winter logging is done using the 77 road, use would be coordinated with the District Recreation Manager to designate an alternative snowmobile route (7700912 road) while log haul is occurring. A culvert would be replaced in road 7787705 which is currently plugged and washing out the road.

Approximately 5.2 miles of temporary road construction is proposed to facilitate harvest systems. Of these temporary roads 2.8 miles are on existing wheel tracks requiring little to no site disturbance for log haul use and 2.4 miles would require some minor construction. Temporary roads would be obliterated after use by implementing some or all of the following activities: installation of erosion control devices, ripping to reduce soil compaction, seeding, and camouflaging roads to discourage further use.

Approximately 21.9 miles of currently closed roads would be reopened to facilitate harvest/fuel reduction activities. Any road currently closed by gate or barricade to be re-opened would be re-closed in the same manner at the conclusion of harvest activities within the units they access.

Rehabilitation Work:

As described under the Common Elements section road decommissioning would all be accomplished under this alternative.

C) Alternative 3

Alternative theme:

Alternative three is driven by the following issues: 1) Improvement of long term forest health conditions; 2) Effects of temporary road construction on water quality and other resources; 3) Impacts of using regeneration harvest prescriptions; 4) Treatment within potential wilderness areas; and 5) Areas which may also support old growth management indicator species.

Alternative three was designed to address the purpose and need while emphasizing eliminating temporary road construction and the use of regeneration prescriptions, and limiting disturbance in areas identified as potential wilderness areas.

728 acres of commercial harvest is deferred from treatment consideration in this alternative, primarily to eliminate the need to construct temporary roads, avoid impacts to potential wilderness areas, and avoid the use of regeneration harvest prescriptions. Where possible unit boundaries and/or logging systems were modified; however, if no other options were available the unit was entirely deferred. Refer to Appendix B for a complete list of treatment unit prescriptions and maps for this alternative.

Vegetation and Fuels Management:

Fuels Reduction:

Mechanical fuels prescriptions and prescribed fire prescriptions will be as described under the Common Elements section of this chapter.

Fire/Fuels Units (FFU) – Approximately 431 acres of Fires/Fuels Units would be included in this alternative. These non-harvest units would receive a mechanical fuels reduction treatment designed to increase the effectiveness of the proposed prescribed burning.

Prescribed Burn Units (RXB) – 15,938 acres of burn blocks are part of this alternative, because not every acre within the burn blocks is expected to burn because of existing fuel loadings, topography, stand conditions, past management (thinning and planting), riparian areas, etc. approximately 7,465 acres are expected to have direct ignition within those burn block boundaries (see Table 2.3).

Timber Harvest - Commercial harvest treatments would occur on approximately 1,465 acres of the Sandbox Project area, including 774 acres of commercial thinning (HTH), 520 acres of improvement cuts (HIM), 5 acres of commercial fuels reduction (HFU), 47 acres of overstory removal (HOR), 14 acres of patch openings (HPO), and 105 acres of sanitation harvest (HSA). These treatments are proposed to reduce stocking densities, remove diseased and poor growing trees, and promote stands with multi and single story large tree characteristics.

Precommercial Thin (PCT) - Approximately 128 acres would be precommercially thinned to improve tree growth and select desirable tree species.

Old Forest – Old forest multi-stratum (OFMS) forest conditions are over represented in this area due primarily to past suppression of wildfire in stands historically maintained in more open large tree

dominated conditions by frequent, lower intensity fires. Approximately 998 acres in old forest multi-strata (OFMS), is proposed for treatment to meet the following objectives: 1.) manage for old forest single strata (OFSS) which is deficit and well below HRV within the project area, 2.) Promote seral species, 3.) Reduce fuel loadings with non-commercial treatments, and 4.) Emulate historic disturbance patterns. There will be no net loss of Old Forest (OF), but a redistribution of OFMS to OFSS old forest conditions

Proposed treatments would return 522 acres of dry PVG OFMS to OFSS using the following prescriptions.

Affected units:

HTH - 15, 17, 30, 38, 42, 43, 49, 52, 67, 77, 79, 80, and 83
HSA – 23, 33, 41

Proposed treatments would treat 205 acres of moist OFMS, maintaining OFMS using the following prescriptions.

Affected Units:

HIM - 8, 51, 53, 54, 62, and 85
HTH – 51, 55, 56, 81
HFU – 72
HPO - 68

Proposed treatments would non-commercially treat 271 acres of moist OFMS to reduce fuel loadings, maintaining OFMS using the following prescriptions.

Affected Units:

FFU - 101, 105, 107, 112, 114-116, 119, 120, 122-125, and 127-129

Stands with dry OFSS structure proposed for treatment in this project (217 acres) would have reduced fuel loadings and improved stand health and vigor while maintaining their structure resulting in no net loss of old forest.

Affected Units:

HTH - 1, 3, and 4
HIM - 2

Riparian Habitat Conservation Areas (RHCAs) – Refer to the description of RHCA treatments under the Elements Common to the Action Alternatives section in this chapter.

Mechanical commercial harvest treatments would occur on 4.5 acres in the following unit:

Affected Units: 72

Hand treatment within RHCAs would occur on 40 acres in the following units:

Affected Units: 107, 108, 109, 110, 112, 114, 120, 121, 122, and 124

Other Features of Alternative 3

Forest Plan Consistency - Review of Alternative 3 with respect to the Wallowa-Whitman National Forest Land and Resource Management Plan (Forest Plan) indicates that no amendments would be needed and that the project is consistent with Forest Plan standards and guidelines.

Connective Corridor Units – As stated under common elements, the goal within these units would be to maintain and enhance their cover and connectivity qualities such as medium to large trees as a common occurrence and canopy closure within the top 1/3 of site potential.

Affected Units: 16 and 105

Raptor Nest Site – The known historically active peregrine eyrie located within the project area will have a seasonal haul restriction coordinated with the District Biologist if it is found active during project activities.

Treatment within Buck Creek Campground and Trailhead (Unit 116) - Treatments would primarily be lodgepole thinning within the campground including removal of hazard/safety trees. Stumps will be flush cut within the campground. Thinned tree boles would be bucked into firewood lengths and stacked within the campground with the remainder of the slash (branches and needles) hand piled outside of the campground and burned.

Fuelwood Removal Area – Roads 7700770, 7700772, 7700860, 7700900, 7700890, and 7700912 are currently open but have high down fuel loadings which would be emphasized for fuelwood removal to meet fuel reduction goals. Fuel reduction treatments along these roads would have materials left for one season within 300 feet of the roads to make them available to firewood cutters. Public firewood gathering would occur from May 1 – November 30.

Downed Logs – Downed logs would be retained at the following minimum levels:

200 lineal feet per acre
Minimum lengths of logs 20 feet or largest available
Minimum of 12" small end diameter logs or largest available

Snags – With the exception of an occasional snag removed for safety or construction clearing, no snags $\geq$12 inches dbh would be removed with this project.

Roadside Hazard Trees - Danger trees would be cut along all haul road. If the trees are within RHCA's, as described previously, or needed to meet down wood requirements, they would be cut and left on site. If they are outside of those areas or not required to be retained for other resource needs and are of commercial value, they may be removed with this timber sale.

Harvest System and Road Activity Summary:

Removal Systems Summary – Proposed harvest treatments are estimated to result in removal of approximately 4.35 million board feet of commercial material using the following yarding systems.

- Cable based yarding systems 231 acres
- Ground based yarding systems 1,234 acres

No new permanent or temporary road construction is proposed with this alternative. If winter logging is done using the 77 road, use would be coordinated with the District Recreation Manager to designate an alternative snowmobile route (7700912 road) while log haul is occurring.

A culvert would be replaced in road 7787705 which is currently plugged and washing out the road.

Approximately 12.4 miles of currently closed roads would be reopened to facilitate harvest/fuel reduction activities. Any road currently closed by gate or barricade to be re-opened would be re-closed in the same manner at the conclusion of harvest activities within the units they access.

Rehabilitation Work:

As described under the Common Elements section road decommissioning would all be accomplished under this alternative.

Management Requirements, Constraints and Mitigation Measures

The following items are included in all action alternatives, unless otherwise noted, and provide the measures necessary to keep project impacts at acceptable levels. These items would be applied to the proposal as it is implemented on the ground. Unless specifically identified as a mitigation measure, the following are considered either management requirements or constraints.

A) Soil Quality Mitigation Measures

Mass stability will be maintained (Forest Plan Soils S&G #1; FSM 2521.03.1.b R6 Supplement 2500-98-1), including stability of any existing landslides if discovered during project activities.

Soil productivity will be maintained by complying with Regional standards and guidelines in FSM 2521.03, R6 Supplement 2500-98-1. The standard is to "leave at least 80% of an activity area in acceptable soil quality condition." Specific standards are defined for soil compaction, puddling, displacement, burning, surface erosion and mass wasting. Guidelines are defined for organic matter and soil moisture regime.

Compliance with soil quality standards in FSM 2521.03, R6 Supplement 2500-98-1, will be determined through use of protocols described in "Interim Protocol for Assessment and Management of Soil Quality Conditions," Wallowa-Whitman National Forest, Version 3.3, September 2001 or subsequent version. Burn conditions will be monitored using "fire severity" (burn intensity) and "severity burn" (burn area) concepts in Fire's Effects on Ecosystems, by DeBano, Neary & Folliott, 1998, p. 63, as required by the current BAER manual, or appropriate modifications thereof to address thresholds in soil standards or hydrologic models.

The following soil guidelines from the Wallowa-Whitman National Forest publication, *Watershed Management Practices - Guide for Achieving Soil and Water Objectives,* (BMP's) are applicable to this sale:

Existing infrastructure: Existing landings and skid trails will be used as much as reasonable and practical.

Soil Moisture: Under saturated soil conditions no off-trail skidding or machine falling is allowed. . Existing skid trails will be used as much as reasonable and practical as well as use of BMPs such as waterbars and not operating in wet conditions mitigations.

Subsoiling: Evaluate activity areas for the need for subsoiling following use by the sale. In individual units with greater than 20% detrimental soil conditions (DSC) post-harvest, mitigation methods will be evaluated by the sale administrator and district watershed personnel.

Approved skid trails, maximizing use of existing skid trails and landings, logging over snow or frozen ground, or some equivalent system for limiting the impact and aerial extent of skid trails and landings will be used to limit cumulative increases from multiple entries in tractor logging areas.

Recommended tons per acre of coarse woody material for long-term soil productivity are listed with Wildlife constraints under "Snags and Down Woody Material" for wildlife and soils.

To minimize accelerated erosion and to provide for long-term soil productivity, 80-100% ground cover will be maintained in forestlands and 65-85% ground cover will be maintained in rangelands, except for short-term reductions associated with management activities, or where natural potential is limited. Standards for minimum percent effective ground cover during the first and second years following major disturbance are described in FSM 2500, R6 Supplement 2500-98-1, 2521.03. Erosion control methods are listed under the Water Quality and the Logging and Sale Design sections.

The guidelines from The Watershed Management Practices Guide for Achieving Soil and Water Objectives for the Wallowa-Whitman National Forest (Hauter and Harkenrider 1988) would be applied to this project during layout and implementation.

B) Water Quality

1. Water Quality Standards

Meet (or show progress toward meeting) water quality standards for Waters of the State of Oregon (Oregon Administrative Rules, Chapter 340-41) through project design, application and monitoring of best management practices (BMPs) as defined in the Code of Federal Regulations [40CFR 130.2(m)]. BMPs are used for various situations encountered during layout and administration of the timber sale contract and other activities. BMPs area listed in several sections of these constraints, including the "Logging and Sale Design" section, and in other documents, including the Wallowa-Whitman Watershed Management Practices Handbook, which is on file at the La Grande Ranger District.

2. Erosion Control Mitigation Methods

Highly disturbed areas (which may include: skid trails, roads, landings, road cuts and fills, etc.) will be seeded with a mix of native species, or a non-native species mix approved by the District Diverse Species Program (contact program coordinator for the exact species mix and seeding schedule). Non-native species may include one fast germinating annual grass species to provide immediate ground cover that facilitates establishment of native species. Seed application rates will be adjusted, as needed, to compensate for the broadcast method of application, and to generate vegetation densities adequate to provide a deterrent to noxious weed invasion.

Seed will be certified weed free, per the Wallowa-Whitman Integrated Noxious Weed Management Plan protocol.

Erosion control measures will be taken on all skid trails and temporary roads as needed. Spacing of waterbars will be determined by on the ground conditions and guidelines stated in the Sale Administration Handbook.

Slash and soil material may be left in the trail to divert water, or the subsoiling can be done to provide lead-off drainage from the trails.

C) Riparian Habitat and Fisheries Mitigation Measures

RHCAs were delineated along all riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems. RHCAs 1) influence the delivery of sediment, organic matter, and woody debris to streams, 2) provide root strength for bank and channel stability, 3) shade the stream, and 4) protect floodplains and water quality.

The following PACFISH RHCA widths described below are minimum widths to be applied in all treatment units. With the exception of site specific RHCA treatments within the RHCAs described under each action alternative, the remainder of the units will have no activity within these RHCAs:

1) *Fish Bearing Streams* – No harvest 300 feet on either side of the flood plain.

2) *Permanently Flowing Non-Fish Bearing Streams* – No harvest 150 feet on either side of the flood plain.

3) *Ponds, Lakes, Reservoirs, and Wetlands greater than 1 acre* – No harvest 150 feet from the edge of the wet area.

4) *Seasonally Flowing or Intermittent Streams, Wetlands less than 1 acre, landslide, and landslide-prone areas* - No harvest 100 feet on either side of the flood plain, no harvest within the extent of landslides and landslide-prone areas.

In ephemeral draws, trees will be left at a minimum of two large trees per 100 feet of draw bottom for future down woody material recruitment. All bank stabilizing, hardwood, and non-merchantable trees will be left.

Layout and marking of treatment units with treatments within the RHCAs will be done in conjunction with the watershed specialist identified for the project.

D) Wildlife

1) Down Woody Material (for wildlife and soils) Mitigation Measures

Where material is available, all treatment units (harvest and prescribed burn) will exceed the minimum levels for down woody material described in the table below for each species.

Table 2.4 – Minimum pieces of large down dead wood.

SPECIES	PIECES PER AC	PIECE LENGTH AND DIAMETER SMALL END		TOTAL LINEAL LENGTH
		Diameter	Min Length	
Ponderosa Pine	3-6	12”	6ft	20-40 ft
Mixed Conifer	15-20	12”	6ft	100-140 ft
Lodgepole pine	15-20	8”	6ft	120-160 ft

The above pieces per acre are the minimums required by the Forest Plan for wildlife and would be used in the appropriate contract provision; it is desirable to meet the following tons/acre of coarse woody material for soil productivity after harvest/burn operations:

Table 2.5 – Desired requirements for woody material.

TONS PER ACRE	PLANT ASSOCIATION
5-10	Douglas-fir/spirea, Douglas-fir/elk sedge, Douglas-fir/pinegrass, Grand fir/pinegrass, Ponderosa pine/pinegrass, ponderosa pine/elk sedge, ponderosa pine/snowberry
7-15	Grand fir/twinflower, grand fir/huckleberry, grand fir/spirea

Coarse wood material includes all diameter classes. The large (>12”) snags and logs should be protected during all phases of the project including prescribed burning.

Green Tree Replacements (GTRs) Mitigation Measures

In addition to the guidelines for logs and snags, sufficient green trees of adequate size would be retained in harvest units to provide replacements for snags and logs through time. Generally GTRs need to be retained at a rate of 25-45 trees per acre, depending on biophysical group. All harvest prescriptions in the Sandbox project would retain GTRs within or above this range.

2) *Raptors*

Active raptor nest sites found during field reconnaissance for this project will be protected during project activities. If active raptor nests are located during layout, marking, or project activities,

appropriate protection measures will be prescribed as described in the Wildlife Inventory document in the project file.

3) *Sensitive Habitats Mitigation Measures*

Plant communities adjacent to sensitive/unique habitats will be protected by maintaining vegetative structure characteristic of the edge inherent to these areas. These areas include cliffs, caves, talus, natural openings, and meadows. No harvest buffers, feathered buffers, or retention of higher basal area will be used to maintain the context of these features.

Buffer widths for sensitive habitats will be at least 100 feet, possibly more on some habitats. The degree of activity allowed within these buffers will vary depending on the type of sensitive habitat. Natural openings will generally not receive a buffer but will have prescription modifications to retain basal areas in the upper half of the management zone to maintain the integrity of the inherent edge for these areas.

Grassy scabs and meadows will not be used as locations for landings or skid trails unless no other location is practical. In those situations where landings are necessary, using the edge of these openings is preferred.

4) Big Game Winter Range

Logging operations will be conducted outside the period between December 15 through April 30 in the following units:

Affected Units: Alternative Two: 2-5, 65-67, 70-72, 119, 124, and 125
Alternative Three: 2, 4, 67, 72, 119, 124, 125

Waivers to operate during this time period may be requested and will be evaluated on a case by case basis by the District Ranger.

5) Management Indicator and Neotropical Migratory Species

If management indicator species, other than those protected by the design criteria and specifications or the stream buffers discussed earlier, are discovered in any units programmed for prescribed burning the following protective measures could be applied either separately or in combination to reduce possible impacts to snags with nest cavities, and to protect other nest sites during burning: a) fuel distribution (pull back) around snags, b) varied lighting techniques, c) fall burning, d) deferred burning until after the unit is no longer being used during the reproductive period.

E) <u>Fuels and Smoke Management</u>

Smoke Management Mitigation Measures:

Prescribed burning activities are coordinated with the Oregon Department Forestry Smoke Management Division and by BMIDC to assure that all air quality standards for personal health are met. Visual quality standards will be protected in the Eagle Cap Wilderness area during the peak recreational use period of July 1 through September 15. These actions respond to the non-key issue of air quality. All smoke generating project activities will comply with the Clean Air Act.

RHCA Burning Mitigation Measure Procedures:

During prescribed burning in harvest units, there will be no direct ignition within PACFISH RHCAs, fire will be allowed to back into RHCAs. Direct ignition will be prohibited within 300’ of class I streams, within 150 feet of class III streams, and within 100 feet of class IV streams.

Prescribed fire line will be kept to a minimum inside RHCAs. Brushline (no mineral soil exposed) will be constructed if necessary within RHCAs to keep fires from burning riparian vegetation.

Fisheries and watershed personnel will be notified prior to burning near RHCAs.

Prescribed Burn Units:

Prescribed burning in units that have been mechanically treated may be delayed 2-3 years after the completion of the mechanical treatment to allow the stand to recover from thinning induced stress. This decision will be coordinated with the project Silviculturist prior to any planned ignitions.

Prescriptions on Warm/Dry sites (open pine with grass understory) will limit burn effects to the low-severity burn class which means less than 17% high severity plus moderate severity will be allowed on treated grounds.

No direct ignition will occur immediately adjacent to large down logs or large snags.

Water sources needed during prescribed fire operations will consist of temporary sumps. Sites to be identified at a later date will be constrained by the following:

a) Locate site to minimize washout and erosion potential.
b) Springs and elk wallows will be avoided.
c) Avoidance of potential habitat of PETS plant species.

F) <u>Logging and Sale Design</u>

The sale area boundary will be the project area boundary as described under Project Area Description, section I of this EA and identified on alternative maps in the appendix.

All units with ponderosa pine listed as one of the principal conifer species shall be cut between July 1st and December 1st to mitigate for *Ips* bark beetle impacts.

Trees selected for retention under the Tree Improvement Program will be protected during project activities.

No trees used as anchor trees along a fence line shall be marked for harvest.

Slash piles will not be constructed or burned on scablands.

7700 Road Corridor

New temporary roads and landings may be evident but must remain subordinate to the shape and pattern of the natural appearing forest canopy. By placing and designing roads and landings in a manner that is subordinate will reduce visual impacts.

The HPO portion of unit 8 would not be adjacent to the 7700 road and therefore would be screened from view by the remainder of the stand.

Soil and Water Mitigations:

Excluding Unit 5, skyline yarding units will have full suspension over RHCAs (Alternative 2 – Units 33, 41, 44, 45, 48, 67, 69, 75, 76, 81, 82, and 84; Alternative 3 – Units 33, 41, 67, 69, 75, 76, 81, and 82). No corridors are needed through the RHCA for removal of material since no treatment of RHCAs is proposed in the majority of skyline units. Occasionally a tree may need to be cut down to facilitate raising of the cable. With the exception of Unit 5, trees cut within the RHCA to facilitate raising of the cable would be left on site since there is no yarding within RHCAs.

In Unit 5 yarding corridors may need to be cut within the buffer if deflection is inadequate to provide for lift completely over the no harvest portion of the RHCA buffer. A corridor approximately 12 feet in width may be required. Any trees cut to create this corridor would be left on site. Natural openings will be taken advantage of when possible. Full suspension will be required over stream channels and no activity buffers. One end suspension would be required through the remainder of the RHCA.

Generally, ground-based yarding will not occur on ground steeper than 35%. Ground-based yarding on slopes over 35% and greater than 200 feet distance will be identified during pre-sale activity (layout and marking) and approved by the Forest Service Representative/Sale Administrator and district hydrologist/fisheries biologist.

Short, steep areas in tractor ground (up to 200 feet and 50% slope) should require winch lines on all skidding equipment operating on those slopes or use of forwarders which provide full suspension of logs during skidding/yarding.

Skid trails will not be located in ephemeral drainage bottoms and will not cross ephemeral draws on an average of more than once every 200 feet of linear distance.

Designated skid trails will be pre-approved in advance of felling operations by the Forest Service Representative or Sale Administrator to minimize detrimental soil impacts. A unit-by-unit evaluation of detrimental soil conditions will be made in sensitive units upon completion of logging activities. Where detrimental soil impacts exceed twenty percent (20%) of the total acreage within the project area, including landings and system roads, restoration treatments will be considered. Detrimental soil conditions include compaction, puddling, displacement, and severe burning, surface erosion and mass wasting.

Recommended average minimum skid trail spacing for ground-based equipment is 60 feet, center to center for mechanized harvesting, and 80-100 feet for conventional hand felled trees. Require directional felling to minimize soil disturbance during skidding operations. Recommended minimum skyline corridor spacing is 150 feet, center to center, to minimize ground disturbance and protect residual trees. See Soil Quality section.

The normal operating season for the analysis area is July 1 to October 31.

Winter logging over snow and/or 4” of frozen soil or skid trail and landing subsoiling would be required for tractor yarded portions of units 6, 7, 10, 20, 42, 52, 73, 78, 79, 80, 83, and 85 (Alternatives 2 and 3). These units could be near 20% DSCs post-harvest assuming use of existing skid trails and landings. These units would also require monitoring during project implementation by the sale administrator and soils specialist (refer to Monitoring section).

Utilize existing user built roads where possible to avoid previously undisturbed soil when designating temporary road or skid trail locations.

To prevent road damage and maintain water quality, road use will be restricted to dry or frozen conditions. If road use is approved outside the normal operating season, drainage structure will be kept in a functional condition, and daily operations will be managed to minimize sediment transport from roads. Operations will cease when roads turn muddy and/or rutting occurs, resulting in sediment transportation. Reference the district forest roads and erosion control document in analysis file, transportation section.

Temporary roads will not be constructed immediately adjacent to or within riparian areas. Any planned reconstruction or construction of roads crossing riparian areas will not alter stream or groundwater flow characteristics to the extent that it will impact the riparian area. Locate roads to avoid paralleling stream channels in streamside management units. Roads will be managed to minimize impacts to

water quality and fish and wildlife habitat. Design and maintain road drainage to prevent the influx of significant amounts of road sediment runoff into stream courses.

Temporary roads will be obliterated at the completion of harvest activities and put back into production. Obliteration may include re-contouring, scattering slash, subsoiling, and seeding, as ground conditions dictate.

Drainage structures will be installed and maintained on all open roads within RHCAs, using spacing guides listed in the Watershed Management Practices Handbook.

Road maintenance will maintain existing drainage features. Post-haul maintenance will protect the road surfaces during future periods of inactivity and may require construction of additional drainage features. Cross drains will not discharge onto erodible slopes or directly into stream channels, including ephemeral drainages.

G) Range Mitigation Measures

Allotment boundary fences and other improvements damaged during the grazing season must be repaired to their functional condition immediately and damage outside the grazing season must be repaired two weeks prior to permitted livestock entry. Any damage occurring to existing range improvements should be reported to the District range manager and/or private landowner. This responds to the non-key issue of range and livestock management.

All range improvements will be protected during prescribed burning activities. If damaged they will be repaired as discussed above.

H) Proposed, Endangered, Threatened, and Sensitive Species (PETS)

Biological evaluations and/or assessments have been completed for plants, fish, and wildlife PETS species. Contract provisions will be included to provide for the protection of areas where PETS occur and for those that may be discovered in the area during the contract period.

I) Managing Competing and Unwanted Vegetation

An assessment report of known noxious weed populations is available in the Analysis File. Noxious weed locations also appear on project maps in the analysis file. If new noxious weed infestations are located within the project area, a noxious weed inventory and site assessment will be completed.

The analysis for vegetation management is conducted in accordance with the 1990 Forest Plan Standards and Guidelines, the 1998 Forest Noxious Weed EA, the Integrated Noxious Weed Management Plan - Wallowa Whitman National Forest (INWMP, 1992), and the 2005 Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants FEIS. Management activities will give consideration and evaluation of prevention strategies during the planning process (INWMP, Chapter V. Prevention Strategies, Section B).

The following measures shall be implemented to reduce new establishment or spread of noxious weeds and responds to the non-key issue of noxious weeds:

1. Noxious weed locations are on maps located in the Sandbox analysis file. A copy of these will be included in the contract preparation package, for use by the sale administrator. These sites will be reviewed with the contractor and mitigations explained.

2. Treatment of the noxious weed sites located along haul route roads should be a high priority, along with monitoring.

3. Pre-treatment of weeds along closed roads prior to opening, is recommended. Any soil disturbance should be reseeded, if necessary, and the roads should be monitored following re-closure. Native species should be used where appropriate.

4. Any burn piles should be monitored and reseeded with desirable native grass and forbs species.

5. Rock pit and sources should be inspected, and cleared prior to use of any materials (see Standard 7).

6. Before road maintenance activities on roads with active infestations occurs the contracting officer (COR) will contact the District Noxious Weed Coordinator, to inform them of maintenance plans. The Noxious Weed Coordinator will take the appropriate action to treat the noxious weeds on the infested portions of these roads. (Note: Recommended treatment includes removal of previous year's stalks, to be conducted before maintenance activities occur there; and maintenance activities should not be conducted after the current year's plants have bolted and flowered (mid to late June) unless prior treatment of current year's growth occurs.)

7. If new noxious weed infestations are located within the project area, a noxious weed inventory and site assessment (as defined in the W-W INWMP) will be completed. Location of other species, conditions or future treatments may require additional analysis to determine the appropriate treatment method.

8. All mapped weed sites will be designated as "Areas to Protect" (no decking, skidding or equipment) and include in the contract package (use C.512), for use by the sale administrator. Logs should not be skidded or yarded through areas infested by noxious weeds. Landings and log decks should not be built on or near sites of noxious weed infestation.

9. Roads to be closed will be inspected for known and new noxious weed infestations (and treated as determined to be necessary) prior to road closure. When opened for logging operations, Sale Administrator will notify the Noxious Weed coordinator. Known infestations should be designated as “Areas to Protect”, and no grapple or hand piling of slash should be allowed there.

10. Highly disturbed areas (which may include: skid trails, landings, road cuts and fills, etc.) will be seeded. The seed mix to be used will consist of native species, or a non-native species mix, to be approved by the District Diverse Species Program. This may include one fast germinating annual grass species to provide immediate ground cover. Seed application rates will be adjusted, as needed to compensate for the broadcast method of application, and to generate vegetation densities adequate to help in deterrence of noxious weed invasion.

11. Seed will be certified weed free, per the Wallowa-Whitman INWMP protocol.

12. All hay or straw used for mulching, erosion control, or other rehabilitation purposes will be weed free (per the Wallowa-Whitman INWMP protocol).

13. All equipment to be operated on the project area will be cleaned in a manner sufficient to prevent noxious weeds from being carried onto the project area. This requirement does not apply to passenger vehicles or other equipment used exclusively on roads. Cleaning, if needed, will occur off of National Forest System lands. Cleaning will be inspected and approved by the Forest Officer in charge of administering the project. (Use D.6343 Option #2).

J) <u>Water and Material Sources</u>

Material sources, if needed, will be existing sources. No expansion of sources is anticipated. All work will stay within existing source boundaries. The following rock pits have been identified for project use pending noxious weed inventories (see #11 above):

Table 2.6 - Rock source locations

Pit Name	Road Number	Township, Range, Section
Corral Cr	7700620	T5S, R42E, Section 21
Taylor Green	7700050	T6S, R42E, Section 2
Buck Creek	7787000	T5S, R42E, Section 8
Unnamed	7787155	T5S, R42E, Section 8
Unnamed	6205050	T5S, R42E, Section 19
Unnamed	6220280	T5S, R42E, Section 17

Water sources will be designated from the La Grande Ranger District Water Source Inventory. Available water sources within this area are as follows:

North Fork Catherine Creek, South Fork Catherine Creek, and Buck Creek

K) <u>Precommercial Thinning</u>

The following constraints will apply to all precommercial thinning (PCT) units:

1. Vegetative visual screens will be maintained adjacent to roads open to vehicular traffic (See District Access and Travel Management Plan) to reduce sight distances and mitigate the reduced big game security.

2. All snags within thinning units will be maintained on site to provide wildlife habitat. Dwarf mistletoe-infected lodgepole pine trees up to 9 inches DBH will be cut.

3. Appropriate contract clauses to protect cultural resources and Proposed, Endangered, Threatened, or Sensitive (PETS) species will be incorporated into the final contract to protect these resources should they be discovered during project implementation.

4. Special or unique features such as rock outcroppings and wet meadows were avoided through thinning unit design (See Wildlife Habitats in Managed Forests in the Blue Mountains of Oregon and Washington, Thomas 1979, on file at the La Grande Ranger District Office). However, if additional features are encountered during unit layout, well defined edges around these areas will be achieved by retaining a feathered no-cut buffer of at least a hundred feet projected into the stand from the outer edge of the ecotone (area where there is a marked difference in vegetative communities).

5. Thinning design will incorporate concerns related to biodiversity and wildlife habitat. This includes, but is not limited to, developing a mosaic throughout the landscape by leaving areas un-thinned, variable leave tree spacing, and maintaining as much overstory as possible (consistent with item #3 above) within thinning units. Activities will be coordinated with district wildlife personnel.

6. Thinning will be accomplished when possible, while trees are less than 2” in stem diameter. Trees of this size have faster decay rates and fuel loads will be reduced sooner. Where PCT slash affects a large area (40 contiguous acres) whether from this years or previous years, activity will be spread out over several years to reduce fuel accumulations. This mitigation may be waived by the fuels management specialist assigned to the project if determined that fuel loadings are at acceptable levels. Generally 2-3 years is required for needles to fall off, at which time the fire hazard is significantly reduced.

7. Slash treatment is required within 100 feet of an open collector (4 digit) road. Treatments will consist of pull back of all slash 5 feet beyond the shoulders on each side. In areas with cut and fill

construction, this distance shall be measured from 5 feet beyond the top of the bank to 5 feet beyond the point where the shoulder meets the fill slope (i.e. hinge point of road shoulder and fill slope). All roads shall be kept free of thinning slash, whether the road is blocked by barriers or not. Within the 100 foot area along the roads maximum slash depth will be 18 inches; boles over 15 feet and greater than 2 inch cut diameter shall be bucked in half.

8. Slash treatment is required within 200 feet of private land boundaries. Treatments will consist of pull back of all slash within 5 feet of the edge of private lands. Within 200 feet of the boundary maximum slash depth will be 18 inches; boles over 15 feet and greater than 2 inch cut diameter shall be bucked in half.

9. All units with ponderosa pine listed as one of the principal conifer species shall be cut between July 1st and December 1st.

10. Special areas (springs, seeps, etc) will be given a 50 foot buffer.

11. Leave trees shall be selected within the following order of species preference, the most preferred species listed first: ponderosa pine, western larch, Douglas-fir, Engelmann spruce, white/grand fir, and lodgepole pine. This order of preference only applies if the trees are free of damage or defect.

12. Active raptor nest sites will be protected by seasonal restrictions. If raptor nests are found, restrictions will apply (see project file). Appropriate contract clauses will be incorporated into the final contract for protection of raptor nest sites if any are discovered during project implementation.

13. Slash shall be immediately removed from all open roads. Trees will be felled away from roads and established trails. Pull back of all slash will occur 5 feet beyond the shoulders on each side. In areas with cut and fill construction, this distance shall be measured from 5 feet beyond the top of the bank to 5 feet beyond the point where the shoulder meets the fill slope (i.e.hinge point of road shoulder and fill slope). All roads shall be kept free of thinning slash, whether the road is blocked by barriers or not. A spotter shall be required when felling trees which may reach the roadway.

L) Cultural Resource Protection Mitigation Measures

Several existing historic and prehistoric sites are located within the project area. Sites requiring protection have been mapped and layout of units coordinated with the project archaeologist to avoid all known sites.

Prescribed burning within the project area has the potential to affect several known sites. Layout and burn plans for all prescribed burning within the project area will be coordinated with the map of known sites and the project archaeologist before ignition to provide adequate avoidance/protection.

No new cultural sites were discovered during surveys in proposed activity areas for this project. However, should any sites be discovered during project activities, the Wallowa-Whitman Forest Archaeologist will be notified immediately and appropriate protection measure employed.

M) Recreation

Maintain the character of dispersed camping sites by cleaning up project-created slash. Maintain access to dispersed sites on roads to be left open. Leave adequate space for camping at the point where roads are closed.

N) Improvement-Mitigation Measures with KV or Appropriated Funds

The following projects were identified by the ID team and prioritized in the following order:

ESSENTIAL KV –

A) Site Preparation (whipfelling, burning)
   Alternative 2:
      208 acres burning @ $80/ac + 68 acres whipfelling @ $150/ac = $26,840
   Alternative 3:
      55 acres burning @ $80/ac + 36 acres whipfelling @ $150/ac = $9,800
B) Planting
   Alternative 2:
      208 acres @ $500/ac = $104,000
   Alternative 3:
      55 acres @ $500/ac = $27,500

MITIGATION (Non-essential KV - in order of priority)

A) Noxious weed control - Grass seeding, control, and monitoring.

- Seeding - 15% of tractor and landing acres @ $15 per acre.
- Control - 1% of seeded acres @ $189 per acre. (hand work or chemical if available)
- Monitor KV Work (seeding and control) - @ $2.88 per acre.

ENHANCEMENT

Table 2.7 – Enhancement KV Projects in order of Priority

Indicator	Alt 2	Alt 3
1. Release Treatments (@$220/ac)	$502,260	$390,500
2. Prescribed Burn Fuels Reduction (@$80/ac)	$80,000	$80,000
Total	**$582,260**	**$470,500**

Sandbox - Alternatives at a Glance

Table 2.8 – Sandbox Alternatives

Alternative Elements		Alt 1	Alt 2	Alt 3
Project Area Boundary (PAB) Acres		0	**16,134**	**16,134**
Harvest Treatment Acres (total)		0	**2,193**	**1,465**
Total Acres Treated by Prescription Type (Commercial) (*HPO treatments part of HIM units except Unit 68)	HFU	0	5	5
	HIM*	0	680	520
	HOR	0	55	47
	HPO*	0	24	14
	HSA	0	116	105
	HSH	0	165	0
	HTH	0	1,148	774
Noncommercial Treatments				
Total Acres Treated by Prescription Type (Noncommercial)	FFU (No commercial removal)	0	431	431
	Precommercial Thinning (PCT)	0	128	128
Post-Treatment Activities				
Post-Treatment Activities	Precommercial Thinning	0	2,155	1,647
	Grapple Pile/Slashbuster	0	1,434	1,001
	Handpile & Burn	0	363	280
	Planting	0	208	55
	Whipfelling	0	301	175
	Burning for Site Preparation	0	208	55
	Burning for Slash Reduction	0	1,103	788
Prescribed Fire	Total Burn Block Area	0	15,938	15,938
	Approximate Actual Burn Area	0	7,465	7,465
Treatments within the RHCA	Precommercial Treatments (acres)	0	10	10
	Fuel Reduction Treatments (acres)	0	40	40
	Commercial Harvest Treatments (acres)	0	7.5	4.5
Yarding Systems	Ground Based Tractor and/or Forwarder	0	1,706	1,234
	Skyline Yarding	0	487	231
Road Work	Temporary Roads (miles)	0	5.2	0
	Closed Roads for Admin. Use (miles)	0	21.9	12.4
Enhancement/Safety Work	Danger Tree Removal	No	Yes	Yes
	Road Decommissioning (mi.)	0	1.8	1.8
Fuelwood Removal Areas	Selected Roads	No	Yes	Yes
Harvest Volume in million board feet (MMBF)	Sawtimber Volume	0	5.01	3.23
	Cull Volume	0	1.61	1.12
	Total Volume (MMBF)	0	6.62	4.35

Comparison of How the Alternatives Respond to the Key Issues

The following table compares each alternative with the key issues and key indicators identified in section I.

Table 2.9 – Alternative Comparisons

Comparison Factors		Alternatives		
Key Issue	**Key Indicator(s)**	**1**	**2**	**3**
Improvement of Long-term Forest Health Conditions	Acres of overstocked acres treated. Percent of overstocked acres treated	0 0	2,752 34%	2,024 25%
OFSS is below the historical range of variability	Acres of OFMS restored to OFSS	0	727	522
Area is outside of historic fire return intervals	Treatment acres of conditions class 2 or 3 treated within fire regimes 1, 2 and 3.	0	2,624	1,896
Fire Behavior	Crown Fire Potential Torching Index Crowning Index	 0 53	 195 63	 195 63
	Fire Type – Crown or Surface	Passive Crown	Surface	Surface
	Flame Length (feet)	17	1-2	1-2
	Rate of Spread in (chains per hour)	35	6	6
Economics	Predicted High Bid in dollars/CCF	0	-$2.48	$20.67
	Present Net Value in dollars • Timber Sale & Related Projects • Timber Sale & Non-Timber Projects	 0 0	 -$504,160 -$1,845,909	 -$192,329 -$1,534,050
	Number of Jobs	0	21.1	17.8

Monitoring Plan

Monitoring specific to project activities, and not in conjunction with research studies, would be accomplished to assure that activities conform to objectives of the Forest Plan. Project level monitoring is a component of Forest Plan monitoring. The following types of monitoring will be accomplished:

Implementation Monitoring - Are mitigation measures and BMPs being implemented as planned?

For example, monitoring of sale layout and timber designation will occur to assure proper application of all identified resource objectives, constraints, and mitigation measures. Monitoring will also consist of timber sale contract administration to ensure that all required mitigation measures are properly implemented and are effective.

Included in the monitoring activities is compliance monitoring of Proposed, Endangered, Threatened, and Sensitive species (PETS). If PETS species are discovered in the area during project activity

they will be protected in accordance with appropriate contract provisions. Additional site monitoring by the district fisheries and watershed staff during road construction, pre-sale layout and marking, and timber harvest will be undertaken to assure compliance with water quality standards, hydrology, and soil parameters.

Effectiveness Monitoring - Did mitigation and protection measures result in desired effects?

A walk-through survey of the project area during implementation and after sale closure will be conducted to qualitatively monitor on-site and downstream effects of project implementation.

If monitoring shows that mitigation measures of BMP's are not being implemented as planned or are not being effective in meeting resource objectives, activities will cease or be modified to correct problems.

Handwork within RHCA's will be monitored to determine vegetative responses.

Other

Prescribed Burning Monitoring - Fire Management will conduct monitoring of the prescribed burned acres as outlined in the Wallowa-Whitman Prescribed Burn Monitoring Plan.

Noxious Weeds - The following elements will be monitored and documented; for a list of the species and the responsible person, refer to the Noxious Weed Report in the analysis file:

Table 2.10 – Noxious Weed Monitoring

Type	Activity Monitored	Frequency and Timing	Responsible Person
Implementation	Noxious weed inspections, equipment cleaning, weed infestation avoidance, weed inventory, documentation and communication.	Daily during active operations near noxious weed infestations.	Sale Administrator
Effectiveness	Noxious weed survey and inventory	Annually for 3 years following project end.	Zone Invasive Plant Coordinator
Implementation	Broadcast seeding of disturbed soil along roads, skid trails and landings.	Immediately following soil disturbance	Sale Administrator and Road Maintenance Foreman or COR
Implementation	Road rock sources, pits and/or quarry noxious weed inspections	Prior to use for road construction, reconstruction or maintenance	Zone Invasive Plant Coordinator; Zone Engineer
Implementation	Noxious weed avoidance while prescribed burning	Prior to lighting burn	FMO

Fisheries and Watershed - The following is a list of monitoring activities for fisheries and watershed resources, which have been or will be implemented prior to and following the completion of the project. These activities will provide information on evaluation of the sale and for future planning of projects in the area.

a. Monitor the project to ensure that all standards and guidelines in the Wallowa-Whitman Forest Plan are met through implementation of mitigation measures as identified by the interdisciplinary team.

b. Pre-project monitoring for each Forest Management project includes on the ground survey of the project area, and the proposed treatment units. Monitoring of the proposed treatment units includes survey of any stream channels, RHCAs, slope stability, and general riparian vegetation characteristics.

c. Monitoring of the implementation of the project and protection measures will take place throughout the life of the project by the TSA and Watershed Specialist. For example, if an intense thunderstorm caused overland flow and subsequent excessive soil displacement or sediment production, harvest operations would cease until the soil moisture decreased or protection measures were complete. Potential effects from log haul on roads which parallel RHCAs will be monitored throughout the life of the project by the TSA and Watershed Specialist. Timber harvest operations would be halted if adverse impacts are observed at any point during the operation.

Soils - Monitoring would be undertaken to:

1. Ensure that best management practices and mitigating measures incorporated into the sale are being followed.
2. Determine if these practices and measures are adequate to meet the intent of management directives.

   Monitoring will occur on 10% of the Sandbox activity units to ensure DSC levels remain below Forest Plan minimums for the affected area.

   Monitoring of sale layout and contract administration will be undertaken to ensure proper application of all identified constraints and mitigating measures. Ground-based harvest units will be monitored to ensure adequate spacing between skid trails, restriction of equipment to skid trails, prevention of wet weather yarding, and effective subsoiling of compacted skid trails and landings.

   Post-harvest activities will be monitored to ensure that guidelines to minimize soil disturbance are being followed. Site preparation activities such as area subsoiling and burning will be monitored to ensure the purpose is achieved without causing additional soil damage

3. Special emphasis for monitoring is recommended for the following units: Units 6, 7, 10, 20, 42, 52, 73, 78, 79, 80, 83, and 85 all have high compaction potential. It is recommended that additional BMP effectiveness monitoring take place during project implementation in these units, with a special emphasis on proper water bar construction and spacing.

Table 2.11 - Wildlife Monitoring Summary

What	Type	When	Who	Why
Snags, logs Sample of units	Implementation	During logging, one year after logging	TS administrator & wildlife personnel	To determine if prescribed material was retained

Chapter III: Environmental Consequences

A. Introduction

To facilitate the reader's understanding of the effects analysis, this chapter describes the current resource conditions to provide a baseline for assessing effects associated with proposed activities. The No Action Alternative (Alternative 1) and Action Alternatives (Alternatives 2 and 3) are described in detail in Chapter 2, and a comparison of the alternatives is presented in the Alternatives At A Glance table in Chapter 2. Chapter III discloses the anticipated environmental consequences of the No Action and the Action Alternatives on various resources for which there are potential direct, indirect and cumulative impacts. The effects analysis forms the basis of comparison of the alternatives through evaluation of the key issues and select non-key issues.

The duration and geographic scale of direct, indirect, and cumulative effects varies, and is addressed by each resource and subject area. In addition, the type of projects considered under the cumulative analysis varies according to the resource and nature of project being considered. Key indicators will be used to measure how each alternative responds to key issues. The effects will be discussed by resource or subject area, with key issues and indicators addressed as appropriate.

For the purposes of this EA, the cumulative impacts are the sum of all past and present actions, and reasonably foreseeable future actions. Past activities are considered in the existing condition baseline for this project. Present and reasonably foreseeable future activities are described in Appendix D of this EA. The purpose of the cumulative effects analysis in the EA is to evaluate the significance of the No Action's and Action Alternatives' contributions to cumulative impacts. A cumulative impact is defined under federal regulations as follows:

> "...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 regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

The best available science is considered in preparation of this EA; however, what constitutes best available science might vary over time and across scientific disciplines. As a general matter, we show consideration of the best available science when we insure the scientific integrity of the discussions and analyses in the project NEPA document. Specifically, this EA and the accompanying Project Record identifies methods used, references reliable scientific sources, discusses responsible opposing views, and discloses incomplete or unavailable information, scientific uncertainty, and risk (See 40 CFR, 1502.9 (b), 1502.22, 1502.24).

The Project Record references all scientific information considered: papers, reports, literature reviews, review citations, academic peer reviews, science consistency reviews, and results of ground-based observations to validate best available science. This EA incorporates by reference (as per 40 CFR 1502.21) the Project Record, including specialist reports and other technical documentation. Analysis was completed for the following resource areas: Silviculture, Wildlife, Botany, Proposed, Endangered, Threatened, and Sensitive (PETS) Species, Fire/Fuels, Economics, Soils, Watershed and Fisheries, Access and Travel Management, Range, Noxious Weeds, Cultural/Heritage, and Recreation/Visuals. Information from these reports has been summarized below in this Chapter. The Project Record is located at the La Grande District Office.

B. Alternative Evaluations as They Respond to the Key Issues

Silviculture/Vegetation Management – Improvement of Long Term Forest Resiliency

Introduction

Several factors in the Sandbox Analysis Area affect overall landscape health as described by tree health and vigor and insect/disease susceptibility. These factors are major silvicultural concerns to implementing the Wallow-Whitman Forest Plan in regards to the timber standards and guidelines and direction for management areas 1 and 3 which emphasize promoting vigorous healthy trees commensurate with the productive potential of the sites providing for a mixture of stand ages and sizes and a high level of wood fiber and forage production as well as habitat diversity for big game habitat.

Existing Condition

The following 3 biophysical environments are found within the Sandbox project area:

1) Moist Upland Forests: which includes grand fir/queen's cup, grand fir/twinflower, grand fir/big huckleberry, lodgepole (grand fir)/twinflower, lodgepole/big huckleberry, and Douglas-fir/oceanspray plant associations.

2) Dry Upland Forests: grand fir/pinegrass, grand fir/spirea, Douglas-Fir/pinegrass, Douglas-Fir/snowberry, Douglas-Fir/spirea, Douglas-Fir/ninebark, Douglas-fir/elk sedge, Douglas-fir/big huckleberry, ponderosa pine/idaho fescue, ponderosa pine/pinegrass, ponderosa pine/bluebunch wheatgrass, ponderosa pine/spirea, ponderosa pine/snowberry plant associations.

3) Cold Upland Forests: lodgepole/(grand fir)/pinegrass, lodgepole (subalpine fir) (grand fir)/grouse huckleberry and grand fir/grouse hucklebery plant associations.

Ninety-one percent of National Forest System lands in the Sandbox analysis area are forested. When classified using potential vegetation groups (PVG), approximately sixty-six percent of the forested acres are "moist upland forest", thirty-two percent of these forested lands are "dry upland forest", and two percent are "cold upland forest" (Table 1).

Table 3.1 - Potential vegetation groups (PVG) of the Sandbox forested analysis area

PVG	Acres	Percent
Moist Upland Forest	9,577	66
Dry Upland Forest	4,640	32
Cold Upland Forest	387	2
Total	**14,604**	**100**

COLD UPLAND FOREST GROUP - These sites are low to moderate in productivity. This group consists of 387 acres in the planning area and is 2% of the forested acres. Stands proposed for treatment either have considerable percentage of existing basal area in "non-releasable" suppressed and intermediate trees or stand density index (SDI) values which exceed the LMZ levels. Existing suppressed and intermediate crown class trees within stands proposed for density management exhibit crown ratios well below 30 percent. In addition, roughly 10-20 percent of the codominant trees also display poor crown ratios. This group is very susceptible to fires and can sustain stand replacement fires. Lodgepole, which in many areas is a major component of this type, is also susceptible to mountain pine beetle infestation which can become a serious problem. Many of these stands would remain in a dense, low vigor condition until a disturbance occurs.

Current structure is dominated by the stand initiation and understory re-iniation stages (66%). There are 253 acres in these types.

MOIST UPLAND FOREST GROUP - These sites are the most productive in the Blue Mountains. The degree of damage from insects is variable and depends upon factors such as species composition, tree size, tree vigor and occurrence of root/bole decays. Existing condition in these stands are a mix of species of all sizes. Insects and diseases observed in these stands include several root rots, mountain pine beetle, indian paint fungus, fir engraver, and mistletoes. Mortality in many stands is less than 10% of the overstory with many of the intermediate tree class exhibiting live crown ratios less then 20%. Current structure in this biophysical environment is dominated by the old forest multistory (30%) and the understory re-iniation (46%) stages. One hundred and twenty-four stands of this type were reconned and 50% have a stand density that is above the lower management zone. There are 9,577 acres of this type in the planning area.

DRY UPLAND FOREST GROUP - Dry upland forest sites are moderate in productivity and past harvest activities and fire exclusion have led to changes in species compositions, and increased stocking levels, fuel loadings and understory components of these stands. Historically, many of these stands were dominated by shade intolerant species maintained by fire. The exclusion of fire and past harvest of seral species has resulted in increased proportions of shade tolerant species and development of dense, multi-story stand strucutres. Species composition in these stands are a mix of ponderosa pine and Douglas-fir with some grand fir and western larch of poles to large sized trees. Understories are dominated by seedlings and saplings mostly of grand fir and Douglas-fir with pinegrass and sedges. Mortality in most stands is less then 5% of the overstory. There are 4,640 acres of this type in the planning area. Current structure in this group is dominated by the old forest multistory (45%) and understory re-iniation (38%) stages. Fifty-nine stands of this type were reconned and 78% had overstocked conditions and/or poor live crown ratios.

Overstocking can lead to an increase in beetle populations, reduced health of the stand, decreases in production of both the overstory and understory, and alter stand structures and compositions. In many instances, stress, particularly drought stress is compounded by overstocking (Fiddler, et.al., 1995). This stress can lead to losses in tree growth and increases in insect and disease caused mortality. Appropriate stocking levels can help to increase tree growth and the fire, insect, and disease resistance of stands (Lambert, 1994).

The acreage and associated percentage of overstocked stands treated will be used to measure the effectiveness of the alternatives towards reducing density and enhancing overall forest resiliency.

The Key indicator is as follows:

- Percent of overstocked stands treated within the project area
- Acres of overstocked stands treated within the project area

Effects Analysis

Assumptions

The project area as described in Chapter 1 is the analysis area for the Silvicultural analysis.

Current management maintains stands within a range of densities. The lower range or lower management zone (LMZ) would maintain stocking at a point where a significant portion of the site resources is captured in tree growth. The upper range of density or upper management zone (UMZ) prevents the establishment of a suppressed tree class to develop. Stands near or above the UMZ are more likely to develop stress, be less vigorous, and contain more mortality/self-thinning.

To restore and maintain the landscape, silvicultural treatments can be used to modify forest structure and composition, and rejuvenate the forested landscape in the analysis area. Improvement cuttings, shelterwood, commercial thinning, and salvage/sanitation are types of silvicultural methods that can improve landscape health, reduce the risk of insects, diseases, and wildfire (Powell, 1999, Graham et.al. 1999, Torgenson, 2001, Starr et. al 2001, Thies, 2001, Graham and McCaffrey, 2003, Fettig et. al. 2007). Treatments can provide a range of structures for the long term, release potential of the sites, and alter species composition.

Insects and diseases can cause growth reduction, mortality, defect and decay. On an ecosystem health basis a certain level of tree insect/disease activity is expected (Schmitt 1994). Trees may be predisposition to attack by insects or diseases by various factors including fire, overstocking, and the existing level of insects and diseases. Stand density is one of the most important factors influencing certain insect populations; dense stands increase tree competition, which increases stagnation and development of a suppressed class of trees, which can lead to outbreaks (Scott 1996). Another important factor to spread of insects/diseases is species composition. Current philosophy is to manage the level of insects/diseases and their affects, to within the range that is believed historical (Schmitt 1994). Most root diseases are believed to have increased in their virulence and occurrence in the Blue Mountains (Schmitt 2001).

Many stands in the Sandbox Planning Area have suppressed and intermediate trees and stocking levels exceed recommended numbers in stands across all potential vegetation groups. Overstocking and poor tree conditions can lead to an increase in beetle populations, reduced health of the stand, decreases in production of both the overstory and understory, and alter stand structures and compositions. In many instances, stress, particularly drought stress is compounded by overstocking (Fiddler et al., 1995). This stress can lead to losses in tree growth and increases in insect and disease caused mortality. Appropriate stocking levels can help to increase tree growth and fire, insect, disease resistance of stands (Lambert 1994). The number of stands treated would measure the effectiveness of the alternatives towards reducing stand density.

Treatments in stands, especially in the understory reiniation stage, will anchor habitats of late and old structure across the landscape. There are several factors in the Sandbox Analysis Area that affect overall landscape health as described by tree health and vigor and sustainability. These factors are major silvicultural concerns to implementing the Wallow-Whitman Forest Plan and ecosystem management.

According to the Intergovernmental Panel on Climate Change, there has been a clear pattern of temperature increases and long-term trends in precipitation changes (Kimbell, 2007). The panel concludes that disturbances from pest, diseases, and fire are projected to have increasing impacts on forests. Insect life cycles are highly sensitive to temperature; climate change can have a large impact on the development, survival, and distribution of insects (Mock, et.al. 2007, Redmond, 2007). Recent warming trends have caused mountain pine beetle infestations in areas that have not previously recorded outbreaks in British Columbia and this increase has occurred largely in part due to a shift in climate (Carroll, 2007, Beukema, et.al. 2007).

Environmental changes from ongoing climate changes could create forests that are ill adapted to conditions and more susceptible to undesirable changes (Millar et.al. 2007), such as extreme events due to insect and disease outbreaks and wildfire. Management strategies can assist forests in becoming more resistant and resilient under climate-induced change.

Table 3.2 - Summary of Acres Treated and Volume Harvested

ALT	Total Acres	Volume (MMBF)	Prescriptions (Acres)								
			HPO	HSA	HIM	HTH	FFU	HOR	HSH	SPC	HFU
1	0	0	0	0	0	0	0	0	0	0	0
2	2,752	6.62	24	116	680	1,148	431	55	165	128	5
3	2,024	4.35	14	105	520	774	431	47	0	128	5

Direct effects – changes in structure and composition and associated changes in health/resiliency. Indirect effects – facilitate development of desired structures/compositions (i.e. diameter growth rates, appropriate species compositions), enhanced resiliency to natural disturbances and changes in climate.

No Direct, Indirect, or Cumulative Effects

The following restoration activities associated with the Sandbox Vegetation Management project are of such limited and constrained nature they would not disturb the forested vegetation in the project area and would therefore have no effect on Vegetation resources or activities.

- Danger Tree Removal
- Fuelwood Areas
- Road Decommissioning
- Snag Retention

These activities and their effects will not be discussed further in the Vegetation section.

Direct and Indirect Effects on Vegetative Health

ALTERNATIVE 1 – NO ACTION

The following discusses the direct and indirect effects on the biophysical environments within the project area of not managing the vegetation under the no action alternative.

Stands considered for treatment either have considerable percentage of existing basal area in "non-releasable" suppressed and intermediate trees or stand density index (SDI) values which exceed the LMZ levels. Existing suppressed and intermediate crown class trees within stands proposed for density management exhibit crown ratios well below 30 percent. In addition, roughly 10-20 percent of the codominant trees also display poor crown ratios. In the absence of density management stands would continue to exhibit poor growth rates and crown loss due to overstocking (Cochran et.al 1994, Wyckoff et.al. 2005, Fettig et.al. 2007) and have a higher predisposition to bark beetle attacks (Cole 1988, Scott 1996, Krist et.al. 2007).

Under this alternative stocking levels and the presence of ladder and down fuels will not be reduced. Alternative 1 would do nothing to mitigate the accumulation of fuels or restore ecosystem sustainability that includes the re-establishment of inherent disturbance regimes. Fire Condition classes would continue to be in class 2 and 3 until a wildfire occurred. There will be an increased risk of high-intensity wildfire through continued build-up of dead fuels. In addition to killing surviving trees and other vegetation, intense wildfire can damage the site and contribute to severe scouring of streams during peak run-off events. With this alternative an increase in multi-layering within stands and susceptibility to crown fires, spread of root diseases, dwarf mistletoe and risk of future tussock moth and western spruce budworm defoliation is anticipated. Objectives of maintaining healthy and vigorous stands capable of resisting successful insect and disease attacks would not be realized.

Cold Upland Forests

This group is very susceptible to fires and can sustain stand replacement fires. Lodgepole pine, which in many areas is a major component of this type, is susceptible to mountain pine beetle infestation which is becoming a serious problem. There is an ongoing increase of balsam wooly adelgid affecting subalpine fir.

Moist Upland Forests

In moist upland forests density related mortality will continue to increase and much of the understory component will be suppressed. Many of these stands will remain in a condition of low vigor which

increases the risk of insect and disease damage and reduces growth potential. Competition will also have its effect on the larger component and will contribute to increased mortality. Fire and insect/disease risks will not be reduced. Under this alternative, stands in the group would experience an increased spread of insect and disease (particularly root disease) damage and wildfire. Without partial openings the movement towards more seral species will be delayed until a stand disturbing event creates conditions that enable seral species to develop.

As the canopy naturally opens, ground vegetation will increase and begin to occupy the site delaying natural regeneration. Natural openings will occur and remain grass and shrub dominated for approximately 25-30 year.

Fuel loading, and accumulation will continue and the likelihood of a high intensity fire will increase over time. Fires have the potential to damage adjacent stands some of which do not have excess fuel loadings or where fir is a minor component; and may create stand openings equal to or greater than those openings due to mortality from insects. Excessive heat from fires also has the potential to cause soil sterility, thereby reducing future regeneration success. Moist types would continue to be at risk to insect/disease damage and stand replacement fires due to overstocked conditions, continued accumulation of fuels and development of dense multi-story structures.

Dry Upland Forests

Without some type of disturbance, these stands would continue to develop an excessive understory component. If left untreated these stands would continue to exhibit reduced growth rates and become more susceptible to diseases and insects. Fire and insect/disease risks will likely increase over time and structural stages would be largely understory re-initiation and multi-stratum with large trees, depart even further from historic stand structural conditions and be at increased risk to a wildfire creating stand initiation conditions. Fuel loadings will continue to be excessive and contribute to higher fire intensities than those that would have occurred historically.

This alternative would result in a continued decline in overall forest health due to climate- induced change and overstocking which increases susceptibility to insects and diseases, as well as, increases in fire intensities. Fuel loadings will continue to be excessive and contribute to higher fire intensities than those that would have occurred historically. Overstocked stands would continue to be susceptible to stocking reduction by future insect/disease outbreaks. The dryer types would continue to be in an overstocked, low vigor condition; the risk of losing those stands to mountain or western pine beetle would increase (Sartwell and Stevens 1975; Hessburg, Mitchell and Filip 1994). Additional growth to trees would be reduced and movement towards larger diameter trees would be delayed until densities are reduced. The desired future condition of developing stocking levels, stand structures and species composition that are indicative of historic conditions would not be met with this alternative.

ALTERNATIVES 2 AND 3

These alternatives, as noted in Table 3.2, include a combination of treatments. These treatments would provide stocking levels and species composition compatible with site production to promote healthy, vigorous stand conditions and begin to provide vegetative conditions in terms of structural stages and patch sizes that are within the Historic Range of Variability (HRV). Woody debris would be left on the site to contribute to the nutrient level (long-term site productivity) and enhancement of small mammal habitat. Prescribed underburning in treated stands of the drier type would occur three to five years after treatment. Burning is designed to reintroduce fire in drier types to emulate natural fire return interval and return fire to the landscape as an ecosystem process. Management actions that improve and restore ecologically appropriate forest structure and composition will enable forests to withstand stresses associated with climate change.

Of the 16,134 acre project area approximately 14,604 acres are forested (91% of the project area). There are 515 acres in reserved lands such as allocated old growth, inventoried roadless, and

wilderness areas. Of the non-reserved forested acres, 5,182 acres (37% of the available forested acres) have received a commercial or non-commercial (precommercial thinning or whipfelling) treatment in last 25 years. Alternatives 2 and 3 would commercially and non-commercially (FFU) treat an additional 2,624 and 1,896 (30% and 21% of remaining acres) within the project area. These two alternatives would also re-enter 128 acres of previously harvested stands with a non-commercial treatment (PCT) to cultivate the overstocked understory and increase their health and vigor. With the acres proposed for treatment in this project to those previously entered within the last 25 years, a total of 67% (Alternative 2) or 58% (Alternative 3) of the available forest acres within the project area would be under active management. Approximately 46% of the project area would also receive fuel reduction treatment using prescribed fire. Many of these areas would overlap with the mechanically treated units discussed above but would treat non-forested acres and other acres not mechanically pre-treated increasing the potential area entered within the project area over 70% in Alternative 2 and over 60% in Alternative 3.

These treatments will reduce densities and create those conditions that favor establishment of multi-storied stands or establishment of larch and pine, or remove ladder fuels and reduce crown densities, where applicable. Reforestation is expected to occur much quicker with the harvest alternative, because of planting and adequate site preparation, in comparison with the no action alternative. Created openings will remain for 7-10 years in treated stands. Woody debris will be left on the site to contribute to the nutrient level (long term site productivity) and enhancement of small mammal habitat. Alternative 2 would treat 2,752 acres of the of the 4,466 acres of overstocked acres evaluated within the project area and Alternative 3 would treat 2,024 overstocked acres. Those stands not treated in Alternative 3 will have similar effects to them as Alternative 1.

Natural underburning conducted in fire dependent ponderosa pine and fire tolerant mixed conifer stands will help to perpetuate natural disturbance regimes.

Table 3.3 - Acres treated (Commercial & Non-commercial) by Alternative by Potential Vegetation Group

PVG	Alternatives		
	One	Two	Three
Cold Upland Forest	0	56 acres	56 acres
Moist Upland Forest	0	1,647 acres	1,177 acres
Dry Upland Forest	0	1,020 acres	762 acres
Non-Forest w/in Units		29 acres	29 acres
Total	0	2,752 acres	2,024 acres

Cold Upland Forests

Treatments in this type will be thinnings, improvement harvests, and fuel reduction treatments. These treatments will remove suppressed trees and those with poor live crown ratios generally trees with less than 30-40% LCR and reduce basal area to an acceptable density. Treatments will cause a change in fire behavior by reducing the rate of spread and intensity. Treatment would reduce standing and down dead fuels and ladder fuels. Treatments would reduce the risk of insect/disease problems and provide for altered fire behavior for 20-30 years. Fifty-six acres of this group would be treated under Alternatives 2 and 3.

Moist Upland Forests

Reducing stand densities by improvement cuttings, thinnings, sanitation/salvage and fuels treatments will enhance stand and landscape health. Sanitation/salvage will provde for regeneration to develop and move most stands toward multiple story large tree late/old structure. Improvement harvests, thinnings and fuels treatments will reduce densities and provide for a more vigorous and healthy stands. Shelterwood harvest are in stands that have high amounts of insect and disease, few trees with greater than 30-40% live crown ratios, and mostly suppressed understory. With shelterwood harvest, the main objective is to move stands towards more seral species.

Treatments will cause a change in fire behavior by reducing the rate of spread and intensity and would reduce standing and down dead fuels and ladder fuels. Treatments will alter the amount of grand fir in the stand and promote more seral species. Approximately 1,647 acres of this group would be treated under Alternative 2 and 1,177 acres under Alternative 3.

Two major changes expected from climate change are more severe fire and extensive outbreaks of insects and diseases (Brett, 2008). Climate change is elevating the level of insect and disease caused mortality and impacting the size and extent of wildfires. In response to those changes the strategy is to develop more resilient and resistant forests. Changing species composition from one susceptible to insects and diseases and fire to one more resistant and resilient will provide for sustainability of forests. A healthy forest has a majority of trees that are vigorous and resistant to insects and disease and have the ability to sustain itself when affected by wildfire. Treatments would provide for altered fire behavior for 20-30 years.

In those stands with partial opening prescriptions, treatments will allow for regeneration of seral species through planting and natural regeneration. Four to six acre openings would be created in five units (Units 8, 60, 61, 68, 85) to alter species composition and to create more resilient and resistant stands. Patch treatments can create forests with canopy openings that reflect fine- scale disturbances and create forests resilient to insects, disease, wildfire and climate change (Jain, 2008). Early seral species, such as western white pine and western larch are long lived species that can regenerate and persist in patches (Kolb 2004). Proposed treatments will create conditions that will encourage higher amounts of early and mid-seral trees species (western white pine, western larch, ponderosa pine) and decrease the amount of grand fir, lodgepole pine, and subalpine fire. Western larch and western white pine will lose dominance to shade tolerant species in partial shade (Fowells, 1965). The overall objective is to reduce the amount of suppressed trees, ladder fuels, mistletoe infected western larch and increase the amount of western white pine, western larch, and ponderosa pine. Treatments will maintain dominates and co-dominates with 30-40% live crown ratio and reduce basal area to 40 square feet/acre. These treatments will produce visible sky that will enable western white pine and western larch to be competitive. Western white pine maintains a competitive advantage with greater than 50% visible sky and is free to grow at 92% visible sky when density is reduce to less than 66 square feet of basal area per acre (Jain, 2008). Growth can be sacrificed if openings are less than 10 acres but western white pine can persist in these small openings (Jain, 2008).

The species composition in the moist upland forests are a mix of species and size classes with grand fir, Englemann spruce, western larch, subalpine fir, and lodgepole pine dominating the composition with poles to large sized diameter trees. In the overstory there is also some Douglas-fir and ponderosa pine. Understories are dominated by grand fir, subalpine fir, and Englemann spruce with twinflower and big huckleberry. Insects and diseases observed in these stands include several root rots, mountain pine beetle, indian paint fungus, fir engraver, balsam woolly adelgid, and western larch mistletoe. Mortality in many stands is between 10-20% of the overstory with many of the intermediate size class trees exhibiting live crown ratios less than 20% and poor vigor.

Dry Upland Forests

Treatments in this type would provide more disease resistance and structures more consistent with natural disturbance regimes (Schmidt 1994; Scott 1996; Schowalter and Withgott 2001). Many of these stands would begin to provide more open conditions dominated by ponderosa pine, Douglas-fir, and western larch. The effects of potential climate-induced change will be minimized by reducing densities and minimizing grand fir. Post harvest burning of these stands would play an important role in maintaining them. Density levels, as well as, the amount of understory in the stands would be reduced as burning is conducted. Treatments would reduce the risk of insect/disease problems and provide stocking control for 20-30 years. Approximately 1,020 acres of this group would be treated under Alternative 2 and 762 acres under Alternative 3.

Cumulative Effects for Vegetative Health

ALTERNATIVE 1 – NO ACTION

Past management activities affecting stand structures and composition were primarily historic timber harvests. Intermediate treatments, such as thinnings, partial removals, salvage, and sanitation cuttings have reduced densities and removed dead or damage trees. Of those activities, regeneration harvest such as clearcuts, seed tree, and shelterwood cuts have removed older, mature stands and allowed for younger, smaller diameter healthy stands to develop. Regeneration harvests have helped to alter species composition to more seral, disease resistant species. Past selective harvesting along with fire exclusion have produced excessive disturbance by pathogens and insects (Hessburg, Mitchell and Filip 1994) and has increased the amount of shade tolerant species which are more susceptible to insects and diseases. Past release treatments have helped to maintain appropriate stocking levels.

Structure is a function of the disturbance regimes operating within the upland forests. Single storied structures are generally found on sites experiencing frequent disturbance regimes whereas multi-layered structures dominate on more mesic sites experiencing less frequent disturbance regimes. Research done in the Blue Mountains (Hall 1991, Agee and Maruoka 1994) indicate that fire was a major disturbance in creating landscapes resulting in single story late and old structure due to low severity, high frequency fire in warm, dry types. Recent research by Hessburg et al. (2007), in northeast Washington reported that fire intensity was more variable in the drier grand fir and Douglas-Fir types than previously believed, resulting in more intermediate and young multistoried stands. However, forest sites in northeast Washington tend to differ more than in the Blue Mountains. Structural distributions outside of HRV are likely to result in an increased risk of undesirable ecological change (Swanson and others 1994). It would require excessive resource protection measures to maintain a multi-layered structure within an environment historically experiencing frequent fires. Dry upland stands in multi-layered old forest conditions that are more typical of cool environments would not be treated to convert to single storied condition. Existing single storied old forest is almost nonexistent in the dry type of the project area. Manipulation of stands within the overstocked mid-seral structural stages (SECC and UR) and those that are OFMS would not occur limiting the opportunity to begin the process of increasing the representation of OFSS structures dry upland forests. In the absence of density management, these stands would continue to exhibit poor growth rates when compared to site potential. This delay would lengthen the period of time that would be necessary to achieve the “large tree” component of old-growth structure and these stands would be highly susceptible to stand replacement fire.

In combination with past changes in stand structures and compositions resulting from harvest and fire suppression, the no action alternative would result in continued departure from HRV conditions and reduced resiliency to natural disturbances.

ALTERNATIVES 2 and 3

Active management of some OFMS stands to restore OFSS conditions is necessary because of development of uncharacteristic structure, composition and fuel loadings. As temperatures increase due to climate change, outbreaks of pests and pathogens and risk of destructive large wildfires are also expected to increase. Predicted climate changes for the Northwest include an increase in length and severity of summer dry period and a reduction in snowpack amounts and duration. These changes may affect tree composition, forest productivity and disturbance regimes of fire and insects (Franklin et al 2008). Warming trends in climate are likely to increase the occurrence of extremes for wind, drought, insects, pathogens and fires (Skinner, 2007). Drought can alter ecosystems by causing mortality to susceptible species, creating conditions that support high intensity fire or insect outbreaks and reduce tree growth (Skinner 2007, Running 2009). The Blue Mountains have experienced a large decline in winter precipitation and increases in winter and spring temperatures (Gecy 2009). These trends could result in potential adverse effects to forests of the Blue Mountains.

Manipulation of stands in Alternatives 2 and 3 within the overstocked mid-seral structural stages (stem exclusion closed canopy and understory reinitiation) and in Alternative 2, those that are OFMS would provide the best opportunity to continue the process of increasing the representation of OFSS structures on warm/dry sites and enhancing resiliency to natural disturbances and changes in climate.

Density management activities in these stands would increase growth rates to site potential decreasing the period of time that would be necessary to achieve the “large tree” component of old-growth structure and reducing their susceptibility to insects and loss in a stand replacement fire. Treatments in this assessment would begin to provide old forest within the next 20-60 years, depending on existing size classes and move the area toward the HRV.

Stands that contain large ponderosa pine currently have understories; in many cases this understory is now codominant, putting the large trees at risk (Franklin et al 2007). Thinned and/or altered species compositions are more vigorous and more resistant to insects and pathogens and less fire prone (Strategic Framework, 2008, Policy Statement 2007, Kimbell 2008, Millar et al 2007). Silviculture treatments can reduce within stand density, fuel loadings and alter species composition (Franklin et al 2008). Management to reduce wildfire and insect outbreaks at both stand and landscape level is critical to restoring resiliency to existing dry old forest conditions (Franklin et al 2008, Harrod et al 2007). Thinning can help to protect older trees by reducing competition for limited resources, improving vigor of residuals, and removing younger trees (Fiedler et al 2007).

Forested stands would continue through successional stage development. Historic harvest treatments reduced the amount of Old Forest within the area. The amount of departure from HRV is described in Chapter 1 of this EA. Proposed treatments in this project and the projects surrounding this area such as the Bald Angel Vegetation Management Project and the Medical Spring WUI project which also treats OFMS and SS stand structures would both accelerate stands toward OF and continue the restoration of dry OFMS stands to OFSS. These projects would both continue to move the area toward HRV across the forested landscape contributing to increasing OFSS structure. While this would be a small increase at the landscape level it would contribute to an important stand structure which is severely deficit and well below desired levels.

Previous prescribed fire treatments began the reintroduction of fire into areas outside historic fire return intervals, but were primarily focused in grassy timbered stringers. Prescribed fire in this project and the other projects surrounding this area such as the Bald Angel, Medical Springs WUI, and South Fork Catherine Fuels Reduction projects would continue the treatments started in earlier burns, reduce fuel loadings, improve forage, and reduce encroachment into meadows and reduce the amount of grand fir in timbered stands, which would have historically been Douglas-fir and, ponderosa pine. This, in combination with previous burns, would accelerate movement towards desired stand conditions to create healthier stands more resilient to effects from wildfire.

These vegetation management activities, in conjunction with those to occur within the reasonably foreseeable future mentioned above would continue to move the area toward the historic range of variability for stand structures and conditions within and adjacent to the project area.

Other Activities Common to the Action Alternatives 2 and 3

Direct, Indirect, and Cumulative Effects for Vegetative Health

Common to most harvest units are Pacfish no-harvest buffers. Many of the no-harvest buffers have adequate regeneration, healthy trees and minimum amounts of mortality. Long term implications of these no-harvest buffers are minimized by site conditions. However, some density related mortality is expected and should provide for riparian needs.

Connective Corridors - Those stands that have been designated as connective corridors would be managed to higher density levels. Stand information and density levels are located in the analysis file. Managing to higher density levels would shorten the period of reduced risk of insects/disease problems and overstocking from 20-30 years to 10-15 years when compared to treatment of stands outside of connectivity corridors.

Enhancement and KV projects and mitigation measures are part of all action alternatives, silvicultural effects of each follow:

1) Release Treatments (Non-commercial Thinning): will have positive silvicultural effects by reducing competition, increasing growth rates and helping to maintain species composition.

2) Prescribed Burning and Mechnical Fuels Reductions: burning and fuels reduction treatments will provide for additional openings within stands to assist natural and artifical regeneration and reduce the possibility of a fire damaging the residual stand.

3) Planting: will have positive silvicultural effects by providing: regeneration in stands that have few viable seedlings or saplings, structural component that is lacking in some stands, and tree densities at appropriate numbers.

4) Fire Fuels Reduction (FFU): biomass removal of down and suppressed material will have postive silviculutral effects by reducing the risk of future fires with the chance of a stand replacing event.

All action alternatives will require some utilization of sub-merchantable 5-7" dbh material (CHIP/PULP). This CHIP/PULP specification will decrease harvest fuels and provide better utilization of cull material. Without utilization of sub-merchantable material fire hazard will be increased due to higher fuel loadings, and there may also be an increased cost to site preparation and/or a lag in acquiring acceptable regeneration.

Summary - The overstocked stand conditions can have a major effect on landscape health and attaining the desired future condition (DFC) for the Sandbox Analysis Area. In a healthy landscape there are areas of high density and low vigor, but to develop the DFC for much of the area, many of those stands need to be treated. To move towards a more healthy stand and landscape condition forest management needs to occur. Alternative 1, leaves the landscape in its current condition and carries with it a high risk of stand and landscape decline. Alternatives 2 and 3 will reduce densities, alter stand compositions and provide for a more sustainable landscape. As management occurs, the desired future condition of the area is to use the natural disturbance regime as a template to provide for a structure, density, and species composition mix across the landscape that is sustainable. This mixture will provide a degree of diversity for big game and other wildlife and a level of wood fiber and forage production.

Forest Plan Compliance

Alternatives 2 and 3 comply with the goals for timber in the 1990 Wallowa-Whitman National Forest (WWNF) forest plan as amended by providing for production of wood fiber to satisfy National needs and benefit local economies consistent with multiple resource objectives, environmental constraints, and economic efficiency. It would also provide fuelwood for personal and commercial uses. These alternatives meet the forest plan standards and guidelines for timber because prescriptions have been prepared and reviewed by a certified silviculturist, meet the silvicultural needs of the stands being treated including stand structure and species composition, limit created opening sizes, utilize the appropriate yarding system for stand and ground conditions, and call for precommercial thinning of young stands to accelerate their growth. Both alternatives also harvest timber only on lands suitable for timber management.

Wildlife Effects – Old Growth Habitat & Species

Introduction

The following is a wildlife effects analysis and a comparison of the project alternatives for species dependent on old growth habitat. A Wildlife Inventory describing the existing condition of habitat within the analysis area is in the analysis file. A Biological Assessment/Evaluation was conducted to address effects to Endangered, Threatened, and Sensitive species, and it also resides in the Sandbox Analysis File.

The American marten, northern goshawk, and pileated woodpecker are management indicator species (MIS) of old growth habitat (U.S. Forest Service 1990). Old-growth habitat is categorized and analyzed in 2 categories according to the LRMP: 1) late old-growth structure (LOS); and 2) MA 15 – Old-Growth Preservation. MA-15 is a land allocation under the LRMP (U.S. Forest Service 1990) intended to provide quality habitat for wildlife species associated with old growth characteristics. LOS is a structural classification used to implement direction in the Forest Plan Amendment #2 (Screens; U.S. Forest Service 1995) and refers to multi-strata stands with large trees (OFMS) and single-stratum stands with large trees (OFSS). Although the two terms have different administrative implications, both are intended to provide habitat for old growth associated wildlife species.

Old Forest Single Stratum (OFSS) being below the historical range of variability in all potential vegetation groups is a key issue for the Sandbox project area. This key issue will be analyzed in terms of key indicators as a means of quantifying effects of alternatives.

Key Indicators are as follows:

- **Old Forest**
    1. Acres of OFMS restored to OFSS

Analysis Assumptions – Temporal and Spatial Considerations

The duration of effects are discussed when relevant or practical to predict. The following timeframes will apply for the purpose of this analysis. These timeframes are appropriate given the scale of this analysis and the duration of effects expected from the prescribed treatments.

Short term	0 – 20 years
Mid term	20 – 80 years
Long term	Greater than 80 years

The geographic area for assessing impacts to wildlife is defined as the 16,134 acre Sandbox project area and the 36,702 acre Catherine Creek Watershed.

Analysis Assumptions - Range of Variation and Old Growth (LOS Structure)

Administrative designations - Old-growth habitat is categorized and analyzed in 2 categories according to the Forest Land and Resource Management Plan (LRMP): 1) late/old structure or Old Forest habitat; and 2) allocated old growth (Management Area (MA) 15) – Old-growth Preservation. Habitat covered by either category is intended to provide for old-growth associated wildlife species; however, the two terms have different administrative implications. OF is a general term referring to old forest multi-story (OFMS) and/or old forest single-story (OFSS). Maintaining connectivity and reducing fragmentation of OF stands is important for the use and movement of old growth associated species. MA 15 land is specifically designated for Old-Growth Preservation in the LRMP. These old-growth areas are intended to maintain habitat diversity, preserve aesthetic values, and to provide old-growth habitat for wildlife. Structural stages and biophysical environments referred to in this section are listed in table 3.2.

Range of Variation - Regional Forester Amendment #2 of June 12, 1995 established interim riparian, ecosystem, and wildlife standards for timber sales (these standards are referred to as the "Eastside Screens"). The Eastside Screens require that a range of variation approach be used when comparing historical reference and current conditions, incorporating the best available science. The range of variation approach assumes that native species have evolved with the historical disturbance regimes of an area and so a forest will continue to sustain populations of those species if current conditions fall within the historic range of variation (Powell 2010). The following range of variation analysis uses methods described in Range of Variation Recommendations for Dry, Moist and Cold Forests (Powell 2010), which is now considered the best available science.

The historic range of variation analysis for stand structures was conducted on the 16,134 project area within the Upper Catherine Creek Watershed (50,667 acres). The MIS habitat analysis was conducted on the Upper Catherine Creek Watershed.

According to the SCREENS Forest Plan Amendment (U.S. Forest Service 1995), connectivity corridors do not necessarily meet the same description of "suitable" habitat for breeding for old growth species, but allows free movement between suitable breeding habitats. Identifying these connective corridors insures that blocks of habitat maintain a high degree of connectivity between them, and that blocks of habitat do not become fragmented in the short-term. Connective corridors between patches of old growth structures have been identified on a map that is on file at La Grande Ranger District.

Existing Condition

Table 3.4 - Comparison of existing old forest multi-story to HRV by potential vegetation group (PVG) in the Sandbox project area

PVG	Existing Acres	% of PVG	Historical Range %
Old Forest Multi Stratum (OFMS)			
moist upland	2,906	30%	15-20%
dry upland	2,083	45%	5-15%
cold upland	124	32%	10-25%
Old Forest Single Stratum (OFSS)			
moist upland	152	2%	10-20%
dry upland	229	5%	40-60%
cold upland	0	0	5-20%

Management Indicator Species (MIS) - the American marten, pileated woodpecker, and northern goshawk, are closely associated with or dependent on some aspect(s) of mature or old forest habitat and will be discussed in this section. Other MIS (Rocky Mountain elk and primary cavity excavators) will be discussed in separate sections relating to their primary habit in this Chapter.

American marten - The Upper Catherine Creek watershed contains 10,934 existing acres of marten source habitat (habitat that can support a stable or increasing population of marten) out of 35,764 (31%) potential acres of marten habitat. This watershed currently provides $\geq$ 40% of the median amount of source habitat that occurred historically, which is above the threshold necessary to support marten population viability. The Sandbox project area contains 2,577 acres of primary marten habitat. In addition, the project contains 992 acres of secondary habitat that may be used for foraging, resting, or traveling (cold moist and cold dry vegetation groups with > 50% canopy cover and trees 19-24'' dbh). Marten surveys were performed in 2011 and 2012, using track plates and remote cameras. No marten have been detected within the project boundaries, however the protocol

requires 3 consecutive years of “no occupancy” results to definitively say marten do not occur within the area (Zelinski et al. 1995).

Northern goshawk - The watershed contains 18,599 acres of existing goshawk source habitat (habitat that can support a stable or increasing population of northern goshawks) out of 45,182 acres (41%) of potential habitat. This watershed currently provides ≥ 40% of the median amount of source habitat that occurred historically, which is above the threshold necessary to support goshawk population viability (Penninger and Keown 2011). Approximately 4,365 acres of primary northern goshawk habitat and 1,463 acres of secondary goshawk habitat are located within the Sandbox project area. The majority of available habitat is contained in the northern portion of the project area, with large patches of source habitat. No goshawks nests have been identified in the area. Surveys will be completed in 2013 and if any nest trees are identified, timing restrictions and a no activity nest buffer will be implemented.

Pileated woodpecker - The watershed contains 14,165 acres of existing pileated source habitat (habitat that can support a stable or increasing population of pileated woodpeckers) out of 43,952 acres (32%) of potential source habitat. This watershed currently provides ≥ 40% of the median amount of source habitat that occurred historically, which is above the threshold necessary to support pileated woodpecker population viability. Based on the amount of existing source habitat, it is estimated that this watershed has the potential to support >18 breeding pairs of pileated woodpeckers (Penninger and Keown 2011). Source habitat for pileated woodpeckers within the Sandbox analysis area is approximately 4,316 acres. Source habitat is limited in the southern analysis area due to lack of OFMS and OFSS but fairly evenly distributed in the northern section.

Effects Analysis

No Direct, Indirect, or Cumulative Effects

The following project activities associated with the Sandbox project are of such limited and constrained nature due to their small scale and shortness in duration that they would produce negligible effects on old growth habitat.

- Tree Planting
- Precommercial thinning
- Road Decommissioning
- Roadside Hazard Tree Removal

These activities and their effects will not be discussed further in this section.

Direct and Indirect Effects on Old Forest

Table 3.5 - Comparison of Key Indicators by alternative for Old Forest.

Key Indicators	Alternative		
	1	2	3
Acres of OFMS restored to OFSS	0	727	522

Table 3.5a – Comparison of Old Forest Treatment Acres by PVG and Alternative.

Treatments	Alternative Acres		
	1	2	3
OFSS Enhancement Treatments (Dry PVGs remaining OFSS)	0	217	217
OFMS Enhancement Commercial Treatments (Moist PVGs remaining OFMS)	0	323	205
OFMS Restored to OFSS (Dry PVGs currently OFMS restored to OFSS)	0	727	522
OFMS Non-commercial Fuels Reduction (Moist PVGs remaining OFMS)	0	271	271

ALTERNATIVE 1 - NO ACTION

The Sandbox analysis area is above the historic range of variability for OFMS within the moist and dry upland forest types and below the historic range of variability for OFSS within the moist and dry upland types. This area will continue to be deficient in OFSS, which will preclude or limit the use of the area by species closely tied to open, single-storied, ponderosa pine and Douglas-fir forest. This will persist beyond 100 years unless natural disturbances or active management initiates development of OFSS structure.

Because management activities would not take place under Alternative 1, there would be no direct effects to old growth associated wildlife in the short term. In the absence of large scale disturbances, the Sandbox analysis area would continue to provide Northern goshawk habitat in closed canopy forests with open understory for hunting and down logs as places to pluck their prey. Perpetuating old growth structure in cool, dry-wet grand fir stands will continue to provide pileated woodpecker habitat and maintaining moist LOS with ground heterogeneity and high canopy cover will provide marten habitat.

Due to the high number of overstocked stands, there is an increased risk of insect infestation and mortality as well as increased susceptibility to disease as well as fire. Both standing and down fuels will continue to increase over time as trees die due to competition or insects. This would increase snags and down wood, which are beneficial to marten, goshawk and pileated woodpeckers, but could increase the severity of a wildfire, should one occur. Few large animals die in wildfires, but fires change habitats, and intense fires change habitat most dramatically (USDA Forest Service 2002). Effects from a stand replacing fire could convert wildlife habitat for MIS to an unsuitable condition. A stand replacing fire could also have negative consequences for those species associated with OFSS which currently occurs below the HRV in the Catherine Creek watershed. Wildlife species associated with OFSS, and consequently at risk, include the white-headed woodpecker, flamulated owl, and pygmy nuthatch (Wisdom et al. 2000).

No new specified, reconstructed, or temporary roads occur with this alternative, so there would be no direct or indirect effects associated with roads.

This alternative would not affect the allocated old growth (MA 15) network established by the Wallowa-Whitman LRMP to meet management requirements for marten and pileated woodpecker. The forested habitat between MA 15 areas would progress toward LOS habitat slower (namely development of large diameter trees) under the no action alternative than under the action alternatives.

Without treatment, the area will continue to be deficient in OFSS, which will preclude or limit the use of the area by species closely tied to open, single-storied, ponderosa pine and Douglas-fir forest. This will persist beyond 100 years unless natural disturbances or active management initiates development of OFSS structure.

ALTERNATIVE 2

Late Old–Growth Structure

Fuel reduction- Fuel reduction treatments throughout the project area have been designed to reduce fuel loadings and stand density, modify fire behavior and improve tree health. Approximately 271 acres are proposed for fuels treatment in OFMS. 15,938 acres are proposed for prescribed burning over the project area. Approximately 7,465 acres within those burn blocks would actually be burned. Effects to old growth from burning are reduced snags and logs, particularly those in the later stages of decay. Although some negative effects will occur, the wildlife and vegetation in this area evolved with fire as a frequent and common influence. Prescribed burning is done under more controlled conditions than wildfire so desirable results are more likely.

Commercial treatment- 1,050 acres of treatment in multi-stratum old forest (OFMS) which is above HRV and 217 acres of treatment in single stratum old forest (OFSS), which is below HRV, would occur. Most of the treatments in OFMS (921 acres) and all of the treatments in OFSS (217 acres) would consist of a thinning or improvement treatment, designed to reduce competition for site nutrients and concentrate growth potential for trees left on site. As part of the 921 acres in OFMS, 622 acres are within the dry forest type which, when thinned, will push the stands toward OFSS which is under represented in the area. 102 acres of OFMS would undergo a sanitation harvest, designed to remove dead, damaged or susceptible trees to prevent the spread of pests or pathogens (Units 23, 33, 41, 66). 24 acres are proposed for a patch opening treatment (Units 8, 60, 61, 68, 85). This treatment is designed to reduce crown fuels and increase the presence of fire resistant and lighter crowned tree species, such as western larch or white pine. The treatment would create small canopy openings (4 to 6 acres) to improve stands resilience to wildfire and insect and disease outbreaks.

Single-storied late and old structure, in the dry and moist vegetation types, is underrepresented in the project area for old-growth associated species (Table 3.4). The proposed treatments would reduce tree competition and accelerate growth on remaining trees and move parts of the project area, mostly within the dry forest types, toward stands of large, mature ponderosa pine and Douglas/grand fir that are historically characteristic of these potential vegetation groups. Thinning harvests will help convert approximately 727 acres of dry OFMS habitat to dry OFSS habitat.

Connectivity- Alternative 2 would have negligible effects to habitat connectivity, similar to Alternative 1. The following units have been identified as ones that intersect connective corridors; Units 3, 23, 73, 75, 91, 122, 123. Treatments within these units would retain higher stocking levels and canopy closure compared with non-corridor units in order to provide free movement between suitable breeding habitat.

MIS- American Marten

Of the existing 3,569 acres of marten habitat within the project area boundary (PAB), Alternative 2 proposes treatments in 455 acres (13% of habitat in the PAB). Fuels treatments are proposed in 62 acres of marten habitat (2%). These treatments are designed to reduce surface and ladder fuels to reduce fire intensity and probability of spread. While fuels treatments will not make the stands uninhabitable to martens, if done within source habitat the reduction of complexity on the ground might reduce the possibility of marten denning in that habitat. 394 acres (13%) are proposed for a thinning or improvement treatment. These treatments are designed to improve the health of the stand and the size of the trees by thinning and removing poor quality, small or diseased trees. These treatments can simplify the stand structure and reduce canopy closure but in the long term will create the larger trees which in turn would create the greater canopy cover with which marten are associated.

MIS – Northern goshawk

Treatments in OFMS stands would simplify structure and reduce canopy closure of affected stands. Alternative 2 may have negative effects to goshawk nesting habitat in treatment units where canopy cover is reduced below 40%; however, treated stands would produce an open understory often preferred for hunting by Northern goshawks. GIS analysis identified 5,828 acres of primary and secondary goshawk habitat within the Sandbox project (36%). 860 acres (15%) of this habitat would be treated under Alternative 2. The majority of treated habitat (81%) would be affected by fuels and thinning treatments. Nesting habitat would not be expected to be affected as no large trees (>21 dbh) would be harvested and the encouragement of growth of larger trees through thinning treatments would increase canopy cover over time, increasing source habitat potential. 19% of proposed treatments are improvement treatments, designed to remove poor condition trees and decrease the risk of disease and insect outbreak All treated acres will continue to provide habitat components (e.g., large tree structure, canopy layers, foraging areas) that could be used by goshawks for some or all of their life history functions.

Pileated woodpecker

Pileated woodpecker habitat comprises 27% of the Sandbox project area, and Alternative 2 proposes treatment on 947 acres (22%) of these acres. 72% of treated acres would undergo a fuels and thinning treatment designed to reduce the risk of wildfire and increase the growth of healthy trees within the stand. 28% of the proposed treated acres would have openings created and diseased trees removed in improvement type harvests.

Large diameter snags are an essential component of pileated nesting habitat. Pileateds occur in many forest settings, but are most productive where nesting, roosting, and foraging substrate are abundant. Thinning prescriptions will retain all existing snags except those that pose safety concerns. A thinning treatment will temporarily decrease canopy closure; foraging (down logs) and roosting (hollow, live grand fir) substrate will be reduced, but not eliminated. This may reduce the potential of the area to provide habitat for pileated woodpeckers in the short term (0-20 years). However, by reducing competition and increasing soil nutrient availability the remaining trees will have the opportunity to grow larger and create more canopy closure over the long term (50-100 years). Additionally, Alternative 2 would retain live trees $\geq$ 21 in dbh, snags > 12 in dbh and down wood levels that meet LRMP standards (Screens) and continue to provide nesting, roosting and foraging habitat. Treatments may lead to reduced capability of these stands to support pileated woodpeckers, but would not preclude their use of these stands.

ALTERNATIVE 3

Late Old-Growth Structure

Alternative 3 proposes treatment on approximately 728 fewer acres than Alternative 2 but will have similar effects with fuel, thinning and patch opening treatments. 271 acres in OFMS through fuel treatments are proposed. These treatments are designed to reduce surface fuels (less than 12 inches diameter), ladder fuels and crown fuels (less than 21 inches dbh). Surface fuel loadings would be reduced to Forest Plan minimums through removal, mastication, grapple piling, or hand piling. Alternative 2 and Alternative 3 propose the same amount of burn block acres (15,938). Not all acres within burn blocks would actually be burned, and it is difficult to accurately assess the actual acres that are to be burned; however, approximately 7,465 acres are estimated to be burned within those larger burn blocks. 727 acres of commercial harvest treatments in multi-stratum old forest (OFMS) which is above HRV and 217 acres of treatment in single stratum old forest (OFSS), which is below HRV, would occur in Alternative 3. Most of the treatments in OFMS (522 acres) and all of the treatments in OFSS (217 acres) would consist of a thinning or improvement treatment, designed to reduce competition for site nutrients and concentrate growth potential for trees left on site. 522 acres of thinning are proposed to take place within dry OFMS forest and will push stands toward dry OFSS structure (Table 3.5). 91 acres of OFMS would undergo a sanitation harvest, designed to

remove dead, damaged or susceptible trees to prevent the spread of pests or pathogens. 14 acres are proposed for patch opening treatments (Units 8, 68, 85) which will result in scattered small openings for the purpose of encouraging the growth of western larch or pine to improve stand resilience to fie, disease and insect outbreaks.

Connectivity- Similar to Alternatives 1 and 2, Alternative 3 should have negligible effects to habitat connectivity. The following units have been identified as ones that intersect connective corridors; Units 23, 73, 75, 122, 123. Treatments within these units would retain higher stocking levels and canopy closure compared with non-corridor units

American marten

Alternative 3 proposes treating 316 acres (8% of existing) of marten habitat in the project area. Treatments in moist OFMS stands can simplify the stand structure and reduce the canopy closure affected stands. Fuels treatments are proposed in 62 acres of marten habitat (2%). These treatments are designed to reduce surface and ladder fuels to reduce fire intensity and probability of spread. While fuels treatments will not make the stands uninhabitable to martens, if done within source habitat the reduction of complexity on the ground might reduce the possibility of marten denning in that habitat. 200 acres (6%) are proposed for a thinning or improvement treatment. These treatments are designed to improve the health of the stand and the size of the trees by removing poor quality, small or diseased trees. These treatments can simplify the stand structure and reduce canopy closure but in the long term would create the larger trees which in turn would create greater canopy cover that marten are associated with.

Alternative 3 does not propose any shelterwood treatments, but 14 acres (0.2%) are proposed for a patch opening treatment. This treatment is designed to reduce crown fuels and increase the presence of fire resistant and lighter crowned tree species, such as western larch or white pine by creating small canopy openings (4 to 6 acres) to improve stands resilience to wildfire and insect and disease outbreaks. This treatment would render the 4-6 acres patches of open habitat unsuitable for marten hunting and traveling as long as there is reduced surface fuels and canopy cover (20-25 years).

Alternative 3 also eliminates certain units proposed in Alternative 2 that lie along the northern edge of the PAB. These units proposed thinning and improvement treatments within marten habitat, habitat which stretched beyond the project boundary. While these units would not have cut off access to the wilderness or affected connectivity, a larger, more connected section of moist OFMS is preserved through the elimination of the units.

Northern goshawk

Alternative 3 is similar to Alternative 2 and proposes treatments on 12% of goshawk habitat within the PAB. The majority of treatments consist of fuels and thinning (495 acres, 8%). The rest of the treatments consist of improvement and sanitation harvests (131 acres, 2%), and 36 acres (0.6%) of a patch opening treatment. Although the treatments would simplify structure and reduce canopy closure of affected stands, encouragement of growth of larger trees through thinning treatments would increase canopy cover over time, increasing source habitat potential. Suitable nesting habitat for goshawks would be reduced within the patch openings but foraging habitat would be created as it creates a forest edge and opens up a hunting area. All treated acres will continue to provide habitat components (e.g., large tree structure, canopy layers, foraging areas) that could be used by goshawks for some or all of their life history functions.

Pileated woodpecker

Effects to pileated woodpecker from Alternative 3 are very similar to the effects of Alternative 3 on goshawk habitat. 17% of woodpecker habitat in the PAB is proposed for treatment in Alternative 3. 12% of the habitat would undergo a fuels or thinning treatment. 4% of the existing habitat would be

treated with improvement harvests. 1% would have a patch opening treatment. The patch opening treatment would retain snags, however would reduce the potential of woodpecker use through reduced predator protection. Thinning and improvement treatments will temporarily decrease canopy closure, foraging (down logs) and roosting (hollow, live grand fir) substrate will be reduced, but not eliminated. This may reduce the potential of the area to provide habitat for pileated woodpeckers in the short term (0-20 years). However, by reducing competition and increasing soil nutrient availability the remaining trees will have the opportunity to grow larger and create more canopy closure, foraging and roosting habitat over the long term (50-100 years). Thinning prescriptions will retain all existing snags except those that pose safety concerns, and treated acres, with the possible exception of the patch openings (1%) will continue to provide the habitat components needed for woodpeckers to complete their life cycle.

Summary for All Alternatives

Table 3.6 - Comparison of OFMS and OFSS forest on the landscape between alternatives and HRV

STRUCTURE/ PVG	HRV	CURRENT	ALT 1	ALT 2	ALT 3
OFMS Moist	15-20%	30%	30%	30%	30%
OFMS Dry	5-15%	45%	45%	29%	34%
OFMS Cold	10-25%	32%	32%	32%	32%
OFSS Moist	10-20%	2%	2%	2%	2%
OFSS Dry	40-60%	5%	5%	21%	16%
OFSS Cold	5-20%	0%	0%	0%	0%

Cumulative Effects on Old Forest

The existing condition of the Sandbox project area is a reflection of past management activities which will be taken into consideration along with the present and reasonably foreseeable future activities in the assessment of cumulative effects.

ALTERNATIVE 1 - NO ACTION

Past logging has led to the current lack of old, big trees in the area due to selective harvesting and fire suppression has interrupted historic fire return intervals. Consequently, many stands are now overstocked with young trees and are vulnerable to insects, disease, and wildfire. An extensive roads network built to facilitate timber operations has had a long-term impact on the area and continues to provide access for recreationists, hunters, permittees, woodcutters, and others.

Alternative 1 does not represent an incremental effect to OF habitat that would contribute to other past, present and reasonably foreseeable future actions. Indirectly this alternative will not contribute to restoration of overstocked forested stands, resulting in increased time (approximately 40 years longer) to achieve OF structure in UR stands. This alternative would perpetuate the current level of disturbance and loss of snags and logs from firewood cutting. This effect is expected to decrease following implementation of the access and travel management plan that may restrict motorized access to a limited number of designated routes.

Connectivity between MA 15 areas and OF patches would not change in the short-term under the no action alternative. Structural complexity and canopy closure would only change as natural succession or disturbances dictate. This alternative would have no cumulative effect to connectivity during the short-term. Effects from this alternative on connectivity in the long-term are impractical to predict.

Species like pileated woodpecker and northern goshawk may benefit slightly in the short-term by retaining higher canopy closure and greater structural complexity in drier forest stands. However,

the risk to these stands from insects and wildfire will persist and increase over time. Species like white-headed woodpecker, pygmy nuthatch, white-headed nuthatch and flamulated owl will continue to find little suitable habitat in the Sandbox area if thinning and burning opportunities are deferred.

ALTERNATIVES 2 and 3

This project will contribute to cumulative effects as project treatments would begin to shift the project area towards the overall long-term goal of increasing LOS habitat by removing smaller trees so that larger ones can grow, and shifted some overrepresented stands of OFMS forest to the underrepresented OFSS vegetation group (Table 3.6).

Treatments retain the old-growth component of the area and promote the desired growth of large trees. The proposed treatments will maintain the current number of acres of LOS and are designed to retain and promote the structure and function of LOS habitat in the future, and will not further fragment or convert LOS habitat to early successional habitat. There would be no cumulative loss of LOS due to project implementation. Thinning stands will increase LOS in the long-term. Taking no action would perpetuate the negative affects of decades of fire exclusion that have led to a deficiency of LOS structure and the presence of shade tolerant tree species in areas where they can not be sustained without creating wildfire risk. Burning plans are designed to maximize retention and protection of large diameter live trees snags, and logs.

OFSS stands in both dry and moist forest types is drastically under represented within the Sandbox project area and as a consequence, habitat it limited for species such as the white-headed woodpecker and flammulated owl. Thinning treatments within OFMS will help move stands toward the OFSS structure stage. The historic range of variation for OFSS within the dry forest type is between 40-60% on the landscape. The current condition within the project area is 5%. Alternative 2 actions would increase that to 21% and Alternative 3 would increase it to 16%. Treatments proposed within Alternatives 2 and 3 would not push any potential vegetation group below the associated historical range of variation, but would help the landscape more closely resemble historical conditions.

The east side of the Sandbox project area lies along the boundary of the Eagle Cap wilderness. This wilderness area provides large sections of marten source habitat. Alternative 2 and Alternative 3 proposes patch opening treatments within marten habitat. While these treatments decrease the possibility of marten occupancy within the treated areas, they do not disrupt the overall connectivity of source habitat. Looking at a watershed level, the patch opening treatment would affect 0.2% of marten habitat. The effects of Alternative 2 Alternative 3 won't contribute to a cumulative effect on marten habitat.

None of the proposed treatments within Alternative 2 or Alternative 3 will preclude northern goshawks or pileated woodpeckers from hunting, nesting and reproducing and will have no cumulative effect on these species.

Fire and Fuels Management

Introduction

Existing conditions for fire and fuels management resources are discussed under the key issues section of Chapter 1 of this EA. The following analysis addresses the effects of implementing the proposed alternatives for the Sandbox project area in relation to fire regime departure and fire behavior potential.

Effects Analysis

Assumptions & Method of Analysis

For the purpose of this analysis, mechanical treatments include tree removal, small diameter thinning, stand cleaning, pruning, mastication, and hand piling. These are all methods of mechanically treating areas that are overstocked, have an excess ladder fuel component, and/or have heavy surface fuels loadings. Prescribed fire would follow all mechanical activities in both action alternatives.

The analysis area for direct, indirect, and cumulative effects is the same as the project area shown on the maps in the appendices and incorporates information on activities described in Appendix D of this EA. Direct effects would be those that generally occur within 1-10 years following implementation. Indirect effects would most likely extend upward of 20 years following implementation. Cumulative effects would be those actions that include past, present, and proposed in the reasonably foreseeable future (up to 5 years) following implementation.

Fire behavior modeling is used to predict the fire behavior in the project area for the vegetation conditions that would exist for each alternative. Fire behavior model inputs were obtained from weather records at the closest weather station (Sparta Butte) and fuels models were assigned based on the existing and proposed treatment stand characteristics. The modeling results show how alternative two and three would change both surface and crown fire behavior within the project area.

Fire behavior fuel models are used as input to the Rothermel (1972) fire spread model, which is used in a variety of fire behavior modeling systems. The Fuel models used in this analysis are from Hal Anderson's "Aids to determining fuel models for estimating fire behavior" (GTR INT-122, 1982). The existing vegetation in this project area was best characterized by the following Fire Behavior Fuels Models:

Fuel Model 2
Fuel Model 10

Predicted fire behavior for post treatment vegetation in the timbered stands was modeled as:

Fuel Model 8

Fuels Management Analyst Suite (FMAPlus) was used to make fire behavior predictions. A ninety seventh-percentile fire danger day (only 3% of weather and environmental conditions are worse) was used for the wildfire predictions. Stand exam data backed up by field recon were used to determine stand characteristics used in the fire behavior modeling.

A number of factors including canopy bulk density, crown base heights, torching indices, crowning indices, crown fire potential, rates of spread, and flame lengths were analyzed in determining differences between alternatives (reference detailed modeling results in the Sandbox analysis file). Crown Fire potential (indicated by crowning index and torching index) and flame length were selected as the best measurements. Many of the other factors listed above are functions of crown fire potential. Fire managers are interested in flame lengths, crowning indices and torching indices because it affects how and where to fight a wildfire. Reducing crown fire potential to a surface fire and flame lengths that allow direct attack of a wildfire would meet the purpose and need of the project.

Crown fire potential, fire rate of spread, and flame length were selected as the best measurements for alternative comparison. Crown fire potential is measured by torching and crowning indexes which are defined below.

- **Torching Index** is the 20 foot wind speed at which a ground fire will torch into the crown initiating a crown fire. The lower the torching index, the lower the wind speeds need to be to initiate torching. A torching index of 0 means that there is a very high potential for a crown fire to occur.

- **Crowning Index** is the 20 foot wind speed at which active crown fire is possible. The lower the crowning index, the lower the wind speeds need to be to initiate active burning in the crown and spread through the canopy. A low crowning index (closer to 0) indicates that there is a very high potential for an active crown fire.

Fire managers are interested in flame lengths, crowning indices and torching indices because it determines what suppression strategies would be most effective.

Key Indicators used to compare the alternatives are as follows:

Fire Behavior Potential

- Crown Fire Potential - measured by the potential for a wildfire transition from a ground fire to a crown fire (torching and crowning index)
- Fire intensity - measured in flame length (feet)
- Fire rate of spread - measured in chains per hour (1 chain = 66 feet)
- Fire type:
    - surface fire only burns surface fuels;
    - passive crown fire torching of a single tree or a small group of trees;
    - active crown fire where a surface fire ignites tree crowns and the fire spread is through the canopy

Fire Regime Departure

Number of acres treated within fire regimes one or three that are in a condition class two or three.

No Direct, Indirect, or Cumulative Effects

The following activities associated with the Trail project are of such limited and constrained nature that they would have no effect on Fire or Fuels Management resources or activities.

- Hand planting
- Temporary road construction
- Road Decommissioning

These activities and their effects will not be discussed further in the Fire/Fuels section.

A. Fire Behavior Potential

The structure and fuel loading within the project area has changed considerably during the past century. Fire exclusion, forest harvest, and various land use practices have reduced the frequency of fires, especially in low severity fire regimes, resulting in high accumulations of canopy and surface fuel (PNW-GTR-628).

Crown characteristics that lead to crown fire are described by (Finney, 1996) “A surface fire may make the transition to some form of crown fire depending on the surface intensity and crown characteristics (Van Wagner, 1977 and 1993). The crown characteristics that are used to compute crown fire activity are;

- Crown base height
- Crown height
- Crown bulk density

The mechanical fuels reduction treatments were placed strategically to break up the landscape and were designed to reduce surface fuel loads, increase crown base heights, reduce canopy density, and retain large trees which create shade and moderate wind speed.

Fire Behavior Potential Comparison – Crown Fire Potential and Flame Length outputs were used to compare the relative difference between the alternatives, not the actual fire behavior of a wildfire. The following table displays the differences in crown fire potential and flame lengths by alternative. The fire behavior characteristics listed in table 3.7 were used to compare the relative difference between the alternatives. The following tables display the differences by alternative.

Table 3.7 – Fire Behavior Potential Key Indicator Comparisons by Alternative

Fire Behavior Potential (FMAPlus)			
Indicators	**Alt 1**	**Alt 2**	**Alt 3**
Torching index	0	195	195
Crowning index	53	63	63
Flame length	17ft	1-2ft	1-2ft
Rate of spread (ch/hr)	35	6	6
Fire type	passive crown	surface	surface

Scientific principles of fire behavior were used to consider alternative effectiveness.

Table 3.8 – Alternative Effectiveness by Alternative

Alternative Effectiveness			
Indicators	**Alternative 1**	**Alternative 2**	**Alternative 3**
Reduces surface fuels (% of project area over which fuel loadings are reduced, mechanical treatments as well as Rx fire)	No new acres treated 0%	45% (7,337 ac)	40% (6,609 ac)
Increases crown and canopy base heights	0-3	6-24	6-24
Reduces canopy densities (measured in Basal Area)	128	81	81
Retains large trees	yes	yes	yes

Lower canopy base height (including ladder fuels) facilitates ignition of the crown fuels by the surface fire and then, transition to some form of crown fire. Canopy bulk density is used to determine threshold values for active crown fire, which spreads much faster than a surface fire. Canopy height is used as the upper level of the canopy space for determining canopy fuel loading and the starting height of lofting embers".

Fine fuel loadings (3 inch minus size classes) in harvest units in the action alternatives are expected to experience a short-term increase immediately following harvest activities. In general, these fuel loadings are expected to range in the 10-15 tons per acre which is above the desired ranges for fuels reduction activities. In all of these stands, post-harvest burning is planned with a landscape prescribed burn to follow. Fire hazards immediately following harvest activities are not severely elevated due to the green nature of the slash. Depending on the weather, the slash could cure rapidly and present a short-term (several months) elevated hazard risk in the late summer before fall rains/snows arrive. A curing period is required to achieve desired fuel consumption when prescribed burning. Fuel loadings generally are crushed closer to the ground by winter snows (reducing the potential for the fire to get up into the tree crowns) and after a period of drying in the late spring/early summer they are generally ready for prescribed burning.

Therefore, if the prescribed burning takes place in the fall of the year following harvest as planned, there is a short term (3 months) period of elevated potential for high intensity burning conditions in the event of a wildfire during this period. This occurrence depends largely on weather conditions and the relatively low potential for a lightning strike in that exact same area. This risk would be immediately removed following the completion of the burning activities. Should burning be delayed – this risk would remain in place for the hottest four months each summer for a 2 year period after which the fine fuels will be on the ground and

decomposed to the point that they are no longer a flash fire hazard.

These effects are the same for each action alternative and will not be discussed further on an individual basis.

Direct/Indirect Effects on Fire Behavior Potential

ALTERNATIVE 1

Some strategic mechanical fuels reduction work has occurred adjacent to the 7700 road and along private boundaries in the southeast corner of the project area with the Medical Springs and South Fork WUI projects. Alternative 1 would not enhance or build upon existing strategic fuels reduction work, nor would it create new strategic fuel breaks.

Within the analysis area, multi-layered stand structures, tree densities, and live vegetation continue to grow, and dead wood continues to accumulate, creating conditions that allow fire to move vertically from the ground level to the forest crown. Overstocked stand conditions continue to increase the susceptibility of the stands to insects and disease (reference Silvicultural Effects) resulting in increased surface and crown fuel loadings and associated fire behavior potential. These conditions continue to limit firefighting opportunities, increase risk to private property, firefighter and public safety, and increase the risk of damaging impacts to natural resources.

Alternative one does not meet the purpose and need of the project for the following reasons:

1. No reduction in surface fuel loadings would occur; flame lengths exceed direct attack with hand crews and equipment in most instances.
2. Crown base heights would remain low, canopy bulk densities would remain high, which contribute to torching and crowning indices remaining low. Crown fire potential would remain as passive or active.
3. Does not provide a strategic and safe area for fire suppression activities.

The direct effects of alternative one is a continuation of heavy surface and canopy fuel loadings that have passive (spotting) and/or active crown fire potential, and flame lengths that exceed four feet include: increased risk of a crown fire initiating and spreading to private property, and decreased opportunities to fight fire direct with hand tools. There would be few strategic fuel breaks capable of altering fire behavior. This would result in backing off to a safer location or using heavy equipment. Not having the opportunity to direct attack a fire combined with the limited access in the project area, increases the potential for a large, high intensity fire, the potential for resource damage from heavy equipment, and risk to firefighter and public safety.

The direct effects of not treating acres with crown fire potential also increases the risk of damaging impacts to soil, vegetation, watersheds, and visuals.

<u>Other Issues</u>

Cost of wildfire suppression - Costs of wildfire suppression continue to increase without treatment of hazardous fuels.

Smoke impacts - The Sandbox project area is located approximately 25 miles southeast of La Grande and approximately 5 miles west of the Eagle Cap Wilderness, a high visual quality area. The City of La Grande is designated as a (SSRA) smoke sensitive receptor area. Potential impacts from smoke generated from a wildfire continue to increase as fuel loadings increase. The direct effects of a wildfire burning under the existing conditions has the potential to produce smoke levels that exceed visual and health standards within the Grande Ronde Valley. Nearby sensitive areas that may be affected by wildfire smoke includes:

- I 84
- Highway 82, 203,
- Forest Roads 2034, 6700, 7000, and 7700

- Communities: La Grande, Union, Medical Springs, Keating, North Powder, and Cove
- Eagle Cap Wilderness Area (Class I Airshed)

ALTERNATIVES 2 and 3

Fuels treatments in alternatives two and three are designed to decrease the potential fire behavior, treatments target canopy, ladder and surface fuels with silvicultural operations, mechanical fuels treatments, as well as prescribed burning to modify vegetation composition and structures. Fuels treatments are placed strategically to break up the fuel continuity across the landscape and provide a defensible zone for suppression forces to safely use direct and indirect suppression tactics.

Canopy and ladder fuels are reduced by forest thinning operations that target crown classes, stand basal area and canopy bulk density. Treatments would also maximize managing towards large trees that are resistant to insects, disease, and fire. Approximately 128 acres of small diameter (noncommercial) thinning, and 431 acres of mechanical fuels reduction without removal (FFU), would occur outside of the proposed harvest units. Surface fuels would be reduced by prescribed fire and/or a variety of mechanical treatments that remove and reduce fuel (e.g. pile-and-burn, and mastication), resulting in lower potential flame lengths.

Crown and canopy base heights would be increased through the thinning of the understory and the removal of the low limbs (pruning) from the leave trees. Prescribed burning will also increase crown base heights by removing live limb wood in the lower portions of the crowns, resulting in greater torching and crowning indices.

The majority of the scientific literature supports the effectiveness of fuel treatments in reducing the probability of crown fire (e.g. Agee 1996; Edminster and Olsen 1996; Helms 1979; Kilgore and Sandro 1975; Martinson and Omi 2002; Omi and Martinson 2002; Pollet and Omi 2002; Scott 1998a, 1998b; van Wagtendonk 1996; Wagle and Eakle 1979; Weatherspoon and Skinner 1995).

The following research was incorporated in the development of Alternatives 2 and 3

1. In forest stands that have not experienced fire or thinning for several decades, heavy thinning combined with (often multiple) prescribed-fire or other surface fuels treatments, or both is necessary to effectively reduce potential fire behavior and crown fire hazard (PNW-GTR-628).
2. Stand structure and wildfire behavior are clearly linked (Biswell 1960, Cooper 1960, Dodge 1972, McClean 1993, Rothermel 1991, van Wagner 1977), so fuels reduction treatments are a logical approach to reducing extreme fire behavior. The principle goal of fuels reduction treatments is to reduce fireline intensities, reduce the potential for crown fires, and improve the ability of forest stands to survive a wildfire (Agee 2002).
3. Silvicultural treatments that target canopy closure have the potential to reduce the development of all types of crown fires (Cruz et al. 2002, Rothermel 1991, Scott and Reinhart 2001, van Wagner 1977) if surface fuels are concurrently treated.
4. The most appropriate fuel treatment strategy is often thinning (removing ladder fuels and decreasing tree crown density) followed by prescribed fire, piling and burning of fuels, or other mechanical treatments that reduce surface fuel amounts. This approach reduces canopy, ladder and surface fuels, thereby reducing both the intensity of potential wildfires (Graham, McCaffery and Jain. 2004. RMRS-GTR-120).
5. The torching and crowning indices were not significantly changed after harvesting alone. The addition of mastication resulted in significant increases in torching and crowning indicies primarily from the increased height to live crown base from mastication. (Stephens and Moghaddas, 2005)

Alternative 2 would mechanically reduce fuel loadings on 2,624 acres and Alternative 3 treats 1,896 acres through removal, stand thinning/cleaning, pruning, piling, pile burning. Alternative 2 reduces fuel loading through the use of prescribed fire on 7,465 acres, alternative 3 reduces fuel loading through the use of prescribed fire on 6,737 acres. Crown fire potential would be reduced from

passive and/or active to surface. Reducing crown fire potential to a surface fire would allow for successful fire suppression operations. Treatment effectiveness would last for 20 to 30 years in terms of recommended stocking levels (ladder and crown fuels) and associated crown fire potential.

Vegetation in the treated areas after both mechanical and prescribed fire would be best represented by Northern Forest Fire Laboratory fuel model 8 as described in Aids to Determining Fuel Models for Estimating Fire Behavior (GRT INT-122) where spread rate is very low and flame length very low.

Flame lengths would be reduced to 1-2 feet on treated acres (reference table 2). Hand crews can use direct fire suppression tactics when flame lengths do exceed four feet. Engines and dozers (where roads and terrain allow) can directly fight fire with 4-8 foot flame lengths. Having the opportunity to utilize direct suppression tactics decreases the potential fire size, the risk to public and firefighter safety, and private property.

Treatments would be designed to leave the largest/healthiest trees on site to provide shading of surface fuels and reduced surface wind speeds. Smaller diameter tree densities would be reduced (raising the canopy base height) to minimize the potential for crown fire initiation. This partially shaded gap between the surface and crown fuels would be increased through pruning and prescribed fire, minimizing the potential for crown fire.

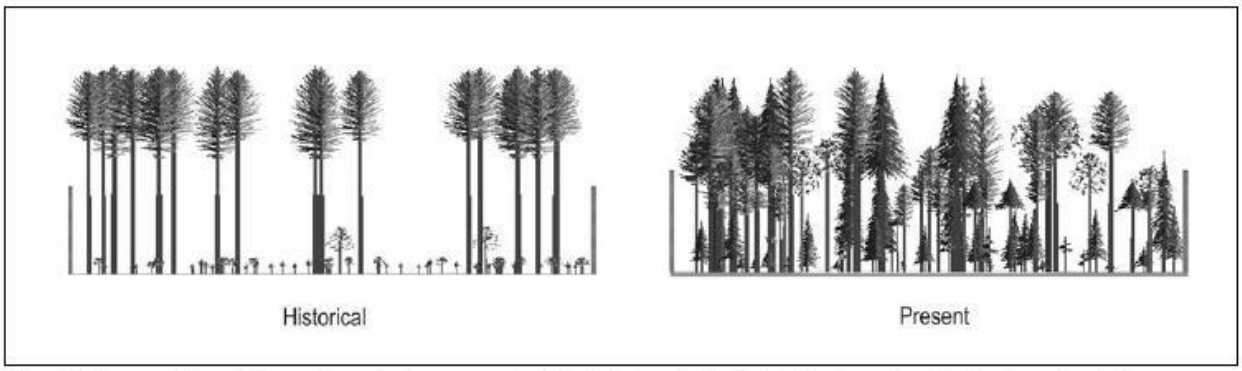
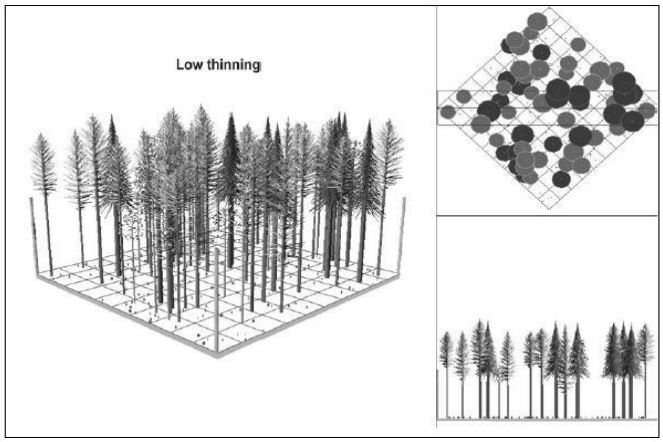


Figure 2—Representation of changes in vertical arrangement and horizontal continuity in forest stand structure. Today's forests tend to have more fuel strata, higher densities of fire-sensitive species and suppressed trees, and greater continuity between surface and crown fuel.

This kind of treatment is known as "thinning from below" or "low thinning" and mimics mortality caused by surface fire (Graham et al 1999). The following diagram shows a stand that has been thinned from below leaving the larger trees to provide shade.

Figure 3



Long range spotting potential decreases as crown fire potential and flame lengths decrease, potential flame lengths are reduced, and firefighting opportunities to direct attack a fire within the corridor are increased.

Firefighter and public safety is increased and the potential of high intensity fire spreading onto private lands that contain homes is decreased. The risk of damaging impacts to soils, vegetation, and visuals from severe burning conditions is decreased as well.

Direct effects of prescribed fire include reducing surface fuel loadings and potential flame lengths to lessen the extent of wildfire impacts to natural resources.

Other Issues

Cost of wildfire suppression - Cost of firefighting would be reduced with smaller, less intense wildfires. Fuel treatment costs over the next 20 to 30 years are expected to be reduced.

Smoke impacts - Smoke impacts due to wildfire are greater that prescribed fire. Huff, Ottmar, et al (1995) found PM10 smoke production was twice as high for wildfires as for prescribed fire. Removal and utilization of small diameter trees and dead standing and down trees would decrease the amount of pollutants generated during a prescribed burn (or wildfire). Smaller less intense fires would produce less smoke.

Smoke from prescribed burning may impact nearby sensitive areas; I84, HWY82, HWY203, FS Roads 2034/6700/7000/7700, La Grande, Medical Springs, Keating, North Powder, Cove, and the Eagle cap Wilderness, but the potential smoke impacts from wildfire would be significantly be reduced.

Smoke generated by prescribed fire would be greater in alternative 2 than in alternative 3 due to the difference in proposed acres treated. Although by treating more acres alternative 2 would have a larger effect on reducing potential smoke impacts of a wildfire than that of alternative 3. The following table displays the estimated amount of emissions released during prescribed burning.

Table 3.9 – Predicted Prescribed Burning Emissions by Alternative

Emissions released during prescribed burning by Alternative (tons/ac)			
Emissions	**Alt 1**	**Alt 2**	**Alt 3**
PM 2.5	0	628	580
PM 10	0	533	492
CO	0	5,164	4,789
CO2	0	142,526	129,808

Cumulative Effects on Fire Behavior Potential

The analysis area has a high occurrence of both lightning and human caused fires that are scattered across all ownership boundaries. The risk combined with heavy accumulations of surface, ladder, and crown fuels increases the potential for large, high intensity wildfire to occur and spread across ownership boundaries.

Vegetation and fuels treatments have occurred on private and national forest lands within and adjacent to the Sandbox analysis boundary. These treatments have reduced fuel loadings and modified fire behavior on several hundred acres within Sandbox.

Currently there are approximately 1,700 acres of PCT associated with the Upper Catherine Creek TSI Proposal, which is ongoing and will be implemented in the next few years. Approximately 750 acres of mechanical fuels reduction treatments and prescribe burning occurred associated with the Southfork WUI project. Several land owners have implemented fuel reduction projects on properties adjacent to the project boundary.

ALTERNATIVE 1

Not treating heavy surface, ladder, and crown fuels on the public lands adjacent to private and industrial lands increases the risk of a wildfire originating on forest land and spreading across these boundaries.

Limited vegetation management, aggressive wildfire suppression, and insects and disease mortality would continue the trend of fuel loadings accumulating in the form of dead and down trees, small diameter trees growing into the overstory, and dense crown conditions. These conditions would continue to increase the potential for a ground fire to transition into a crown fire. Heavy accumulations of surface fuels and/or crown fires would continue to increase the potential for spotting to occur. These conditions would continue to limit firefighting opportunities, increase risk to private property and homes, firefighter and public safety, and increase the risk of damaging impacts to natural resource, air quality, and the visuals. These vegetation conditions and associated risks would continue to escalate until action is taken to reverse the trend, or a stand replacement fire event occurs.

Firefighting cost trends would continue to increase as fires become larger and more explosive and difficult to control. Fighting wildfires in the United States in 2012 cost $1,902,446,000, leaving a 9,326,238 acres footprint, destroying a total of 4,244 structures, including 2,216 residences, 1,961 outbuildings and 67 commercial structures.

ALTERNATIVES 2 and 3

The combined and continued fuel reduction effort of all ownerships would reduce the potential for a large high intensity wildfire to spread through the area. Fuel reduction efforts would reduce potential crown fire and flame lengths and increase opportunities to safely attack wildfire. Treatments that maximize removal and utilization have less chance of creating damaging impacts to air quality.

The strategic treatments along ridges and roads proposed in this project area build upon existing strategic roads and Private boundary treatments from the in the Medical spring and South Fork WUI projects. Alternative 2 mechanically treats 2,624 acres, places strategic fuel breaks along roads as well as ridges, as well as a road to ridge top treatment along the 7787 north, providing strategic places to attack a wildfire. Alternative 3 eliminates 728 acres of harvest treatment, limiting strategic fuel breaks to roads and incomplete ridge treatments leaving fewer options for successful fire suppression. Managing fuels as well as locating treatments strategically within the analysis area would increase the number of strategic areas from which to fight fire from, resulting in less long term risks to private property, homes, firefighter and public safety, and damaging impacts to natural resources including visuals.

Implementing either action alternative would reduce the potential for a large, high intensity wildfire to spread from the Wallowa-Whitman National Forest onto private lands by reducing flame lengths and crown fire and spotting potential. Additionally, allowing firefighting resources strategic locations to successfully suppress fires.

B. Fire Regime Departure

Direct/Indirect Effects on Fire Regime Departure

ALTERNATIVE 1

The analysis area currently has approximately 11,394 acres in fire *regimes one and three* identified as having high departures from historical fire return intervals; and approximately 1,501 acres as having moderate departures from historical fire return intervals. This alternative would not treat any acres within fire regimes one or three that are in a condition class two or three. The direct effects of

not mechanically pre-treating acres with heavy fuel loadings (i.e., ladder fuels, overstocked stands, and heavy concentrations of standing and down dead) in these fire adapted ecosystems would limit the re-introduction and maintenance of low intensity fire because of potential extreme fire behavior.

Alternative one does not restore fire adapted ecosystems within a range of historic conditions. Fire exclusion would continue to extend the fire return interval, increase fuel loadings, change vegetation profiles, and increase the gap between historical conditions and current conditions. True fir establishment would continue in the absence of low intensity "thinning fires." These vegetative conditions have placed Late and Old structure, wildlife habitat, and riparian areas at risk to severe wildfire impacts.

ALTERNATIVES 2 and 3

Treatments (mechanical and/or prescribed fire) under both alternative two and three would target fire regimes one and three that are in a condition class two or three. These acres would be treated mechanically through commercial removal, small diameter thinning, stand cleaning prescriptions, and piling to reduce surface, ladder, and crown fuels. Low to moderate intensity prescribed fire entries would occur within the next three to five years following mechanical treatments. Prescribed fire would be used to thin suppressed overstocked regeneration and reduce surface fuel accumulations. These acres would be moved towards more historical conditions (Condition Class 1) following treatments. Prescribed fire would be the primary tool used to maintain the project area in this desired condition.

Both Alternatives two and three meet the purpose and need of the project by moving fire regimes one and three towards more historic conditions enhancing forest resiliency to natural disturbance processes. Alternative two mechanically treats more acres resulting in more acres moving toward historic conditions. These treatments are expected to last for 20 to 30 years with light maintenance level treatments in 10 to 15 years. This will reduce the risk of intense wildfire behavior to LOS, long-term wildlife habitat, and riparian structure, and areas managed for old growth habitat. Preservation of existing LOS is enhanced while promoting long-term LOS, wildlife diversity, and riparian function across the landscape towards more historical conditions.

Table 3.10 – Acres of Fire Regime Departure Needs Mechanically Treated by Alternative

Fire Regime	Condition Class	Acres in Need of Treatment	Mechanically Treated Acres And Percent of Total Need Treated		
			Alternative 1	Alternative 2	Alternative 3
1 and 3	2 and 3	12,895	0	2,624 (20%)	1,896 (15%)

Table 3.11 - Fire Regime Departure Needs Treated with Prescribed Fire by Alternative

Acres in Need of Treatment	Acres Treated With Prescribed Fire And Percent of Total Need Treated		
	Alternative 1	Alternative 2	Alternative 3
12,895	0	7,465 (58%)	6,737 (52%)

Cumulative Effects on Fire Regime Departure

ALTERNATIVE 1

Acres identified as being in a Condition Class two would convert to a Condition Class three over the next 20 to 30 years. Acres identified as being in a Condition Class Three would continue to be at high risk.

Movement towards historical conditions in disturbance patterns across the landscape would be delayed for approximately 20 to 30 years, or until a stand replacement event occurs.

Heavy concentrations of dead standing and down trees and multi-layered structure and tree densities continue to be at risk to intense, stand replacing fire events, which could result in the loss of late and old structure, wildlife habitat cover, and consumption of large woody material and structure in riparian areas.

ALTERNATIVES 2 and 3

Mechanical treatment proposed in this project combined with previous treatments from Southfork and Medical Springs WUI would allow for more opportunities to use prescribed fire. Fuels can be manipulated prior to burning (where as weather and topography cannot) to reduce the potential for high intensity burning and damaging impacts to natural resources during prescribed fire operations. Mechanical pre-treatment would reduce the amount of smoke emissions generated during prescribed burning by reducing the amount of fuels available for combustion.

Ongoing TSI treatments associated with the Upper Catherine Creek TSI Proposal treat previously harvested stands, lowering tree densities, retaining the healthiest trees, with preference placed on fire resistant trees species. In some instances these treatments are adjacent to and extend proposed mechanical fuel reduction treatments creating larger areas of reduced fuel loading.

Maintaining fire return intervals within Fire Regimes One and Three would help move existing vegetative condition in terms of vegetation composition and structural stages, and disturbance patterns towards historical conditions.

Air resources are somewhat unique in that, the past impacts to air quality are not usually evident. The burn units proposed in the plan would be cumulative only with the local emission sources described in the affected environment occurring at the time of burning. Proposed actions may have some cumulative effects as burning could occur during the same time of year that agricultural burning produced smoke is in the air shed. Since the Grande Ronde Valley agricultural burn emissions are low, the cumulative air quality concentrations would be low and well within standards in regard to local prescribed burning.

Coordination of prescribed burning and associated smoke production would need to take place with the BLM, and adjacent FS Ranger Districts.

Under any alternative that calls for burning, there is a potential for future restrictions to meet air quality standards. Winds from the south may direct smoke into the Eagle Cap Wilderness. Generally burning would take place in the spring or fall, which are time periods that fall outside of the smoke management restrictions that are placed on these air sheds

C. Other Issues and Fire/Fuels

Climate Change - The earth has entered an area of rapid environmental changes. The warming and drying trend predicted under the climate change scenarios will also increase the likelihood of fires. These fires will be larger and more severe, especially at higher elevations. There will be fewer trees regenerating after a fire

due to increased regeneration mortality from higher insect and pathogen activity *(Forest, Insect & Pathogens and Climate Change: Workshop Report, Beukema 2007).*

Resource managers will need to integrate adaptation strategies (actions that help ecosystems accommodate changes adaptively) and mitigation strategies (actions that enable ecosystems to reduce anthropogenic influences on global climate) into project design *(Climate change and Forest of the Future: Managing in the Face of Uncertainty, et al Milar, 2007*).

Adaptive strategies include:

1. Resistance options – manage forest ecosystems and resources so that they are better able to resist the influence of climate change or to stall undesired effects of change.
2. Promote resilience to change – resilient forests are those that not only accommodate gradual changes related to climate but tend to return toward a prior condition after disturbance either naturally or with management assistance. Promoting resilience is the most commonly suggested adaptive option discussed in a climate-change context *(Dale et al. 2001, Price and Neville 2003, Spittlehouse and Stewart 2003)***.** Forest management techniques such as prescribed burning or thinning dense forest, can make forest more resilient to wildfire and decrease fire emissions.
3. Enable forest to respond to change – This group of adaptation options intentionally accommodates change rather than resist it, with a goal of enabling or facilitating forest ecosystems to respond adaptively as environmental changes occur *(Milar, 2007).*

The following are mitigations strategies/actions that would enable ecosystems to reduce anthropogenic influences on global climate:

1. Sequester carbon
- Restore healthy forest so that carbon can be efficiently stored in live trees.
- Reduce potential for carbon loss from severe wildfire.
- Transferring biomass out of forest and into wood products or bio-fuel to replace fossil fuel based products.

2. Reduce emissions – Wildfire and extensive forest mortality as a result of insect and disease are primary sources of unintentional carbon emissions from forests in the western United States *(Stephens 2005).*
- Reduce density of small diameter trees. One means of slowing the release of sequestered carbon is to increase forest resistance to fire, drought, and disease, by reducing the density of small trees *(Stephens and Moghaddas 2005)*.
- Reduce emissions from wildfires and prescribed burns by reducing surface fuel loading.

ALTERNATIVE 1

Under Alternative 1 there are potential impacts on climate change due to: a) the continued potential for carbon loss from severe wildfire; b) limited/low forest resiliency/resistance to wildfires, drought, and disease from increasing density of trees; and c) no utilization of biomass.

ALTERNATIVES 2 and 3

While treatments in alternatives 2 and 3 would produce carbon dioxide, it would be immeasurable when compared to that produced by large wildfires on an annual basis in not only the United States but in the world. See also Climate Change later in this chapter.

Economic Effects

Introduction

This report analyzes the economic effects of the alternatives of the Sandbox Vegetation Management Project. The analysis includes an assessment of economic efficiency, timber sale viability and local community economic benefits. Timber Sale viability provides a comparison of the market values of harvested timber versus costs incurred to remove the timber. Economic efficiency provides a measure related to planning and implementation costs of the project versus revenues obtained through the sale of timber. The local community economic benefit analysis provides a measure of private sector forest worker jobs, wages and total economic outputs expected during implementation.

The Sandbox project will produce a quantifiable product through the timber sale that will be used to determine the "net value" of this project in terms of dollars and cents. Benefits in terms of dollars and cents especially in natural resource management where the benefit may be increased resiliency to pathogens, increased mean annual increment, and reduced fire hazard on acres that are pre-commercial thinned, are hard to define, and outside the scope of this analysis. In addition to use values, existence values otherwise referred to as passive, nonuse or preservation values may capture important economic value to the public (Swanson and Loomis 1996). Although these benefits are important components of the ecosystem services provided to humans, the production relationship between ecosystem functions and ecosystem services (such as changes in recreation visitor days, fishing days, animal units months, or fish population) is not well defined or measurable at the project level in terms that provide meaningful comparisons of commensurate dollar values.

Timber sale contracts are commonly used to achieve vegetation management objectives identified as part of the project. In this case it will be the tool used in addressing these key issues: Reducing fuel hazards, moving more acres into late old structure, and promoting satisfactory wildlife cover. This work will also provide revenue to the county and jobs to the local work force. Service work may account for the remainder of the key issues: Fuel loadings outside harvest units, stocking levels in non-commercial stands, road densities (obliteration or closures). Both action alternatives address these issues to different degrees that will be assessed by the same criteria.

Key Indicators used to compare the alternatives are as follows:

- Timber Sale Viability – Predicted high bid rate
- Economic Efficiency – Present net value
- Socioeconomic Impacts to Communities – number of jobs

Effects Analysis

Assumptions and Methodology

Logging costs estimates were derived from comparisons to local La Grande Ranger District sales to determine stump to truck, haul, contractual costs related to erosion control and brush disposal, road developmental costs related road construction or reconstruction and temporary roads, and road maintenance.

Volumes include both sawtimber and non sawtimber. Estimates are based upon maximum removal and utilization of timber. Timber values for sawtimber have improved since the lows experienced in 2007. Non sawtimber values are based upon delivered log values of $35/ton, which provides a reasonable estimate for the past 10 year period. Non-saw values continue to fluctuate throughout the year. Current quotes as of February, 2013 are less at $26/ton.

Prescription treatments for timber harvest and logging methods are similar between alternatives. In addition the treatments not associated directly with the timber sale are similar as well. The acres treated by harvest and non harvest are the primary variables evident which effect overall costs and revenues.

Forest Service costs for planning, preparation, and administration were compared utilizing Wallowa-Whitman experienced costs on past timber harvest projects as updated November, 2011.

Only essential KV costs will be directly related to the timber harvest contract. All other non harvest on the project will be evaluated as non timber sale related.

The timber sale viability and economic efficiency analysis is based upon a US Forest Service spreadsheet tool developed in Region Six to evaluate timber sale and project economics. Timber sale viability and Benefit/cost measures are both included. The spreadsheet summarizes numerous other measures which also may be utilized to evaluate project or sale economics.

The local community economic benefit analysis is based upon a University of Oregon developed spreadsheet, Economic Impacts of Restoration Calculator for Oregon Counties. The spreadsheet utilizes project specific information and data from individual county calculations related to economic benefits in relation to dollars spent on projects during implementation. For this analysis and comparison purposes, it is projected that all project spending will be spent within Union County, Oregon over a four year period.

Direct/Indirect Economic Effects

Timber Sale Viability

Each alternative was evaluated to determine predicted bid rates for included timber anticipated to be harvested with current market conditions as of January 2013. Harvest units for the two action alternatives were appraised to determine base rates and predicted bid rates for included timber. The base rate reflects the minimum rate for the species and product mix to be harvested plus the costs of any essential KV reforestation work necessary in regeneration harvest units. The predicted bid rate is determined by calculations of timber product value, logging costs including stump to truck, log haul, road maintenance, slash treatment, slash treatment, erosion control, road construction/reconstruction, and temporary road work. The predicted bid rate reflects value of the timber products minus the costs estimated to remove the timber.

Table 3.12 - Timber Sale Viability Comparison

Alternatives	Combined Product Base Rate	Predicted Combined Product Bid Rate	Positive Value Timber Sale Appraisal	Gross Timber Revenue
Alternative 2	$10.13/CCF	-$2.48/CCF	NO	$134,131
Alternative 3	$4.55/CCF	$20.67/CCF	YES	$179,404

Base rates are affected by the species and product combinations anticipated as well as by planned essential KV reforestation costs. Species and product mix on both alternatives are similar. Base rates are also impacted by essential KV reforestation costs which are included in both alternatives. Alternative 2 has essential KV valued at $130,840 on 208 acres, while Alternative 3 has $37,300 on 55 acres. The higher base rate on Alternative 2 reflects the requirement to include more essential KV costs related to planting when compared to Alternative 3.

Alternative 2 has higher average logging costs compared to Alternative 3 due to a greater proportion of skyline logging to ground based logging. There are no temporary roads costs associated in Alternative 3.

In summary, Alternative 2 is projected as a deficit timber sale with $134,141 projected from base rate value revenues. Alternative 3 is projected as a positive value timber sale with $179,404 timber value generated.

Economic Efficiency

An economic efficiency analysis of Alternatives 2 and 3 was completed that focused on identifiable and quantifiable ecosystem benefits and costs for each alternative in terms of the present net value (benefits minus costs) to assess which alternative comes nearest to maximizing net public benefits as defined in 36 Code of Federal Regulations Part 219.3. These analyses are attached to this report. An analysis of the No Action was not done since this alternative did not have identifiable and quantifiable ecosystem benefits and costs.

Ecosystem functions provide a broad set of ecosystem services such as clean water or native forest stands that are valuable to both human and nonhuman components of the ecosystem. These ecosystem values may be assessed in economic and non-monetary terms. Economic valuation provides a partial measure of the full range of ecosystem values in commensurate terms for assessing economic tradeoffs. Non-monetary values are necessarily assessed in terms relevant to other disciplines such as ecology or ethics. Changes in ecosystem services must be measurable and quantifiable in like terms, preferably monetary measures, in order to assess a relevant change in economic value.

This analysis is based on identifiable and quantifiable economic benefits and costs and is more typically a financial comparison between revenues and costs. The objective of the economic efficiency analysis is to show a relative measure of difference between alternatives based on direct costs and values used. All dollar values have been discounted in terms of the present net value (2013 dollars). Discounting is a process whereby the dollar values of costs and benefits that occur at different time periods are adjusted to a common time period so that they can be compared. A real discount rate, exclusive of inflation, equal to 0.3 percent was used in the analysis over the planning period.

Present net value is defined as the discounted net value of project benefits minus the discounted net value of project costs. A benefit-cost ratio is the ratio of present net benefits to present net costs. Present net value is a more appropriate measure for comparison between alternatives when land and productive activities are limiting such as in an environmental analysis of alternatives. A benefit-cost ratio comparison is more appropriate when investment capital is limited, for example when considering budget allocation among a number of different activities. The only economic change that can currently be measured at the Sandbox Vegetation project scale is commercial timber harvest.

Both action alternatives incorporate vegetation treatments including timber harvest of sawtimber and non-sawtimber components, pre-commercial thinning, FFU fuels reduction outside harvest units, and prescribed fire. These proposed activities are described in detail in the Sandbox Vegetation Environmental Assessment. The following tables summarize costs, revenues, net present value and benefit cost ratios of each alternative for timber sale with related projects and timber sale with non-timber related projects.

Table 3.13 - Alternative 2 – Benefit:Cost Summary Table

Analysis	Discounted Costs	Discounted Revenues	Net Present Value	Benefit-Cost Ratio	Type of Sale
Timber sale & related projects	$636,703	$132,544	($504,160)	0.21	Below Cost
Timber & non-timber projects	$1,978,452	$132,544	($1,845,909)	0.07	Below Cost

Table 3.14 - Alternative 3 - Benefit:Cost Summary Table

Analysis	Discounted Costs	Discounted Revenues	Net Present Value	Benefit-Cost Ratio	Type of Sale
Timber sale & related projects	$369,596	$177,267	($192,329)	0.48	Below Cost
Timber & non-timber projects	$1,711,317	$177,267	($1,534,050)	0.10	Below Cost

Both alternatives are below cost projects. Planning costs are sunk costs and do not change by alternative. The revenue generated on Alternative 3 is greater than Alternative 2, due to the higher predicted bid rates. Costs are greater on Alternative 2 primarily due to volume quantity preparation/administration, more skyline logging and temporary road construction and greater amount of essential KV.

Local Economic Impacts

The local community economic effect analysis predicts potential impacts as a result of implementation and spending for completion of a project. Total spending includes projected contract costs expected to be incurred for in the woods costs for restoration work including logging, fuels and pre-commercial thinning work. Total jobs, wages and economic outputs are projected for the anticipated contract spending. A county level analysis was completed assuming all work and dollars spent would affect the local Union County population. The local economic analysis utilized a model called “Economic Impacts of Restoration Calculator for Oregon Counties” and developed by the Ecosystem Workforce Program at the University of Oregon. The table below summarizes the indicators for comparison including total jobs produced, total wages associated with the jobs produced and total economic output expected. The table includes both direct and indirect effects.

Table 3.15 - Local Community Economics - (Projected for 5 year project length within Union County)

Alternative	Total Spending	Total jobs produced	Total Wages	Total Economic Output
Alternative 2	$1,943,138	21.1	$827,922	$3,072,755
Alternative 3	$1,638,910	17.8	$698,768	$2,591,667

Based upon this analysis Alternative 2 improves economic conditions for the local community more so when compared to Alternative 3.

Cumulative Economic Effects

The cumulative effect of Alternatives 2 and 3 are basically the same, they would both provide the county with receipts which otherwise would be dollars out of the taxpayers pocket. They all would provide a similar number of jobs related to harvesting, transporting, processing, marketing and distributing a valuable product. The income generated by this project contributes to family wage earners and local industries which in turn support other local businesses, hospitals, and services contributing to the overall economic vitality of the County. The products produced from this project would not support the local mills alone, however, when added to the wood products being removed from other private and corporate lands, as well as other national forest timber, it contributes to the overall viability and sustainability of local mills and businesses.

Each of the action alternatives reduce fuel loadings and promote forest health. The acres treated would provide seasonal work/benefits for a projected 8-10 years. The difference between Alternatives 2 and 3 is the number of harvest acres deferred from treatment.

C. Alternative Evaluation as They Respond to the Other Issues

Big Game Habitat

Introduction

The following is a wildlife effects analysis and a comparison of the project alternatives for the management indicator species for big game habitat. A Wildlife Inventory describing the existing condition of habitat within the analysis area is in the Sandbox Analysis File.

Rocky Mountain elk, mule deer, white-tailed deer, black bear and cougar are the big game species that occur in the Sandbox area. However, elk is recognized in the LRMP as a management indicator species and will be the focus of this big game habitat analysis. Historically many biologists believed that managing for quality elk habitat would also provide well for mule deer. This thinking has been challenged as researchers uncover more information on mule deer habitat selection and how elk and deer distribute themselves in relation to one another. Currently the most meaningful management standards exist for elk habitat, and it is commonly accepted that the other big game species are at least partially accommodated when high quality elk habitat is present.

Rocky Mountain elk have been selected as an indicator of habitat diversity, interspersion of cover and forage area, and security habitat provided by areas of low human disturbance. Elk management on the Wallowa-Whitman National Forest is a cooperative effort between the Forest Service and the Oregon Department of Fish and Wildlife (ODFW). The Forest Service manages habitat while ODFW manages populations by setting seasons, harvest limits, and goals for individual Wildlife Management Units (WMU). The Sandbox project lies within the Catherine Creek WMU.

Potential elk habitat effectiveness may be evaluated using the Habitat Effectiveness Index (HEI; Thomas et al. 1988). This model considers the density of open roads, the availability of cover habitat, the distribution and juxtaposition of cover and forage across the landscape, and forage quantity and quality. More recently, Rowland et al. (2005) has proposed the use of distance band analysis (DBA) to better understand the effects of roads on elk security habitat.

Existing Condition

The Sandbox project area falls within the Catherine Creek WMU (ODFW). Population estimation in this unit from 1990-2000 averaged 862 animals, with cow/calf rations estimated at 32/100, and bull/cow ratios estimated at 6/100 (Schommer and Johnson 2003). Population estimates are above State Management Objectives (700), while cow/calf ratios are below the objective of 50/100, but below averages for other units within the area. The bull/cow estimate is below the objective of 10/100. As compared to other management units within the Wallowa-Whitman NF, the WMUs on the west side of the Wallowa Mountains historically supported fewer elk as compared to more densely populated units located in the Blue Mountains.

The Forest Plan (LRMP) establishes standards for wildlife habitat, and more specifically elk habitat on the Forest. The Sandbox analysis area provides year round habitat for big game; winter range lies along the western and southwest portion of the analysis area, transitional range is mid-slope and summer range lies along the eastern portion of the analysis area. High security habitat is provided within the eastern and western central portions of the analysis area due to limited motorized access.

The Sandbox project area was analyzed using a habitat effectiveness model (Thomas et al. 1988) to assess the quality of elk habitat. The HEI model evaluates size and spacing of cover and forage areas, density of open roads, quantity and quality of forage available to elk and cover quality. Forage data is unavailable and is not included in the total HEI value. To further examine security habitat for elk, a distance band analysis (DBA) was performed as described by Rowland et al. (2005), and a separate HEI value was calculated (Table 3). DBA calculates the percent of the analysis area from varying distances from open motorized routes. To provide for a more landscape-scale approach, and therefore more meaningful results, HEI and

DBA were analyzed for the Sandbox analysis area which includes portions of the following sub-watersheds: Beagle Creek, Middle Big Creek, Milk Creek-Catherine Creek, North Fork Catherine Creek, South Fork Catherine Creek, Upper Big Creek, and West Eagle Creek.

A distance band analysis uses GIS to draw concentric bands around motor vehicle routes until the entire area of interest (in this case the Sandbox analysis area) is occupied by these bands. The distance band closest to motor vehicle routes (within one half mile) provides the least security for elk. As a result, elk choose to spend less time within one half mile of motor vehicle routes. As distance from motor vehicle routes increases, so does habitat effectiveness for elk. Elk find more security from human disturbance further from motor vehicle routes. The second distance band occupies the area between on-half and one mile from motor vehicle routes, and represents moderate quality security habitat for elk. Effects from motor vehicles begin to dissipate within the second distance band. Finally, effects from roads are nearly negligible within the third distance band that occupies the area greater than one mile from motor vehicle routes. The third distance band represents high to optimal quality security habitat for elk. For this analysis, the percentage of the landscape within each distance band was used as a means of comparing alternatives with regard to the effects of motor vehicle disturbance to elk.

Cover: Forage Ratio – A cover: forage ratio is used to describe the relative amounts of cover to forage and while the optimal ratio of cover to forage is 40:60 (Thomas 1979), the LRMP establishes a minimum standard that at least 30% of forested land be maintained as cover (>40% canopy closure). “Forested land” refers to only those acres that currently provide forested cover or have the potential to provide it, not to grassland, shrub steppe, rock, or bodies of water. Cover refers to any combination of satisfactory cover (a stand of coniferous trees with >70% canopy closure) and marginal cover (a stand of coniferous trees with 40-70% canopy closure). Forage habitat has less than 40% canopy cover. There are currently 3,872 acres (24%) of satisfactory cover, 5361 acres (34%) of marginal cover and 6,624 acres (42%) of forage habitat within the analysis area. All Management Areas were pooled for analysis, because they have the same cover standard, thus providing for a more landscape-scale based approach, and MA-1 makes up 90% of the analysis area. The existing cover:forage ratio is 58:42. This ratio exceeds the LRMP standard, suggesting a surplus of cover, however stand data was collected in the early 80’s and the ratio may misrepresent the analysis area based on changed conditions due to natural disturbances over time.

Cover Quality – The Wallowa-Whitman LRMP establishes a minimum standard for big game thermal cover (marginal and satisfactory combines). At least 30% of the forested lands should be maintained in a thermal cover condition. Within the Sandbox analysis area, thermal cover exists on 58% of the analysis area of which 24% is satisfactory cover and 34% is marginal cover, resulting in a cover quality value of 0.71 (Table 3.16).

Size and Spacing – Thomas et al. (1979) suggest that size and spacing of cover and forage habitat is a key to elk use of forested habitat, and this assumption was verified by Leckenby (1984) in the Blue Mountains of northeastern Oregon. Size and spacing of habitat is considered optimal when cover to forage edge widths are between 100-200 yards (Thomas et al. 1988). The existing HE size and spacing value of 0.74 (Table 3.16) indicates that forage to cover ratios within the analysis area is less than optimal, but acceptable. However, this variable is not meant to stand alone and therefore management decisions for providing optimum elk habitat solely based on HE size and spacing value should be used with caution.

Open Roads – Excessive open road densities have deleterious effects on habitat effectiveness by taking land out of production (1 road mile equals 4 acres of land), reducing the effectiveness of cover and increasing disturbance to elk. The road density estimate does not take into account off-road vehicle use on OHV trails, cross-country travel and on closed roads. When these variables are taken into account, road density estimates are likely to be higher. The existing average open road density within the Sandbox analysis area is 2.2 mi/mi^2 (Table 3.16). 88% of the Sandbox planning area is designated MA-1 and the average open road density is lower than the forest plan guideline of 2.5mi/mi^2 for MA-1.

Habitat Effectiveness Index – The Habitat Effectiveness Index (HEI) values are based on a comprehensive elk habitat model developed by Thomas et al. (1988). These values consider the interaction of size and spacing of cover and forage areas, density of roads open to vehicular traffic, forage quantity and quality, and

the quality of cover. For this analysis, HEI values were calculated without a forage quality value because accurate forage data is not available. The existing HE values are 0.47 (road density analysis) and 0.42 (distance band analysis; Table 3.16).

While the Sandbox analysis area does not currently support a large number of elk, the habitat potential is present (Personal Communication ODFW, 2012). A large population of elk currently occupies private land, just west of the project area. Maintaining a distribution of old growth forest to establish connectivity and cover corridors will ensure that the population on the west has access, not only to the analysis area, but to the wilderness area beyond.

Table 3.16 - Habitat-effectiveness index calculations for elk habitat within the Sandbox analysis area

Habitat Effectiveness Variable	Habitat Effectiveness Value (Optimal = 1.0)	Comments
HE Cover	0.71	Amount of satisfactory cover relative to marginal cover
HE Size and Spacing	0.74	Mosaic of cover and forage
HE r value using road density	0.47	Open road density 2.13 mi/mi sq
HE r value using distance bands	0.42	Concentric bands around open roads
Total HEI using road density[1]	0.62	LRMP MA-1 $\geq$ 0.5 HEI
Total HEI using distance band analysis*	0.60	LRMP MA-1 $\geq$ 0.5 HEI
Percent of area $\geq$ 0.90 mi from open motorized route*	11%	High quality security habitat

[1] HEI calculations do not include a forage variable because current, reliable forage data are not available
[*] Habitat $\leq$ 0.90 mi from an open motorized route is considered marginal or poor

Effects Analysis

The analysis area for elk is the subwatersheds that overlap the project area.

Analysis Assumptions – Temporal and Spatial Considerations

The duration of effects are discussed when relevant or practical to predict. The following timeframes will apply for the purpose of this analysis. These timeframes are appropriate given the scale of this analysis and the duration of effects expected from the prescribed treatments.

Short term	0 – 20 years
Long term	50 - 100 years

The geographic area for assessing impacts to wildlife is defined as the 16,134 acre Sandbox project area and the 36,702 acre Catherine Creek Watershed.

Direct and Indirect Effects Elk Habitat

Table 3.17 - Comparison of affect to big game habitat by alternative

Key Indicators	Alternatives					
	1		2		3	
	Acres	%	Acres	%	Acres	%
Acres of cover converted to forage	0	0%	826	9%	434	5%
Acres of cover converted to forage within winter range	0	0%	30	2%	17	1%

ALTERNATIVE 1

Alternative 1 will not result in direct or indirect effects to big game cover and forage habitat, but will forego some opportunities to improve habitat conditions in the short and long-term. This alternative would be the least impacting to big game habitat in the short-term. Current levels of cover and forage will remain the same (Table 3.17). The areas that are poor to fair quality cover (marginal cover) today are important to elk while created openings are growing back into a cover condition. Forage enhancement through prescribed burning would not occur in this alternative.

Cover – Without disturbance, (e.g. wildfire, insect outbreak), the existing cover: forage ratio (58:42) would not be altered. Current levels of cover would remain and continue to influence elk distribution and movement within the analysis area. This no action alternative would forego opportunities to improve big game habitat including: 1) converting some cover to forage thus transitioning habitat to more closely reflect optimal ratios (40:60; Thomas 1979); and 2) Forage quality and quantity would not be enhanced through prescribed fire (Long et al. 2008). Decadent shrubs and grasses that have been absent of fire for several decades will continue to provide marginal quantities and quality of forage.

Road Densities – Road densities would be unaltered. Excessive open roads have negative effects on habitat effectiveness by taking land out of production, reducing the effectiveness of cover, and increasing disturbance to elk. Travel management planning on the Wallowa-Whitman National forest is currently on hold; however, it is expected to resume in the next year. When completed the Travel Management Plan will address road density on the forest and unregulated cross country motorized travel. This would improve some aspects of motorized effects to elk.

ALTERNATIVES 2 and 3

Alternative 2 would result in the greatest reduction in elk cover in the short and mid-term (826 acres). Similar to Alternative 2, Alternative 3 would reduce cover and create forage, but to a lesser extent (434 acres). Direct and indirect effects include reductions in marginal and hiding cover, improvements in forage, and disturbance from motorized vehicles from the logging operation in the short-term. The scale, duration and nature of this project would not change the potential of the project area to provide elk habitat.

Cover- Commercial and non-commericial thinning treatments associated with this project would convert 47% cover to 45% cover in Alternative 2 and 46% cover in Alternative 3 (Table 3.17). The stands where these treatments are proposed currently exhibit poor crowns, and would fade out of cover within a decade if left untreated. The effects of converting cover stands to forage would persist through the short-term. There would continue to be an over-abundance of cover but it would be closer to the optimal ratio (40:60) suggested by Thomas (1979). Moving existing ratios toward more optimal ones is to the benefit of big game, especially in an area where populations are below the management target. An increase in forage is likely from opening stands up to sunlight.

Treatments proposed in MA-3 winter range will reduce 51 acres of cover to forage in Alternative 2 (Units 3, 67, 70, 71) and 19 acres of cover to forage in Alternative 3 (Unit 67). The LRMP requires that any conversion of cover to forage in MA-3 be within 600 ft of a satisfactory cover patch at least 40 acres in size; The largest unit that will be converted to forage is Unit 67 which contains 19 acres. This unit lies adjacent to large stands (>40 acres) with > 40% canopy cover. The other three units (Unit 3, 70 and 71) which will only be treated in Alternative 2 are also within 600ft of large blocks of marginal/satisfactory cover. The conversion of cover to forage will not be enough to reduce the ability of this winter range to support game during moderate and harsh winters. Winter range will continue to provide snow intercept and options for finding limited forage and shelter from weather. To reduce disturbance to big game on winter ranges timber sale activities, including log haul, would be minimized during periods of low temperatures and accumulated snow depths, typically from December 15 through March 31st.

Forage - Prescribed burning on 7,465 acres for Alternative 2 and Alternative 3 would improve forage quality and quantity, particularly during the spring. Long et. al. (2008) found that fuels reduction treatments lead to higher percent nitrogen and improved palatability during the spring, but untreated areas had higher percent nitrogen and palatability during summer. Also, percent nitrogen and palatability were higher in treated areas during both spring and summer for two to five years following burning. "As a result of the interacting effects of fuels reduction and season on forage characteristics, treated stands provide better foraging opportunities for elk during spring (May – June), whereas control stands (untreated) provide better foraging opportunities during summer (July – August). Consequently, maintaining a mosaic of burned and unburned (late successional) habitat may be of greater benefit to elk than burning a large portion of the landscape" (Long, et. al. 2008). Both alternatives 2 and 3 would result in a mosaic of burned and unburned habitat which would benefit elk and deer. Low level cover provided by shrubs and small trees would be set back in the short-term, but would return in three to ten years, depending on the species. The benefits to big game habitat from burning often outweigh the negatives in relatively open timber and grasslands like those found in much of this analysis area. Effects of burning would not differ between the action alternatives.

Open Roads – As in Alternative 1, road densities would be unaltered in Alternatives 2 and 3. Excessive open roads have negative effects on habitat effectiveness by taking land out of production, reducing the effectiveness of cover, and increasing disturbance to elk. The Wallowa-Whitman National forest Travel Management Plan is currently on hold; however, planning will continue in the next year. The Travel Management Plan may address road density on the forest and unregulated cross country motorized travel. The outcome would potentially improve security habitat for big game by eliminating unregulated cross country motorized travel and reducing road densities. However, the effects can't be evaluated in detail until its completion (estimated 2016).

Cumulative Effects for Elk Habitat

ALTERNATIVE 1

Alternative 1 would not contribute to the cumulative effects of past management in this analysis area. Ample acres have been treated through regeneration harvest, planting and non-commercial thinning to provide adequate cover in the long-term. Prescribed fire would not be used to promote higher forage quality and persistence later into the summer as with the action alternatives. Ponderosa pine stands will continue to be overstocked and susceptible to stress and mortality from insects and wildfire.

ALTERNATIVES 2 and 3

Cumulative effects from Alternative 2 would be greater than Alternative 3 in regard to elk cover, however, the significance of the difference is difficult to determine. The primary difference is that Alternative 3 retains more cover by 3% and Alternative 2 converts 13 more acres of winter range

cover to forage. However, both alternatives maintain enough elk forage and cover to maintain the current population.

By 2015 or 2016 this area should be managed under the Forest Travel and Access Management Plan which would manage cross country motorized travel. This would create some patches of security habitat with low levels of human intrusion. The presence of security areas would have a positive effect on elk distribution and bull escapement during hunting seasons. These effects can not be evaluated in detail until completion of the Plan.

Prescribed burning in all action alternatives in combination with other prescribed burning projects across the landscape (such as Medical Springs WUI and Bald Angel) would generally benefit big game through forage enhancement. Periodically burned grasslands typically provide higher quality forage later into the year than stagnant grasslands that have missed several years of fire. Fire would also regenerate some shrub communities that are decadent and currently functioning only as low cover. Fire would create a mosaic of cover and forage that closer represents historical conditions. Effects to forage from prescribed fire are the same for the action alternatives. Prescribed fire would be scheduled out over multiple years to avoid depleting forage over such a large area at one time.

Grazing by cattle will continue in this analysis area. Grazing by cattle throughout August, September, and part of October could reduce available forage for elk and deer prior to going into the rut and winter. These effects can lead to elk and deer going into breeding and winter seasons with less body fat than necessary to survive or successfully reproduce. The effect of adequate forage not being available to deer and elk is localized and not widespread enough to affect herd productivity. Many years of monitoring and observations by the range specialist and wildlife biologist do not indicate a broad scale problem of cattle over-utilizing the forbs and graminoids in this area. These effects, although relatively small in scale, will not change as a result of either action alternative.

Release thinning included in all action alternatives would result in a short-term reduction in hiding cover, but hiding cover would be restored in these stands within 10 years. The nature and scale of this activity is negligible in terms of habitat effectiveness for big game, but does change hiding cover which can influence how elk use an area at a localized scale.

Fisheries and Watershed Management

Introduction

The following is a summary of the analysis of potential effects on instream habitat, riparian vegetation, water quality, stream flow regimes, and fish populations, for the 16,134 acre Sandbox Vegetation Management project area. The Sandbox project area is located in three watersheds and seven subwatersheds. The Big Creek and Eagle Creek Watersheds are in the Powder River subbasin and the Upper Catherine Creek Watershed is in the Grande Ronde River subbasin.

The description of watershed/fisheries resources, along with the analysis of the expected and potential effects for each alternative were assessed using field surveys, water quality databases, supporting literature, and professional judgment. Refer to the Fisheries and Watershed Inventory and Effects Analyses in the Sandbox Vegetation Project Analysis File for additional information.

Several management directives/recommendations apply to this project. The Management directives from the Wallowa-Whitman Land and Resource Management Plan (LRMP) 1990, the Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH 1995); and the LRMP Biological Opinion (1998) will be followed. In addition, the PACFISH amendments add further interim management direction in the form of Riparian Management Objectives (RMOs), Riparian Habitat Conservation Areas (RHCAs), and standards and guidelines.

Existing Condition

Table 3.18 - Watersheds and subwatershed information for the Sandbox project.

Watershed Name/Number	Subwatershed Name/Number	SWS Acres (Total)	Project Area Acres w/in SWS	Project Area FS Acres w/in SWS	Other SWS Acres (Private, State & BLM)
Big Creek 1705020307	Beagle Creek/ 170502030703	13,718	716	715	1
	Middle Big Cr./ 170502030702	13,791	2	2	0
	Upper Big Cr./ 170502030701	10,385	3	3	0
Eagle Creek 1705020310	West Eagle Cr./ 170502031002	12,532	0.1	0.1	0
Upper Catherine Creek 1706010405	Catherine Cr.-Milk Cr./ 170601040503	13,503	1,499	1,405	94
	North Fork Catherine Cr./ 170601040501	21,821	3,609	3,565	44
	South Fork Catherine Cr./ 170601040502	15,343	10,305	10,184	121

Instream Habitat

Region 6 classifies streams based on type of flow and presence or absence of fish. Class I streams are permanently or intermittently flowing and fish bearing, Class II streams are permanently or intermittently flowing and fish bearing with limited numbers of fish, Class III streams are permanently flowing and non-fish bearing, and Class IV streams are intermittently flowing and non-fish bearing. The La Grande Ranger District has dropped the Class II classification and identifies any fish bearing stream as Class I.
Table 3.19 shows the miles of stream class by subwatershed in the Sandbox project area. Stream class was verified in the field seasons of 2010 and 2011.

Table 3.19 - Miles of stream class by subwatershed within the Sandbox project area.

Subwatershed Name	Class I Streams (miles)	Class III Streams (miles)	Class IV Streams (miles
Beagle Creek	0	1.1	0
Middle Big Creek	0	0	0
Upper Big Creek	0	0	0
West Fork Eagle Creek	0	0	0
Catherine Creek-Milk Creek	1.4	1.2	1.1
North Fork Catherine Creek	4.7	9.0	5.3
South Fork Catherine Creek	12.5	13.1	29.1
Total:	**18.6**	**24.4**	**35.5**

Class I = fishbearing, **Class III** = perennial non-fishbearing, **Class IV** = intermittent non-fishbearing

The Class I streams or portions of Class I streams within the project area are Scout Creek, Bottle Creek, Camp Creek, Prong Creek, Collins Creek, North Fork Catherine Creek, South Fork Catherine Creek, Sand Pass Creek, Pole Creek, Corral Creek, and Buck Creek. Scout Creek is in the Catherine Creek-Milk Creek subwatershed, and the North Fork of Catherine Creek and Buck Creek are in the North Fork of Catherine Creek subwatershed. All other Class I streams are in the South Fork Catherine Creek subwatershed.

Table 3.20 shows the results of fish habitat surveys for those streams that have had habitat surveys completed within the project area. This information was obtained from the Region 6 stream survey database and surveys are on file at the La Grande Ranger District. Surveys within the analysis area were completed in 1991, 2006, 2008, and 2010. Survey information was collected utilizing the Hankin and Reeves methodology as modified by the PNW R6 Regional Office. No fish habitat surveys have been conducted on Camp Creek, a tributary to the South Fork of Catherine Creek. Camp Creek is fishbearing for an approximate 0.2 miles.

Table 3.20 - Results of fish habitat surveys for streams within the Sandbox project area.

Stream/Year Surveyed	Survey Length (miles)	Pools (#/mile)	Wetted Width (ft)	Stable Banks (%)	W/D Ratio	LWD (pcs/mi)
Buck Creek/2006	4.9	11	7	100	15	11
Bottle Creek/2008	2.6	12	5	99.9	19	50
Collins Creek/2008	1.9	14	9	99.4	14	58
Corral Creek/1991	1.1	12	4	ND	12	33
North Fork Catherine/2010	2.6	20	25	95.9	18	11
Pole Creek/1991	2.9	18	7	ND	6	84
Prong Creek/2008	2.6	55	8	96.1	19	52
Sand Pass Creek/1991	2.6	28	8	ND	8	58
Scout Creek/2008	3.6	18	4	89.0	12	18
South Fork Catherine Cr./2008	8.8	9	17	99.9	13	23

ND=No Data

PACFISH Riparian Management Objectives (RMOs)

Landscape-scale interim RMOs describing good habitat for anadromous fish were developed using stream inventory data for pool frequency, large woody debris, bank stability, and width to depth ratio. State water quality standards were used to define favorable water temperatures. All streams surveyed were below the RMO for pools/mile at the time of the survey. Five temperature monitoring sites are located within the project area. There are two standards applicable to streams within the Sandbox project area. In the North Fork Catherine Creek, South Fork Catherine Creek, and Catherine Creek-Milk Creek subwatersheds water bodies must not be warmer than 53.6^{o}F for bull trout spawning and rearing. The temperature standard for Beagle Creek subwatershed is that water bodies must not be warmer than 68.0^{o}F. Temperature standards for streams in the Sandbox project area are shown below in Table 3.20. All streams monitored exceeded the temperature standard for bull trout spawning and rearing in all years monitored. Collins Creek and upper South Fork of Catherine Creek (at Pole Creek) came close to meeting the temperature standard in 2008 and 2010. No stream temperature monitoring has been conducted in Scout Creek, Bottle Creek, Camp Creek, Corral Creek, Sand Pass Creek, Buck Creek or streams in the Beagle Creek subwatershed.

Seven of the 10 streams with fish habitat surveys have high percentages of streambank stability ranging from 89% to 100% stable streambanks.

Of the 10 streams surveyed within the project area, two (Pole Creek and Sand Pass Creek) met the PACFISH width to depth ratio of <10. The width to depth ratios for the remaining eight streams surveyed within the project area exceeded the PACFISH width to depth ratio (12-19). However, the width to depth ratios for these eight streams is within the expected range of Rosgen stream types (Rosgen, 1996).

Seven of the 10 streams surveyed within the project area exceeded the standard of > 20 pieces of large wood per mile. Three streams, Buck Creek, North Fork of Catherine Creek, and Scout Creek had less than 20 pieces of large wood per mile (Table 3.20).

Oregon Department of Environmental Quality (ODEQ) 303 (d) Listed Streams

Upper Grande Ronde River Subbasin (North Fork and South Fork Catherine Creek, Milk Creek-Catherine Creek Subwatersheds)

A TMDL Water Quality Management Plan (WQMP) has been developed for the Upper Grande Ronde Subbasin, and was approved By EPA in May of 2000. With the approval of a TMDL the ODEQ 303 (d) list no longer applies. Once the TMDL is developed and approved all management activities on federal lands managed by the USDA Forest Service will continue to follow standards and guidelines (S&Gs) as listed in PACFISH, the Wallowa-Whitman N.F. Forest Plan, and Best Management Practices (BMPs) as defined in the Implementation Plan for 208 (Water Pollution Control Act, PL 92-500, as amended). Additionally, specific

SMU Constraints and Mitigation Measures are identified in the Wallowa-Whitman Watershed Management Handbook, which is used when various situations are encountered during project layout.

Powder River Subbasin (Beagle Creek Subwatershed)

There are no streams listed on the ODEQ 303 (d) list as water quality limited in the Beagle Creek subwatershed. A TMDL Water Quality Management Plan (WQMP) is in the process of being developed for the Powder Basin. Once the TMDL is developed and approved all management activities on federal lands managed by the USDA Forest Service in the Powder Basin will continue to follow standards and guidelines (S&Gs) as listed in the LRMP, as amended by INFISH (USFS 1995), Best Management Practices (BMPs) as defined in various Federal and State laws such as the Implementation Plan for 208 (Water Pollution Control Act, PL 92-500, as amended), and Specific Stand Management Unit (SMU) Constraints and Mitigation Measures identified in the Wallowa Whitman NF Watershed Management Handbook.

Erosion and Sedimentation

Roads provide a substantial source of sediment and a mechanism for delivering sediment to the stream systems. The amount varies by density, location and condition of roads. PACFISH Standards and Guidelines for existing roads within RHCAs include minimizing sediment delivery to streams from the road surface; closing and stabilizing, or obliterating and stabilizing roads not needed for future management activities; improving stream crossings to accommodate a 100-year flood; and providing and maintaining fish passage at all road crossings of existing and potential fish-bearing streams.

Since the early 1990s, approximately 8.9 miles of road have been decommissioned in the North Fork of Catherine Creek subwatershed, 14.3 miles of road have been decommissioned in the South Fork Catherine Creek subwatershed, and 10.1 miles of road have been decommissioned in the Milk Creek-Catherine Creek subwatershed. These decommissioned roads included many of the draw bottom roads within the subwatersheds that were causing impacts to water quality and stream and riparian habitats.

Road Density and Location

Table 3.21 shows the existing miles of open and closed Forest Service (FS) roads, and total road density of FS roads by subwatershed.

Table 3.21 - Total existing lengths (miles) and densities (miles/square mile) of roads in the subwatersheds affected by the Sandbox project area.

Subwatershed Name	Drainage Area (mi^2)	Total FS Open Roads (mi)	Total FS Closed Road (mi)	FS Open and Closed Road Density (mi/mi^2)	FS Open Road Density) (mi/mi^2)
Milk Creek-Catherine Creek	21.1	28.0	24.8	2.5	1.3
North Fork Catherine Creek	34.1	22.5	39.5	1.8	0.7
South Fork Catherine Creek	24.0	32.0	33.7	2.7	1.3

Road densities in the Beagle Creek, Middle Big Creek, Upper Big Creek, and West Fork Eagle Creek subwatersheds were not analyzed at the subwatershed scale since there are few project acres in these subwatersheds.

There are approximately 31.1 miles of open and closed roads within RHCAs and 227 stream crossings in the project area. This includes Class I (fish bearing), Class III (perennial non-fishbearing), and Class IV streams (intermittent non-fishbearing). Closed roads consist of 18.2 miles of the 31.1 miles of open and closed roads in RHCAs. Miles of roads to be opened and stream classes to be crossed are listed in table 3.24.

There are 1.1 miles of foot trail within RHCAs and 0.2 miles of motorized trails within RHCAs in the project area.

Streamflow Regime

Streamflow discharge in the Sandbox project area is characteristic of a snowmelt hydrograph, with late spring and fall rains contributing to the annual average flows. Peak flows in the project subwatersheds usually occurs in the later part of May to early June with flow gradually decreasing to minimum discharge in late August-early September.

The Matrix of Diagnostics, Pathways and Indicators used in consultation with NOAA Fisheries and the United States Fish and Wildlife Service (USFWS) use an Equivalent Clearcut Acres (ECAs) recommended value of <15% to indicate potential changes in peak and base flows. ECAs are calculated at the subwatershed scale. The existing 2012 ECA value for the Beagle Creek subwatershed is 10.2%, Milk Creek-Catherine Creek subwatershed is 6.3%, the ECA value for the North Fork Catherine Creek subwatershed is 1.4%, and the ECA value for South Fork Catherine Creek subwatershed is 2.4%.

Fish Species, Distribution, and Habitat

There is approximately 18.6 miles of fish bearing stream within the project area. Fish bearing streams in the project area are within the Milk Creek-Catherine Creek, North Fork Catherine Creek, and South Fork Catherine Creek subwatersheds.

Fish species and designated critical habitat within the project area include spawning and rearing habitat and Designated Critical Habitat for Snake River summer steelhead (*Oncorhynchus mykiss*), Snake River Basin spring Chinook salmon (*O. tshawytscha*), Columbia River Basin bull trout (*Salvelinus confluentus*), and spawning and rearing habitat for redband trout (*O. mykiss gibbsi*), which are on the Regional Forester's Sensitive Species List.

Effects Analysis

Proposed activities which have no direct, indirect, or cumulative effects on fisheries and watershed resources are addressed immediately below. , The remainder of the activities will be analyzed for their potential impacts on 1) Water Quality Resources, 2), Fisheries and Fish Habitat, and 3) Potentially Endangered, Threatened and Sensitive Fish Habitat.

No Direct, Indirect, or Cumulative Effects

The following activities associated with the Sandbox Project have been analyzed and are of such limited context and constrained nature that they would have little to no measurable effect on watershed and fisheries resources. These activities and their effects will not be discussed further in this effects analysis.

- Roadside Danger Tree Removal
- Invasive Species Treatment
- Fuelwood Removal Areas

Roadside danger tree removal will only occur outside of RHCAs. Danger trees felled within RHCAs will be left on site. No ground disturbance will occur within RHCAs from this activity, and there will be no potential effects to water quality or fisheries resources.

There is no herbicide treatment proposed within RHCAs. Therefore, there are no potential effects to water quality or fisheries resources from this activity.

No fuelwood removal is allowed within RHCAs. Therefore, there are no potential effects to water quality or fisheries resources from this activity. Closed roads opened for fuelwood removal will be used for project activities, and the use of these closed roads is analyzed in the Indirect Effects to Water Quality and Stream Temperature section.

1. Watershed Resources

Introduction

The watershed resources section analyzes the direct and indirect effects to water quality, and indirect effects to stream temperature. Effects to stream temperature are indirect only. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance.

The primary effects to water quality that could arise as a result of Alternatives 2 and 3 are increases in sediment delivery rates. In addition to the potential for increases in sediment delivery rates, there is also the potential to affect stream temperatures. In this section, the impacts, both positive and negative on sediment delivery rates and stream temperature will be discussed. Effects related to commercial harvest treatments include all aspects of the treatment such as cutting, skidding, piling, and removal of any trees cut during the operation.

Assumptions

PACFISH RHCAs have been delineated on all streams within the Sandbox Project area as described in Chapter II of this EA.

Sediment Delivery Rates: The definition of accelerated sediment delivery for the Sandbox Project includes any increase over and above the natural sediment rates of the watershed. It is difficult to equate soil erosion directly to sedimentation rates. Obstructions in the path (i.e. downed wood, grass/forb cover) between the sediment source and the stream reduce the risk of indirect sediment delivery to the stream. Therefore, adequate filter strips (in terms of size, ground cover and downed material) are necessary to slow or prevent sediment movement downslope of disturbed areas. The use of riparian buffers has long been recognized as a mitigation measure to reduce sediment transport to streams. The structural complexity of roots and herbaceous vegetation, in addition to the absorption capability of the duff layer, limits excess sedimentation to the aquatic system. Surface runoff slows down when it comes in contact with herbaceous shrubs, mature trees and the duff layer on the forest floor and sediment is deposited within the riparian buffer before it reaches the watercourse (Decker 2003).

Alternative Treatment Element Assumptions

Commercial Harvest:

Alternative 2 proposes the commercial harvest of 2,193 acres using ground based equipment and skyline yarding, and Alternative 3 proposes the commercial harvest of 1,465 acres using ground based equipment and skyline yarding. Generally, skyline yarding is used on ground with slopes greater than 35% for removal of material, and ground based equipment is used on ground with slopes less than 35%. In commercial harvest units (HFU, HIM, HOR, HPO, HPO/HIM, HSH, and HTH prescriptions) PACFISH RHCA buffer widths would be implemented as no activity stream buffers with the exception of two units, Units 5 and 72 discussed below.

Unit 5 is included in Alternative 2 only, and Unit 72 is included in both Alternative 2 and Alternative 3. In Unit 5, commercial thinning is proposed with skyline yarding along a Class III stream (perennial non-fishbearing) in the Beagle Creek subwatershed of the Big Creek watershed in the Powder River subbasin. The unit is approximately 42 acres, and three acres of RHCA are proposed for thinning using skyline yarding. A minimum no activity stream buffer of 50 feet would be implemented.

In Alternatives 2 and 3, unit 72 lays completely upslope of the 7787 road adjacent to Buck Creek, a tributary to the North Fork of Catherine Creek in the North Fork Catherine Creek subwatershed. The 5 acre unit will be treated mechanically using ground based equipment, and includes 4.5 acres of RHCA treatment upslope of the 7787 road. Unit distance from Buck Creek averages 125 feet and ranges from 75 feet to 175 feet.

Fire Fuels Treatment (FFU):

A total of 431 acres of fire fuels treatment is proposed for both Alternative 2 and Alternative 3. This includes 391 acres outside of RHCAs and 40 acres within RHCAs.

Outside of RHCAs - Both Alternative 2 and Alternative 3 propose 391 acres of fuels reduction (FFU units) outside of RHCAs. Fuels reduction outside of RHCAs includes mechanical treatment using a slash buster (mastication) and piling slash with a grapple pile machine. For FFU units outside of RHCAs, PACFISH RHCA widths will be implemented as minimum no activity stream buffers.

Within RHCAs - Both Alternative 2 and Alternative 3 propose 40 acres of fuels reduction (FFU units) handwork within RHCAs. Units would receive ladder and ground fuels reduction treatment involving precommercial thinning of live trees less than nine inches dbh to a spacing of 14 by 16 feet using chainsaws. Ladder fuels branches on trees up to six feet above ground would be pruned, and slash would be piled by hand and burned.

For Fuels Reduction work within RHCAs, minimum no activity stream buffers of 10 feet on Class IV streams (intermittent non-fish bearing), 30 feet on Class III streams (perennial non-fishbearing), and 50 feet on Class I streams (fishbearing) would be implemented. Depending on the amount of slash generated, hand piling and hand burning of slash piles within RHCAs outside of no activity stream buffers may be required to address fuel accumulations.

RHCA treatment by stream class include: 21.8 acres along Class I streams (fishbearing); 1.6 acres along Class III streams (perennial non-fishbearing), and 17.0 acres along Class IV streams (intermittent non-fishbearing). The Class I streams (fishbearing) are Bottle Creek (9.6 acres FFU hand treatment), Prong Creek (10.3 acres hand FFU treatment), and Buck Creek (1.9 acres FFU hand treatment). Approximately 38.5 acres of RHCA fire fuels treatment is in the South Fork of Catherine Creek subwatershed, and 1.9 acres are in the North Fork Catherine subwatershed.

Precommercial Thinning (PCT):

A total of 128 acres of precommercial thinning in old harvest units is proposed for both Alternative 2 and Alternative 3.

Outside of RHCAs - Both Alternative 2 and Alternative 3 propose 118 acres of precommercial thinning (PCT units) in old harvest units outside of RHCAs. Precommercial thinning outside of RHCAs includes both handwork on slopes >30% and the use of slashbusters (mastication) on slopes <30%.

Within RHCAs - Both Alternative 2 and Alternative 3 propose 10 acres of precommercial thinning (PCT units) in old harvest units within RHCAs. Thinning of overstocked trees less than 9 inches dbh, and hand piling and burning of slash would occur in old harvest units within RHCAs. For precommercial thinning by hand within RHCAs, minimum no activity stream buffers of 10 feet on Class IV streams (intermittent non-fish bearing), 30 feet on Class III streams (perennial non-fishbearing, and 50 feet on Class I streams (fishbearing) would be implemented. Depending on the amount of slash generated, hand piling and hand burning of slash piles within RHCAs outside of minimum no activity stream buffers may be required to address fuel accumulations.

Prescribed Fire:

Both Alternative 2 and Alternative 3 propose 7,465 acres of prescribed fire (actual burn area). For prescribed fire, no direct ignition within PACFISH RHCAs would be allowed, but fire would be allowed to back into RHCAs. Prescribed burning would occur when weather and fuel conditions are appropriate to meet the objectives and prescription. Prescribed burning would be accomplished within a 10 year period depending on environmental conditions needed to meet burning

prescriptions.

Temporary Roads:

Alternative 2 proposes the use of 5.2 miles of temporary road, and Alternative 3 does not propose any temporary roads. All temporary roads in Alternative 2 are located in uplands outside of RHCAs. All temporary roads would be built, used, and restored during the dry season and during the same season of use. After use, temporary roads will be subsoiled where appropriate, returned to original contours where needed and wood debris scattered across the footprint of the temporary road where debris is available.

Closed Roads for Administrative Use

The miles of closed roads opened for administrative use is 21.9 miles for Alternative 2 and 12.4 miles for Alternative 3. In Alternative 2, one closed road crosses three perennial non-fishbearing streams (Class III), and seven closed roads cross 11 intermittent non-fishbearing streams (Class IV). In Alternative 3, five closed roads cross six intermittent non fishbearing streams. In both alternatives, a culvert that is washing out on a perennial non-fishbearing stream is proposed for replacement.

Maintenance of roads may be required, which includes brushing, spot rocking, blading and shaping of the road surface, cross drain culvert cleaning, and limited ditch cleaning. A culvert on closed road 7700705 on a perennial non-fishbearing stream (Class III) would be replaced. The culvert is currently plugged and the road bed is washing out.

The majority of maintenance activities such as brushing, blading and shaping of the road surface, cross drain culvert cleaning, and limited ditch cleaning would not occur instream but would occur on the road prism or immediately adjacent to the road prism.

Closed roads used for the project will be reclosed after use and would consist of closing and locking of gates where present, or replacing earthen barricades. No closed draw bottom roads would be opened for project purposes.

Road Decommissioning

Both Alternative 2 and Alternative 3 propose the decommissioning of 1.8 miles of road. The roads identified for decommissioning are overgrown and naturally decommissioned. Naturally decommissioned roads would not require actions beyond removing the road sign and removing the road from the transportation system.

The following table shows the total number of acres of treatments for each action alternative by subwatershed within the project area.

Table 3.22 - Acres of treatment by subwatershed.

Subwatershed/Treatments	Treatments	Alternative 2 Acres	Alternative 3 Acres
Beagle Creek/ 170502030703	Commercial Harvest	300	204
	Fire Fuels (FFU)	2	2
	Precommercial Thinning	0	0
	Prescribed Fire	567	567
Middle Big Cr./ 170502030702	Commercial Harvest	0	0
	Fire Fuels (FFU)	0	0
	Precommercial Thinning	1	1
	Prescribed Fire	0	0

Subwatershed/Treatments	Treatments	Alternative 2 Acres	Alternative 3 Acres
Upper Big Cr./ 170502030701	Commercial Harvest	1	1
	Fire Fuels (FFU)	0	0
	Precommercial Thinning	0	0
	Prescribed Fire	0	0
West Eagle Cr./ 170502031002	Commercial Harvest	0	0
	Fire Fuels (FFU)	0	0
	Precommercial Thinning	0	0
	Prescribed Fire	0	0
Catherine Cr.-Milk Cr./ 170601040503	Commercial Harvest	249	249
	Fire Fuels (FFU)	114	114
	Precommercial Thinning	70	70
	Prescribed Fire	1,605	1,605
N. Fork Catherine Cr./ 170601040501	Commercial Harvest	455	237
	Fire Fuels (FFU)	129	129
	Precommercial Thinning	0	0
	Prescribed Fire	762	762
S. Fork Catherine Cr./ 170601040502	Commercial Harvest	1,188	774
	Fire Fuels (FFU)	186	186
	Precommercial Thinning	57	57
	Prescribed Fire	4,531	4,531
Totals	Commercial Harvest	**2,193**	**1,465**
	Fire Fuels (FFU)	**431**	**431**
	Precommercial Thinning	**128**	**128**
	Prescribed Fire	**7,465**	**7,465**

Direct Effects to Water Quality

The following analysis of potential direct and indirect effects incorporates the Alternative Treatment Element Assumptions described under the Assumptions section above.

ALTERNATIVE 1 - NO ACTION

There are no direct effects on water quality as a result of the No Action Alternative. Effects related to this alternative on water quality and stream temperature are primarily indirect in nature and are discussed in the Indirect Effects to Water Quality and Stream Temperature section below.

ALTERNATIVES 2 and 3

Commercial Harvest

PACFISH buffers will prevent direct effects to water quality from commercial harvest. In skyline units, full suspension over the RHCA is required and will prevent direct effects to water quality.

In Unit 5 (Alternative 2), a minimum no activity stream buffer of 50 feet will be implemented that will prevent direct effects to water quality.

In Alternatives 2 and 3, because unit 72 lays completely upslope of the 7787 road adjacent to Buck Creek, the distance for any treatments within this unit from Buck Creek averages 125 feet and ranges from 75 feet to 175 feet. These distances will prevent direct effects to water quality.

There would be no difference in the direct effects to water quality with the implementation of either Alternative 2 or Alternative 3 since there are no direct effects to water quality.

Fire Fuels Treatment (FFU)

Below are the direct effects of fire fuels treatment outside and inside of RHCAs.

Outside of RHCAs - For FFU units outside of RHCAs, PACFISH RHCA widths will be implemented as minimum no activity stream buffers and would prevent direct effects to water quality from fuels reduction activities outside of RHCAs.

Within RHCAs - No activity stream buffers would prevent direct effects to water quality since handwork would be restricted from occurring on streambanks or in the stream channel.

There would be no difference in the direct effects to water quality with the implementation of either Alternative 2 or Alternative 3 since there are equal numbers of acres in both alternatives.

Precommercial Thinning (PCT)

Below are the direct effects of precommercial thinning outside and inside of RHCAs.

Outside of RHCAs – Because these precommercial thinning activities are outside of RHCAs and on gentle slopes direct effects to water quality would be prevented.

Within RHCAs - No activity stream buffers would prevent direct effects to water quality since handwork would be restricted from occurring on streambanks or in the stream channel. There would be no difference in the direct effects to water quality with the implementation of either Alternative 2 or Alternative 3 since there are no direct effects to water quality in either alternative in regard to precommercial thinning.

Prescribed Fire

No direct ignition within PACFISH RHCAs would be allowed and would prevent direct effects to water quality. There would be no difference in the direct effects to water quality with the implementation of either Alternative 2 or Alternative 3.

Temporary Roads

All temporary roads in Alternative 2 are located in uplands outside of RHCAs and therefore will not have a direct effect on water quality. There would be no difference in the direct effects to water quality with the implementation of either Alternative 2 or Alternative 3.

Closed Roads for Administrative Use

The majority of maintenance activities such as brushing, blading and shaping of the road surface, cross drain culvert cleaning, and limited ditch cleaning would not occur instream but would occur on the road prism or immediately adjacent to the road prism and would not result in direct effects to water quality. These road maintenance activities are a potential indirect effect, which is discussed in the indirect effects to water quality section.

Direct effects to water quality would result from the replacement of the culvert in the perennial non-fishbearing stream on closed road 7700705. The culvert is proposed for replacement to avoid complete failure of the culvert at this crossing, which would introduce a large amount of sediment into the stream system. Culvert replacement will have a direct, short term (<48 hours after replacement) effect on water quality. Foltz (2008) studied sediment concentrations and turbidity changes during culvert removals. The study found that 95% of the culvert related sediment occurred in the first 23 hours after culvert removal in streams where flows were low. Where flow locations were higher, 40-95% of the culvert related sediment occurred in the first two hours. Culvert replacement in the Sandbox project would be more similar to the low flow sites, and sediment concentrations and turbidity would return to preconstruction levels within 48 hours after replacement. Jakober (2002) found that after culvert replacement in the Bitterroot National Forest, sediment concentrations decreased to near pre project levels within 24 hours.

Use of BMPs such as conducting activities when streamflows are low, development of a Pollution and erosion control Plan (PCEP), delineating construction impact areas on project plans and confining work to the noted area, and rehabilition of disturbed areas by mulching and seeding would minimize sediment yield. Vegetation will only be removed if necessary to complete realignment. The culvert would be sized to prevent the degradation of streambanks and maintain integrity of the stream channel and stream processes.

Alternative 2 and 3 would have the same direct effect on water quality as a result of culvert replacement in a non-fishbearing perennial stream since the culvert is proposed for replacement in both alternatives.

Road Decommissioning

Naturally decommissioned roads would not require actions beyond removing the road sign and removing the road from the transportation system. Because there will be no site disturbance there are no direct effects to water quality from road decommissioning.

Indirect Effects on Water Quality and Stream Temperature

ALTERNATIVE 1 - NO ACTION

Water Quality

With the non-treatment of stands and fuels treatments, fuel conditions in stands, both fuel loadings and accumulation, will be excessive and the likliehood of a high intensity fire occuring is high. Fires have the potential to damage adajcent stands and RHCAs. Interconnected, fuel laden stands may now link areas that historically burned less frequently or uniformily into large, homogemeous areas that are vulnerable to high intensity stand replacing events (Agee 1988; Henjum et al. 1994). Under certain circumstances, such as through fuel accumulations and a hot dry period, riparian zones can act as passages for fire leading to the spread of fire to unburnt uplands (Agee 1998). Under particular conditions, steep sided canyons can act to funnel winds increasing wind speeds that may increase fire rate of spread and operate as a conduit for fire to different parts of the landscape (Dwire and Kaufman 2003). Under some circumstances climatic pre-fire conditions can drive large and intense fires in riparian zones with significant ecological impacts (Pettit and Naiman 2007).

Riparian fires can lead to an increase in sediment yield to stream channels as well as an increase in streambank erosion. The major physical effects of riparian fire are an increase in the liklihood of bank erosion, and the large fluctuations in the delivery of woody debris in the riparian zone and in the stream. Fire increases erosion in the riparian area by removing vegetation, increasing surface runoff, and reducing soil infiltration rates. Fire reduces infiltration rates by creating a hard soil surface crust which is often hydrophobic, and combined with loss of ground cover leads to sheet or gully erosion (Shakesby and Doerr 2006). Fire can destroy accumulated forest floor material and vegetation, altering infiltration by exposing soils to raindrop impact or creating water repellent conditions (DeBano et al. 1998). Loss of soil from hillslopes produces several significant ecosystem impacts. Soil movement into streams may degrade water quality and change the geomorphic and

hydrologic characteristics of these systems (Robichaud et al. 2000). Sediment delivery following forest operations and prescribed fire with forested buffers are a magnitude or more lower than following wildfire, and the increased number of disturbances from active forest management result in lower long term average sediment delivery rates than would occur following less frequent wildfire disturbances (Elliot and Robichaud 2001).

Stands and RHCAs proposed for precommercial thinning are overstocked. In many instances, stress, particularly drought stress is compounded by overstocking (Fiddler, et al., 1995). This stress can lead to losses in tree growth and increases in insect and disease caused mortality. If left untreated, overstocked stands and RHCAs would stagnate, and tree diameters would remain in lower size classes (an average of less than eight inches dbh) until a disturbance occurs such as fire, insect infestation or disease. The risk associated with insects and disease is that these could cause an epidemic in adjacent stands and RHCAs resulting in an increased risk of wildfire, increase in sediment yield to perrenial and fishbearing streams in the event of a high intensity fire, and long term loss of wood recruitment and structure to stream channels and hillslopes. Non-treatment of stands and RHCAs could increase sediment yield to stream channels above existing levels under this alternative due to an increase in fire intensity. Appropriate stocking levels can help to increase tree growth and increase resistance of stands to fire, insect, and disease (Lambert, 1994).

High intensity fire within and adjacent to RHCAs has the potential to reduce the long term recruitment of large wood to stream channels. The pulse of snags, logs, and coarse wood generated by a stand replacement fire is the recovering forest ecosystem's sole source of coarse wood until the new stand begins to generate snags and logs of comparable size and heartwood content, which generally takes 150 to 200 years in some forest types (Maser et al. 1988, Franklin et al. 2002, Harmon et al. 2004). Excessive heat from fires has the potential to cause soil sterility, thereby reducing future regeneration success. Severe site conditions can slow natural regeneration of coniferous trees following a stand replacement burn (Noss et al. 2006).

Non-treatment of RHCAs and stands could result in a long term loss of large wood recruitment to stream channels and hillslopes needed for sediment retention and channel structure, increased loss of RHCAs to wildfire, and could increase sediment yield to stream channels in the event of a high intensity wildfire.

Stream Temperature

With the non-treatment of stands and RHCA treatments, fuel conditions, both fuel loadings and accumulation, will be excessive and the likliehood of a high intensity fire occuring is high. Fires have the potential to damage adajcent stands and RHCAs.

Fire in riparian forests have the potential to elevate stream temperatures. Changes in channel form and reduction in riparian canopy cover due to fire led to elevated stream temperatures for extended periods of up to 10 years in a British Columbia headwater stream (Moore et al. 2005). In smaller streams, riparian fires can defoliate trees, resulting in more light reaching the stream thereby increasing water temperature as well as growth of aquatic and emergent plants (Pettit and Naiman 2007).

ALTERNATIVES 2 and 3

Water Quality and Stream Temperature

The primary benefits of stand and fuels treatment adjacent to RHCAs and handwork within RHCAs is ensuring a long term source of large wood recruitment within RHCAs to hillslopes and stream channels for sediment retention, channel structure, riparian function, and reduced risk of a high intensity fire that could lead to sediment yield in fishbearing streams.

Pre-commercial thinning will reduce stocking densities in overstocked stands leaving the healthiest

and most vigorous trees that meet species and stocking requirements. This will result in larger trees with fuller crowns in the RHCA for recruitment to stream channels and hillslopes for sediment retention, channel structure, and stream shade. In addition, there will be a decreased risk of insect and disease infestation in adjacent stands, including overstocked conditions and ladder fuels in RHCAs, which could contribute to higher fire intensities than those that would have occurred historically leading to a long term (> 100 years) reduction of large wood recruitment and potential increase in sediment yield to streams.

The most documented effect of precommercial thinning is increased diameter growth caused by the redistribution of the environmental resources among a smaller number of selected trees. When the number of stems per hectare is very large, the leaf area of each tree could be so limited that few carbohydrates are available for height development and stagnation of growth occurs (Pothier 2002).

The benefits of stand and fuels treatment on stream temperature is reducing the risk of high intensity fire to adjacent RHCAs. Treatment of stands and fuels reduction will reduce the risk of the loss of streamshade, which could lead to elevated stream temperatures.

Pre-commercial thinning will result in larger trees with fuller crowns in the RHCA for stream shade. In addition, there will be a decreased risk of insect and disease infestation in adjacent stands and RHCAs, which could contribute to higher fire intensities.

Typical riparian conditions such as wide spacing and mixed conifer or hardwood stands allow later crown closure than tightly packed plantations (Berg 1995). Homyack et al. (2004) found that stands thinned six to 11 years prior to the study had a greater overstory structure than similar untreated stands. In contrast, unthinned stands gained little overstory structure indicating that the application of pre-commercial thinning was responsible for the accelerated height and diameter growth.

Commercial Removal

Excluding Unit 5, skyline yarding units will have full suspension over RHCAs. No corridors are needed through the RHCA for removal of material since no treatment of RHCAs is proposed in the majority of skyline units. In most cases the cable can be raised without cutting trees in the RHCA. Occasionally a tree may need to be cut down to facilitate raising the cable. With the exception of Unit 5, trees cut within the RHCA to facilitate raising the cable would be left on site since there is no yarding within RHCAs. Location and number of trees that may need to be cut for cable suspension are infrequent and scattered through the RHCA and would not be of an amount to increase stream temperature or affect water quality. Only a narrow opening is needed for cable suspension (raising of the cable) above the tree canopy of the RHCA.

Excluding Unit 5, Alternative 2 has 12 skyline units that will require cable suspension above RHCAs, and Alternative 3 has eight units that will require cable suspension above RHCAs (Table 3.23). Fish bearing streams that will have cable suspended above RHCAs include Prong Creek, South Fork of Catherine Creek, and Buck Creek.

Table 3.23 - Stream Classes with skyline suspended above by Alternative.

Alternative 2 Skyline Units	Alternative 3 Skyline Units	Stream Class With Skyline Suspended Above	Class I Stream Name
33	33	I, III, IV	Prong Creek
41	41	I	Prong Creek
44	Not In Alt. 3	III	****
45	Not In Alt. 3	III	****
48	Not In Alt. 3	I	S. Fk. Catherine Creek

Alternative 2 Skyline Units	Alternative 3 Skyline Units	Stream Class With Skyline Suspended Above	Class I Stream Name
67	67	I	Buck Creek
69	69	III	****
75	75	IV	****
76	76	IV	****
81	81	IV	****
82	82	IV	****
84	Not In Alt. 3	IV	****

Class I=fishbearing, Class III=perennial non-fishbearing, Class IV=intermittent non-fishbearing

PACFISH RHCA widths used as no activity stream buffers will prevent indirect effects to water quality and stream temperature as a result of skyline yarding.

Unit 5 (HTH) Alternative 2

A minimum no activity stream buffer of 50 feet would be implemented in this unit which should prevent indirect effects to water quality.

Yarding corridors may need to be cut within the buffer if deflection is inadequate to provide for lift completely over the buffer. In this instance, a corridor approximately 12 feet in width may be required and trees felled will be left on site since yarding of these trees would create ground disturbance within the minimum 50 foot stream buffer . Natural openings will be taken advantage of whenever possible. Using natural openings will reduce the need for the felling of trees for corridors to facilitate line setting. In worst cases, a corridor every 150 feet may be needed to facilitate line setting. Full suspension will be required when yarding over stream channels, and through the 50 foot buffer. One end suspension will be required through the remainder of the RHCA (outside of the 50 foot buffer). No ground disturbance will be created within the minimum 50 foot stream buffer so ground cover and down woody debris will remain intact to trap sediment before reaching the stream channel. One end suspension decreases the amount of ground disturbance by decreasing ground and tree interaction.

Rashin et al. (2006) demonstrated the effectiveness of best management practices for controlling sediment related water quality impacts from timber harvest activities. Rashin et al. found that stream buffers were most effective where timber falling and yarding activities were kept at least 10 meters (approximately 33 feet) from streams and outside of steep inner gorges. This 10 meter buffer for ground disturbing activities was found to prevent sediment delivery to streams from about 95% of harvest related erosion features. There would be no stream crossings with equipment in Unit 5 since it is a skyline unit and no ground base equipment would be used.

Potential detrimental soil conditions (DSCs) from skyline logging are lower than from tractor logging. Skyline yarding on 0-20% slope gradients produces about 0-1% DSCs (McIver 1998). Effects should be less in Unit 5 where the steeper slopes provide better deflection for partial to full suspension systems. Average slope of the RHCA in Unit 5 is >35%.

Danehy and Kirpes (2000) found that the riparian microclimate gradient on four perennial streams in the Grande Ronde Basin of eastern Oregon extended no more than10 meters (30 feet) from the edge of the stream channel into the upland forest. Beyond 10 meters humidity was similar to upland conditions. Indian Creek, a perennial stream in the Upper Grande Ronde River, was one of the study streams and is near the vicinity of the Sandbox project area. The minimum 50 foot stream buffer would protect the riparian microclimate, which includes stream temperature.

Olson et al. (2007) found that less intensive thinning harvests that retain a substantial proportion of the pre-harvest stand density and canopy have less impact on stream and riparian microclimates than do more intensive regeneration harvest (clear cuts).

Rykken et al. (2006) stated that “Thinning rather than clearcutting the forest near the streamside treatments may provide additional latitude for protecting riparian conditions”. No clearcut or regeneration harvests are proposed along perennial streams and no harvest is proposed within no-activity buffers. All shade producing vegetation will be retained within the minimum 50 foot no treatment buffer and a fully stocked stand will remain beyond the 50 foot buffer to provide streamshade.

A 50 foot no activity stream buffer would prevent or minimize sediment yield resulting in a non-measurable amount of sediment reaching the stream (Lakel et al 2010, Chan et al, 2004), protect the riparian microclimate (Danehy and Kirpes 2000, Chan et al. 2004, Anderson et al. 2007), and would not result in an increase in stream temperature (Moore et al. 2005, Wilkerson et al. 2006).

Unit 72 (HFU) Alternative 2 and Alternative 3

This unit is located an average 125 feet (ranges from 75 feet to 175 feet) from Buck Creek. These distances will prevent indirect effects to water quality. Unit 72 has an average stream buffer width 75 feet greater than the minimum stream buffer of 50 feet in unit 5. Since HFU units are thinning, and no equipment would be in the stream buffer below the road the distance to the stream would prevent sediment yield to Buck Creek and prevent increases in stream temperature (Lakel et al. 2010, Chan et al. 2004).

Fire Fuels Treatment (FFU)

Below are the indirect effects of fire fuels treatment outside and inside of RHCAs.

Outside of RHCAs - In both Alternative 2 and Alternative 3, PACFISH RHCA widths will be implemented as minimum no activity stream buffers and would prevent indirect effects to water quality from fuels reduction activities outside of RHCAs.

Within RHCAs - Both Alternative 2 and Alternative 3 FFU units with handwork within RHCAs include units 107, 108, 110, 112, 114, 121, 122, and 124.

Work within RHCAs would be conducted by hand, which would result in minimal ground disturbance. A study conducted by Madrid et al. (2006) evaluated three silvicultural treatments, which are 1) untreated control, 2) precommercial thin with slash piled, and 3) precommercial thin with slash scattered. Treatments were done by hand. Fuels reduction and thinning within RHCAs in the Sandbox project are similar to the treatment described in number two above, precommercial thin with slash piled. Ground disturbance in the pile treatment ranged from no ground disturbance to slight roughing of the litter with slight exposure of mineral soil where slash was hauled to piles. Sediment yield on pile and scatter treatments was very low and within erosion rates of undisturbed forested watersheds. The values for thin and pile are very close to zero and well within background levels for erosion rates of undisturbed forested watersheds. Amount of sediment generated by this activity is not measurable.

Best Management Practices monitoring on the La Grande Ranger District supports the research findings. Mechanical treatment in RHCAs in the Starkey and Horsefly Vegetation Management Projects found that there was no offsite movement of sediment, no sediment movement through the no-treatment stream buffers of 50 feet on perennial and 30 feet on intermittent streams, and no sediment yield to stream channels. This was mechanical treatment. Hand treatment results in

minimal to no ground disturbance, does not compact soils, and would result in very small amounts of sediment that would not be measurable above back ground levels.

Rashin et al. (2006) demonstrated the effectiveness of best management practices for controlling sediment related water quality impacts from mechanical timber harvest activities. Their study found that mechanical treatment can be conducted without increasing sediment yield using 33 foot stream buffers. If this is possible using mechanical equipment within 33 feet of stream channels, there would be no risk of sedimentation from handwork only within RHCAs even with 10 foot buffers on intermittent streams where there is no risk of effects to listed fish. With handwork there is no skid or shovel trails that cross streams or any other mechanical ground disturbance. The stream buffers described for hand treatment allow optimum hand treatment of the RHCA with no risk of adverse effects to listed fish or designated critical habitat.

Fire intensity in thinned stands is greatly reduced if thinning is accompanied by reducing the surface fuels created by the cuttings (Graham et al. 1999). A study conducted by Kalabokidis and Omi (1998) found that thinning combined with slash treatment is an effective means for reducing fire spread, reducing the resistance to control, and reducing ecological losses. Thinning with no slash modification is an inappropriate option because more fuel becomes available for combustion contributing to extreme fire outcomes such as crowning and erratic fire behavior. Slash fuels increase the fire hazard as long as they remain on the ground, so prompt treatment with prescribed fire or mechanical means is important (Fule et al. 2001).

Hand piling and hand burning of small piles are not a source of erosion, do not create overland flow, and therefore are not a source of sediment to stream channels. Seymour and Tecle (2004) study results indicate that there were no significant differences in soil bulk density and porosity, soil infiltration capacity, or soil moisture between treatments of slash piles ranging from 4 feet to 8 feet tall. Since bulk soil density and porosity were not significantly affected, soil infiltration rates were not reduced indicating the absence of the formation of a hydrophobic layer that could lead to overland flow and erosion. Precommercial thinning slash hand piles within RHCAs would be similar in size to the small 4 foot high hand piles analyzed in this study. Piles would be burned when there would be a high soil moisture content and would result in a low intensity burn to minimize effects to soils and vegetation.

An inspection of small diameter burn piles, similar to those described above, in the South Fork Catherine WUI Project area within the RHCA of a perennial stream found good soil moisture and infiltration in the footprint of burn piles and virtually no erosion or offsite movement of sediment. It was determined that the small burn piles retained roughness and soil infiltration, and also lacked the surface area and hydrophobic soils needed to create overland flow. This verifies the results of the research described above.

Sediment yield from precommercial thinning and hand piling and burning of slash would be very close to zero due to minimal ground disturbance, and well within the background levels of sediment yield in undisturbed forested watersheds. Given that small burn piles are not a source of sediment, that there will be minimal ground disturbance in the RHCA, and that minimum no activity stream buffers will retain the small amount of sediment, there will be a negligible effect to water quality.

Fuels reduction handwork within RHCAs will result in a negligible amount of sediment yield to streams. Given that there is the same number of acres of hand treatment in both alternatives, there is no difference in the indirect effects to water quality in regard to sediment yield to streams between Alternative 2 and Alternative 3.

A minimum 50 foot no activity stream buffer on fishbearing streams and minimum 30 foot buffer would prevent removal of shade producing vegetation and alteration of stream temperatures. Only small diameter understory trees, less than nine inches dbh would be thinned and all overstory trees

would remain. Intermittent non-fishbearing streams within the project area are typically dry by mid June and do not contribute to summer stream temperatures and are therefore not an issue for maximum stream temperatures. No overstory trees would be removed from within RHCAs that could increase stream temperatures.

The 50 foot and 30 foot minimum no activity stream buffers are based on the riparian microclimate. Microclimate studies are discussed in the commercial removal indirect effects section above.

Fuels reduction handwork within RHCAs would not increase stream temperatures due to the minimum 50 foot no activity buffer on fishbearing streams, minimum 30 foot no activity stream buffer for perennial no-fishbearing streams, thinning prescriptions, and no overstory removal in RHCAs. Understory thinning would occur, and the overstory canopy would remain intact to provide streamshade.

There would be no difference in the indirect effects to water quality with the implementation of either Alternative 2 or Alternative 3 since there are equal numbers of acres in both alternatives.

Precommercial Thinning (PCT)

Below are the indirect effects of precommercial thinning treatment outside and inside of RHCAs.

Outside of RHCAs - Because this activity is outside of RHCAs in both Alternative 2 and Alternative 3 indirect effects to water quality would be prevented by the RHCA..

Within RHCAs - Both Alternative 2 and Alternative 3 PCT units with RHCA hand treatment include units 109 and 120. PCT activities and effects within RHCAs are very similar to FFU activities and effects in RHCAs. Stream buffers for FFU and PCT are based on the riparian microclimate. There would be no difference in the indirect effects to water quality with the implementation of either Alternative 2 or Alternative 3 since there are equal numbers of acres in both alternatives.

Prescribed Fire

The use of prescribed fire would not increase sediment delivery rates to stream channels over and above the natural sediment rates of the subwatershed. There will be no direct ignition within PACFISH RHCAs, but fire will be allowed to back into RHCAs. The fire intensity is expected to be low in riparian areas, having little effect on riparian conditions. Prescribed fire is not expected to be a source of erosion or sediment delivery.

Agee et al. (2002) found that understory vegetation in riparian zones tended to be moister later in the season than in drier upland forests. In low elevation, interior forests such as those with ponderosa pine, Douglas fir and grand fir, higher understory foliar moisture in riparian zones should dampen surface fire behavoir compared to upland forests late in the dry season. High foliar moisture in understory plants will be associated with lower surface fireline activities as fires approach the riparian zone, even when fire return intervals have been shown to be similar between riparian and upland sites (Olson, 2000).

Control lines would include roads, natural barriers (rock outcrops, rock bluffs, rocky scabs etc.), and brush removal rather than bare mineral soil line construction where possible.

There would be no difference in the effects to water quality between Alternative 2 and Alternative 3 as a result of prescribed fire since the same acres are proposed for both Alternative 2 and Alternative 3.

The use of prescribed fire will not increase stream temperatures. There will be no direct ignition

within PACFISH RHCAs, but fire will be allowed to back into RHCAs. The fire intensity is expected to be low in riparian areas, having little effect on riparian vegetation or the conifer overstory.

There would be no difference in the effects to stream temperature between Alternative 2 and Alternative 3 as a result of prescribed fire since the same acres are proposed for both Alternative 2 and Alternative 3.

Temporary Roads

All temporary roads in Alternative 2 would not have an indirect effect on water quality and stream temperature since they are located in uplands outside of RHCAs. There would be a negligible difference in the indirect effects to water quality with the implementation of either Alternative 2 or Alternative 3 with respect to temporary roads.

Closed Roads Opened For Administrative Use

Table 3.24 shows the miles of closed roads to be opened, number of stream classes that closed roads cross, and approximate total distance of associated RHCA these closed roads traverse.

Road maintenance can reduce sediment delivery to stream channels through improved drainage and reduced erosion of the road surface by directing water off of the road surface. Road maintenance is necessary to keep roads in good condition, minimize erosion, and identify and correct problems promptly (Furniss et al. 1991). Maintenance keeps roads in a condition suitable for travel and prevents severe erosion from failure of the drainage system (Luce and Black 2001).

Blading consists of pulling material from the sides of the road inwards to redevelop the road crown. All material would remain on the road surface. Luce and Black (2001) observed that blading of only the traveled roadway on an aggregate surfaced road with well vegetated ditches yielded no increase in sediment production from a complete road segment, while blading of the ditch, cutslope, and traveled roadway substantially increased sediment yield from road segments. Sediment yields from older roads with undisturbed ditchlines are much smaller than sediment yields from newer roads or roads with disturbed ditchlines. No cutslope grading, removal of vegetation from cutslopes or widespread ditch cleaning is proposed for closed roads that would be opened for administrative purposes. Some small scale, local, and scattered ditch cleaning may be needed. The majority of vegetated ditchlines would remain to trap sediment before reaching streams.

Brushing out of the road prism would not cause ground disturbance. Vegetation is trimmed back approximately six feet either side of the traveled roadway. Removal of some vegetation (brushing) may be needed where the closed roads cross through RHCAs. Vegetation would only be removed where it has grown over or into the road prism making travel difficult. No streamside vegetation would be removed. Only that vegetation within the road prism would be removed and would have no effect on stream temperature. Intermittent non-fishbearing streams within the project area are typically dry by mid June and do not contribute to summer stream temperatures and are therefore not an issue for maximum stream temperatures.

Spot rocking will prevent rutting, erosion and puddling of the road surface. Swift (1984) investigated the influence of graveled, ungraveled, and grassed road surfaces on soil erosion. The study concluded that the graveled road surface with vegetated sideslopes have the lowest soil loss compared to ungraveled and grass road surfaces.

Replacement of the culvert on a perennial non-fishbearing stream (Class III) is in need of replacement. The culvert is currently plugged and the road bed is washing out. This plugged culvert is on closed road 7700705. Ground disturbance adjacent to the perennial stream would result in a short term increase (< one year) in sediment yield. In the long term (> one year) soils would begin to revegetate and stabilize. This is based on a road decommissioning study with ground disturbance adjacent to streams.

Implementation of Best Management Practices would minimize indirect effects to water quality as a result of culvert replacement. A pollution control plan (PCP) would also be used to protect water quality or respond to toxic spills that could threaten water quality.

Culvert replacement would not have an effect on stream temperature. Only that vegetation associated with the roadbed and culvert would be removed. No overtsory vegetation would be removed. In addition, this is a very small corridor compared to the length of stream, and vegetation removed would not increase solar exposure to the point where stream temperatures would increase.

Roads would be used only under dry or frozen conditions to minimize sedimentation to stream channels. Prohibition of wet weather haul is an increasingly common best management practice that is effective in reducing sediment production from existing roads (Luce and Black 2001). Some types of impacts can be avoided simply by keeping people off roads during part of the year. This approach has been taken to decrease road surface erosion rates during wet weather (Ried et al. 1994).

The degree of sedimentation to stream channels above existing levels is expected to be low since roads would be used only under dry and frozen conditions and established vegetation on the road margins, sides of the road prism, and in ditches would be retained to filter and trap sediment.

Alternative 2 would have a greater potential for indirect effects to water quality than Alternative 3 since there are more stream crossings of closed roads opened for administrative project use.

Table 3.24 - Miles of closed road to be opened and stream classes crossed by Alternative.

Miles Road Opened		Number Stream Classes Crossed					
		Class I		Class III		Class IV	
Alt. 2	**Alt. 3**	**Alt. 2**	**Alt. 3**	**Alt. 2**	**Alt. 3**	**Alt. 2**	**Alt. 3**
TOTAL 21.9 miles	**TOTAL 12.4 miles**	0	0	3	0	11	6
Approximate Distance of Road in RHCAs ⇨		0 feet of Class I Streams	0 feet of Class I Streams	900 feet of Class III Streams	0 feet of Class III Streams	2,495 feet of Class IV Streams	1,375 feet of Class IV Streams

Class I=fishbearing, Class III=perennial non-fishbearing, Class IV=intermittent non-fishbearing

Road Decommissioning

Indirect Effects to Water Quality and Stream Temperature

Because there would be no ground disturbing activities associated with this action there are no indirect effects to water quality or stream temperature from road decommissioning.

Flow Regimes

The Matrix of Diagnostics, Pathways and Indicators used in consultation with NOAA Fisheries and the United States Fish and Wildlife Service (USFWS) use an Equivalent Clearcut Acres (ECAs) recommended value of <15% to indicate potential changes in peak and base flows. ECAs are calculated at the subwatershed scale. ECAs will be used only as an indicator of overall disturbance in the Sandbox Project area, and will not be used to describe hydrologic response. The change in ECA values that would occur from the implementation of the action alternatives for the Sandbox project area is presented in Table 8. Commercial harvest occurs in the Beagle Creek, Catherine Creek-Milk Creek, North Fork Catherine Creek, and South Fork Catherine Creek subwatersheds and is where ECA values would change substantially with the implementation of either Alternative 2 or Alternative 3. Increases in ECA

values for Alternative 2 range from 2.1% to 12.8%, and for Alternative 3 range from 1.7% to 12.0%. These values are all below the NOAA Fisheries and USFWS recommended ECA value of <15%.

Approximately 0.5 acres of commercial harvest would occur in the Upper Big Creek subwatershed and would increase the ECA in that subwatershed by 0.10 acres. This equates to a change of ECA across the subwatershed of less than 1/100th of a percent (< 0.001%).

The West Eagle and Middle Big Creek subwatersheds do not have any commercial removal so there would be no increase to ECAs in those subwatersheds.

Effects to flow regimes are similar for both Alternative 2 and Alternative 3 since all values are well below the recommended value of <15%.

Table 3.25 - ECA values for the Sandbox Project by alternative and subwatershed.

SWS	Existing ECA %	Alternative 1 ECA %	Alternative 2 ECA %	Alternative 3 ECA %
Beagle Creek	10.2%	10.2%	12.8%	12.0%
Catherine Creek-Milk Creek	6.3%	6.3%	7.9%	7.9%
North Fork Catherine Creek	1.4%	1.4%	2.1%	1.7%
South Fork Catherine Creek	2.4%	2.4%	4.8%	3.8%

Summary of Effects to Water Quality and Stream Temperature from Action Alternatives

With the exception of Unit 5 and Unit 72, commercial harvest units would have PACFISH RHCA widths implemented as no activity stream buffers which would prevent direct and indirect effects to water quality and stream temperature throughout the project area.

Alternative 2 has a slightly greater risk of a potential increase in a non-measurable amount of sediment yield to a perennial non-fishbearing stream due to the mechanical (skyline yarding) RHCA treatment in Unit 5. There would be no effect to stream temperature since the minimum no activity stream buffer of 50 feet is based on the riparian micro climate and the prescription is for thinning only.

The RHCA of Unit 72 would be treated upslope of the 7785 road using ground based equipment Alternative 2 and Alternative 3. Since the mechanical treatment is restricted to the area upslope of the road and average distance to Buck Creek is 125 feet, there would be no increase in sediment yield and no effect to stream temperature.

Hand treatment only within RHCAs combined with no activity stream buffers will prevent direct and indirect effects to water quality and stream temperature. Minimum no activity stream buffers for handwork proposed for fishbearing streams is based on the riparian microclimate and the prescription is for thinning only. Handwork within RHCAs would not result in an increase in sediment yield to streams, and would not decrease stream shade or alter stream temperatures.

All temporary roads are outside of RHCAs, which will prevent direct and indirect effects to water quality and stream temperature. Alternative 2 would have a greater potential for indirect effects to water quality than Alternative 3 since there are more stream crossings of closed roads opened for administrative project use. No closed roads opened cross fishbearing streams, and use and maintenance of closed roads would result in a negligible indirect effect to fish habitat and fish populations.

ECA values after project implementation for Alternative 2 range from 2.1% to 12.8%, and ECA values after project implementation for Alternative 3 range from 1.7% to 12.0%. All values are below the recommended value of <15%. All other subwatersheds have very little increase in ECA values for both Alternative 2 and 3 and increases range from 0% to <0.001%.

Stand and fuels treatment adjacent to RHCAs and handwork within RHCAs would maintain/enhance the long term source (> 20 years) of large wood recruitment within RHCAs and stream channels. Treatment of stands, fuels reduction, and RHCA treatments will reduce the risk of a high intensity fire that could lead to the loss of streamshade, which could lead to elevated stream temperatures.

2. Effects to Fish Habitat and Populations

The following analysis of potential direct and indirect effects incorporates the Alternative Treatment Element Assumptions described under the Assumptions section under the Watershed Resources analysis.

Direct Effects on Fish Habitat and Populations

ALTERNATIVE 1 - NO ACTION

There are no direct effects on instream fish habitat or populations as a result of the No Action alternative. Effects related to this alternative on fish habitat and populations are indirect.

ALTERNATIVES 2 and 3

Commercial Removal

Commercial Harvest units along fishbearing streams would have PACFISH RHCA widths implemented as no activity stream buffers which would prevent direct effects to fish and fish habitat. The 125 foot no activity stream buffer in Unit 72 (included in both alternatives) would prevent direct effects to fish habitat and fish populations. There is no difference in the direct effects to fish habitat and fish populations between Alternative 2 and Alternative 3 as a result of commercial removal.

Treatments (FFU & PCT) Outside of RHCAs

Alternative 2 and Alternative 3 propose FFU and PCT units outside of RHCAs including PACFISH RHCA widths which would prevent direct effects to fish and fish habitat. There is no difference in the direct effects to fish habitat and fish populations between Alternative 2 and Alternative 3 as a result of fuels reduction and precommercial thinning outside of RHCAs.

Treatments (FFU & PCT) Within RHCAs

Alternative 2 and Alternative 3 proposed FFU and PCT units with handwork within RHCAs including a minimum 50 foot no activity stream buffer on fishbearing streams which would prevent direct effects to fish and fish habitat. There is no difference in the direct effects to fish habitat and fish populations between Alternative 2 and Alternative 3 as a result of fuels reduction and precommercial thinning within RHCAs.

Prescribed Fire

Prescribed burning would occur when weather and fuel conditions are appropriate to meet the objectives and prescription. There will be no direct ignition within PACFISH RHCAs, but fire would be allowed to back into RHCAs. The fire intensity is expected to be low in riparian areas, having little effect on riparian conditions. There would be no direct effects to fish or fish habitat from the implementation of Alternative 2 or Alternative 3 in regard to prescribed fire.

Temporary Roads

Alternative 2 proposes the use of 5.2 miles of temporary road. Alternative 3 does not propose any

temporary roads. All temporary roads in Alternative 2 are located in uplands outside of RHCAs and will not have a direct effect on fish habitat and fish populations.

Closed Roads for Administrative Use

None of the closed roads proposed for opening for administrative access cross fishbearing streams; therefore, there would be no potential for direct effects to fish or fish habitat. Some maintenance of closed roads may be required and effects will be discussed in the indirect effects to fish habitat and populations section.

Road Decommissioning

There are no direct effects to fish and fish populations from road decommissioning and there is no difference in the direct effects to fish habitat or fish populations with the implementation of Alternative 2 or Alternative 3 in regard to road decommissioning.

Indirect Effects to Fish Habitat and Fish Populations

ALTERNATIVE 1 - NO ACTION

With the non-treatment of stands and fuels treatments, fuel conditions in stands, both fuel loadings and accumulation, will be excessive and the likliehood of a high intensity fire occuring is high. Fires have the potential to damage adajcent stands and RHCAs reducing the amount of large wood to streams needed for habitat formation, defoliate trees leading to increases in stream temperature, and could increase sediment yield to streams.

With the No Action Alternative, pre-commercial thinning would not occur and stands would remain overstocked. If left untreated, overstocked stands and RHCAs would stagnate, and tree diameters would remain in lower size classes (an average of less than eight inches dbh) until a disturbance occurs such as fire, insect infestation or disease.

An increase in sediment yield to streams resulting from wildfire can have potential negative effects to the growth and survival of salmonids. Increased concentrations of sediments and increased sedimentation rates can negatively affect spawning habitat, rearing habitat, overwintering habitat, and cause lethal effects to salmonids through increased egg mortality, reduced egg hatch, a reduction in the successful emergence of larvae (fry), and sediment induced death of juvenile and adult fish (Anderson, 1996).

Intense fires and related events have killed fish (Bozek and Young 1994) and even caused local extinctions (Propst et al. 1992, Rinne 1996). Large and intense fires could threaten populations of sensitive salmonids such as bull trout, Chinook salmon, steelhead, and others that are depressed from other causes (Rieman et al. 1995). The magnitude and intensity of recent fires heighten concerns regarding forest/ecosystem health and the apparent threat to sensitive species. Effects from forest fires in three study watersheds in the Boise National Forest during 1992 and 1994 included increased surface erosion and large pulses of fine sediment throughout systems following the first year of the event (Rieman et al. 1995). In many cases pools were virtually filled with new material, although pools in higher gradient channels often remained relatively free of sediment. In reaches with high intensity burn effects, shading from riparian cover was virtually eliminated. Woody debris in stream channels was often burned as well.

High intensity fire within and adjacent to RHCAs has the potential to reduce the long term recruitment of large wood to stream channels needed for the formation of fish habitat. The pulse of snags, logs, and coarse wood generated by a stand replacement fire is the recovering forest ecosystem's sole source of coarse wood until the new stand begins to generate snags and logs of comparable size and heartwood content, which generally takes 150 to 200 years in some forest

types (Maser et al. 1988, Franklin et al. 2002, Harmon et al. 2004). Fire effects in low order streams are likely to have consequnces for the riparian environment throughout the downstream system. The consumption of woody debris by fires in low order streams may deprive downstream reaches of this important ecological asset (Gregory et al. 2003, Gurnell et al. 2005, Pettit and Naiman 2005, Latteral and Naiman 2007). Excessive heat from fires has the potential to cause soil sterility, thereby reducing future regeneration success. Severe site conditions can slow natural regeneration of coniferous trees following a stand replacement burn (Noss et al. 2006).

ALTERNATIVES 2 and 3

The primary benefit to fish habitat and fish populations is the long term maintenance/enhancement of large wood recruitment to stream channels needed for structure for the formation of fish habitat, sediment retention, riparian function, and reduced risk of a high intensity wildfire in RHCAs that could increase sediment yield to fishbearing streams as well as defoliate trees leading to an increase in stream temperatures.

Sediment delivery following forest operations and prescribed fire with forested buffers are a magnitude or more lower than following wildfire, and the increased number of disturbances from active forest management result in lower long term average sediment delivery rates than would occur following less frequent wildfire disturbances (Elliot and Robichaud 2001).

Precommercial thinning will reduce stocking densities in overstocked stands to reduce risk of disease and insect infestation leaving the healthiest and most vigorous trees that meet species and stocking requirements. This will result in larger trees with fuller crowns in the RHCA for stream shade and recruitment to stream channels and hillslopes for sediment retention and channel structure. In addition, there will be a decreased risk of insect and disease infestation in adjacent stands, including those portions of stands in the RHCA, which could contribute to higher fire intensities than those that would have occurred historically leading to a long term reduction of a large wood recruitment and potential increase in sediment yield to fishbearing streams.

Commercial Harvest

All commercial harvest units except Unit 72 (included in both action alternatives) would have PACFISH RHCA widths adjacent to fish bearing streams which would prevent indirect effects to fish habitat and fish populations.

Silvicultural systems can improve the overall vigor of some stream ecosystems and provide a long term supply of forest structural components for streams and riparian forests (Swanson and Berg 1991). Thinning stands adjacent to streams allows for the improvement of stand vigor without deleterious impact to aquatic production. Increased growth of selected trees to be retained improves future sources of large wood. Thinning early increases diameter growth and concentrates volume growth on fewer stems (Berg 1995). Rentmeester (2004) conducted a thinning study focused on the production of snags as the primary recruitment mechanism along mainstem stream channels. Results indicate that silvicultural thinning resulted in increased diameter growth within residual trees. Faster diameter growth meant that trees were larger when they died and therefore the number of snags above the target diameter was greater. The abundance of large diameter snags increased by 20-74% under the thinning scenarios analyzed in this study relative to “no touch” silviculture.

As discussed under the indirect effects to water quality the no activity stream buffer along Buck Creek combined with distance between the mechanized treatment and Buck Creek would prevent indirect effects to fish habitat and fish populations in Unit 72.

In Unit 5 (Alternative 2 only) the RHCA of the perennial non-fishbearing stream would be thinned using skyline yarding for removal. The nearest fishbearing stream (Beagle Creek) is approximately 0.8 miles from the unit. There would be no adverse effects to fish habitat or fish populations due to

the minimum no activity stream buffer of 50 feet which is based on the riparian microclimate, thinning prescription, no activity stream buffer to trap and retain sediment, and distance to fish and fish habitat.

There is no difference in the indirect effects to fish habitat and fish populations between Alternative 2 and Alternative 3 in regard to commercial harvest.

Fire Fuels Treatment (FFU)

Outside of RHCAs - For FFU units outside of RHCAs, PACFISH RHCA widths will be implemented as no activity stream buffers and would prevent indirect effects to fish habitat and fish populations. There is no difference in the indirect effects to fish and fish habitat between Alternative 2 and Alternative 3.

Within RHCAs - A minimum 50 foot no activity stream buffer on fishbearing streams would prevent indirect effects to fish and fish habitat. Hand treatment within RHCAs would not result in sediment yield to streams, and would not alter stream temperatures since no overstory is being removed. There is no difference in the indirect effects to fish habitat and fish populations between Alternative 2 and Alternative 3 in regard to fuels reduction handwork within RHCAs.

Precommercial Thinning

Outside of RHCAs - Both Alternative 2 and Alternative 3 propose PACFISH RHCAs as no activity stream buffers which would prevent indirect effects to fish habitat and fish populations. There is no difference in the indirect effects to fish habitat and fish populations between Alternative 2 and Alternative 3 in regard to precommercial thinning outside of RHCAs.

Within RHCAs - Both Alternative 2 and Alternative 3 propose a minimum 50 foot no activity stream buffer on fishbearing streams which would prevent indirect effects to fish and fish habitat, and is based on the riparian microclimate. Precommercial hand thinning treatment within RHCAs is similar to hand fuels reduction work in RHCAs, and indirect effects to water quality and stream temperature are the same. See indirect effects to water quality for fire fuels hand treatment within RHCAs for analysis of effects. Hand treatment within RHCAs would not result in sediment yield to streams, and would not increase stream temperatures.

Given that there are the same number of acres of precommercial thinning hand treatment within RHCAs in both alternatives, there is no difference in the indirect effects to fish habitat and fish populations between Alterantive 2 and Alternative 3.

Prescribed Fire

The use of prescribed fire in both action alternatives would not increase stream temperatures. Because fire would be allowed to back into RHCAs, fire intensity is expected to be low in riparian areas, having little effect on riparian vegetation or the conifer overstory. Prescribed fire would not result in indirect effects to fish or fish habitat. There is no difference in the effects to fish habitat and fish populations between Alternative 2 and Alternative 3 as a result of prescribed fire.

Temporary Roads

All temporary roads in Alternative 2 are located in uplands outside of RHCAs and will have no indirect effect on fish habitat or fish populations. There is no difference between Alternative 2 and Alternative 3 in regard to the effect on fish habitat and fish populations as a result of temporary roads.

Closed Roads Used For Administrative Purposes

Maintenance activities on closed roads and the use of closed roads would not result in an adverse affect to fish habitat or fish populations. The only instream activity that would occur from the use of closed roads is the replacement of a culvert on a perennial non-fishbearing stream that is washing out on the 7700705 road. This site is approximately 0.80 miles from Buck Creek, a fishbearing stream. In a sediment and turbidity study of culvert removal, Foltz et al. (2008) found that during culvert removal sediment concentrations dropped with distance from the culvert outlet. At 100 meters (328 feet) downstream of the culvert removal site, sediment concentrations was one order of magnitude less than at the culvert outlet. At 810 meters downstream (approximately 0.5 miles) sediment concentrations had returned to near backdrop levels. Sediment concentrations, from the culvert replacement on the 7700705 road, would return to backdrop levels before reaching Buck Creek, a distance of 0.8 miles.

At all other stream crossing sites on closed roads road maintenance activities would result in a negligible non-measurable amount of sediment reaching fishbearing streams due to distance to occupied habitat, limited maintenance proposed, and use of roads during dry or frozen conditions. Table 3.26 shows the distances from stream crossings on closed roads proposed for project use to fishbearing streams.

Table 3.26 - Distance from stream crossings on closed roads to fishbearing streams.

Road Number	Included Alternative 2 (Yes/No)	Included Alternative 3 (Yes/No)	Stream Class Crossed	Distance to Fishbearing (miles)
7700705	Yes	No	III	1.1
	Yes	No	III	0.8
	Yes	No	III	0.8 (culvert replacement site)
7700565	Yes	No	IV	1.0
	Yes	No	IV	0.9
7700630	Yes	Yes	IV	1.3
7700720	Yes	No	IV	1.1
	Yes	No	IV	1.2
	Yes	No	IV	1.0
7700730	Yes	Yes	IV	0.9
7700795	Yes	Yes	IV	1.0
7700850	Yes	Yes	IV	0.6
	Yes	Yes	IV	0.3
7700870	Yes	Yes	IV	2.0

Stream Class III=perennial non-fishbearing, Stream Class IV=intermittent non-fishbearing

Streams crossed by closed roads are small headwater streams in forested mountainous terrain. Studies have documented the retention of sediment in headwater streams.

- Gomi et al. (2003) states “because stream channels are narrow (in headwater streams), a range of LWD (Large Woody Debris) orientations can effectively store sediment and form channel steps”.
- Sequences of steps and pools alter the transport of bedload sediment in headwaters channels because they wedge, jam, and store material (Whitaker, 1987).
- May and Gresswell (2002) found that large wood was the focal point for sediment accumulation because it provided a physical obstruction to sediment transport. Sediment accumulation increased linearly in proportion to the volume of wood in the channel. As wood accumulation in the channel increased through time, the storage capacity of the channel also

increased and a series of positive feedbacks could be initiated. Sediment that was stored behind wood in the channel increased the streambed roughness, decreased the local slope of the channel, and reduced the capacity for sediment transport. As a greater proportion of the streambed was covered by sediment, roughness continued to increase and more of the water could begin to flow subsurface, further decreasing surface water velocities. In addition, vegetation became established and root networks held the sediment in place.

- Sediment delivery from headwater to downstream is often interrupted because sediment is temporarily stored in or along the streambed, banks, terraces, and debris fans (Hey 1979, Benda and Dunne 1997a, Nakamura et al. 2000).

The majority of sediment generated from maintenance activities on closed roads opened for project use would be retained in the small headwater streams before reaching fishbearing streams.

The degree of sedimentation to stream channels above existing levels is expected to be low since roads would be used only under dry and frozen conditions and established vegetation on the road margins, sides of the road prism, and in ditches would be retained to filter and trap sediment.

Since Alternative 2 has more stream crossings from closed roads opened for project use, there is a greater potential for sediment yield to fishbearing streams. However, a non-measurable amount of sediment would reach fishbearing streams and would not result in adverse effects to fish habitat or fish populations.

Road Decommissioning

Under Alternative 2 and Alternative 3 naturally decommissioned roads would not require actions beyond removing the road sign and removing the road from the transportation system; therefore, there would be no indirect effetcs to fish and fish populations from road decommissioning.

Summary of Effects to Fish Habitat and Populations from Action Alternatives

There are no direct effects to fish habitat and fish populations from the implementation of Alternative 2 or Alternative 3.

With the exception of Unit 72 (included in both action alternatives), all commercial harvest units adjacent to fish bearing streams would have PACFISH RHCA widths implemented as no activity stream buffers. PACFISH RHCA widths will prevent indirect effects to fish habitat and fish populations. In Unit 72, the average no activity stream buffer along Buck Creek would be 125 feet. The 7785 road combined with distance between the mechanized treatment and Buck Creek would prevent indirect effects to fish habitat and fish populations.

The mechanical treatment of the RHCA in Unit 5 using skyline yarding, Alternative 2 only, would not result in adverse effects to fish habitat or fish populations due to the minimum no activity stream buffer of 50 feet which is based on the riparian microclimate, thinning prescription, no activity stream buffer to trap and retain sediment, and approximate distance of 0.8 miles to fish and fish habitat (redband trout only in the Beagle Creek subwatershed).

For FFU activities where mechanical treatment would occur, PACFISH RHCA widths will be implemented as no activity stream buffers. These will prevent direct and indirect effects to fish and fish habitat.

Hand treatment within RHCAs combined with minimum no activity stream buffers will prevent direct and indirect effects to fish and fish habitat. No activity stream buffers for handwork proposed within RHCAs along fishbearing streams are based on the riparian microclimate. There will be no direct ignition of prescribed fire within RHCAs.

All temporary roads are outside of RHCAs, which would prevent direct and indirect effects to water quality.

A non-measurable amount of sediment would reach fishbearing streams from the use of closed roads due to distance to occupied habitat, limited maintenance proposed, sediment retaining abilities of headwater streams, and use of closed roads during dry or frozen conditions.

Primary benefits to fish habitat and fish populations from stand treatment, fuels treatment, and precommercial thinning is the long term maintenance/enhancement (> 20 years) of large wood recruitment to stream channels, and reduced risk of a high intensity wildfire in RHCAs that could increase sediment yield to fishbearing streams as well as defoliate trees leading to an increase in stream temperatures.

The culvert replacement on the perennial stream on the 7700705 road would prevent complete failure of the culvert and roadbed that could affect downstream fish habitat and fish populations.

Cumulative Effects for Fisheries and Watershed Resources

Potential cumulative effects are analyzed by considering the proposed activities in the context of present and reasonably foreseeable future actions. A reasonably foreseeable future action is defined as within the next 5 years. These activities are described in Appendix D of this EA.

The logical area for cumulative effects to occur would be in the Beagle Creek, Milk Creek-Catherine Creek, North Fork Catherine Creek, and South Fork Catherine Creek subwatersheds. This is where the majority of the Sandbox project activities are located and where cumulative effects could occur. The Middle Big Creek, Upper Big Creek, and West Eagle Creek subwatersheds have few project acres compared to the size of the subwatershed, and therefore project activities would not result in cumulative effects at the subwatershed scale.

ALTERNATIVE 1 – NO ACTION

The potential cumulative effect to the subwatershed from the non-treatment of fuels and stands is an increased risk of high intensity fire that could potentially increase sediment yield to fishbearing streams, decrease stream shade, and reduce future recruitment of large wood to stream channels and RHCAs.

ALTERNATIVES 2 and 3

Project activities would not contribute to cumulative effects since they do not show a measurable or detectable cumulative effect (Appendix D). Some of the reasonably foreseeable future projects would result in beneficial effects. This includes Timber Stand Improvement, Future Designated OHV Trails and Areas, Travel Management Plan, Corral Creek Road Relocation Project, North Fork Catherine Creek Ford removal, and the Pole Creek Large Woody Debris Project. These are all beneficial cumulative effects.

Travel Management and Designated OHV Trails and Areas - Not detectable at the subwatershed scale. The Wallowa-Whitman Travel Management Plan is estimating a completion sometime in 2015 or 2016. OHV use will be regulated and will prevent or minimize direct and indirect effects to water quality and fisheries resources resulting in beneficial effects.

Corral Creek Road Relocation Project - Corral Creek road is a draw bottom road and chronic source of sediment to Corral Creek and the South Fork of Catherine Creek. The road would be moved to uplands and the draw bottom road obliterated. The relocation project would also remove three instream culverts that impede fish passage in Corral Creek. Riparian vegetation and streamside conifers would be planted to increase stream shade and future recruitment of large wood.

North Fork Catherine Creek Ford - The North Catherine Ford would be replaced with a bridge. This may create a short term (< one year) increase in sediment yield that would be offset by eliminating the steep approach from the east leading directly into the North Fork of Catherine Creek thereby eliminating that sediment source. Fish passage to upstream habitat would be restored for three listed fish species.

Pole Creek Large Woody Debris project - A short term increase in sediment yield (< one year) may occur from the operation of equipment for wood placement in and around the stream. A long term beneficial effect (> one year) would occur from restricting livestock access from the stream and riparian area as well as enhancing spawning and rearing habitat for steelhead and bull trout.

Climate Change

A study conducted by Miles et al. (2000) within the Columbia River Basin, which includes the Snake River drainage, indicates that the consequence of climate change is higher flows during the winter and spring, and lower flows during the summer and fall. The tendency towards more precipitation and warmer temperatures during the winter implies substantially more rain, less snowpack accumulation, and therefore increased wintertime runoff. The decrease in snowpack accumulation, combined with lower summertime temperatures and evapotranspiration lead to decreased summertime flows. The timing of flows is also altered. Peak spring flows tend to begin earlier compared to current runoff patterns.

The effects to Columbia River streamflow from simulated changes in climate are generally towards higher winter streamflow, reduced winter snow accumulation, and reduced spring and summer streamflow (Hamlet and Lettenmaier, 1999).

Determination of Effect to Listed Fish, Fish Habitat and Sensitive Fish Species

ALTERNATIVE 1 – No Action

The No Action Alternative May Affect, but is Not Likely To Adversely Affect summer steelhead or their designated critical habitat. These are primarily indirect effects due to non-treatment of stands that could lead to disease, insect infestation, increased risk of high intensity wildfire, increased sedimentation from wildfire, and suppression of conifers from competition that could lead to a decrease in large trees for future recruitment to the stream channel and stream shade. While there is a potential for negative affects to fish and habitat from increased sediment yield to fishbearing streams as a result of wildfire, the actual effects to fish and fish habitat is unknown so a Not Likely to Adversely Affect determination was reached for this alternative.

The No Action Alternative may impact redband trout individuals or habitat for this species, but is not likely to contribute to a trend towards federal listing or cause a loss of viability to the population or species.

ALTERNATIVES 2 and 3

Steelhead, Spring Chinook Salmon, Bull Trout, and Designated Critical Habitat for the Three Species

Alternatives 2 and 3 **May Affect**, but are **Not Likely to Adversely Affect** steelhead, spring Chinook salmon, bull trout or designated critical habitat for the three species based on no direct effects to steelhead, spring Chinook, bull trout or designated critical habitat for the three species from the implementation of Alternative 2 or Alternative 3, implementation of PACFISH RHCA widths, hand treatment only within select RHCAs, no direct ignition of prescribed fire within RHCAs, location of all temporary roads outside of RHCAs, non-measurable amounts of sediment possibly reaching fishbearing streams from the use of closed roads due to distance to occupied habitat, no draw bottom roads would be opened for project use, and culvert replacement on the 7700705 road.

In Unit 72, the RHCA upslope of the 7785 road will be treated using ground based equipment. The average no activity stream buffer along Buck Creek would be 125 feet. The road feature combined with distance between the mechanized treatment and Buck Creek would prevent indirect effects to listed fish and designated critical habitat.

Redband Trout

Implementation of the Sandbox Project may impact redband trout individuals or habitat for this species, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Essential Fish Habitat

The implementation of the Sandbox Project **May Affect** but is **Not Likely to Adversely Affect** Essential Fish Habitat for spring Chinook salmon.

The determination for Essential Fish Habitat is based on the reasons stated above for the three listed fish species and designated critical habitat.

Water Quality Compliance Statement, Floodplains and Wetlands Executive Orders Compliance Statement

The Sandbox Project will not degrade water quality. Planning and application of BMPs will maintain or improve water quality. This includes monitoring of BMPs and effectiveness. Neither of the action alternatives will have an effect on stream temperature. With the exception of maintenance of closed roads, ground disturbing activities in the Sandbox project are away from streams and would not increase sediment delivery rates within the subwatersheds. RHCA treatments (that will benefit the RHCA) are restricted to Unit 5 and Unit 72, pre-commercial hand thinning, fuels reduction handwork, and hand piling and burning. No draw bottom roads would be opened for project work. A discountable, non-measurable amount of sediment will reach stream channels as a result of implementation of either Alternative 2 or Alternative 3. The Sandbox Project is in accordance with the Clean Water Act and complies with the Clean Water Act requirements of the 1990 Forest Plan.

Project Effects on Riparian Management Objectives

Landscape-scale interim RMOs describing good habitat for anadromous fish were developed using stream inventory data for pool frequency, large woody debris, bank stability, and width to depth ratio. State water quality standards were used to define favorable water temperatures. All of the described features may not occur in a specific segment of stream within a watershed, but all generally should occur at the watershed scale for stream systems of moderate to large size (3rd to 7th order).

RMOs are as follows:

Pool Frequency: (varies by wetted width)

Wetted width in feet:		10	20	25	50	75	100	125
150								
Number of pools per mile:	96	56	47	26	23	18		14
12								

Water Temperature: Compliance with state water quality standards, or maximum < 68F.
Large Woody debris: > 20 pieces per mile; >12 inches diameter; 35 foot length
Bank Stability: >90 percent stable
Width/Depth Ratio: <10, mean wetted width divided by mean depth

The Sandbox project will not immediately affect any of the RMOs with the implementation of Alternative 2 or Alternative 3. However, in the long term (>20 years), this project could increase large woody debris in stream channels through pre-commercial thinning and by reducing the risk of high intensity fires. An increase in large

wood could lead to an increase in pool frequency by providing a long term supply of large wood for stream channel structure. Precommercial thinning will increase stream shade by producing larger trees with fuller crowns.

Floodplains, Executive Order 11988

Executive Order (EO) 11988 requires the Forest Service to "avoid to the extent possible the long and short term adverse impacts associated with the occupation or modification of floodplains. The Sandbox Project is consistent with this EO because it does not propose to occupy or modify any floodplain.

Wetlands, Executive Order 11990

Executive Order (EO) 11990 requires the Forest Service to "avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands". The Sandbox Project is consistent with this EO because it does not propose to destroy or modify any wetlands.

Soil Quality and Productivity

Introduction

The following is an analysis of the effects on soil resources of the activities proposed in the Trail Vegetation Management Project. The analysis area for this analysis is the for the 11,456 acre Trail Vegetation management Project area as described in Chapter One. The Sandbox project area is primarily located within the Upper Catherine Creek watershed of the Grande Ronde River basin and the Big Creek watershed of the Powder River basin. Additional specific information and analysis related to soil quality and productivity is located in the specialist reports in the Sandbox analysis file.

Existing Condition

Soils in the Sandbox project area developed over layers of basalt, andesite, volcanic breccias, and Columbia River bedrock. These soils vary greatly and may range from those on thin, rocky, low-productivity ridgetop scablands to those in deep ash accumulations on very productive grand fir sites. In the majority of the area the soil is buried under a mantle or cap of volcanic ash deposited from the eruption of Glacier Peak (12,000 years ago) and Mount Mazama (6600 years ago).

Soils with a high amount of ash in surface horizons are common in the project area, ranging from relatively thick to non-existent. Ash-cap soils derived from volcanic eruptions are most often classified in the silt or sandy loam categories. They are also characterized by low bulk density, high porosity, and high water holding capacity. They tend to be non-cohesive and because of their relatively low strength, are highly susceptible to compaction (Johnson, Page-Dumroese and Han 2007). Ash-cap soils can be susceptible to disturbance during forest management, and strategies to predict compaction, displacement and erosion hazards are essential for planning forest management operations (Curran, Green and Maynard 2007). Soil depth, combined with the depth of the unconsolidated material lying over bedrock in the project area ranges from very shallow (less than 10 inches) to deep (40-60 inches). The surface soil layer is the layer that supports the root zone for fine and medium size roots.

Soils with an ash mantle commonly have a different surface texture than the material buried beneath the ash. Typically, soil textures in the project area are silt loams with varying rock content. Subsurface layers in the project area are generally rockier than surface layers. In general, soils consist of basalt or andesite parent material with a volcanic ash-cap over colluvium and residuum.

Soils information for this analysis was obtained and interpreted through data collected by the NRCS Soil Data Mart website, Level I soil surveys conducted by the La Grande ranger district silviculturist, Level II soil surveys by the La Grande ranger district range management specialist, project area soil assessments by the past district soil scientist and the WWNF Ecological Unit Inventory (EUI). The EUI, which meets the standards of the National Cooperative

Soil Survey, describes soil map units, their individual components, and provides interpretive information on soil use and management.

Soil Description

In the Sandbox project area, soils within the treatment units occur on 4 Land Type Associations (LTAs). The LTAs are a product of the interaction between soils, geology, landforms, vegetation and climate. For this project, soils are described in relationship to the LTAs where they occur (Table 3.27). Erosion hazards are considered low to moderate when vegetated. Surveys completed during project recon showed near 100% coverage with perennial vegetation for the plots surveyed, lowering the potential for soil loss.

Table 3.27 - Landtype Association Descriptions

Land Type Association	Geology	Landform	Sediment Delivery Efficiency	Soil Erosion Risk without Vegetation	Vegetation	Erosion Hazard with Vegetation	Landslide Hazard with Vegetation	Project Acres
116	Basalt	Mountain Slopes, Gentle	L	L-M	Moist Forest	Low	Low	10627
117	Basalt	Mountain Slopes, Steep	M	H	Moist Forest	Low	Low to Moderate	3650
131	Undifferentiated	Trough Floors	L	L-M	Moist Forest	Low	Low	77
217	Basalt	Mountain Slopes, Steep	M	H	Dry Forest	Moderate	Low	1660

Individual soils found within the Sandbox project area along with soil properties of erodibility (Kw factor) and compaction potential (bulk density) were assessed from data available from the NRCS Soil Data Mart website. Surface soils within the project area range from 0 to 25 inches deep, with the total depth to bedrock ranging from 0 inches at the rock outcrops to greater than 60 inches.

Individual soils are grouped together to create “map units” or “soil complexes” which retain the properties of each individual soil. The dominant map unit and corresponding analyzed compaction potential and erosion hazard for each harvest unit which includes mechanical treatment was determined for this project area. Those units where only hand treatment is proposed were not included, as no additional disturbance or potential for increased DSC’s is expected.

Most of the dominant soil complexes in this project area are ash mantles covered or ashy silt loams and have a high inherent compaction potential (bulk density less than 0.85). Compaction potential increases when rock fragments within the soil decreases. The units with high compaction potential will require careful placement of skid trails to reduce the accrual of DSCs.

The “Erosion Hazard” column shown in Table 3.27 is derived from the NRCS soils database. The values in the “Erosion Hazard” column differs from the representative soil series’ inherent erodibility ratings, which are not listed in Table 3. The inherent erodibility of soils is calculated in a laboratory in the absence of live vegetation or effective ground cover and is based on soil texture and detachability, not slope gradient.

<u>Sheet and Rill Erosion</u>

More than 90% of the major soil complexes represented within the analysis area exhibit moderate to low erosion potential when vegetated (Table 3.27). Existing established ground cover is excellent and is consistently greater than 85% across the treatment area. Evidence of soil erosion in the project area is low,

less than 11% of the sample points showed erosion. The majority of soil erosion is limited to shallow coarse grained soils near rock outcrops.

One other area of particular concern is the upper portion of the Collins Creek watershed. This area is heavily influenced by the South Catherine Creek irrigation ditch and the 7700-570 road. The slope below the South Fork ditch is saturated for extended periods of time during the winter, spring, and summer due to subsurface flow from the ditch. These saturated conditions result in overland flow and erosion below the ditch. Near the eastern end of the 7700-570 road the ditch and the road run parallel and are in close proximity to one another. This results in subsurface flow discharging out through the cutslope and onto the road surface. Water flows down the road surface causing erosion of the road surface and then dicharges onto the hillslope below the road. This process along with subsurface flow from the ditch saturates the hillslope below the road and causes erosion of the slope below the road. Corrections to this condition will be initiated with a separate project proposed for work in 2015.

Gully and Landslide Erosion

The project area is generally a stable landscape and the potential for landslides to occur is relatively low with some moderate potential on steeper slopes (Table 3.27). When vegetated, the soils and geology in the project area are not prone to mass movement. There are four small known landslides in the project area that have been documented on the Oregon Department of Geology website. These historic slides are not active are currently fully vegetated.

As stateded above, the proximity of the South Fork Catherine ditch to the 7700-570 road has created extended periods of saturated soil conditions, and concentrated overland flow. These saturated conditions leave the hillslope succeptible to gully formation and landslides. There are several large gullies exceeding 1m in depth originating from the road surface along the eastern portion of the 7700-570 road. These gullies are directly above and likely contribute to at least two large hillslope failures below the 7700-570 road. The hillslope failures are 3-6 feet deep and approximately 5 acres in area. This results in large quantities of sediment being discharged into Collins Creek.

Organic Matter and Large Woody Material

Organic matter (surface litter and duff) depth averages 1.5cm within the Sandbox project area**.** Total ground cover was high across the project area and was generally greater than 85%. Similarly, organic matter cover was greater than 58% and live plants were present on 100% of observed points**.**

Large down woody material (over 30 cm in diameter at the small end and at least 2 m in length) is variable across the units, but is present on at least 51% of observed points.

Soil Compaction and Displacement

In the Sandbox project area soil compaction is a primary disturbance factor affecting soil productivity. Skid trails, landings and non-surfaced roads, ATV trails, livestock trails and dispersed campsites all have led to increased soil compaction and bulk density throughout the project area. Visual surveys by the past District soil scientist in 2010-11 indicated vegetation re-growth and biological activity is breaking up some of the surface compaction (0-4 inches) of soil on the historic skid trails and closed roads.

Some soil displacement has occurred in most surveyed units. This form of disturbance was evident where machinery had sharply turned or where previous harvesting had occurred during periods of wet or moist soil conditions. Resource surveys indicated that locations where surface soil displacement had occurred in the past were often re-vegetated with a high percent of ground cover.

Detrimental Soil Conditions

The Forest Plan defines detrimental soil condition as any management practice that results in soil compaction, puddling, displacement, erosion, mass wasting, or severe burning.

Surveys found previous harvest units utilizing both rubber tired and tracked skidders. These older units showed closer skid trail spacing (30-60 ft spacing) compared to current practice of spacing 60-100 feet. These past entries have for the most part softened, become vegetated, and do not show lingering evidence of extenisve rutting or compaction. In those units where compaction was present (following past harvest), evidence (plated surface soils) of compaction from has been ameliorated in many areas by freeze thaw processes and the established root systems of native grasses, forbs, shrubs and conifers**.** The majority of soil compaction occurs on the existing system haul roads, which are reletively abundant in the area due to the steep slopes in the project area.

Evidence of surface soil displacement by mechanical disturbance is relatively limited within the Sandbox project area**.** The majority of soil displacemnt occurs on old haul roads, which are reletively abundant in the area due to the steep slopes in the project area. Puddling was rarely observed within the project area.

Site specific surveys of the project area were completed and one unit was found to have existing DSCs that currently exceed Forest Plan standards. Unit 72 is a small (5 acre) narrow unit that includes NFS road 7787 through the length of it. Existing DSCs are due to the system road and would not be able to be mitigated to bring the total DSCs below the 20% threshold.

Total existing DSCs averaged 7.6% for the project area as a whole. DSCs varied between units and were dependent largely upon the number of roads that traversed or compromised the unit boundary. Specific unit by unit DSCs were developed for each unit and used to develop project design criteria and monitoring requirements as well as the baseline for the following effects analysis.

Methodology

Soil properties were gathered from queries in the Soil Resource Inventory Database for the Blue Mountain National Forests, Oregon and Washington using Terrestrial Ecological Units (TEU) for the Wallowa-Whitman National Forest (Sasich 2006). Major soil series complexes were determined for NFS lands in the project area by GIS.

Soil quality conditions were assessed in proposed treatment units using two methodologies; the Forest Soil Disturbance Monitoring Protocol (Dumroese et al. 2009) and the typical Level I/ II surveys described in the WWNF Interim Protocol for Assessment and Management of Soil Quality Conditions (WWNF, 2002).

- The past district soil scientist assessed the entire project area, irrespective of proposed treatment units utilizing a project wide assessment tiered to the Dumroese described assessments.

  One hundred random points were generated across the project area using GIS. Points were located in the field using a hand held GPS and soil disturbance was assessed in a 9 m^2 area around each point. The protocol was used to assess hill slope, ground cover, woody debris, topsoil displacement, erosion, rutting from mechanical equipment, compaction, puddling, and evidence of burning.

- Level I soil surveys were completed by the project silviculturist and Level II soil surveys were completed by the district range management specialist to assess DSCs within potential treatment units.

  The level I survey provides ocular estimates of soil disturbance to place them into one of the same four classes as the level II survey. The level II soil survey is more in-depth than a Level I survey and usually involves digging soil samples along the transect and observing the soil structure to demine the degree of soil disturbance. Each soil sample is placed into one of four classes: soils in classes 0 & 1 are undisturbed or have low soil disturbance; soils in classes 2 & 3 are considered to be detrimentally disturbed (by severe burning, puddling, compaction, displacement, or the loss of ground cover). In general, in the units where Level I and Level II surveys were completed on the same unit, the surveys did not show significantly different levels of DSCs.

  On-site observations are also recorded to detail the type of soil damage and unit characteristics such as slope, surface rock or landslide activity.

These methods were used to determine DSCs within the treatment units. The Forest Plan defines detrimental soil condition as any management practice that results in soil compaction, puddling, topsoil displacement > 50%, erosion, mass wasting, or severe burning. Therefore; areas exhibiting rutting > 10 cm (4 inches), mechanical topsoil displacement > 50%, platy or puddled soil structure, or evidence of severe burning were considered to have DSCs.

Soil Productivity

Soil productivity of a site is defined as the ability of a geographic area to produce vegetative biomass, as determined by abiotic conditions (e.g. soil type and depth, rainfall and temperature) in that area. Specifically as related to soils in this analysis, productivity is related to the capacity or suitability of a soil for establishment and growth of appropriate plant species, primarily through physical impediment to root growth, water availability, and nutrient availability.

The productivity of forest soils can be adversely affected by removal of nutrients and alterations in the soil structure. Removal of nutrients can occur through the removal of vegetation (i.e. trees, shrubs and grasses), erosion, preparation of sites for treatment and burning. The effects of soil disturbance on soil productivity and the duration of adverse effects largely depend upon the type of disturbance. Disturbances such as roads and ditches generally are long term because the soil structure is severely altered during construction. Compaction from tractor yarding can potentially last for several decades (Froehlich and McNabb 1984), thereby reducing productivity. Soil surface erosion rates following timber harvest can potentially remain elevated for several years, depending upon the yarding method (Johnson et al. 2007). The effects of nutrient removal through woody debris removal, erosion, burning and site preparation can be short lived, or long lasting depending upon the extent, duration and intensity of the disturbance (Harvey et al. 1994).

Sheet and Rill Erosion

Soil erodibility is a function of cohesion, infiltration rate, permeability of lower horizons, uniformity of slope and slope percent, water concentration potential, distribution of annual precipitation, rainfall intensities, soil temperatures, and the density of effective ground cover before and following disturbance. Soil erosion is a natural process that can be accelerated by land management activities. Soils on steep slopes with poor vegetative cover and lack of structural development are more susceptible to erosion than are soils on flatter terrain. Vegetation protects the soil surface from raindrop impact, dissipates the energy of overland flow, and binds soil particles together.

Organic Matter and Large Woody Material

Soil nutrients are primarily replenished through the decomposition of organic matter and root turnover (Harvey et al. 1987). Potential future down wood recruitment from standing dead trees depends upon their location relative to firewood cutting access.

Soil Compaction and Displacement

Soil displacement is the movement of soil from one place to another by mechanical forces and is typically associated with roads, landings, and skid trails. Effects include reduced water holding capacity, loss of ground cover, nutrients and soil microorganisms, and increased runoff due to an increased amount and condition of bare ground exposed (Page-Dumroese et al 2007). Steeper slopes are more vulnerable to soil displacement and require careful placement of skid trails to reduce side hill turns.

Detrimental Soil Conditions

The Forest Plan defines detrimental soil condition as any management practice that results in soil compaction, puddling, displacement, erosion, mass wasting, or severe burning. Soil damage can negatively affect the productivity of a site. Generally speaking vegetative, forest floor, and soil process appear to be functioning properly in the majority of the project area. Residual soil disturbance is limited due to the topography and the ability

of the soil and vegetation to recover following disturbance in this area. The results from project area soil disturbance monitoring protocol for hill slope, ground cover, woody debris, topsoil displacement, erosion, rutting from mechanical equipment, compaction, puddling, and evidence of burning are presented in Table 3.28. These observations were completed irrespective of location within the proposed treatment units and provide a project wide representation of the soil conditions as a whole to be interpreted in combination with the unit specific level I and level II surveys. Mean estimates identified qualitative evidence of the variables listed as present within the plot.

Table 3.28 - Means and 95% confidence intervals for existing soil conditions observed in the Sandbox mechanical harvest units.

Variables Observed	Mean Estimates for Observations within the Project Area	Points Observed	N Needed	95% Confidence Intervals	
				Lower Bound	Upper Bound
Hillslope %	23	100	30	20	66
Total Soil Cover %	90	100	30	85	94
Organic Matter Cover %	63	100	30	58	68
Bare Soil	23%	100	68	15%	31%
Rock Cover %	20%	100	61	12%	28%
Live Plant Presence	100%	100	30	100%	100%
Fine Woody Litter <7 cm Presence	98%	100	30	95%	101%
Coarse Woody Litter >7 cm Presence	94%	100	30	89%	99%
Coarse Woody Debris >30 cm Presence	51%	100	96	41%	61%
Topsoil displacement	6%	100	30	1%	11%
Evidence of Erosion	11%	100	38	5%	17%
Rutting <5 cm Evidence	26%	100	74	7%	21%
Rutting 5-10 cm Evidence	7%	100	30	17%	35%
Rutting >10 cm Evidence	5%	100	30	2%	12%
Light Burning Evidence	14%	100	46	7%	21%
Moderate burning Evidence	5%	100	30	1%	9%
Severe Burning Evidence	0%	100	30	0%	0%
Platy/Massive/Puddled structure 0-10 cm	8%	100	30	3%	13%
Forest Floor Depth (cm)	1.5	100	30	1	2

Soil displacement is defined as the movement of soil from one place to another by mechanical forces such as a wheel, blade or animal hoof. Soil puddling is a concern when soils are ground based logged under wet or very moist spring, summer or fall conditions.

Total DSCs on a treatment unit scale was determined by combining the DSCs derived from the level I and/or II soil surveys to the percent DSCs from existing roads as determined by GIS.

If a unit included a level I and level II survey, the results from the more intensive level II survey were used. If a unit did not have either a level I or level II survey completed, it was estimated that the unit would have 5% existing DSCs (average of level I surveys). This estimate was based on similarities across the proposed units that had past activities. Most units had some level of past activity disturbance

Since not all units were surveyed, it was necessary to stratify the units based on type of harvest, past activities, soil type and slope. Units where past activities may have resulted in creation of DSCs were

prioritized for a level II survey if a level I was not completed. If a level I survey had indicated DSCs over 10%, the unit was prioritized for a level II survey.

Existing road acreage was reached by multiplying the miles of road that transects a unit by a 25 ft. width. Road acres that border a unit were determined by multiplying the miles of road by 12 feet. The level I and II surveys were within 1% of each other, indicating that the level I surveyors estimates were very similar to the more intensive level II survey. The level II survey also matched the project level soil survey that was completed (6% DSCs) which adds to the confidence that the level I surveys are representative of the total existing DSCs.

Effects Analysis

Assumptions:

The project area is identified as each treatment unit for determining DSCs prior to treatment (WW interim protocol 2002).

Three alternatives are analyzed for this project to determine the magnitude of direct, indirect and cumulative effects on the soil resource. In the following discussion, the degree of impact, of compaction, puddling, displacement, severe burning, erosion, mass wasting, organic matter loss and drainage class change is severe enough to classify effects as detrimental soil conditions (DSCs). Extent is described generally as affected area and duration is noted as years. The effects outlined below are based on soil mitigation measures being implemented in full.

Effects to soils can be short-lived (one to three years) in the case of erosion potential; soil erosion potential depends on soil type and vegetative cover to determine how long risk of erosion is a concern. Erosion control measures normally occur immediately following treatments and / or re-vegetation occurs in the first year or two. Other effects to soils such as compaction, rutting, and displacement tend to be longer term impacts that are cumulative in nature if these types of impacts have not fully recovered when new activity occurs in the same location.

Management activities can result in direct, indirect and cumulative effects on soil productivity and soil stability (USFS 1998). Effects may be positive or negative. Effects may include alteration of physical, chemical, and / or biological characteristics or properties of soils. Many standard and guidelines in the Forest Plan, in addition to the five identified specifically in the soils section, relate to soil function, soil productivity and soil stability.

The most adverse effects of management activities on soils are described as detrimental compaction, detrimental puddling, detrimental displacement, detrimental burning, detrimental erosion, and detrimental mass wasting; other concerns include adverse changes in vegetation and organic matter on the soil surface, and adverse changes in water table (USFS 1998). Soil compaction, puddling, displacement, severe burning, and impacts to ground cover (vegetation and organic matter) are direct effects; soil erosion, mass wasting, and changes in water table are indirect effects. Cumulative effects are the sum of incremental changes in past, present, and reasonably foreseeable future direct / indirect effects on the soil resource that overlap both in time and space. Recent past, ongoing, and foreseeable future effects are discussed under cumulative effects.

The magnitude of the effects of an activity on soil function, soil productivity and soil stability are described by the speed, direction (upward / downward), extent, and duration of change. Minimizing productivity losses associated with any action can be accomplished by managing the magnitude of detrimental soil conditions (DSCs) within activity areas through prescription and/or mitigation. DSCs are to be minimized, with total acreage detrimentally impacted not to exceed 20 percent of the total acreage in the project area including landings and system roads.

To facilitate the cumulative effects analysis a list of present and reasonably foreseeable future activities within the project area, and on immediately adjacent public and private lands is described in Appendix D of this EA. To understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment to the present.

Cumulative effects are rated as negligible, minor, moderate or major based on professional judgment. Negligible means the effect of an activity on an indicator was so small it was not measurable, or caused a change of less than 1%, or less than 1% of an area was affected. Minor means the effect was a change equal to less than one-half of the flexibility for a standard, or 1-10% of an area was affected. Moderate means the effect was a change equal to more than one-half of the flexibility for a standard, or 11-20% of an area was affected. Major means a standard was exceeded or more than 20% of an area or resource was affected; e.g. the detrimental soil condition threshold is 20% (USFS 1998).

Ground Based Logging Model

Project design allows skid trails an average of 60 feet apart on tractor ground. Bliss et.al, 2006, determined that at this spacing, new ground based yarding activities would disturb about 10-20% of the ground surface. Based on past monitoring has shown that 50% of skid trail width is detrimentally compacted and displaced, resulting in approximately 5-10% DSCs per unit before implementation of mitigations. Landings would occupy about 1-2% of a unit. The effect of skid trails plus landings would be about 6-12% new DSCs before subsoiling in those units where there no pre-existing conditions (DSCs) occur. Subsoiling as mitigation can be prescribed for those units where DSCs would potentially exceed Forest Plan standards.

As noted in the soils existing condition report, ground transects of older tractor logging impacts in the project area indicate that low to moderate levels of DSCs (average of 5-6%) were evident in units where past harvest used established skid trails. There was very little disturbance in units where selective harvest did not produce multiple skid trails. This would suggest that the level of DSCs within the project area would not measureably increase post harvest using similar logging techniques and mitigations.

Using the results of this survey, 10-20% new ground surface disturbance would be equivalent to an average range of 6-12% potential DSCs (including 1-2% landing disturbance) in those units where no past entry had occurred. Several factors would influence actual effects of new activity, such as equipment type, operator skill, coarse woody debris and slope gradient; use of existing skid trail network and landings; and soil moisture, rockiness and density. With 60-foot skid trail spacing on volcanic ash soils, potential DSCs could be in the upper half of the 6-12% DSC range, or about 10-12% DSCs. For this analysis, 10% new DSCs will be used for analyzing tractor units with no past entry and 5% new DSCs for any unit with past tractor entry.

Soil effects resulting from the use of a forwarder instead of a tractor would similar. This project does not differentiate between tractor or forwarder based harvest and has used tractor based logging as the baseline for effects analysis of potential DSCs.

Temporary Roads Effects Model

Temporary roads construction would be used where access to harvest units is not currently available. Temporary road placement would occur on existing wood cutting roads where possible. Road effects are modeled for two slope positions: gently sloping ridges and benches, and moderately steep side slopes. Roads on ridges and benches would be about 12-14 feet wide, with an average disturbed area of 1.6 acres per mile. Roads on side slopes would be 20-30 feet wide, with an average disturbed area of 3 acres per mile. This is equivalent to a 25 foot wide roadway, top of cut to bottom of fill. The entire disturbed area will be treated as a DSC. Temporary roads will be rehabilitated following use to reduce compaction and eliminate future use. Rehabilitation can include, slash placement, wing ripping, re-contouring and seeding with native grasses, forbs or conifers.

Underburn Effects Model

Burn effects are based on definitions in (DeBano et. al 1998) and (USFS 1998). Underburn effects qualify as detrimental soil conditions if they are severe burns and occupy an area of at least 100 square feet (USFS 1998). Local data (Bliss 2003a) indicates there would be 0-4% severe burn effects in prescribed fire underburn areas, but no DSCs because severe burn areas would be less than 100 square feet. Severe burn effects typically occur adjacent to and under logs and in burned out stump holes. Underburn effects may range from low-severity burn class to high-severity burn

class, based on percent moderate fire severity, but do not qualify as detrimental soil conditions.

Grapple Pile Effects Model

Effects are based on definitions of detrimental compaction and displacement (USFS 1998). The equipment to be used for grapple piling of woody debris would be a low ground pressure tracked vehicle with a grapple. Normal use would track a maximum of 8% of a treatment unit. Total ground disturbance would be 5-8% with an estimate of 1-2% DSCs. Actual DSCs would be affected by variables such as soil density, percent rock in/on the soil surface greater than 3 inch diameter, soil moisture (veg type and woody debris tonnage) type of equipment used and operator skill. Slashbuster treatment would have similar disturbances (Naughton pers comm.) although the material following treatment would remain on site and reduce potential compaction and displacement, err towards 1% DSCs.

The above models were used in analyzing potential detrimental soil compaction conditions from project activities. In addition to logging effects, roads and potential burning effects were also analyzed to determine the total potential to affect soil quality within the project area. Rationale for burn effects is discussed in the burn effects section.

For ground based logging; methods such as operating seasons, use of existing landings and skid trails, subsoiling, seeding skid trails, etc. are effective measures for minimizing or rehabilitating potential soil impacts. Utilizing these methods is expected to maintain DSC levels well within Forest Plan standards and guidelines for all action alternatives.

In the following discussion, the degree of impact, of compaction, puddling, displacement, severe burning, erosion, mass wasting, organic matter loss and drainage class change is severe enough to classify effects as DSCs. Extent is described generally as affected area and duration is noted as years. The effects outlined below are based on soil mitigation measures being implemented in full.

No Direct, Indirect, or Cumulative Effects on Soils

The following restoration activities associated with the Sandbox project have been analyzed and are of such limited context and constrained nature that they would have little to no measurable effect on Soils resources.

- Pre-commercial thinning without pile burning
- Fuelwood removal area
- Buck Creek trailhead treatments
- Retention of connective corridors
- Roadside danger tree removal

Precommercial thinning is completed with hand crews will not create soil disturbance, displacement or changes in soil texture.

Fuelwood removal will have no measureable effect on soils beyond the current fuelwood program present at the forest level. Soil disturbance is very limited if permit requirements are followed.

Retention of Connective Corridors would not result in any change from the existing soils condition or result in any measureable effect to soils within the project area.

Roadside danger tree removal will have no measurable effect on soils. Soil disturbance is very limited and removal would be completed from the established road prism.

These activities and their effects will not be discussed further in the Soils section.

Direct Effects on Soil Quality

ALTERNATIVE 1 – NO ACTION

This is the no action alternative, which means that all actions authorized by current management plans, permits, easements, and contracts would continue. Authorized actions on National Forest lands in the project area include agency actions, such as, road maintenance and noxious weed treatments, and public actions, such as livestock grazing, fuel-wood cutting, mining, and various types of recreation.

All current detrimental soil conditions would continue to exist, with some conditions improving, others remaining static, and still others deteriorating over time. Plus some new detrimental soil conditions are likely to occur from the above listed ongoing activities.

In the following discussion, the degree of impact of compaction, puddling, displacement, severe burning, erosion, mass wasting, organic matter loss and drainage class change is severe enough to classify effects as DSCs. Extent is described generally as affected area and duration is noted as years. The effects outlined below are based on soil mitigation measures being implemented in full.

Ongoing activities effects on soil quality would include:

Compaction and Puddling: These soil impacts are associated with skid trails, landings and non-surfaced roads, ATV trails, livestock trails and dispersed campsites. Effects include reduced water holding capacity, infiltration and permeability, reduced ability of soil to support vegetation and organisms in and on the soil, increased runoff and in extreme cases, a change in drainage class.

Reoccurring uses by livestock, wildlife, ATVs, vehicles and equipment could potentially re-compact or re-puddle these areas. Where recurring impacts are low to non-existent, existing compaction, and puddling would improve over time in the top 4 inches, due to beneficial effects of frost heaving, root establishment of vegetation, and rodent activity. Compaction deeper than 4 inches could persist 20 to potentially 100+ years.

Displacement: These soil impacts are associated with roads, landings, skid trails and rock-pits. Effects include reduced water holding capacity, loss of ground cover, nutrients and soil microorganisms and increased runoff due to an increased amount and condition of bare ground exposed. Duration of effects is permanent, unless soils are replaced with equipment, however some soil mixing will still occur.

Severe Burning & Organic Matter Loss: These soil impacts are associated with areas with soil displacement, discussed above, plus areas that experience prescribed fire and wildfire. Effects include short-term to long-term loss of organic ground cover (duff, litter, coarse wood, basal area of herbaceous plants) and canopy cover (herbaceous plants, shrubs, trees). Severely burned soils experience nutrient loss, microorganism mortality, increased water repellency, runoff and erosion hazard.

Organic matter would continue to accumulate and recycle in rangeland and forestland plant communities. Organic matter accumulations would be slowest in rangelands and in forestlands where the canopy has been removed. In areas where the canopy cover is present, organic matter accumulations on the forest floor would equal or exceed historic accumulation rates due to current fire control activities, which would continue to maintain or improve soil productivity. Existing disturbed areas such as skid trails, landings, and decommissioned roads would continue to have lower than normal accumulations of organic matter on the soil surface. Moderate to severe burn effects would decrease as trees, herbaceous plants, and soil flora and fauna re-colonize burned sites and organic matter accumulates.

The potential for high intensity wildfires increases every year in the absence of forest density management and surface soil organic matter management. In the event of a wildfire, the potential

effects upon soil productivity, extent of post-fire soil erosion, and the length of time needed for soil recovery from those impacts would depend primarily upon the fire intensity, mosaic, and fire size. The length of time needed for soil recovery would depend upon residual post-fire surface soil organic matter, soil erosion, and the length of time needed for ground cover reestablishment. Stand replacing wildfires could reduce long-term soil productivity by removing litter, humus, and large downed woody material from the soil surface, by consuming soil organic matter, and by killing soil flora and fauna essential to the nutrient recycling process to a 9 to 16 cm soil depth. Surface soils and their associated nutrient reserves could also be lost through increased erosion due to loss of ground cover and due to soil crusting and water repellency, which reduces infiltration.

Drainage Class (Soil Moisture Regime): Changes in soil drainage class exist where rock-pits store water, where water collects in puddles on native surface roads, and where road fills have covered riparian wetlands. No change in soil drainage class is expected over time under this alternative.

Prescribed Fire

There would be no direct affect to soils from the no action alternative as there would be no prescribed fire as a treatment.

Roads

There would be no direct affect to soils from the no action alternative as there would be no new road or temporary road construction miles as a part of the alternative.

ALTERNATIVES 2 and 3

Soil erosion is a natural process that can be accelerated by land management activities; it depends on soil texture, rock content, vegetative cover and slope. Ash soils have higher soil erosion hazard ratings than other soils because of their low bulk density and high detachability. This can be ameliorated by operating on slopes less than 30% with good vegetative cover. Vegetation binds soil particles together with roots, and vegetative cover (including biological crust and duff) protects the soil surface from raindrop impact and dissipates the energy of overland flow.

Commercial Timber Harvest

The most important direct effects of harvest activities on soils are compaction and displacement of litter, duff and topsoil by harvest equipment. Most of these effects would be in ground based yarding areas; 1,706 acres for Alternative 2 and 1,234 acres for Alternative 3. Table 3.29 describes the pre and post-harvest treatment percent DSC's by unit for the project.

Mitigations may include the following methods to reduce the accumulation of new DSC's for treatment units;

- Use of existing skid trails to reduce additional DSC's (reduced by 5%)
- Subsoiling skid trails and or landing areas to reduce final DSC's by 5%
- Water bar construction
- Road re-contouring

For units where past harvest had resulted in detectable DSC's from skid trails or landings, mitigations listed will reduce potential new DSC's by 5% thereby minimizing accumulation of DSC's beyond LRMP standard of 20%. This mitigation is assumed in the calculation of expected new DSC's in column 3.

It was determined using WWNF Effects Modeling Assumptions (WWNF, 2006) that units with no existing DSC's will accumulate 10% new DSC's and units with DSC's from past harvest will accumulate 5% new DSC's if existing skid trails and landings are utilized.

Table 3.29 - Sandbox proposed action Detrimental Soil Conditions post treatment.

Unit Number and logging system T-tractor S-skyline	Existing DSCs (%)	DSCs (%) from mechanical log skidding	DSCs (%) from grapple piling or slash busting	DSCs from hand pile burning	Total percentage DSCs following mechanical treatment	Final DSCs (%) Post mitigation
1-T	5.8	5.0	2.0		12.8	12.8
2-T	5.0	5.0	2.0	0.5	12.5	12.5
2-S	5.0	1.0			6.0	6.0
3-T	0.0	10.0	2.0		12.0	12.0
4-T	6.0	5.0	2.0	0.5	13.5	13.5
4-S	6.0	1.0			7.0	7.0
5-S	0.0	10.0		0.5	10.5	10.5
6-T	10.5	5.0	2.0		17.5	17.5
7-T	17.9	5.0	2.0		22.9	17.9
8-T	8.0	5.0			13.0	13.0
9-T	7.8	5.0	2.0		14.8	14.8
10-T	10.0	5.0	2.0		17.0	17.0
11-T	7.4	5.0	2.0		14.4	14.4
12-T	6.1	5.0	2.0		13.1	13.1
13-T	6.4	5.0	2.0		13.4	13.4
14-T	3.9	5.0			8.9	8.9
15-T	7.8	5.0	2.0		14.8	14.8
16-T	5.6	5.0			10.6	10.6
17-T	2.0	5.0	2.0		9.0	9.0
18-T	8.6	5.0	2.0		15.6	15.6
19-T	6.9	5.0	2.0		13.9	13.9
20-T	10.1	5.0	2.0		17.1	17.1
21-T	2.6	5.0	2.0		9.6	9.6
22-T	0.0	10.0	2.0		10.2	10.2
23-T	5.8	5.0			10.5	10.5
24-T	0.0	10.0	2.0		12.0	12.0
25-T	0.0	10.0	2.0		12.0	12.0
26-T	0.0	10.0	2.0		12.0	12.0
27-T	0.0	10.0	2.0		12.0	12.0
28-T	5.0	5.0	2.0		12.0	12.0
29-T	0.0	10.0	2.0		12.0	12.0
30-T	1.5	10.0	2.0		13.5	13.5
31-T	0.0	10.0	2.0		12.0	12.0
32-T	8.0	5.0	2.0		15.0	15.0
33-T	9.6	5.0	2.0		16.6	16.6
33-S	5.0	1.0			6.0	6.0
34-T	8.8	5.0	2.0		15.8	15.8
35-T	0.0	10.0			10.0	10.0
36-T	6.8	5.0	2.0		13.8	13.8
37-T	6.7	5.0	2.0		13.7	13.7
38-T	6.5	5.0	2.0		13.5	13.5
39-T	5.0	5.0	2.0		12.0	12.0
40-T	8.3	5.0	2.0		15.3	15.3
41-S	9.2	1.0		0.5	14.7	14.7
42-T	10.7	5.0	2.0		17.7	17.7
43-T	7.7	5.0	2.0		14.7	14.7
44-T	9.1	5.0			14.1	14.1

Unit Number and logging system T-tractor S-skyline	Existing DSCs (%)	DSCs (%) from mechanical log skidding	DSCs (%) from grapple piling or slash busting	DSCs from hand pile burning	Total percentage DSCs following mechanical treatment	Final DSCs (%) Post mitigation
44-S	9.1	1.0			10.1	10.1
45-T	10.2	5.0			15.2	15.2
45-S	10.2	1.0			11.2	11.2
46-T	5.2	5.0			10.2	10.2
47-T	0.0	10.0	2.0		12.0	12.0
48-T	5.5	5.0			10.5	10.5
48-S	5.5	1.0			6.5	6.5
49-T	7.5	5.0			12.5	12.5
50-T	5.0	5.0	2.0		12.0	12.0
51-T	6.0	5.0	2.0		13.0	13.0
52-T	14.7	5.0	2.0		**21.7**	16.7
53-T	5.4	5.0			10.4	10.4
54-T	5.8	5.0			10.8	10.8
55-T	6.0	5.0	2.0		13.0	13.0
56-T	5.0	5.0	2.0		12.0	12.0
57-T	9.8	5.0			14.8	14.8
58-T	6.0	5.0	2.0		13.0	13.0
60-T	9.9	5.0	2.0		16.9	16.9
61-T	6.1	5.0	2.0		13.1	13.1
62-T	6.4	5.0			11.4	11.4
63-T	8.3	5.0	2.0		15.3	15.3
64-T	4.0	5.0	2.0		11.0	11.0
65-T	6.2	5.0	2.0		13.2	13.2
66-T	8.9	5.0	2.0		15.9	15.9
67-T	5.2	5.0	2.0	0.5	12.7	12.7
67-S	10.2	1.0			11.2	11.2
68-S	16.8	1.0			17.8	17.8
69-S	14.5	1.0			15.5	15.5
70-S	12.6	1.0			13.6	13.6
71-S	15.7	1.0		0.5	17.2	17.2
72-T	25.6	5.0	2.0		**32.6**	**27.6**
73-T	18.6	5.0			**23.6**	18.6
74-S	10.3	1.0			11.3	11.3
76-S	5.9	1.0			6.9	6.9
77-T	10.1	5.0			15.1	15.1
78-T	13.8	5.0			18.8	18.8
79-T	12.5	5.0			17.5	17.5
80-T	14.9	5.0			19.9	19.9
81-S	7.2	1.0			8.2	8.2
82-S	5.9	1.0			6.9	6.9
83-T	17.4	5.0			**22.4**	17.4
84-S	3.7	1.0			4.7	4.7
85-T	16.9	5.0	2.0		**23.9**	18.9
101	8.0		2.0		10.0	10.0
103	6.6		2.0		8.6	8.6
104	5.9		2.0		7.9	7.9
105	7.1		2.0		9.1	9.1
107	10.0		2.0		12.0	12.0

Unit Number and logging system T-tractor S-skyline	Existing DSCs (%)	DSCs (%) from mechanical log skidding	DSCs (%) from grapple piling or slash busting	DSCs from hand pile burning	Total percentage DSCs following mechanical treatment	Final DSCs (%) Post mitigation
108	9.4		2.0		11.4	11.4
110	5.0		2.0		7.0	7.0
111	7.0		2.0		9.0	9.0
AVERAGE	7.4	5.4	2.0		13.2	13.1

Under Alternative 3 ground based harvest area would be reduced by 472 acres compared with Alternative 2. This would result in less potential for compaction and displacement of litter, duff and topsoil by harvest equipment. Direct effects would be the same for all units common to Alternatives 2 and 3. No temporary roads would be constructed, eliminating the direct effects to soil resources.

Prescribed Fire

In general, the estimated percent additional detrimental soil conditions that maybe be expected from prescribed fire range from 1-2% of the actual area burned.

Prescribed fire usually results in a mosaic of low, moderate and high fire severity that would be classified mostly as low severity burn class. Low-severity burn class effects include up to 2% high fire severity, up to 15% moderate fire severity, and at least 83% low fire severity and unburned. There is potential for fall burns and for heavier fuel areas to experience the low end of the moderate-severity burn class.

High fire severity effects are what Region 6 standards define as a detrimental soil condition (FSM 2520). The top of the mineral soil would be reddish to orange. Soil organisms would be killed to a depth of 9 to 16 cm. All organic materials in color-altered soil near the soil surface, plus all litter and humus and most woody debris on the soil surface would be consumed. There would be up to about 1% high fire severity from spring burns and about 2-3% from fall burns.

For moderate severity fire areas, soil organisms would be killed to a depth of 3 to 5 cm. Litter would be consumed and duff would be charred to consumption. Approximately 2-15% of the area would experience moderate fire severity, ranging from 2-5% for spring burns and higher, up to 15%, for fall burns.

For low severity fire areas, soil organisms would be killed to a depth of only 1 cm, and duff would be largely intact with scorching to consumption of litter.

Roads

The primary direct effect of road work on soil quality is detrimental soil displacement. Table 3.30 summarizes the miles of road work that would occur for each alternative in the Sandbox Project.

Table 3.30 - Miles of Road Work Proposed for Alternatives 2 and 3

Road Work	Alternative 2	Alternative 3
Temporary Road Construction	5.2 mi	None
Closed Roads to be Re-opened	21.9 mi	12.4 mi

Temporary road construction for Alternative 2 would include approximately 1.5 miles of temporary road construction on side slopes and would result in approximately 4.5 acres of new soil displacement (3.0 acres per mile). Approximately 3.7 miles of temporary road would be constructed on ridges or benches would result in approximately 5.9 acres of new soil displacement (1.6 acres per

mile), however, careful placement of the temporary roads to include existing user built roads would reduce this new displacement or compaction. There is no temporary road construction for Alternative 3.

For Alternatives 2 and 3, closed roads reopened would not measurably increase soil displacement as the displacement and mixing has already occurred. Placement of road closure barriers would not cause new soil disturbance outside of the existing roadway.

Temporary roads constructed for Alternative 2 would be re-contoured or ripped immediately following completion of use. This will reduce the potential DSCs by 80-90% or more for the 3.7 miles of temporary road on ridgetops and benches where soil horizons are not mixed during construction of the temporary road. The 1.5 miles of roads where cut and fill construction would take place would be re-contoured, treated with slash and seeded with native grasses to stabilize the disturbed soil. This will reduce the potential DSCs by 80-90% but leave 10-20% DSCs on the footprint due to mixing of the soil and the inability in most cases to return the slope to pre-road slope shape and soil depth (WWNF).

Indirect Effects on Soils Quality

ALTERNATIVE 1

Commercial Timber Harvest

This alternative would leave the greatest amount of organic matter in the system. It also has the greatest risk of wildfire which could result in an unpredictable reduction of organic matter, increase in surface erosion, and possible soil damage from heat. Within the scope of this project, erosion on open roads and ditches would not be expected to change over time, except as influenced by heavy rainfall and snowmelt, or by climatic variables of drought or wet cycles. With this alternative, no additional compaction would occur. Selection of this alternative would reduce the opportunity to rehabilitate pre-existing compaction.

Prescribed Fire & Roads

There would be no in direct affect to soils from the no action alternative as there would be no prescribed fire as a treatment.

Alternative 1 proposes that no new or temporary road construction occur, which would result in no increase in soil erosion.

ALTERNATIVE 2

Commercial Timber Harvest

Long term soil productivity of forested ecosystems relies on a continual flux of coarse woody material. Important nutrients to the soil ecosystem, such as sulfur, phosphorus and nitrogen, are supplied by decaying coarse woody material (Graham 1994). Timber harvest, slash disposal and site preparation can reduce the amount of organic material in the forest floor to below what is needed to ensure soil productivity (Harvey et al. 1987). Recent publications have provided information on appropriate levels of coarse wood required to protect long term soil productivity (Agee 1994, Harvey et al. 1994, Graham 1994).

One indirect effect of harvest activities on soils would be the loss of nutrients by removing trees from the ecosystem that would naturally recycle into the soil over the long-term if they were left on site. Prescriptions used for this project will leave adequate residual large and small trees on each unit to replenish this initial loss of stems. Much of the residual woody material will be left on site in the way of tops and roots which will decompose naturally, maintaining soil productivity.

Another effect is increased soil erosion hazard in areas where ground cover is removed by equipment over a large enough area to pose a hazard of long-term accelerated erosion. Vegetation protects the soil surface from raindrop impact, dissipates the energy of overland flow, and binds soil particle together. Soils on steep slopes with poor vegetative cover and lack of structural development are more susceptible to erosion than soils present on flatter terrain. Treatment units are not generally placed within areas where this condition is present.

Prescribed Fire

Erosion hazard would increase in moderate and high fire severity areas due to loss of litter and duff on the soil surface. However, change in erosion hazard would be small in low-severity burn class (and low end of moderate-severity burn class) areas where a minimum of 60-70 percent total effective ground cover still exists, there is a good mosaic burn pattern, and a residual forest canopy has the potential to replace litter burned by the fire.

Roads

The primary indirect effect of road work on soil quality is soil erosion. Soil erosion would increase on proposed acres of, temporary and decommissioned roads. The amount of temporary road construction proposed for the project is less for Alternative 3 versus Alternative 2 (none versus 5.2 miles). Thereby soil erosion would be less in the proposed acres from Alternative 3.

ALTERNATIVE 3

Commercial Timber Harvest

Nutrient loss from timber harvest would be reduced compared with Alternative 2. Erosion hazard would also be reduced by foregoing harvest on 473 acres compared with Alternative 2. No temporary roads would be constructed, eliminating the indirect effects to soil resources.

Prescribed Fire

Effects from prescribed fire on soil resources would be the same as those described under Alternative 2 above.

Roads

Soil erosion would increase on proposed acres of temporary and decommissioned roads. Because there are no temporary roads proposed under this alternative soil erosion would be less in Alternative 3 than in Alternative 2.

Cumulative Effects on Soils Quality

Appendix D summarizes the present and reasonably foreseeable future management activities within the cumulative effects analysis area, which includes the subwatersheds (6th field HUCs) within the Sandbox project area.

ALTERNATIVE 1

The cumulative effects of all current and foreseeable direct and indirect effects of detrimental soil conditions on soil quality, soil function, soil productivity, and soil stability over the next 10 years would be a static to improving trend, with potential for a downward trend due to increasing potential for wildfire or flood damage.

The combination of the past harvest activities, extensive road network built to facilitate the logging

operations that provide continued access, organic matter reductions from prescribed fire and livestock, and recreational use will be considered to assess cumulative effects of this project.

Analysis of the cumulative effects of detrimental soil conditions indicates that soil quality is being maintained on about 92.6% of the project area, in comparison to the Forest Plan guideline of maintaining at least a minimum of 80% of the project area in a non-detrimental soil condition.

Most of the existing DSCs were found on existing haul roads that were in the area. Disturbance varied within treatment units dependent upon past harvest activities and the existing road system. The range was from 0% to 26% DSCs. On that 7.4% of the project area considered in a detrimental condition ground cover, fine organic matter and coarse woody material is below potential (including existing roads). The remaining 92.6% currently has adequate ground cover. The project area has also been protected from wildfire and rangelands are managed to retain adequate residual vegetation. Observations made during field surveys indicated satisfactory accumulations of ground cover, fine organic matter, and coarse woody materials on forestland and rangelands.

ALTERNATIVES 2 and 3

Implementation of Alternatives 2 and 3 would increase DSCs in the project area about 6.2% for Alternative 2 and 5.7% for Alternative 3. Alternative 2 and 3 both include mitigations that would decrease existing DSCs. The totals in include disturbance from harvest activities and roads. Table 3.31 summarizes the potential detrimental soil conditions (DSCs) with the implementation of Alternative 2.

Table 3.31 - Estimated Change in DSCs for Alternatives

Alternatives	Mechanical Treatment Acres	Estimated Average Acres of Current DSCs in Treatment Units	Estimated Maximum Acres of New DSCs in Treatment Units	Estimated Maximum Acres of New DSCs for Temporary Roads	Estimated Maximum Percent Post Project DSCs
Alternative 1	0	162	0	0	7.4%
Alternative 2	2,193	162	127	9.3	13.6%
Alternative 3	1,463	108	85	0	13.1%

It is important to keep in mind that DSCs naturally change over time. Certain DSCs recover in a few years to decades, while other DSCs require recovery times of 100 or more years without restoration treatments. DSCs with long recovery rates are often considered for restoration treatments, where environmentally and economically feasible.

Consistency with Laws and Policy for Soils

All action alternatives will meet soil Forest Plan and Regional soil standards designed to maintain long-term soil productivity.

Proposed, Endangered, Threatened, and Sensitive Plant Species

Evaluation of effects plant PETS species is discussed below and covered in the biological evaluations for PETS plant species, residing in the analysis file of this project. Evaluation of effects to aquatic PETS species has been covered earlier under "Water Quality, Fisheries, and Riparian Habitat". Wildlife PETS species are covered later in this chapter.

Introduction

The following discussion addresses the effects on Region – 6 Sensitive Plant Species for the Sandbox project. The description of resources, along with the analysis of the expected and potential effects was assessed using field surveys, documented site information, revisits, as well as professional judgment.

Existing Condition

There are no known occurrences or habitat for any Threatened, Endangered or Proposed plant species that may possibly occur on the Wallowa-Whitman National Forest, within or in close proximity to the SandBox project analysis area. There are no occurrences or habitat for the *Thelypodium howellii* ssp. *spectabilis*, which may occur in Union County, according to the USDI, F&W Request list. Habitat for one candidate plant species, whitebark pine (Pinus albicaulis) is adjacent to the Sandbox project area. Whitebark pine is known to occur in the Blue Mountains of eastern Oregon and Washington. Along with subalpine fir, it codominates between 7,600 and 8,500 feet; increasing with elevation, it is the only tree at the highest sites. The nearest populations would be in the adjacent Eagle Cap Wilderness, to the east. Elevations within the Sandbox analysis are too low and suitable habitat does not exist within the project implementation area. Because there is no whitebark pine habitat or plants in the analysis area, this project would have no impact on this candidate species.

There are four sites for two Region – 6 sensitive plant species, at four locations within the project area, which includes the following:

Table 3.32 – Sensitive plant locations within the Sandbox Project area.

Watershed	Subwatershed	Plant Species	Site ID	GIS Acres
Upper Catherine Creek	South Fork Catherine Creek	*Phacelia minutissima*	0189	0.24 acres
		Phacelia minutissima	0193	0.36 acres
		Phacelia minutissima	0192	0.44 acres
		Botrychium montanum	0990	0.04 acres

Two currently listed sensitive species (*Botrychium minganense* and *Phacelia minutissima*) were discovered during previous surveys within the South Fork Catherine Creek subwatershed and do occur within the project area. There is potential for a number of sensitive plant species to occur within the project area in addition to the riparian associated *Botrychium* and *Phacelia* species.

Based on present available information, it was determined that the analysis area does contain potential threatened, endangered and sensitive (TES) plant habitat. A pre-field review of district data and the Wallowa-Whitman sensitive plant list shows that the analysis area contains posssible habitat for 20 TES plant species. Assessment is based on past observations and previous survey experience by the La Grande district botanist.

Based on the inventories, suitable habitat for *Castilleja fraterna, Pellaea bridgesii, Plantanthera obtusata* and *Pleuropogon oregonus* is considered highly unlikely to occur in the project treatment area. Although there are areas with steep rock outcroppings, bluffs and high elevation meadows, these occur within the Upper Catherine Creek and Boulder Park Roadless areas and no activities will occur there.

Although suitable habitat may exist in the project area for the following six species, none were located during surveys and it is unlikely they occur within areas to be impacted by project activities: *Cypripedium fasiculatum, Eleocharis bolanderi, Listera borealis, Lycopodium complanatum, Ophioglossum pusillum* and *Trifolium douglasii* .

Effects Analysis

The impacts to sensitive plants are based on the level of disturbance; consider the likelihood of project activities, and the consequence of the effects. Activities under analysis are associated with, or in close proximity to one newly discovered sensitive plant species, as well as a number of areas identified (on the ground) as having high potential habitat for several sensitive plants. Due to the locations for these activities, there is an inherent risk for impacting plants or habitat for these sites.

No Direct, Indirect, or Cumulative Effects

The following activities associated with the Sandbox project are of such limited and constrained nature that they would have no effect on PETS Plants species.

- Road Maintenance
- Planting
- Danger Tree Removal
- Precommercial thinning (PCT)
- Non-commercial fuel reduction (FFU)
- Construction of control lines for fire,
- Fuelwood Removal Areas,
- Roadside Danger Tree Removal,
- Temporary Road Construction
- Road Obliterations.

For both PCT and FFU units minimum no activity buffers of 10 feet on Class IV streams (intermittent non-fish bearing), 30 feet on Class III streams (perennial non-fishbearing), and 50 feet on Class I streams (fishbearing) will be implemented. These buffers should be sufficient to protect riparian associated plant species. Hand treatment only would occur within the RHCA's.

Due to the lack of suitable habitat for *Castilleja fraterna, Pellaea bridgesii, Plantanthera obtusata* and *Pleuropogon oregonus* there will be no impact to these species. *Cypripedium fasiculatum, Eleocharis bolanderi, Listera borealis, Lycopodium complanatum, Ophioglossum pusillum* and *Trifolium douglasii* were not located during surveys and are unlikely to occur within areas to be impacted by project activities; therefore, there will be no impact to these species and they are not discussed any further.

There will be no impacts on the TES plant species from firelines, fuelwood removal, temporary road construction, and road obliterations because these activities are not associated with suitable habitat, or known occurrences; or are of such limited nature (with no soil disturbance) as to have little to no measurable impact on sensitive plants or suitable habitat.

Direct, Indirect, and Cumulative Effects on Plant PETS

ALTERNATIVE 1 - No Action

This alternative would not impact individuals or habitat and would not contribute to a trend towards federal listing, or cause a loss of viability to any plant species. There would be no direct, indirect or cumulative effect to any proposed, threatened, endangered or sensitive plant species because no activities would be implemented.

ALTERNATIVES 2 and 3

Botrychium species are known from mesic areas that have limited potential to be directly impacted by vegetation management activities because riparian areas and other mesic features are protected by INFISH buffers. Other possible actions within the analysis area such as fire suppression

activities, road maintenance, and ongoing activities like recreation, fuelwood gathering and livestock grazing may have the potential to impact *Botrychium* populations and habitat.

Effects from climate change may be considered a component of cumulative impacts. However, it is impossible to know the mode, timing or extent of changes or magnitude of environmental responses at the project scale. Species most at risk of climate change are those with small geographic ranges, narrow phsiological tolerances, limited dispersal abilities, strong interspecific dependencies, low genetic diversity and those that have recently experienced population declines.

Habitat for *Phacelia minutissima* is described as moist meadows and seep edges, or on vernally wet open meadows and barren slopes. Gravely, clay-loam, well drained soils. This is a small annual species that is difficult to locate once its bloom season has passed. Suitable sites encountered were searched thoroughly for this species, however no new locations were found. This species does not occur in forest habitat so it is unlikely there will be impacts from timber harvest. However it is possible that potential habitat or undiscovered populations may be impacted from activities associated with the project, including decking, skidding and burnpiles. Other possible actions within the analysis area such as large wildfires, wildfire suppression, and ongoing activities like recreation, fuelwood gathering and livestock grazing have the potential to impact dwarf phacelia populations and habitat, as well. Known occurrences will be designated as Areas-to-Protect on the project and contract maps and no activities will occur there, so there should be no impact to known sites.

Determination and Conclusion

There will be no impact to any documented sites for sensitive *Botrychium* species from the Sandbox project activities. Since impacts from project activities will not occur, cumulative impacts would not increase significantly.

There will be no impact to any documented sites for *Phacelia minutissima* from the Sandbox project activities. However, it is possible that undiscovered populations may possibly be impacted from associated activities. The Sandbox project may impact individual plants (MIIH) or habitat, but will not likely contribute to a trent towards federal listing, or cause a loss of viability to the population or species.

Summary

Of the 20 plant species identified in the prefield as documented on the forest and/or possibly occurring in the planning unit (or Union County), there will be no impact to 18 species.

Two currently listed (Dec 9, 2011) Region – 6 Sensitive Plant species (*Botrychium montanum* and *Phacelia minutissima*) are known to occur within the Sandbox project area. However there will be no impact to the documented locations for these two species which have been identified as Areas-To-Protect under mitigations for project implementation.

There are no known occurrences for any Threatened, Endangered or Proposed plant species. No plants or habitat were located during surveys within the project analysis area. There will be no direct, indirect or cumulative effect to any proposed, threatened, or endangered plant species from project implementation.

Proposed, Endangered, Threatened, and Sensitive Wildlife Species (PETS)

Evaluation of effects to terrestrial PETS species is discussed below and covered in the biological evaluations for PETS wildlife species, residing in the analysis file of this project.

PETS species known to exist and/or for whom potential habitat is present within or immediately adjacent to the project area are evaluated in the Sandbox Wildlife Biological Evaluation in the Sandboc analysis file. Species without habitat and/or not believed to exist in the area are not addressed because there would be no effect from this project.

The following wildlife PETS species will be addressed for the Trail Project: White-headed woodpecker, Columbia spotted frog, California wolverine and Gray wolf.

Effects Analysis

Analysis Assumptions

Effects calls on species and their habitats are based on the expertise, training, and records of the preparer of this biological evaluation and uses the procedures and language of a USDA Forest Service R-6 letter, "Determining Effects to Listed, Proposed and Sensitive Species", signed by Harv Forsgren, Regional Forester, R-6 (1995).

Discussion of the action alternatives is combined because the effects of these alternatives would be similar. Any effects from these alternatives would likely be related to potential effects to OFSS habitat, large trees, and dead wood.

Direct, Indirect and Cumulative Effects on Wildlife PETS

The following proposed, endangered, threatened, or sensitive species (PETS) of wildlife are listed on the Regional Forester's Sensitive Species List (January 2011; Table 3.33). Only those PETS, or their habitats, known or suspected to occur in or immediately adjacent to the analysis area are addressed in this analysis. Those with no habitat within the project area are omitted from the table.

Table 3.33 - Proposed Endangered, Threatened or Sensitive species known or suspected to occur on the Wallowa-Whitman NF

STATUS[1]	Species	Habitat	Alt 1	Alt 2	Alt 3	Rationale
	AMPHIBIANS					
S	Rocky Mt tailed frog *Ascaphus montanus*	**N**	NI	NI	NI	Habitat protected by RCHAs
	BIRDS					
S	Northern bald eagle *Haliaeetus leucocephalus*	**P**	NI	NI	NI	Potential roosting habitat in trees >21 dbh protected
S	American peregrine falcon *Falco peregrinus anatum*	**Y**	NI	NI	NI	Historical nest within project boundary
S	Lewis' woodpecker *Melanerpes lewis*	**P**	NI	NI	NI	Large trees and riparian areas protected
S	White-headed woodpecker *Picoides albolarvatus*	**P**	NI	BI	BI	All snags retained, trend toward restoring habitat under Alternative 2 and 3
	MAMMALS					
T	Canada lynx *Felix lynx canadensis*	**P**	NE	NE	NE	Highly unlikely to occur in this area
S	Gray wolf *Canis lupus*	**P**	NI	NI	NI	No known den sites within area
S	Fringed myotis *Myotis thysanodes*	**N**	NI	MIIH	MIIH	Potential occurrence within area, roost trees potentially affected

STATUS$_1$	Species	Habitat	Alt 1	Alt 2	Alt 3	Rationale
	AMPHIBIANS					
S	Spotted bat *Euderma maculatum*	**N**	NI	NI	NI	Highly unlikely to occur in this area, habitat requirements not affected
	INVERTEBRATES					
S	Johnson's hairstreak *Callophrys johnsoni*	**P**	MIIH	MIIH	MIIH	Majority of potential habitat unaffected
S	Intermountain sulphur *Colia Christina pseudochristina*	**P**	NI	MIIH	MIIH	Potential meadow habitat disturbed
S	Silver-bordered fritillary *Boloria selene*	**N**	NI	MIIH	MIIH	Potential meadow habitat disturbed
S	Western bumblebee *Bombus occidentalis*	**P**	MIIH	MIIH	MIIH	Potential meadow habitat disturbed

Status: T = Threatened; E = Endangered; C = Federal Candidate;S = Region 6 Sensitive.
Habitat: K = Known habitat; P = Potential habitat; H = historic habitat; N = No habitat
Listed species: NE = No Effect, LAA = May Affect-Likely to Adversely Affect, NLAA = May Affect – Not Likely to Adversely Affect, BE = Beneficial Effect
Sensitive species: NI = No Impact, MIIH = May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species, WIFV = Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards federal listing or cause a loss of viability to the population or species, BI = Beneficial Impact

ROCKY MOUNTAIN TAILED FROG (*Ascaphus montanus*) - Tailed frogs historically have been found in Catherine creek, which runs through the project area. Alternatives 1, 2, and 3 (Discussion of these alternatives is combined because the effects would be similar)- The no action alternative would not change the stream morphology where tailed frogs occur. Alternative 2 and Alternative 3 will preserve riparian habitat with a corresponding Riparian Habitat Conservation Area no activity buffers. These RHCA's will preserve the canopy cover, flow and woody debris within and around occupied streams. Therefore all alternatives will have No Impact (NI) on the tailed frog.

NORTHERN BALD EAGLE (*Haliaeetus leucophalus*) - Occasional bald eagle sightings might be reported during the winter, but it is rare along Catherine Creek. There is no history of eagles nesting in the Sandbox project area and no large bodies of water that bald eagles require within the project area. Alternatives 1, 2, and 3 (Discussion of these alternatives is combined because the effects would be similar)- The Sandbox project area may contain some incidental roosting habitat for bald eagles but does not contain nesting habitat. None of the alternatives would alter this habitat enough to make it unsuitable for bald eagles; therefore this project will have No Impact (NI) on bald eagles or their habitat.

PEREGRINE FALCON (*Falco peregrinus anatum*) - Peregrine falcons have historically nested along a cliff face within the Sandbox project area boundary. This site is surveyed annually by USFS and ODFW personnel. If it is determined to be active during the time period timber treatments are proposed, management actions will be taken.

Alternative 1- The no action alternative will not introduce any new management activities to the historical nest site. If it is found to be active human activities will be restricted during the breeding season. *Alternatives 2 and 3*- Similar to Alternative 1, if the nest is found to be active prior to timber activities taking place, those activities will only take place outside of the breeding season and human activities will be restricted. Alternatives 1, 2 and 3 will have No Impact (NI) on the peregrine falcon.

LEWIS WOODPECKER (*Melanerpes lewis*) - No surveys have been specifically conducted for the Lewis woodpecker. However in surveys aimed at identifying goshawk and pileated occupancy, the Lewis' woodpecker has not been observed in this area. Habitat for the Lewis' woodpecker is uncommon in the Sandbox analysis area. However riparian habitat and corresponding Riparian Habitat Conservation Area no activity buffers will be conserved within the Sandbox project area. Ponderosa

pines over 21 inches dbh will not be treated and so large ponderosa pine habitat near riparian habitat will not be altered. For these reason, there is No Impact (NI) to the Lewis' woodpecker or their habitat under any alternative.

WHITE-HEADED WOODPECKER (*Picoides albolarvatus)*

There are no known records of white-headed woodpeckers in the project area, but habitat does exist, though it is underrepresented. An HRV analysis done within the analysis area shows that dry OFSS (white-headed woodpeckers preferred habitat) historically comprised 40-60% of the dry forest type. The landscape currently is made up of only 5% dry OFSS. Conversely, the dry OFMS forest type is over represented in the area, comprising 45% when historically it only comprised 5-15%. Existing overstocked conditions of small diameter trees are inhibiting the rate of larger tree development in these stands.

Alternative 1 (No Action) - Under this alternative, the risk of uncharacteristic wildfire or disease/insect outbreaks would continue to increase naturally over time because there would be no changes to stand stocking levels or fuel loads from active management. The large ponderosa pines that are rare in the project area, along with other existing large trees, snags, and down wood, would be at risk under this alternative if uncharacteristic wildfire or disease/insect outbreaks occurred. Conversely, wildfire would likely also produce snags, but newly created snags are usually hard and not easily excavated. Sound live trees that are killed by fire do not contain the rot and defects that exists in snags and logs that die more slowly from other causes. The impact to habitat would depend on the size and severity of the disturbance. Alternative 1 May Impact Individuals or Habitat (MIIH) but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Alternatives 2 and 3 - In the short term, disturbance from treatment activities might cause individual birds to shift spatially, but this alternative would increase the potential of the project area to provide habitat. In the long term, the proposed treatments (removing small trees, retaining big trees, underburning) for these alternatives would move the project area toward open stands of single-story, mature ponderosa pine and Douglas-fir that are characteristic of the single story old growth that historically dominated the project area.

Alternatives 2 and 3 each propose approximately 7,465 acres for fuels treatment. Prescribed burning has the potential to consume existing snags and logs, but burn prescriptions would maximize retention. Burning would occur when fuel moistures are high, fuel pull-back of needles, bark accumulations, et cetera would be implemented from around live trees and snags ≥30 in dbh where necessary to minimize loss, and appropriate ignition patterns would be used to minimize losses (no snags or large logs would be used as an ignition source). Prescribed burning would also likely create new snags to replace some of the material that might burn. New snags created from the burning would partially mitigate the loss of snags, but burning would likely replace some higher quality, softer snags with lower quality, harder snags without heartrot. Newly created snags are usually hard and not easily excavated. After about 3 years, the newly created low quality hard snags would begin to turn soft and become available for nesting and foraging. Endemic levels of insects and disease would be retained. Insect activity and disease presence would remain at normal functional levels, creating individual snags or small pockets of dead trees.

Treatments would begin to restore OFSS and return it to historic proportions in the long term by removing smaller trees to promote the desired development of larger ones. Activities would reduce tree densities in dry OFMS by 727 acres in Alternative 2 and 522 acres in Alternative 3 in order to restore open single structure dry old forest structure (OFSS) and increase the rate of development of the large trees needed by white-headed woodpeckers. Tree densities after treatment would more closely reflect historical conditions. OFSS would increase under the proposed treatments. Proposed treatments would retain the old-growth component of the area. Existing large trees and dead wood would be retained and protected. All trees >21 inches dbh and snags ≥9 inches dbh would be retained unless they presented a safety hazard and those cut would be left on-site as down wood.

Pre-activity down logs would be retained according to LRMP Amendment #2 standards (U.S. Forest Service 1995). Logs would be left in current lengths and not cut into pieces.

Because of these reasons Alternatives 2 and 3 would have a Beneficial Impact (BI) on the white headed woodpecker.

GRAY WOLF *(Canis lupis)* - While no wolves have been documented within the Sandbox project area, there is potential for wolves to pass through the project area. *Alternatives 1, 2, and 3 (Discussion of these alternatives is combined because the effects would be similar)* - Gray wolves are habitat generalists and the project area would continue to provide marginal habitat. Wolves are known to avoid densely roaded areas, choose areas free of human disturbance for denning and rendezvous sites, and therefore would be expected to avoid the project area during breeding. There is no known denning or rendezvous sites on or in the immediate vicinity of the project area. Effects of the proposed project should have no direct negative impacts on wolves, wolf habitat, or potential habitat. There would be no effects to the gray wolf from this project because: 1) no denning or rendezvous sites have been identified within the project area, and 2) prey species will not be negatively affected by proposed actions therefore it can be determined that the proposed project would have No Effect (NE) to the gray wolf.

FRINGED MYOTIS (*Myotis thysanodes*) - The fringed myotis has been identified in northeast Oregon, and it is assumed that the Sandbox project area contains habitat for this bat, though no specific records occur. *Alternative 1*- The no action alternative would retain all trees and snags and would have No Impact (NI) on the fringed myotis. *Alternatives 2 and 3 (Discussion of these alternatives is combined because the effects would be similar)* - Alternatives 2 and 3 propose commercial harvest treatments on 2,193 acres 1,465 acres respectively. This has the potential to remove existing and potential roost trees. However all snags and trees over 21 inches dbh (which have the highest likelihood of being roost trees) will be retained. With this taken into account, Alternative 2 and 3 May Impact Individuals or Habitat (MIIH) but are not expected to lead to a population decline of the species.

SPOTTED BAT (*Euderma maculatum*) - No spotted bats have been recorded on the Wallowa–Whitman, however due to the lack of intensive bat sampling, it is possible that the spotted bat occurs in the Wallowa-Whitman. *Alternatives 1, 2, and 3* - None of the alternatives would affect potential roosting habitat and all riparian areas would be protected by a Riparian Habitat Conservation Area (RHCA). Because of these reasons, all alternatives would have No Impact (NI) on the spotted bat.

JOHNSON'S HAIRSTREAK (*Callophrys johnsoni)* - There are 52 records of this species occurrence in Oregon with the majority from 3,500 to 6,000 feet in elevation and west of the Cascade Range. There are a few records south of the project area in Baker County (Black and Lauvray 2005). Additional local sightings are needed to document its range. It is unknown if this species occurs within the project area. Johnson's hairstreak typically spends much of its time in the top of the forest canopy which contributes to the rarity of sightings. It is assumed that timber harvest has contributed to this species reduction in habitat. The species of mistletoe Johnson's hairstreak depends on is abundant throughout the forest and its availability is not the limiting factor to the viability of the population. However, large stand replacing fires do have the potential to reduce available habitat for this species.

Alternative 1 – Under the no action alternative, the risk of uncharacteristic wildfire or disease/insect outbreaks would continue to increase naturally over time because there would be no changes to stand stocking levels or fuel loads from active management. In the absence of fire, the abundance of mistletoe would likely increase in the short to mid-term, thus creating more larval host plants for the Johnson's hairstreak. Under this alternative, the risk of stand-replacing fire would continue to increase, potentially reducing available habitat for this species. For these reasons Alternative 1 May Impact Individuals or their Habitat (MIIH) but is not expected to lead to a decline in the population of the specie.

Alternatives 2 and 3 – Under Alternatives 2 and 3, the harvest of trees from 1,050 acres and 727 acres respectively, of OFMS would directly impact Johnson's hairstreak by removing trees with mistletoe and potentially killing larvae should they occur within the project area. These alternatives may also indirectly impact Johnson's hairstreak by reducing the available amount of larval host plants. However, mistletoe is abundant within the project area and the level of harvest proposed in Alternatives 2 and 3 will not significantly reduce the availability of host plants for this species. For these reason, Alternatives 2 and 3 May Impact Individuals or their Habitat (MIIH) but are not expected to lead to a decline in the population of the species.

INTERMOUNTAIN SULPHUR (*Colia Christina pseudochristina)* - The Intermountain sulphur butterfly inhabits open woodland from 3400 to 5000 ft., including meadows, roadsides, and open forest. Warren (2005) states that members of this subspecies are most often found on steep sunny slopes at the ecotone between forest and shrubsteppe or grassland habitats. It is found from the eastern Blue Mountains in Washington, through the Blue and Ochoco Mountains in Oregon and there have been numerous sightings in the Wallowa Mountains.

Alternative 1- Under the no action alternative, the risk of uncharacteristic wildfire and insect/disease outbreak would continue to increase naturally over time because there would be no changes to stand stocking levels or fuel loads from active management. However if tree stands were lost through insect/disease/fire the loss of trees would not impact the life cycle of this butterfly and so there would be No Impact (NI).

Alternatives 2 and 3 (Discussion of these alternatives is combined because the effects would be similar)- Alternatives 2 and 3 both propose to burn approximately 7,465 acres. This has the potential to eliminate food plants and insects in those areas but also increase the viability of food sources in the coming years and renew flowering plants as long as the diversity of unburned and burned areas is retained. For these reasons Alternatives 2 and 3 May Impact Individuals or their Habitat (MIIH) but are not expected to lead to a decline in the population of the species.

WESTERN BUMBLEBEE (*Bombus occidentalis*) - The Western bumble bee is rare throughout much of its range and is in decline. Historically is was found from the Pacific coast to the Colorado Rocky Mountains but has seen severe population decline west of the Sierra-Cascade Crest. It is known to feed on sweet clover, rabbit brush, thistle, buckwheat and clover (Koch et al 2011). The invasiveness and dominance of native grasslands by exotic plants may threaten bumble bees by directly competing with the native nectar and pollen plants that they rely on. In the absence of fire, native conifers encroach upon many meadows, which removes habitat available to bumblebees.

Alternative 1 – Under the no action alternative there would be an absence of fire on the landscape except for the case of a stand replacing fire due to high stocking levels and high fuel loads. In the absence of fire, native can encroach on meadows, removing bumblebee habitat. Because of this, Alternative 1 May Impact Individuals or Habitat (MIIH) but is not expected to lead to a decline in the population of the species.

Alternatives 2 and 3 (Discussion of these alternatives is combined because the effects would be similar)- Prescribed burns planned in Alternative 2 and 3 have the potential to eliminate food plants and overwintering insects, however burning an area also has the potential to renew flowering plants as long as diversity of unburned and burned areas is retained. Alternative 2 and 3 plans burn blocks on 7,465 acres. This has the potential to eliminate food plants and insects in those areas but also increase the viability of food sources in the coming years. Additionally, prescribed fire will reduce the encroachment of overstocked stands onto bumblebee meadows. For these reasons Alternatives 2 and 3 May Impact Individuals or their Habitat (MIIH) but are not expected to lead to a decline in the population of the species.

Access and Travel Management

Introduction

The desired future conditions for the transportation system are to provide a safe, cost effective, efficient, and environmentally sound transportation system for the movement of people, equipment, and forest products. The Sandbox project will need some Forest roads to remain open during harvest activities and the life of the project. Open roads may be closed after the project has been completed. Road densities will be calculated as recommend in the Forest plan (by sub-watershed and management area). However, table 1 reflects calculations within the project boundary and management area. No roads will be closed with this project. Therefore, future condition open road density will not change as a result of implementing the Sandbox Vegetation Management project. Forest Plan guidelines for open road densities by Management Area are as follows:

Management Area 1, Timber Production Emphasis (2.5 miles/square mile)
Management Area 3, Wildlife/Timber (1.5 miles/square mile)
Management Area 6, Backcountry (none specified)
Management Area 15, Old Growth Preservation (none specified)

In harvest units where closed roads need to be re-opened and maintained for project use the purchaser may be required to close roads at the end of project.

Table 3.34 describes the potential outcome of the District Access and Travel Management Plan developed for the action alternatives in comparison to the current condition (Alternative 1 – No Action). Due to a Forest moratorium on road closures until the completion of the Forest Travel Management Plan, only those currently closed roads opened by this project for administrative use will be reclosed at the completion of those activities. It is assumed that the post sale road plan for this project will be considered in the Forest Travel Management Plan process. Implementation of the Forest Travel Management Plan would manage cross-country motor vehicle travel and use of roads and trails for motor vehicles by the public.

Table 3.34 – Forest Plan Open Road Densities

SWS	Management Areas	Project Area (sq. mi)	Current Open Road Density (mi./sq. mi.)	Forest Plan Road Density Guideline	District Access and Travel Plan
Beagle Creek	1	372	5.19	2.5	1.5
	3	343	1.08	1.5	1.01
Milk Creek-Catherine Creek	1	1,498	3.38	2.5	2.77
	3	1	6.57	1.5	6.57
North Fork Catherine Creek	1	2,757	2.15	2.5	1.72
	3	844	1.33	1.5	1.31
	15	8	0	N/A	N/A
South Fork Catherine Creek	1	9,543	2.24	2.5	1.51
	3	219	0	1.5	0
	15	543	0.46	N/A	N/A

The project area includes very small portions (0.3 to 2.5 acres) of the Middle Big Creek, Upper Big Creek, and West Eagle Creek subwatershed. Therefore, this portion of the project area was considered by the ID Team; however, because the existing road management plan is appropriate and no new road construction is proposed within these areas, these subwatersheds were removed from the calculations and will not be analyzed further in this EA for access management.

Due to the location of the project area boundary, the Beagle Creek subwatershed portion is just over one acre in size and the MA3 portions of the Milk Creek-Catherine Creek subwatersheds, North Fork and South Fork Catherine Creek subwatersheds are near to or less than one acre in size. Because these portions of these subwatersheds result in a very small number of acres being analyzed within each management area

which results in skewed road densities due to the inappropriate scale of the analysis area for an evaluation of this type resulting in figures which do not provide useful information (WWNF Forest Plan, page 4-35).

In general, the effects of this plan on other resources are discussed under each of the resource areas it may affect. Refer to those write-ups for a description of the effects of this plan on a particular resource. The direct and indirect effects analysis area for access and travel management is the same as the project area boundary as described in Chapter One of the EA.

Effects Analysis

No Direct, Indirect, or Cumulative Effects

The following activities associated with the Sandbox project are of such limited and constrained nature that they would have no effect on Access and Travel Management within the project area.

- Precommercial thinning and Planting
- Prescribed Burning
- Danger Tree Removal

These activities and their effects will not be discussed further in the Access and Travel section.

Direct, Indirect and Cumulative Effects

ALTERNATIVE 1 - No Action

Under Alternative 1, the no action alternative current conditions and road densities would continue. Timber sales normally provide the much needed maintenance on roads and without a timber sale maintenance would continue to be deferred on road systems which would continue to degrade. Drainage and other roads issues that exist would not be addressed. Roadside danger trees that lean over or near roadways and present a hazard to vehicles and persons would not be removed in this alternative and would continue to present a hazard to people and equipment using the roads. Roads that are open to public traffic would continue to see their current level of traffic as well as those roads which can be accessed by going over or around closure devices with motor vehicles. , Road condition would continue to deteriorate.

The Forest Travel Management Plan should be completed within the next few years; this would improve the success of past closures and protect natural resources, minimize big game harassment, and reduce sediment issues within the area.

The combination of no action in the Sandbox analysis area and the projects listed in Appendix D would continue to have an adverse impact on road systems unless maintenance funding can be attained from other sources. Because roads in the analysis area may not be designated for motorized use by the public and cross-country travel would be restricted under the Forest Travel Management Plan, recreational traffic under all alternatives would be concentrated on a smaller number of roads in the future. The mixture of a higher concentration of vehicles on roads with unbridled maintenance issues and the lack of supplemental maintenance from the Sandbox project could further strain the ability for the Forest Service to maintain road systems.

Until the Forest travel management plan is implemented, motor vehicle use within the project area would continue including use and construction of unauthorized roads and trails. Once the travel management plan is implemented, open road densities may then be reduced and the creation and use of unauthorized roads and trails would no longer be permitted.

Under this alternative, reconstruction of the road junctions and road decommissioning would not occur.

ALTERNATIVES 2 and 3

With the implementation of Alternative 2, approximately 5.2 miles of temporary roads would be constructed and approximately 21.9 miles of currently closed roads would be re-opened for administrative use. Under Alternative 3 no temporary roads would be constructed and 12.4 miles of closed road would be opened for administrative use. Both action alternatives would include reconstruction. Many of the roads in the analysis area would be maintained in some fashion with implementation of either action alternative however more would occur under Alternative 2 than Alternative 3.

The action alternatives would improve the effectiveness of the closures which have been breached where possible which would increase the benefits realized to resources such as big game, water quality, and snag protection.

In the MA 3 portion of the Milk Creek-Catherine Creek subwatershed a very small number of acres are being analyzed (1 square mile of project area). In this situation, road densities are skewed due to the inappropriate scale of the analysis area for an evaluation of this type (WWNF Forest Plan, page 4-35). There is only one road within this small area and it is an important road for long term access needs to the area, therefore, no changes to this portion of the project area was considered by the ID Team for the District Travel Management Plan. Because this project would only close those currently closed roads used by the project activities, more of this would occur under Alternative 2 than Alternative 3.

Alternative 2 and 3 could temporarily impact the road system by increasing heavy truck traffic on most roads within the analysis area. Alternative 3 does not utilize temporary roads and has less commercial haul. Impacts from log haul would be mitigated by the required pre-haul, during and post haul maintenance that would take place. Roadside hazard trees would be removed to provide public and worker safety.

Temporary roads would be decommissioned and closed roads open for administrative use would be re-closed at the conclusion of the project activities.

Since the amount of haul units is decreased in Alternative 3 when compared to Alternative 2, the number of roads impacted and the extent of the impact would be less. However, this would also result in a reduction of maintenance by the purchaser across the entire analysis area.

Alternatives 2 and 3 would be consistent with the Wallowa-Whitman Land and Resource Management Plan as all transportation standards and guidelines would be met (USDA Forest Plan 1990) but would not meet Forest Plan open road density standards. There is a potential to meet these standards with implementation of the Forest Travel Management which would enforce road closures without the need to physically put closure devices on them and would also eliminate the construction and use of unauthorized roads and trails within the project area.

Management Indicator Species - Terrestrial

Introduction

Effects to management indicator species are primarily disclosed under the habitat type they are indicators for. Therefore, American marten, northern goshawk, and pileated woodpeckers are discussed under Old Growth Habitat, while Rocky Mountain elk are discussed under Big Game Habitat, and primary cavity excavators are discussed under Snag and Log Habitat.

The following discussion responds to the potential impacts on species viability from the Sandbox project on these species.

A. Management Indicator Species – American Marten

The American marten is associated with mature, mesic coniferous forests and is one of the most habitat-specialized mammals in North America (Bull and Heater 2001). Martens in northeastern Oregon exhibited larger home ranges than those found in other areas, with an average home range size of 6,714 acres for males and 3,499 acres for females (Bull and Heater 2001).

Viability Determination

Wisdom et al. (2000) assessed broad-scale trends of 91 species in the interior Columbia Basin, including the marten. The historical estimate of source habitat for marten in the Blue Mountains was 8.83%, which increased to 23.5% by the 1990s. By managing habitat similar to historical conditions, it is assumed that remaining habitat will be adequate to ensure population viability because species survived those levels of habitat in the past to be present today (Landres et al. 1999).

Source habitat for marten was evaluated on the Wallowa-Whitman National Forest (Penninger and Keown 2011) and represents the highest quality habitat which contributes to species viability. Source habitat for American marten is considered to be cold-moist and cold-dry forests with multi-stories, large tree structure and closed canopies. The threshold of ≥40% of the historical amount of source habitat in a watershed was used to identify watersheds with a relatively high amount of source habitat. Watersheds that contain ≥40% of the estimated historical median amount of source habitat are believed to provide for habitat distribution and connectivity, and better contribute to species viability across the forest. Not all watersheds on the Wallowa-Whitman NF have the potential to provide source habitat for marten; historically 76% of the watersheds provided source habitat and currently 68% of the watersheds provide source habitat. Although the viability outcomes for the current condition are lower than the historical, habitat is estimated to currently exist in the quality, quantity, and distribution capable of supporting a viable marten population at the Wallowa-Whitman National Forest scale.

ALTERNATIVES 2 and 3

The Upper Catherine Creek watershed currently provides ≥40% of the median amount of source habitat that occurred historically, which is above the threshold necessary to support marten population viability.

Out of the existing 3,569 acres of marten habitat within the project area boundary (PAB), Alternative 2 proposes commercial harvest treatments in 455 acres (13% of habitat in the PAB). Fuels treatments are proposed in 62 acres of marten habitat (2%). Fuels treatments would not make the stands uninhabitable to martens, if done within source habitat the reduction of complexity on the ground might reduce the possibility of marten denning in that habitat. 394 acres (13%) are proposed for a thinning or improvement treatment. These treatments can simplify the stand structure and reduce canopy closure but in the long term will create the larger trees which in turn would create the greater canopy cover with which marten are associated.

Alternative 3 proposes commercially treating 316 acres (8% of existing) of marten habitat in the PAB. Treatments in moist OFMS stands can simplify the stand structure and reduce the canopy closure affected stands. Fuels treatments are proposed in 62 acres of marten habitat (2%). While fuels treatments would not make the stands uninhabitable to martens, if done within source habitat the reduction of complexity on the ground might reduce the possibility of marten denning in that habitat. 200 acres (6%) are proposed for a thinning or improvement treatment. These treatments are designed to improve the health of the stand and the size of the trees by removing poor quality, small or diseased trees. These treatments can simplify the stand structure and reduce canopy closure but in the long term will create the larger trees which in turn would create greater canopy cover that marten are associated with.

Alternative 3 defers treatment in certain units proposed in Alternative 2 that lie along the northern edge of the PAB. These units proposed thinning and improvement treatments within marten habitat, habitat which stretched beyond the project boundary. While these units would not have cut off access to the wilderness or affected connectivity, a larger, more connected section of moist OFMS is preserved through the elimination of the units.

B. Management Indicator Species – Northern Goshawk

The Northern goshawk was chosen as a supporting indicator of abundance and distribution of mature and old-growth forests. The goshawk is associated with dense canopied mixed conifer, white fir, and lodgepole pine associations (Wisdom et al. 2000).

Goshawks use broad landscapes that incorporate three types of habitat during the breeding season: (1) a nest area, composed of one or more forest stands or alternate nests; (2) a post fledging area (PFA), which is an area around the nest used by adults and young from the time of fledging, when the young are still dependent on the adults for food, to independence; (3) a foraging area that comprises the breeding pairs entire home range (Reynolds et al. 1992, Reynolds 1983).

Viability Determination

Throughout the Interior Columbia Basin, the amount of source habitat (i.e., habitat requirements to provide long term population persistence) available to the goshawk has declined from historical conditions. The greatest declines have occurred in the interior ponderosa pine and western larch forest types. It is estimated that there has been a 96% decline in old forest single-story ponderosa pine (Wisdom et al. 2000). However the interior Douglas-fir, grand fir, white fir, lodgepole pine, and juniper sagebrush have all increased in abundance from historical conditions. The overall decline in source habitat and strong decline in the ponderosa pine cover type is offset somewhat by increases in these other cover types and structural stages that provide source habitat.

Additional source habitat analysis was conducted at a finer scale on National Forest lands as part of a species viability assessment conducted by Wales (2011) in support of the Blue Mountains Forest Plan revision (Penninger and Keown 2011). The threshold of $\geq$ 40% of the historical amount of source habitat in a watershed was used to identify watersheds with a relatively high amount of source habitat. Watersheds that contain $\geq$ 40% of the estimated historical median amount of source habitat are believed to provide for habitat distribution and connectivity, and better contribute to species viability across the forest. Thirty-two of the thirty-five watersheds on the Wallowa-Whitman National Forest which historically provided source habitat are above the historical median of source habitat providing 440,696 acres (94% of historical condition) of goshawk habitat. While the presence of roads and trails has decreased the habitat effectiveness of source habitat in most watersheds (67% in the low habitat effectiveness class) the majority of watersheds (86%) on the WWNF have high watershed index scores. High watershed index scores indicate good habitat abundance with low departure from historical conditions, and high habitat quality, with greater 50% of the source habitat being late-successional habitat.

The current viability outcome index for the WWNF show that current source habitat for the goshawk is slightly lower than for the entire Blue Mountains but is very near historical conditions, indicating that suitable habitats are broadly distributed and of high abundance, and the goshawk is likely well-distributed throughout the WWNF (Peninger and Keown 2011).

ALTERNATIVES 2 and 3

Treatments in OFMS stands would simplify structure and reduce canopy closure of affected stands. Alternative 2 may have negative effects to goshawks in treatment units where canopy cover is reduced below 40%; however, treated stands would produce an open understory often preferred by Northern goshawks. GIS analysis identified 5,828 acres of primary and secondary goshawk habitat within the Sandbox PAB (36%). 860 acres (15%) of this habitat would be treated under Alternative 2. The majority of treated habitat (81%) would be affected by fuels and thinning treatments. Nesting

habitat would not be expected to be affected as no large trees (>21 dbh) would be harvested and the encouragement of growth of larger trees through thinning treatments would increase canopy cover over time, increasing source habitat potential. 19% of proposed treatments are improvement treatments, designed to remove poor condition trees and decrease the risk of disease and insect outbreak. All treated acres would continue to provide habitat components (e.g., large tree structure, canopy layers, and foraging areas) that could be used by goshawks for some or all of their life history functions.

Alternative 3 is similar to Alternative 2 and proposes treatments on 12% of goshawk habitat within the PAB. The majority of treatments consist of fuels and thinning (495 acres, 8%). The rest of the treatments consist of improvement and sanitation harvests (131 acres, 2%), and 36 acres (0.6%) of a patch opening treatment. Although the treatments would simplify structure and reduce canopy closure of affected stands, encouragement of growth of larger trees through thinning treatments would increase canopy cover over time, increasing source habitat potential. Suitable nesting habitat for goshawks would be reduced within the patch openings but foraging habitat would be created as it creates a forest edge and opens up a hunting area. All treated acres will continue to provide habitat components (e.g., large tree structure, canopy layers, and foraging areas) that could be used by goshawks for some or all of their life history functions.

C. Management Indicator Species – Pileated Woodpecker

In northeast Oregon, the pileated woodpecker shows high selection for mature, unlogged grand fir stands with ≥ 60% canopy closure, multiple canopy layers, and high snag density (Bull and Meslow 1988, Bull 1987, Bull and Holthausen 1993). Bull et al. (2007) found that densities of nesting pairs of pileated woodpeckers were positively associated with the amount of late structural stage forest and negatively associated with the amount of area dominated by ponderosa pine and the amount of area with regeneration harvest.

Based on research data compiled in the DecAID Wood Advisor (Mellen-Mclean et al. 2009) for eastside mixed conifer forests, 70% of pileated woodpeckers in the populations studied used snags > 12.9 in. dbh for foraging. Stands with high density of snags and logs were preferred for foraging (Bull and Meslow 1977).

Viability Determination

Habitat trends of the pileated woodpecker were assessed at the Interior Columbia Basin, Blue Mountains ecological reporting unit (ERU), and WWNF scales using information provided by Wisdom et al. (2000) and the species viability assessment conducted by Wales (2011) in support of the Blue Mountains Forest Plan revision.

A fine-scale analysis of source habitat on National Forest lands in the Blue Mountains, including the WWNF was conducted in 2011 (Penninger and Keown 2011). This analysis indicated that there has been a decline in the amount of source habitat on the WWNF from historical conditions. However, source habitat of the pileated woodpecker is still available in adequate amounts and distribution to maintain pileated species viability on the WWNF. Currently, there are approximately 206,374 acres (57% of historical condition) of source habitat on the WWNF, with twenty-nine of the thirty-five watersheds (83%) on the WWNF that historically provided source habitat, continuing to provide that habitat. Reductions of snags and the presence of roads has decreased the quality of source habitat in many watersheds but 33% of the watersheds on the WWNF have high watershed index scores, indicating good habitat abundance, moderate to high snag densities and low to moderate road densities. Additionally, 29% of the watersheds are in the moderate category. Watersheds having ≥40% of the median amount of source habitat are distributed across the WWNF and found in all clusters.

The viability assessment indicates the WWNF still provides for the viability of the pileated woodpecker. The pileated woodpecker is distributed across the WWNF and there are adequate amounts, quality, and distribution of habitat to provide for pileated woodpecker population viability.

ALTERNATIVES 2 and 3

Pileated woodpecker habitat comprises 27% of the Sandbox PAB, and Alternative 2 proposes treatment on 947 acres (22%) of these acres. 72% of treated acres would undergo a fuels and thinning treatment designed to reduce the risk of wildfire and increase the growth of healthy trees within the stand. 28% of the proposed treated acres would have openings created and diseased trees removed in improvement type harvests.

Thinning prescriptions would retain all existing snags except those that pose safety concerns. A thinning treatment would temporarily decrease canopy closure; foraging (down logs) and roosting (hollow, live grand fir) substrate will be reduced, but not eliminated. This may reduce the potential of the area to provide habitat for pileated woodpeckers in the short term (0-20 years). However, by reducing competition and increasing soil nutrient availability the remaining trees will have the opportunity to grow larger and create more canopy closure over the long term (50-100 years). Additionally, Alternative 2 would retain live trees $\geq$21 in dbh, snags >12 in dbh and down wood levels that meet LRMP standards (Screens) and continue to provide nesting, roosting and foraging habitat. Treatments may lead to reduced capability of these stands to support pileated woodpeckers, but would not preclude their use of these stands.

Effects to pileated woodpecker from Alternative 3 are very similar to the effects of Alternative 3 on goshawk habitat. 17% of woodpecker habitat in the PAB is proposed for treatment in Alternative 3. 12% of the habitat would undergo a fuels or thinning treatment. 4% of the existing habitat would be treated with improvement harvests. 1% would have a patch opening treatment. The patch opening treatment would retain snags, however would reduce the potential of woodpecker use through reduced predator protection. Thinning and improvement treatments would temporarily decrease canopy closure, foraging (down logs) and roosting (hollow, live grand fir) substrate would be reduced, but not eliminated. This may reduce the potential of the area to provide habitat for pileated woodpeckers in the short term (0-20 years). However, by reducing competition and increasing soil nutrient availability the remaining trees will have the opportunity to grow larger and create more canopy closure, foraging and roosting habitat over the long term (50-100 years). Thinning prescriptions would retain all existing snags except those that pose safety concerns, and treated acres, with the possible exception of the patch openings (1%) will continue to provide the habitat components needed for woodpeckers to complete their life cycle.

D. Primary Cavity Excavators (PCEs)

More than 80 species of wildlife use snags and living trees with defects (deformed limbs or bole, decay, hollow, or trees with brooms) in the interior Columbia River basin (Bull et al. 1997). The Blue Mountains of Oregon have 39 bird and 23 mammal species that use snags for nesting or shelter (Thomas 1979).

PCEs rely heavily on decadent trees, snags, and down woody material and can be used as an indicator species of snag habitat. These birds; common flicker (*Colaptes auratus*); Lewis' (*Melanerpes lewis*), hairy (*Picoides villosus*), downy (*Picoides pubescens*), white-headed (*Picoides albolarvatus*), black-backed (*Picoides arcticus*), three-toed (*Picoides tridactylus*), northern three-toed (*Picoides tridactylus bacatus*), and pileated (*Dryocopus pileatus*) woodpeckers; yellow-bellied (*Sphyrapicus varius*) and Williamson's sapsuckers (*Sphyrapicus thyroideus*); black-capped (*Parus atricapillus*), chestnut-backed (*Poecile rufescens*), and mountain chickadees (*Poecile gambeli*); and white-breasted (*Sitta carolinensis*), red-breasted (*Sitta Canadensis*), and pygmy (*Sitta pygmaea*) nuthatches, depend on snags for nesting and roosting, and snags and down wood for foraging. A key assumption is if habitat is provided for PCEs, then habitat requirements for secondary cavity users will be met. Suitable nest sites are often considered the limiting factor for cavity nesting bird populations. Habitat for the white-headed woodpecker, and other species such as western bluebirds, was once quite common on the east side of the Cascade Mountains, but years of fire exclusion, along with selectively harvesting large old pine trees has greatly reduced this habitat to well below historic levels.

Viability Determination

ALTERNATIVES 2 and 3

Tolerance levels are not expected to change for PCEs; Snag densities are expected to provide habitat for all PCE's, though limited beyond the 30% tolerance level for Wiliamsons sapsuckers and pileated woodpeckers. Large snags greater than 21 inches dbh would continue at current levels through the short- and mid-terms, but increase in the long-term as the number of large diameter trees increases.

E. Rocky Mountain Elk

Rocky Mountain elk have been selected as an indicator of habitat diversity, interspersion of cover and forage area, and security habitat provided by areas of low human disturbance.

Viability Determination

The National Forest Management Act (1976) requires that habitat exist to provide for viable populations of all native and desires non-native vertebrates. Elk is a game species that is managed on a management objective (M.O.) basis. Management objectives were developed to consider not only the carrying capacity of the lands, but also the elk population size that would provide for all huntable surplus, and tolerance levels of ranchers, farmers, and other interests that may sometimes compete with elk for forage and space. Biologically, a population that is managed around a M.O. is much larger than a minimum viable population. A minimal viable population represents the smallest population size that can persist over the long term. Historically there were game species, including elk, which warranted serious conservation concerns due to depressed populations and range contractions resulting from unregulated market and sport hunting and loss of habitat. Many of the factors that contributed to the decline of large wild ungulates in the past do not exist today. Currently, elk populations on the WWNF are regulated by hunting and predation. Elk numbers are substantially higher than what would constitute a concern over species viability.

ALTERNATIVES 2 and 3

Alternative 2 would result in the greatest reduction in elk cover in the short and mid-term (826 acres). Similar to Alternative 2, Alternative 3 would reduce cover and create forage, but to a lesser extent (434 acres). Direct and indirect effects include reductions in marginal and hiding cover, improvements in forage, and disturbance from motorized vehicles from the logging operation in the short-term (0-20 years). The scale, duration and nature of this project would not change the potential of the project area to provide elk habitat. Activities proposed in the Sandbox project area would not impact species viability for elk.

SNAG AND LOG HABITAT

Introduction

Primary cavity excavators (woodpeckers, sapsuckers, flickers, nuthatches, and chickadees) are Management Indicator Species (MIS) on the Wallowa-Whitman NF. A common element in the habitat of these species is snags and down woody material. These MIS rely heavily upon decadent trees, snags, and down logs. Some cavity nesters (e.g. northern flicker) do not require high canopy closure, and habitat for these species is abundant and well distributed. Other cavity nesters show a preference for closed canopy settings. The analysis area for snag and log habitat is the subwatersheds that contain the project area.

Pileated woodpecker is a MIS addressed separately in the Forest Plan from the other primary cavity excavators. This species serves as a management indicator for old growth habitat, and could equally represent large snag and log habitat and is covered in detail in the LOS (old growth) section of this effects analysis.

Many PCEs, and secondary cavity nesters, feed on forest insects and play a vital role in maintaining healthy, productive forests. Large snags and trees provide more functions, for more species, for a greater period of time than smaller ones. Large woody structures are not easily or quickly replaced. Down woody material is an important component of the forest ecosystem because of its role in nutrient cycling and immobilization, soil productivity, and water retention (Johnson and O'Neil 2001). It also provides habitat for mycorrhyzal fungi, invertebrates, reptiles, amphibians, and small mammals. For these reasons emphasis should be placed on conserving or creating these structures when carrying out forest management practices. There is increasing pressure on snag and log habitat as logging safety restrictions and firewood gathering intensify.

Existing Conditions

Based on field reconnaissance (summer/fall 2011-2012), down wood in all size classes (0 - 0.25 in, 0.25 - 1 in, and > 3 in) is common throughout the project area and the Catherine Creek Watershed, therefore the total volume of down wood exceeds LRMP standards. Within the watershed the cold upland forest types contain (< 30 tons/acre fuel loads), the dry upland forest types contain (< 20 tons/acre fuel loads), and the moist upland forest types contain (>30 tons/acre fuel loads).

Stand exams of proposed units found snag levels were found to be generally between 3-7 snags per acres (10-21+ inch diameter and >20 ft tall), dependent on stand composition. Although past logging has reduced snags in past regeneration harvest units, other areas (especially grand fir dominated stands) show an increase in snags due to past insect and disease outbreaks.

The Decayed Wood Advisor (DecAID)

The DecAID advisor (Mellen et al. 2006) and "Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-Scale Trends and Management Implications" currently provide the most current, peer-reviewed science available for assessing snag habitat. DecAID is an internet-based computer program developed as a tool to help federal land managers evaluate effects of management activities on wildlife species that use dead wood habitats, and is used primarily to compare existing and projected snag levels to wildlife use levels. GNN (Gradient Nearest Neighbor) data can give an idea of current snag levels within the analysis area and validate field reconnaissance. Comparing this data with stand exams conducted in stands with no evidence of previous harvest can give an idea of what the current vs. historical conditions for the area are like (Figure 4).

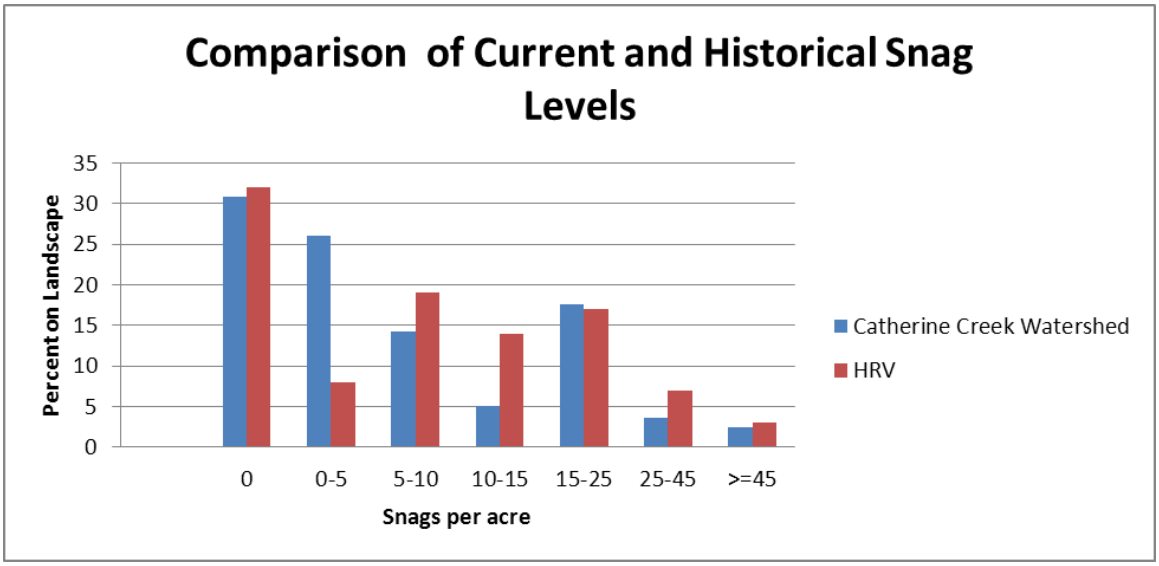


Figure 4 – Comparison of Current vs. Historical Snag Levels in Sandbox Area

A “qualitative assessment” is the level of DecAID analysis that is used based on the fact that all existing snags ≥ 12 in dbh would be retained in all harvest units. Cursory snag and down wood data were collected during field reconnaissance for this project. Recent, local research has been done on Pileated Woodpecker (*Dryocopus pileatus*), Black-backed Woodpecker (*Picoides arcticus*), Williamson’s Sapsucker (*Sphyrapicus thyroideus*), Pygmy Nuthatch (*Sitta pygmaea*) and White-breasted nuthatch (*Sitta caroliensis*) by Bull and Nielsen-Pincus (2007) which has been incorporated into DecAID.

The habitat categories from DecAID that most closely reflect conditions in the Sandbox area are the “Small/medium tree” structural conditions within the “Eastside Mixed Conifer Forests, East Cascades/Blue Mountains” DecAID synthesized data for wildlife use of snag densities, by a representative sample of PCEs possibly found within the analysis area, are given below (Table 3.35). Effects are discussed in terms of snag densities with and without the proposed treatments, and how those densities relate to tolerance levels for wildlife species that utilize snags. The information is presented at three statistical tolerance levels which may be interpreted as three levels of “assurance”: low (30% TL), moderate (50% TL) and high (80% TL). Each tolerance level is the amount of assurance a land manager would have that they are meeting the habitat needs of the specific species (e.g., 0.3 snags per acre <10 inches dbh would provide a 30% assurance of meeting habitat needs for white headed woodpeckers).

Table 3.35 - DecAID synthesized data for wildlife use of snag densities for Eastside Mixed Conifer Forests, East Cascades/Blue Mountains and small/medium trees and larger trees structural condition classes (EMC_ECB_S).

Species	Snags > 10 in dbh		
	30% TL[1] Snag density (#/acre)	50% TL Snag density (#/acre)	80% TL Snag density (#/acre)
White-headed woodpecker	0.3	1.7	3.7
Pygmy nuthatch	1.1	5.6	12.1
Black-backed woodpecker	2.5	13.6	29.2
Williamson's sapsucker	14.0	28.4	49.7
Pileated woodpecker	14.9	30.1	49.3

[1] TL = Tolerance level.

Existing snag densities (<20in dbh, Figure 36) were compared to wildlife tolerance levels (Table 3.35) to come up with an estimate of the percent of the watershed that can provide all aspects of habitat (roosting, nesting, foraging) for the identified PCE’s (Table 3.36).

Table 3.36 - Percent of landscape available as habitat based on snag density data

Species	30% TL	50% TL	80% TL
White-headed woodpecker	67%	67%	67%
Pygmy nuthatch	67%	42%	27%
Black-backed woodpecker	67%	27%	5%
Williamson’s sapsucker	22%	5%	2%
Pileated woodpecker	22%	5%	2%

The studies used in DecAID to derive this data are largely from NE Oregon and are applicable to the project area. Based solely on snag density, all species are supported at the 30%, 50% and 80% TL. Habitat availability declines sharply for the Williamson’s sapsucker and Pileated woodpecker at the 50% and 80% TL. At those tolerance levels, Williamson’s sapsuckers and pileated woodpeckers can be assumed to not use the majority of the project area for nesting, roosting, or foraging. These birds need areas with snag densities much higher than those in the project area. However, these assumptions are derived solely from

snag density and do not take in the full picture of the surrounding forest. Black-backed woodpeckers thrive in areas where snags are created by a stand replacing fire, so while snag densities capable of supporting black-backed woodpeckers might exist, these snags may not contain the characteristics needed by the blac-backed woodpeckers and the area might not be viable for them. Historically, white-headed woodpeckers probably used most of the lower elevation areas within the analysis area. Source habitats for low-elevation old-forest species have declined more than any other habitat type from historical to current conditions and populations of white-headed woodpeckers have declined strongly along with this loss of habitat (Wisdom et al. 2000).

Retention of downed logs is based on Amendment #2. DecAID provides estimates of percent cover of downed wood. The existing down wood data is in tons per acre. A direct conversion to percent cover tolerance levels is not possible without the length of the logs and diameter, and this data is not available. However, estimates of post project down wood exceed LRMP standards.

Effects Analysis

Assumptions

Effects are discussed in terms of snag densities with and without the proposed treatments, and how those densities relate to tolerance levels for wildlife species that utilize snags.

Direction from the Regional Forester's Forest Plan Amendment No. 1 requires that pre-activity levels of logs be left unless those levels exceed those shown in the table under section D (1) Down Woody Material (for wildlife and soils) in the Management Requirements, Constraints, and Mitigation Measures in Chapter II of this EA.

Guidelines for logs and snags also require that green trees of adequate size be retained in harvest units to provide replacements for snags and logs through time. Generally green tree recruits (GTRs) need to be retained at a rate of 25-45 trees per acre, depending on biophysical group. All harvest prescriptions in the Sandbox project would retain GTRs within or above this range. Effects to GTRs would not differ between alternatives.

No Direct, Indirect, or Cumulative Effects

The following project activities associated with the Trail project are of such limited and constrained nature that they would not disturb any of snag and log habitat and would therefore have no effect on Snag and Log resources or activities.

- Precommercial Thinning
- Planting

These activities and their effects will not be discussed further in this section.

Direct and Indirect Effects on Snag and Log Habitat

ALTERNATIVE 1

Snag densities are within the historical ranges as described in DecAID (Mellen et al. 2006). This alternative retains the most snag habitat in the short-term and mid-term to the degree that snags would not be reduced for operational reasons or consumed during prescribed burning as in the action alternatives.

Stands containing larger structure trees would continue to provide snag and down wood habitat to meet habitat requirements of primary cavity nesters at least through the short-term (15-25 years). In the absence of stand replacement fires, down wood levels would continue to increase. Stands within

the analysis area that were logged in the early 1990s would begin to provide snag habitat in the long- term. Drought stress in overstocked stands will increase fuel loadings, increasing the likelihood of stand replacement fires reducing snag habitat in the long term.

ALTERNATIVES 2 and 3

Proposed activities (removing small trees, retaining large trees, prescribed burning) are expected to help create habitat for PCEs using open forests with large trees in the long-term and reduce habitat for those PCEs using dense forests. Treatments should have negligible effect on existing snags because all existing snags >12 in dbh would be retained although some loss of snags would occur due to safety requirements. More treatments would occur under Alternative 2 modified (approximately 2,772 acres of non-commercial and commercial fuels reduction and thinning work) than Alternative 3 (2,024 acres).

Treatments would increase the growth rate of remaining trees, thus increasing the amount of large trees in the mid to long-term. Eventually, they would become available as large snags and would benefit primary cavity excavators in the long term. Although snag densities within harvest units would not be reduced substantially, the effectiveness of snag habitat is reduced when stands are converted from a closed canopy setting to an open one. A few species (e.g., flicker, bluebirds, sapsuckers) seem to do well in either setting, but others (e.g., pileated woodpeckers, nuthatches, black-backed woodpeckers) generally avoid nesting and foraging in open settings.

Alternatives 2 and 3 propose 7,465 acres of prescribed burning. Burning creates a period of reduced “soft snag” habitat that persists into the early mid-term. This can cause wildlife species that depend on such structures, such as pileated woodpeckers, to move to other areas in search of suitable habitat, resulting in lower productivity and reduced local populations. Although burning would likely reduce the densities of snags and logs, the burn plan is designed to protect large snags. The function of snag and log habitat in the analysis area is not likely to be compromised by burning given the considerations that are built into the prescription; the lighting pattern would be designed to protect large diameter snags. Fire would also likely create new snags and logs to replace some of the small to medium diameter material that may burn. However, newly created snags and logs are usually hard and not easily excavated. Burning creates a period of reduced “soft snag” habitat that persists into the short and early mid-term. This can cause wildlife species that depend on such structures to temporarily move to other areas in search of suitable habitat, resulting in lower productivity and reduced local populations.

It can be assumed that an increase in treatment unit acres would result in a greater reduction in snags and logs due to skid trails, landings, safety reasons and prescribed burning. Alternative 3 treats fewer acres in the Sandbox project area compared to Alternative 2 and therefore, Alternative 3 would better meet the snag needs for PCEs. However, standards for snags and down wood would be met in both alternatives and project activities are not expected to negatively affect species associated with snags and down woody material.

Tolerance levels are not expected to change for PCEs; Snag densities are expected to provide habitat for all PCE’s, though limited beyond the 30% tolerance level for Wiliamsons sapsuckers and pileated woodpeckers. Large snags greater than 21 inches dbh would continue at current levels through the short- and mid-terms, but increase in the long-term as the number of large diameter trees increases.

Cumulative Effects on Snag and Log Habitat

ALTERNATIVE 1

This alternative would not contribute to cumulative effects of other management activities in the analysis area. Snag habitat in past treatment units would slowly develop as these stands grow and snags are naturally recruited in the long-term. In the absence of large scale disturbances snag

densities would likely reflect densities from un-harvested areas across the analysis area within 100 years and down wood levels would continue to increase. Drought stress in overstocked stands will increase fuel loadings, increasing the likelihood of stand replacement reducing snag habitat in the long term.

ALTERNATIVES 2 and 3

Proposed activities (removing small tress, retaining large trees, prescribed burning) are expected to help create habitat for PCEs using open forests with large trees in the long-term and reduce habitat for those PCEs using dense forests. Both alternatives would retain snags >12 inches diameter, except those lost for operational reasons or during prescribed burning. This would result in a minor effect since the existing snag component will change very little except for changes from closed canopy settings to open canopy settings and the loss of snags due to operational reasons and prescribed fire. This would have a positive effect for some species and a negative effect for others. Flickers and white-headed woodpeckers, which is a species of population viability concern, would benefit from treatments that accelerate the development of open canopy OFSS stands (Table 6).

Fuel reduction activities in the action alternatives in combination with the fuel reduction activities on adjacent private lands and prescribed fire in the Wilderness would increase firefighting options and the potential to limit the size of wildfires in the area. The combined fuel reduction activities on public and private lands increase the potential to limit the amount of long term snag habitat lost within the analysis area.

Landbirds and Neotropical Migratory Birds (NTMBS)

Introduction

A migratory bird is defined by the Migratory Bird Treaty Act of 1918 as any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle. They are a large group of species, including many hawks (*Buteo sp.*), shorebirds (*Charadriiformes*), flycatchers (*Muscicapidae sp*), vireos (*Vireonidae sp.*), swallows (*Hirundinidae sp.*), thrushes (*Turdidae sp.*), warblers (*Parulidae sp.*), and hummingbirds (*Trochilidae sp.*), with diverse habitat needs spanning nearly all successional stages of most plant community types. Nationwide declines in population trends for migratory species, especially neotropical species, have developed into an international concern. Recent analyses of local and regional bird population counts, radar migration data, and capture data from banding stations show that forest-dwelling bird species, have experienced population declines in many areas of North America (Finch 1991). Habitat loss is considered the primary reason for declines. Other contributing factors include fragmentation of breeding grounds, deforestation of wintering habitat, and pesticide poisoning.

The U.S. Fish and Wildlife Service (FWS) is the lead federal agency for managing and conserving migratory birds in the United States; however under Executive Order (EO) 13186 all other federal agencies are charged with the conservation and protection of migratory birds. In response to this, the Forest Service has implemented management guidelines that require the Forest Service to address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans (Executive Order 13186, 2001). To aid in this effort, the USFWS published *Birds of Conservation Concern 2008* (*BCC 2008*). The overall goal of the report is to accurately identify the migratory (and non-migratory) bird species that represent the high conservation priorities. BCC 2008 uses current conservation assessment scores from three bird conservation plans: Partners in Flight North American Landbird Conservation Plan (PIF; Rich et al. 2004), the United States Shorebird Conservation Plan (USSCP; Brown et al. 2001, USSCP 2004), and the North American Waterbird Conservation Plan (NAWCP, Kushlan et al. 2002).

Bird Conservation Regions (BCRs) are used to separate ecologically distinct regions in North American with similar bird communities, habitats, and resource management issues. Species contained within the BCC are

identified for each BCR. The La Grande District and majority of the Wallowa-Whitman NF is found within BCR-10, Northern Rockies.

Existing Conditions

BCR-10 includes the Northern Rocky Mountains and outlying ranges in both the United States and Canada, and also the intermontane Wyoming Basin and Fraser Basin. The Rockies are dominated by a variety of coniferous forest habitats. Drier areas are dominated by ponderosa pine, with Douglas fir and lodgepole pine at higher elevations and Engleman spruce and subalpine fir even higher. More mesic forests to the north and west are dominated by eastern larch, grand fir, western red cedar and western hemlock. 5 migratory species of conservation concern have been identified as potentially occurring within the project area (Table 3.37). No formal surveys have been conducted specifically for any of these species within the Sandbox analysis area, although terrestrial birds were monitored in the Blue Mountains from 1994-2011 as part of the U.S. Forest Service Avian Monitoring Program (Huff and Brown 2006), as well as multiple annual breeding bird survey route through the La Grande district (Sauer et al. 2011).

Effects Analysis

The following table describes the 5 migratory species of conservation concern found within the project area, their associated habitat, and the potential effects from activities proposed in the action alternatives to their species.

Table 3.37 - Migratory species of conservation concern identified within Sandbox analysis area

Species	Habitat	Impacts to Species	
		No Action	Alternative 2 and Alternative 3
Flammulated Owl (Otus flammeolus)	Associated with ponderosa pine forests and mixed conifer stands with a mean 67% canopy closure, open understory with dense patches of saplings or shrubs	Habitat would be provided at the same level that currently exists until suppression mortality creates more gaps and edge habitat. Due to overstocked stands there is a higher probability of habitat destroying fire.	The treatments will open up the understory component of the forest while maintaining untreated patches throughout. Untreated suitable habitat will remain dispersed through the area but the treatments will have the potential to improve habitat suitability throughout the overstocked areas.
Williamsons Sapsucker (Sphyrapicus thyroideus)	Occupies mature open mixed coniferous and deciduous forests at mid to high elevation. Snags are a critical habitat component.	Habitat would be provided at the same level that currently exists until suppression mortality created more gaps and edge habitat. Due to overstocked stands there is a higher probability of habitat destroying fire.	Variable density thinning would create more diverse stand conditions and accelerate growth of larger trees that may become snags. Low intensity prescribed fire would help restore habitat by opening up the understory component of the forest.
Olive-sided Flycatcher (Contopus cooperi	Open conifer forests (<40% canopy cover) and edge habitats where standing snags and scattered tall trees remain after a disturbance.	Habitat would be provided at the same level that currently exists until suppression mortality created more gaps and edge habitat. Due to overstocked stands there is a higher probability of habitat destroying fire or insect	Variable density thinning would create more diverse stand conditions and accelerate growth of larger trees that may become snags. Forest gaps would increase understory growth, contributing to increased insect production over the next 20 years. Increased forest edge habitat would also enhance foraging opportunities.

Species	Habitat	Impacts to Species	
		No Action	Alternative 2 and Alternative 3
		infestation.	
Calliope Hummingbird (Selasphorus calliope)	Predominantly a montane species found in open shrub sapling seral stages (8- 15 years) at higher elevations and riparian areas.	Habitat would be provided at the same level that currently exists. Forage habitat in overstocked stands would continue to be limited until suppression mortality creates gaps.	Tree removal and low intensity prescribed fire would create openings where flowering vegetation important for foraging would persist until the canopy cover increases and closes in 10 to 20 years.
Cassins Finch (Haemorhous cassinii)	Open, mature coniferous forests of lodgepole and ponderosa pine, aspen, alpine fir, grand fir and juniper steppe woodlands.	Habitat would be provided at the same level that currently exists. Overstocked stands would limit habitat and increase probability of habitat destroying fires or insect infestations.	Variable density thinning would create more diverse stand conditions and accelerate growth of larger trees. Low intensity prescribed fire would help restore habitat by opening up the understory component of the forest and creating more open mature stands.

Direct and Indirect Effects NTMBS

ALTERNATIVE 1 – No Action

In absence of large scale disturbances, alternative 1 would provide long-term habitat for migratory birds at the same level that exists today. However, due to the high number of overstocked stands, there is an increased risk of insect infestation and mortality as well as increased susceptibility to disease as well as fire.

Both standing and down fuels would continue to increase as trees die due to competition or insects. This would increase snags and down wood, which are beneficial to primary cavity excavators, but could increase the severity of a wildfire, should one occur. Few large animals die in wildfires, but fires change habitats, and intense fires change habitat most dramatically (USDA, Forest Service 2002). With no treatment of stands and fuel treatments, fuel loadings would continue to accumulate and the likelihood of a high intensity fire occurring would increase. Effects from a stand replacing wildlife could destroy nests and convert neotropical migrant habitat to an unsuitable condition, which could have a greater negative effect to wildlife than the action alternative.

ALTERNATIVES 2 and 3

There will be no new system road construction in the project area and all logging access roads will be closed with earthen berms, waterbars, or rehabilitated (scarified, seeded, scattered with debris) after the project is completed. Native seed mixes will be used where available and none of the seed will be treated with herbicides or fungicides.

In the short-term, some nesting habitat may be lost because of logging and burning, but the scale at which it will occur is not expected to significantly reduce migratory bird richness or abundance. Some birds may experience shifts in home ranges as habitat is altered, but treatments will not result in their complete displacement from the project area. The short-term losses of relatively abundant, early-nesting species, such as the dark-eyed junco, may be a necessary tradeoff for the effective restoration of dry forests. Such losses may be further justified if populations of other species, such as the flammulated owl, white-headed woodpecker, and pygmy nuthatch, ultimately benefit from such restoration. While the long-term overall shift in forest structure would favor species dependent on OFSS forest, this is the type of forest historically characteristic of the project area and is important

to migratory specices of conservation concern. Open forest stands would continue to support a diversity of shrubs and grasses that migratory birds depend on. A mosaic of forest and rangeland conditions capable of supporting breeding migratory bird populations will exist if the project is implemented. There is no indication that habitat changes from the project would result in reduced numbers of these birds that would be meaningful at local or landscape scales.

Cumulative Effects to NTMBS

Past timber sales, fires, roads, grazing, and prescribed burns have modified and converted migratory bird habitat in the project area. Past logging has led to the current lack of old, big trees in the area due to selective harvesting, and was likely detrimental to species that depended on contiguous conifer cover and avoided forest edges, but favored species that utilize dense shrubs and early seral forest habitat. Grazing has modified understory fuels and fire supression has interrupted historic fire return intervals. Consequently, many stands are now overstocked with young trees and are vulnerable to insects, disease, and wildfire. An extensive roads network built to facilitate timber operations has had a long-term impact on the area and continues to provide access for recreationists, hunters, permittees, woodcutters, and others.

This project should not contribute to cumulative effects because project treatments would begin to shift the project area towards the overall long-term goal of increasing late and old structure (LOS) habitat by removing smaller trees so that larger ones can grow. Treatments retain the old-growth component of the area and promote the desired growth of large trees. Burning plans are designed to maximize retention and protection of large diameter live trees, snags, and logs, and there will be no increase in open road density. A mosaic of forest and rangeland conditions capable of supporting breeding migratory bird populations will exist if the project is implemented.

There is no indication that habitat changes from the project would result in reduced numbers of migratory birds that would be meaningful at local or landscape scales. Grazing is an ongoing activity in the project area, but is not causing any cumulative effects because it does not change the density or distribution of live trees, snags, or down wood, or increase open road density. While grazing does not affect forest canopies, shrub and grass habitats can be altered by vegetation removal which leads to reduced structural diversity. A simplification of the vegetation likely causes a shift to generalist species (Knopf 1996). Grazing should not affect migratory bird shrub or grass habitat because grazing according to LRMP standards leaves adequate shrub and grass cover, and is designed to allow for normal recovery rates that do not delay regeneration. There are no reasonably foreseeable future activities that may impact migratory birds or their habitat in the project area.

UNIQUE & SENSITIVE HABITATS

Introduction

This analysis area contains numerous unique and sensitive habitats in the form of rock features, ponds, springs, seeps, and shrub patches. All action alternatives will protect these features in the same manner. No harvest buffers or retention of higher basal area will be used to maintain the context of these features. The project area is the analysis area for unique and sensitive wildlife habitats. For further discussion of this resource refer to the Wildlife Reports in the Sandbox Analysis File.

Effects Analysis

No Direct, Indirect, or Cumulative Effects

The following restoration activities associated with the Sandbox project are of such limited and constrained nature that they are not near any of these habitats and would therefore have no effect on Unique and Sensitive Habitats.

- Precommercial Thinning

- Planting
- Road Decommissioning
- Temporary Road Construction
- Fuelwood Area

These activities and their effects will not be discussed further in this section.

Direct and Indirect Effects for Unique Habitats

ALTERNATIVE 1

Alternative one would retain unique and sensitive habitats in their current condition and context, having the least effect to wildlife in the short-term. An indirect effect of alternative 1 would be continued departure from HRV and buildup of forest fuels. In the event of wildfires or insect epidemics unique and sensitive habitat would be at increased risk of being damaged or compromised.

ALTERNATIVES 2 and 3

Negative effects from the project should be minimal. LRMP standards for protecting fisheries and watershed resources generally maintain and protect riparian areas, ponds, seeps, springs, and wallows. Riparian habitat and aquatic species (fish, amphibians, insects) should be largely unaffected by treatment activities because streams are protected by appropriate buffers (see the Hydrology and Soils, Fisheries Reports). There will be no direct lighting of vegetation at large rock/boulder piles. There is no indication that changes to unique and sensitive habitats from the proposed project would result in reduced populations of any wildlife species that would be meaningful at local or landscape scales.

Cumulative Effects for Unique Habitats

ALTERNATIVE 1

There are no measurable cumulative effects on sensitive and unique habitats from the no action alternative.

ALTERNATIVES 2 and 3

Past road construction, logging, fires, firewood cutting, and unregulated vehicle travel have all contributed to isolated detrimental effects to the unique and sensitive habitats in the area. Past logging has led to the current lack of old, big trees in the area due to selective harvesting, and was likely detrimental to species that depended on contiguous conifer cover and avoided forest edges, but favored species that utilize dense shrubs and early seral forest habitat. Grazing has modified understory fuels and fire suppression has interrupted historic fire return intervals. Consequently, many stands are now overstocked with young trees and are vulnerable to insects, disease, and wildfire. An extensive roads network built to facilitate timber operations has had a long-term impact on the area and continues to provide access for recreationists, hunters, permittees, woodcutters, and others. This project should not contribute to cumulative effects because burning plans are designed to maximize retention and protection of large diameter live trees, snags, and logs, and there will be no increase in open road density. A mosaic of unique habitat conditions capable of supporting breeding wildlife populations will exist if the project is implemented. Grazing is an ongoing activity in the project area, but is not causing any cumulative effects because it does not change the density or distribution of live trees, snags, or down wood, or increase open road density. Grazing according to LRMP standards is designed to allow for normal recovery rates of shrubs and should not delay their regeneration. There are no reasonably foreseeable future activities that may impact unique and sensitive habitats in the project area.

Management Indicator Species - Aquatic

The Wallowa-Whitman National Forest Land and Resource Management Plan identifies two fish species as Management Indicator Species (MIS). These include the redband /rainbow trout and steelhead (USDA 1990). These species were selected as they were considered to be good indicators of the maintenance and quality of instream habitats. These habitats were identified as high quality water and fishery habitat.

Riparian ecosystems occur at the margins of standing and flowing water, including intermittent stream channels, ephemeral ponds, and wetlands. The aquatic MIS were selected to indicate healthy stream and riparian ecosystems across the landscape. Attributes of a healthy aquatic ecosystem includes: cold and clean water; clean channel substrates; stable streambanks; healthy streamside vegetation; complex channel habitat created by large wood, cobbles, boulders, streamside vegetation, and undercut banks; deep pools; and waterways free of barriers. Healthy riparian areas maintain adequate temperature regulation, nutrient cycles, natural erosion rates, and provide for instream wood recruitment.

The fish bearing streams or portions of fish bearing streams in the project area include: Bottle Creek, Buck Creek, Camp Creek, Collins Creek, Corral Creek, North Fork of Catherine Creek, South Fork Catherine Creek, Pole Creek, Prong Creek, Scout Creek, and Sand Pass Creek. Habitat for each MIS species exists within the project area and is included in the analysis area. Table 3.38 below describes the MIS, the habitat they represent, and whether they are present in the project analysis area.

Table 3.38 - MIS and habitat description for the Sandbox project area.

MIS	Habitat Description	Habitat Present in Analysis Area	Species Present in Analysis Area
Rainbow Trout/ Redband Trout	Water quality/ Fish Habitat	Yes	Yes
Steelhead		Yes	Yes

In general, the aquatic MIS selected for the Wallowa-Whitman National Forest have similar stream and riparian ecosystem requirements. However, they do represent a range of minor differences in habitat conditions found and utilized across the forest. Because the habitat requirements for each species are generally similar and often overlap, they were collectively chosen to represent healthy stream and riparian ecosystems.

Methods used to document fish distribution include field presence/absence surveys, aquatic inventory surveys, escapement data, and redd surveys. The origin of this data has come from several sources including Forest Service watershed baseline updates, Forest Service Level II stream survey reports on fish-bearing streams based on the Hankin and Reeves method of stream survey, Oregon Department of Fish & Wildlife (ODFW) spawning ground surveys, and the state of Oregon Streamnet fish distribution database. Geographic Information System data (GIS) catalogues miles of MIS distribution by fish species. Steelhead viability data from the ICTRT and found in the Mid-Columbia Recovery Plan and Oregon Snake River Recovery Plan are used to characterize population trends for Mid-Columbia and Snake River steelhead. Only presence/absence surveys have been completed for redband trout/rainbow trout in the project area.

Steelhead – The viability criteria defined by the Interior Columbia Technical Review Team (ICRT) reflects the hierarchical structure of salmonid populations and species. The criteria describe the biological characteristics for the species, Major Population Groups (MPGs) and independent populations that are consistent with a high probability of long-term persistence. The ICTRT used the viability criteria to assess the extinction risk based on four different viable salmonid population (VSP) parameters: abundance, productivity, spatial structure and diversity. The ICTRT also assessed the “gap” between the populations’ current status and the desired status for delisting based on the viability criteria. The ICTRT used the information from the population –level assessments to evaluate

viability at the next hierarchical level, the MPG. All Steelhead MPGs need to meet the ICTRTs viability criteria for the ESU to be rated viable.

The Lower Grande Ronde population of the Grande Ronde MPG currently does not meet the minimum abundance and productivity values that represent levels needed to achieve a viable population (95% probability of persistence over 100 years for the population). The current status of the Lower Grande Ronde River Steelhead population for risk of extinction is Low to Moderate with the desired status of Low or Very Low Risk.

The Wallowa-Whitman National Forest is utilizing this viability assessment for Snake River Steelhead populations for the purposes of MIS assessment.

Redband/Rainbow Trout– Redband trout habitat requirements are similar to that of juvenile steelhead. Redband trout are sensitive to changes in water quality and habitat. Adult redband trout are generally associated with pool habitat, although other life stages require a wide array of habitats for rearing, hiding, feeding and resting. Pool habitat is important refugia during low water periods. An increase in sediment in the stream channel lowers spawning success and reduces the quality and quantity of pool habitat. Other important habitat features include healthy riparian vegetation, undercut banks and large wood debris. The Wallowa-Whitman National Forest is utilizing this fish/habitat relationship to provide the basis for assessment of redband trout populations for the purposes of MIS assessment.

Only presence/absence surveys have been completed for resident salmonid species (redband trout) in the Sandbox Project area. In the absence of redband trout population trend data, the Wallowa-Whitman National Forest has measured key habitat variables, and then assessed changes expected to occur as a result of project activities. This MIS analysis assumes that activities that maintain and improve aquatic/riparian habitat will provide for resident fish population viability on Wallowa-Whitman National Forest lands.

Habitat Condition – The Wallowa-Whitman National Forest has completed Forest Service Region 6 Stream Surveys in most fish-bearing streams in the Sandbox Project area. The stream survey protocol (based on the Hankin and Reeves survey methodology) guides collection of field data for stream channels, riparian vegetation, and fish presence. Data collected from these surveys are then rated using habitat indicator benchmarks developed by the National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS) (USDA, USDC, and USDI 2004). Measured habitat data is summarized in Table 3.39.

Table 3.39 – Habitat summary data for Class 1 streams in the Sandbox analysis area. Shading indicates that a habitat element is meeting Forest Plan RMOs and BO Matrix indicators.

Stream Name	Wetted Width (ft)	Pools/Mile[1]	Pieces LWD/Mile	W/D Ratio[2]	Stable Banks (%)
Buck Creek	7	11	11	15	100
Bottle Creek	5	12	50	19	99.9
Collins Creek	9	14	58	14	99.4
Corral Creek	4	12	33	12	ND
N. Fk. Catherine	25	20	11	18	95.9
Pole Creek	7	18	84	6	ND
Prong Creek	8	55	52	19	96.1
Sand Pass Cr.	8	28	58	8	ND
Scout Creek	4	18	18	12	89.0

Stream Name	Wetted Width (ft)	Pools/Mile[1]	Pieces LWD/Mile	W/D Ratio[2]	Stable Banks (%)
S. Fk. Catherine	17	9	23	13	99.9
RMO/Indicator	------	96 56 47	>20	<10	>90

ND=No Data

1) RMO based on stream width. Wetted widths ≤ 10 feet = 96 pools/mile, wetted width 10 to 20 feet=56 pools/mile, wetted width 20 to 25 = 47 pools/mile.
2) Width to depth ratios for all streams meet width to depth ratio as described for Rosgen stream types.

The amount of occupied MIS habitat on the Wallowa-Whitman National Forest ranges from about 1,310 miles to over 990 miles, depending on the species (See Table 3.40). Based on GIS analysis, the amount of MIS habitat in the project area (10.4 for steelhead and 17.9 for redband trout) represents a fraction of the overall miles of habitat for the entire forest.

Table 3.40 - MIS distribution in the project area in relation to the Wallowa-Whitman National Forest.

MIS	Forest Distribution (mi)*	MIS in Analysis Area (mi)	Proportion of MIS habitat in Project Area out of total on Forest
Rainbow Trout/ Redband Trout	1,310	17.9	1.4%
Steelhead	990	10.4	1.1%

*Miles calculated for the Wallowa-Whitman National Forest.

There will be no direct effects to MIS fish species or habitat from the implementation of the Sandbox Project. All activities are away from fishbearing streams. No activities associated with the Sandbox Project are proposed within fishbearing streams in the project area. Implementation of Standards and Guidelines in the Forest Plan as amended by Pac Fish (USDA/USDI 1994) and the Sandbox Project Design will avoid negative indirect effects to MIS fish species. MIS life stages present in the project area include juvenile, adult, and eggs. See Analysis of Effects on Fisheries and Watershed Resources for direct and indirect effects to fish and fish habitat.

Reduced sediment delivery improves important aquatic elements such as cleaner water, higher quality substrates for spawning and rearing habitat, and less pool infilling. Thinning densely stocked Riparian Reserve stands improves vegetation conditions, which leads to increased large wood recruitment and creates more fire resilient stands along streams. The cumulative effects are within the scope of anticipated effects to aquatic resources determined in the Wallowa-Whitman National Forest Land and Resource Management Plan (USDA 1990). For more information on cumulative effects for the Sandbox Project, see cumulative effects analysis for fisheries and watershed conditions.

Improved Conditions

The Sandbox Project will improve habitat conditions for the aquatic MIS in the project area through fuels reduction and thinning. Anthropogenic fine sediment delivery in the project area could decrease with project implementation as a result of road decommissioning. In the long-term, there would be a reduction in artificially induced sediment entering the stream system, benefiting aquatic MIS and their habitat. Therefore, the project will not contribute to a negative trend in viability on the Wallowa-Whitman National Forest for these species.

Rangeland Resources

Introduction

The following is a discussion of the existing condition and analysis of effects on rangeland resources for the 16,134 acre Sandbox Vegetation Management project area.

For the complete analysis of these resources refer to the Rangeland documents in the Sandbox Vegetation Analysis File.

Existing Condition

The boundaries for the Sandbox project lie primarily within portions of the Pole Creek and Big Creek C&H allotments on the La Grande Ranger District. Both allotments have current allotment management plans (AMP's), completed in 2011. There are small (10 acres or less) portions of the project within the Catherine Creek C&H, Frazier Mountain C&H and Minam S&G Allotment (Table 3.41). These are slivers adjacent to the project boundary and will not be discussed in existing condition or effects due to their small area within the project and there being no proposed treatments within the allotments.

Table 3.41 - Allotments within the Sandbox project area

Allotment	Type	Total Allotment Acres	Allotment acres within Sandbox Project Area	Allotment Season of Use
Pole Creek	Cattle	11,280	7,017	6/16-9/15
Big Creek	Cattle	45,261	9,098	6/16-10/15
Catherine Creek	Cattle	21,477	10	6/16-9/30
Frazier Mountain	Cattle	6,727	2	6/1-10/31
Minam	Sheep	Closed	5	Closed
Non-Allotment	N/A	N/A	2	N/A

Allotments include various range improvements; including fences, spring developments, ponds, corrals and cleared livestock trails. It is important that activities associated with this project do not unnecessarily impact livestock operations or compromise the integrity of range improvements necessary for management of rangeland resources on the allotments.

Forest and Rangeland Vegetation

The allotments within the Sandbox project area are located within the Wallowa mountain range. Forest vegetation includes open and closed mixed conifer stands, upland shrubs, dry meadows, moist meadows and areas of conifer regeneration. Conifer stands are interspersed with rocky, grass covered slopes; dry meadows; and moist meadows usually associated with a riparian area. Forestlands are defined as those areas with at least 10% canopy cover.

Where limited or no canopy exists, rangeland types are predominately shrub-grassland plant communities and include species such as snowberry, needle and thread, bluebunch wheatgrass, Idaho fescue, Sandberg's bluegrass, prairie Junegrass, and onespike oatgrass and a variety of forbs such as mountain pea, lupine, yarrow, and arrowleaf balsamroot.

Portions of the analysis area have been observed to be colonized with the invasive annual African wiregrass (Ventenata dubia). This annual is unpalatable to wild ungulates and livestock. Its spread across the Blue Mountains province has been rapid and unchecked. Ventenata is found in areas with shallower soils which are inundated with water in early spring but dry out as the season progresses. Range condition seems to be irrelevant to Ventenata as it is found in healthy bunchgrass stands as well as areas of disturbance and poor range condition.

The project area has been and continues to be grazed by wild ungulates (elk and mule deer). Many portions of the project area have been grazed by domestic livestock since the early 1900's. Effects from livestock can be similar to those of wildlife. While some effects of livestock grazing are considered acceptable and/or desirable, concentrated use or use that occurs in the same areas year after year can have undesirable effects.

The allotments within the analysis area have small to medium sized (10-500 acres) stands of rangeland vegetation within much larger expanses of forested landscapes, primarily Ponderosa pine and grand fir/ mixed conifer overstory vegetation.

Transitory Rangeland

Many areas within the project area have experienced extensive timber harvest, most recently in the early 1990's. Following this harvest activity, many new roads were constructed and have remained open, allowing livestock access to areas previously inaccessible due to dense vegetation. This harvest also allowed for the development of transitory rangeland where forage grasses and shrubs became established in areas that had previously been under closed forest canopy.

Transitory range is defined as "forested lands that are suitable for grazing for a limited time following a complete or partial forest removal" (Spreitzer 1985). The increased forage production made available as a result of past forest management that reduced overstory shading, has allowed for distribution of livestock over a larger area within the allotment boundaries (Hedrick D.W. 1975). The forage produced following development of transitory range is highly variable depending on site conditions.

Transitory forest range is temporary and becomes less productive as the trees regenerate. Forage production for livestock can be expected to peak from a few years to perhaps 20-30 years after logging. Grass and forb production peaks earlier than shrub production (Bedunah and Willard, 1987).

Through tree regeneration, this condition has been gradually reverting back to a closed canopy forest and resulting in reduced forage production over these portions of the allotments. This has resulted in increased reliance by livestock on higher production riparian areas and those timber stands with less than 60% canopy closure.

Effects Analysis

The following is an analysis of the effects on rangeland resources for the Sandbox Vegetation Management project area. The 16,134 acre Sandbox analysis area serves as the scale of analysis for rangeland resources. The description of rangeland resources and noxious weeds, along with the analysis of the expected and potential effects for each alternative were assessed using field surveys and professional judgment.

Management directives from the Wallowa-Whitman Land and Resource Management Plan (LRMP) 1990, apply to this project. The effects outlined below are based on all rangeland resources protection and mitigation measures being implemented in full.

No Direct, Indirect, or Cumulative Effects

The following activities associated with the Sandbox project have been analyzed and are of such limited context and constrained nature that they would have little to no measurable effect on rangeland resources. These activities and their effects will not be discussed further in this effects analysis.

- Buck Creek Trailhead Treatments
- Snag retention
- Fuelwood Removal Area

- Connective Cooridors

Roadside danger tree removal will have no measurable effect on rangeland resources or livestock management. Soil disturbance is very limited and changes in canopy densities would offer no increases in capable or transitory rangeland.

Snag removal would have the same negligible effects as roadside danger tree removal in regards to rangeland resources or livestock management

Fuelwood removal will have no measureable effect on rangeland resources or livestock management beyond the current fuelwood program present at the forest level. Soil disturbance is very limited if permit requirements are followed and changes in canopy densities would offer no increases in capable or transitory rangeland.

Retention of Connective Corridors would not result in any change from the existing condition or result in any measureable effect to rangeland resources or livestock management.

Direct and Indirect Effects on Rangeland Resources/Range Management

ALTERNATIVE 1 - NO ACTION

There are no known direct effects on range resources as a result of the No Action Alternative. Effects related to this alternative on range resources are primarily indirect in nature.

Indirect effects of the No Action Alternative would be continued high concentrations of fallen debris and dense forest cover in those areas proposed for treatment. This prevents livestock from using areas that may have had been historically more productive due to decreased canopy closure resulting from fire suppression as well as stands where over-story removal may result in created transitory rangeland.

This alternative would also prevent implementation of the prescribed burning planned. Much of the area proposed for treatment has converted to greater that 60% canopy closure. Livestock use of areas with greater than 60% canopy closure is greatly reduced due to loss of understory forage production. Fire is necessary to reduce competition, prepare a mineral seedbed, reduce fungal disease and open the forest canopy (Barbour et al. 1987).

ALTERNATIVES 2 and 3

The following table describes range improvements located within or near treatment units in Alternatives 2 and 3 which could be potentially impacted and would need protection or replacement following project activities.

Table 3.42 – Range Improvements in or near Alternative 2 and 3 Harvest Units

Treatment Unit	Allotment	Improvement Type	Alternative 2 and 3 Units/Length of Fence
2	Big Creek	Fence	0.26 miles on edge of unit
8	Big Creek	Trough	1 trough
38	Big Creek	Fence	0.22 miles on edge of unit
46	Big Creek	Fence	0.16 miles on edge of unit
107	Big Creek	Fence	0.30 miles through center of unit
120	Big Creek	Fence	0.22 miles through center of unit
72	Pole Creek	Fence	0.02 miles on edge of unit
Fences within or adjacent to units			**1.18 miles**
Water developments within units			**1 Trough**

Commercial and Non-Commercial Fuels Reduction— Direct effects due to biomass removal (commercial and non-commercial) include disturbance to livestock during harvest activities, hazards created by livestock on roads during log haul and other related activities. Disturbance to rangeland plants and soils may occur if landings are placed in sensitive areas such as scabs or moist meadows. Equipment use in conditions with wet soils may result in soil compaction and loss of desirable native vegetation. Indirect effects are an increase in transitory rangeland and improved access for livestock into areas where down wood has accumulated due to lack of fire.

Alternative 2 would result in more potential acres available for transitory rangeland conversion than Alternative 1 or 3 although the differences between the action alternatives are negligible. Transitory range is defined as "forested lands that are suitable for grazing for a limited time following a complete or partial forest removal" (Spreitzer 1985). Increased forage production made available as a result of forest management that reduces overstory shading, (Hedrick D.W. 1975) will allow for distribution of livestock over a larger area within the allotment boundaries. The forage produced following development of transitory range is highly variable depending on site conditions. Transitory forest range is temporary and becomes less productive as the trees regenerate. Forage production for livestock can be expected to peak from a few years to perhaps 20-30 years after removal. Grass and forb production peaks earlier than shrub production (Bedunah and Willard, 1987).

Prescribed Fire—Direct effects from the implementation of any action alternative described with this project include an immediate reduction in available forage where burning occurs. This would be short term (1 year) until the following growing season. This reduction can span up to two years but is expected to return within 3-5 years if grazed conservatively (Valentine 1989). If prescribed fire is implemented during the normal grazing season some displacement of livestock is expected. Deferral of livestock grazing may be required if prescribed burning is completed in one season. This would allow perennial plants to fully mature and set seed.

Snowberry understory shrub-lands would benefit from prescribed fire and show increased crown density for 3-5 years post treatment (USDA, GTR INT-239). Higher severity burns may damage below ground rhizomes and reduce sprouting (Hansen et al, 1988) however snowberry is generally resistant to even severe burns.

Proposed prescribed burning and future maintenance burns would allow retention of understory vegetation released during forest thinning projects. Many of the mixed conifer stands within the project area are outside the historic level of canopy closure expected in a stand where natural fire cycles would have reduced stems per acre and allowed for full canopy closure, precluding maintenance of understory grasses and shrubs.

Control lines for prescribed fire treatment may permit access by livestock into areas previously not accessible. Livestock would use control lines as defacto cattle trails.

RHCA Thinning — Direct effects due to thinning within RHCA would be to initially reduce livestock access to the stream corridor. Hand thinning does not create disturbance to herbaceous forage in the way that mechanical equipment would. RHCA thinning would indirectly allow increased sunlight and allow improved photosynthetic activity in areas where canopy closure has occurred. This would allow for increases in vegetative growth and possible improvement in plant diversity.

Pre-Commercial Thinning — Direct effects due to thinning within would be a reduction of livestock access to thinned areas due to debris left on the site until the thinned material decomposes. Units where piling of thinned material is conducted would allow ungulates to access areas where dense small diameter vegetation has been the limiting factor. Units where mechanical thinning (slash buster) devices area used would create mulch on the ground surface. Livestock access through these areas would not be limited or reduced by slash.

These areas would be used as transitory rangeland and show an increase in understory vegetative

growth as a result of the reduced canopy closure. Hand thinning does not create disturbance to herbaceous forage in the way that mechanical equipment would. Pre-commercial thinning would indirectly allow increased sunlight and allow improved photosynthetic activity in areas where canopy closure has occurred. This would allow for increases in vegetative growth and possible improvement in plant diversity.

Roads — Direct effects due to re-opening the previously closed roads within the project area would be a potential increase in livestock use of the opened roads. This would allow livestock to more readily access areas where easy travel had been limited by down wood or other debris. Temporary roads that are closed immediately following use would not be used by livestock if slash is placed on the surface. There would be no measurable effect on rangeland resources following road reconstruction activities.

Road obliteration may change livestock use patterns by removing existing trails that use the roads as they currently exist. Several of the roads proposed for obliteration lead towards riparian areas where reduced livestock grazing has been identified to meet management objectives. The removal of these roads will indirectly affect these areas by reducing livestock grazing pressure and allowing increased protection of riparian vegetation and streambanks.

Post-harvest Treatment — Post harvest treatments are designed to bring surface fuels loads and precommerical sized trees to desired levels. Units with heavy surface fuel loadings (fir dominated stands) usually be treated by slashbuster (mastication) or whipfell/grapple pile post harvest treatment with rx burn several years (5 -10 yrs) after mechanical treatment. Harvest units with light surface fuel loading/low density precommercial thinning would receive a whipfell and RX burn within 2-3 years after the whipfelling. Direct effects of mastication treatment will include increased access for livestock to areas where dense understory vegetation precluded free access. Reduced understory competion and reduced canopy closure would allow for increased forage production on those stands where sunlight and soil resources had otherwise been intercepted by dense conifer stands.

Cumulative Effects Rangeland Resources/Range Management

Potential cumulative effects are analyzed by considering the proposed activities in the context of past, present and reasonably foreseeable actions within the project area. In addition, some activities have an influence that may extend downstream in the subwatershed within the project area boundary. This broad area is referred to as the “cumulative effects analysis area”. A summary table of the present and reasonably foreseeable future management activities in the analysis area is located in Appendix D of the EA and has been used to assess the cumulative effects of implementing this project on Rangeland Resources.

ALTERNATIVE 1

Livestock distribution and forage available for utilization would remain consistent with existing management. Potential improvements in livestock distribution made possible through development of transitory range would not occur or improved understory vegetative growth allowed through reduced canopy closure would not occur. Loss of forage resulting from canopy closure in some stands can be attributed to past fire suppression. Loss of historically available forage and loss of previously converted transitory rangeland over the project area within the allotments affected by this project would continue to occur. This could lead to reductions in stocking if livestock are not able to find adequate forage within the allotment boundaries, while meeting LRMP standards.

Areas where burning would have occurred in the action alternatives would remain untreated for the foreseeable future. The potential for uncontrolled wildfire may increase in the absence of controlled burning. This could lead to reductions in livestock grazing if destructive wildfire occurred on a large scale.

ALTERNATIVES 2 and 3

The action alternatives in this project would result in a return to more historic conditions for most treated units where canopy closure was has reduced the forage production of understory vegetation. A study in Montana found that reducing canopy closure to less than 50% results in a proportional increase in forage production until canopy closure has been reduced to 10-20% (Kolb, 1999). Kolb also suggested that decreased canopy closure also increases the effective precipitation reaching understory plants. Thinned stands of trees tend to collect snow, increasing the spring water supply to an area as much as 100%.

Historically, overstory removal developed areas of transitory range which increased the forage available to be used by livestock. Changes in forest management and long term fire suppression activity have likely resulted in the loss of any transitory rangeland that was created in the 1960's-1980's as the effective improvements in forage production are diminishing after 30 years (Bedunah and Willard, 1987). A return to active management and reintroduction of prescribed fire would allow for a return to more historic conditions that would carry forward in time. The combination of reducing fuel loads, reducing conifer encroachment in open meadows and opening canopies would increase understory vegetation, and therefore, could improve wildlife and livestock forage allow for improved and herbivore distribution within the project area.

Bunchgrasses normally respond to burning with improved vigor which attracts an increase in big game and livestock use (Johnson 1998). The additional use is managed by implementing a review process where burned areas (prescribed or wildfire) are assessed by the fuels specialist and range manager to determine if the area may need a growing season's rest or more from grazing. This can be accomplished by deferring use of the pasture until grasses have senesced and seed shatter occurs, changing stocking rates, prescribing moderate defoliation (do not exceed a 3" minimum stubble height on preferred species) and changing the grazing season each year (WSU Extension, 2012). These management strategies can be accomplished by the use of temporary fencing; by resting the pasture and/or through the herding livestock to avoid the areas burned. Without controlled reintroduction of ungulate grazing, the combination of stressors to the plants from the burning and preference by ungulates to graze the fresh growth, may result in a decline in forage condition or delay in recovery for forage in the unit.

The potential for improper or unregulated grazing management and timber harvest practices on adjacent private lands, together with effects of grazing on public lands, could increase sediment delivery to streams caused by hoof action or riparian herbivory. It is unknown how many acres of private lands adjacent to the analysis area are currently grazed by livestock and what the current condition of these lands is in compared to the public lands. Observation and local knowledge of the area supports the assumption that most of the private lands adjacent to the project within the affected watersheds are grazed by livestock. Appropriate management of the NFS lands should allow for retention of soil in the upper watersheds and reduce the potential for movement of sediment above what would be expected in near natural systems.

Heritage Resources

Introduction

This section covers the existing conditions and effects of implementation for heritage resources. Reports and analyses can be found in the Sandbox analysis file.

<u>Prehistory</u>
The Sandbox project area elevation ranges from 3,700 feet to 6,500 feet. Due to the elevation gradient of the project area Native American use is assumed to have been occasional to seasonal. Temporary camps were limited to spring, summer, and early fall use. Deer and elk and other big game continue to be significant source of meat for Tribal members today. Plants are also gathered within the region by Tribal

members. Some specific plants observed by the archaeologist during survey includes Douglas-fir, ponderosa pine, larch, spruce, white fir, willow, aspen, juniper, sage, rabbit brush, currant, ceanothus, yarrow, balsam root, strawberry, huckleberry, and grasses.

Prehistoric and historic American Indian cultural resource site types may include such things as lithic scatters, toolstone quarries, and plant processing sites, seasonal camps etc. Special places may consist of sites and places that are valued for cultural, religious, or traditional importance. Tribal members have expressed interest in this project area specific to huckleberry gathering and the potential for maintenance and enhancement of huckleberry production for protection of tribal treaty rights.

History

Trappers and Protestant and Catholic missionaries began to arrive in the area around 1807. In 1855, treaties were formed with the Cayuse, Umatilla, Walla Walla, and Nez Perce tribes. Persons who traveled to the Willamette Valley often passed through northeastern Oregon on the Oregon Trail. Settlements were not established in the area until the 1860s at the same time gold began to be discovered. Gold mining created the need for new and larger settlements. Gold camps stimulated the economy through their demand for food, living supplies, and mining equipment. The need for food brought ranchers to the area. Once the railroad reached the region, the lumber market grew. By the 1880s, lumber began to be shipped to distant markets.

EFFECTS ANALYSIS

The Sandbox Vegetation Management Project heritages resources analysis area encompasses all of the 16,134 acre project area. The area of potential effect, following Region 6 guidance and 36 CFR 800.16(d), for the Trail project area consists of slopes less than 15 percent within the analysis area. Site records and existing maps were reviewed; all known sites were surveyed again for this project. Transects that follow Oregon State Historic Preservation Office guidelines at 20 meter intervals were used. Springs are considered a high potential area and were surveyed.

Cultural resource identification in the project area focused on three primary types of resources: prehistoric archaeological sites, historic archaeological sites, and places that support resources of contemporary tribal interest. No new or isolated sites were discovered within the project area.

Direct, Indirect and Cumulative Effects on Heritage Resources

ALTERNATIVE 1 – No Action

Past vegetation management and aggressive wildfire suppression combined with insects and disease within the project area have influenced existing conditions. Many of the stands have become overstocked with small diameter shade tolerant trees with a heavy loading of surface fuels. These conditions would continue and the potential for a high intensity wildfire would increase.

Under this alternative, no treatment activities would be undertaken. Heavy accumulations of surface fuels and small diameter trees would continue to degrade many of the heritage sites within the project area.

ALTERNATIVES 2 and 3

Avoidance criteria built into the design of the action alternatives provides protection of all known heritage resources within the project area. Mitigation measures are in place and will be part of contract specifications should any new cultural sites be discovered during project activities. Because these measures are adequate to protect heritage resources within the project area there are no direct, indirect or cumulative effects on heritage resources from any of the alternatives within this project. Alternatives 2 and 3 would be consistent with the Wallowa-Whitman Land and Resource

Management Plan as all cultural resource standards and guidelines would be met (USDA Forest Plan 1990).

Invasive Non-Native Plants

Introduction

The analysis for the Sandbox project covers the entire area within the project boundary. Individual site-specific consultation with project managers must be conducted after all sale and burn plans are finalized. Mitigation measures contained in this document will be used to deal with specific issues after completion of final planning, and before landing, road, burn unit, and haul route activities are begun.

The Pacific Northwest Region Invasive Plant Program Record of Decision (ROD) (USDA, 2005) and the Wallowa Whitman Land and Resource Management Plan (LRMP) (USDA, 1990) decisions mandate prevention and management of non-native species under all planning efforts.

The LRMP as amended by the Region 6 ROD (amendment #RF5) outlines 23 standards for the prevention and management of invasive non-native plants that have been added to all regional Forest Plans and require consideration of invasive species in all planning efforts. The regional ROD does not however approve any site-specific treatment, instead requiring a completed analysis by each National Forest. Therefore, the Wallowa-Whitman FEIS was completed to provide direction for a site-specific program to contain, control, and eradicate new and existing invasive species infestations found within national forest system (NFS) lands.

Of the 23 prevention and management standards in the regional ROD, seven directly affect activities found in the Sandbox project. These standards are:

1. Prevention of invasive plant introduction, establishment, and spread must be addressed in watershed analysis, roads analysis, fire and fuels management….. grazing allotment management plans, Timber harvest and sale, and all other land management assessments.
2. Actions conducted or authorized by written permit by the Forest Service that operate outside the limits of the road prism, require cleaning of all heavy equipment prior to entering NFS lands.
3. Use weed-free straw and mulch for all projects, conducted or authorized on NFS lands.
4. Use only gravel, fill, sand, and rock that are judged weed free by District weed specialists.
5. Conduct road blading, brushing, and ditch cleaning in areas with high concentrations of invasive plants in consultation with District or Forest-level invasive plant specialists, incorporate invasive plant prevention practices as appropriate.
6. Develop a long-term site strategy for restoring/re-vegetating invasive plant sites prior to treatment (if invasive plant treatment is needed prior to project activities as a prevention measure).
7. Native plant materials are the first choice in re-vegetation for restoration and rehabilitation where timely natural regeneration of the plant community is not likely to occur.

Under the Region 6 ROD, these standards apply to the prevention and management of all invasive non-native species and not just those listed as “noxious weeds.”

Invasive plants are defined as non-native plants, whose introduction is likely to cause economic, environmental, or human health harm. An invasive species is distinguished from other non-natives by their ability to spread in native ecosystems. “Noxious weeds” on the other hand is a legal term used by state, county, and federal agencies to denote plants that pose particular threats, generally to agriculture. Many undesirable non-natives can be invasive and pose threats to healthy native plant communities but do not meet the criteria for listing as a “noxious weeds.” For that reason, this analysis will focus on all invasive non-native plants and not just those listed as “noxious weeds.”

Existing Condition

There are 52 inventoried invasive non-native plant sites (8 different species) within the Sandbox Project Area. The inventoried infestations are shown in the table below (Table 3.43). Acreages reflect current information in the Forest GIS layer (GIS query, 2011). In addition to these listed species the project area also includes *Ventenata dubia, Bromus tectorum*, and others that are potentially harmful invasive species but don't meet the requirement for listing on the state or county "noxious weed" lists.

Table 3.43 - Invasive plant inventory for the Sandbox project area

Common Name	Number of Sites	Acres
whitetop	2	3
nodding plumeless thistle	1	2
spotted knapweed	9	61
diffuse knapweed	11	44
Canada thistle	11	97
gypsyflower	14	196
Scotch cottonthistle	1	12
stinking willie	3	0.3
Total	**52**	**415.3**

Treatment and monitoring records document all site visits by invasive plant specialists, spanning the years since initial discovery and inventory of the site. These records are on file at the La Grande Ranger District Office in La Grande, Oregon. These sites are visited on a regular basis for treatment and monitoring and can be relocated and identified on the ground when necessary.

The following table provides site information in relation to activities in the proposed actions in the Sandbox project area. Many sites are linear, lying along roads, and in several cases multiple species occur within a single location.

Table 3.44 - Noxious weed proximity to activities in proposed action

Common Name	Proximity to proposed activities
Canada thistle	Linear site along open road 7787 and 7700635. Site runs through unit 126, and boarders units 61, 115, 116, 125, and is a main haul rout.
diffuse knapweed	Patch near intersection of open road 7700900 and 7700980. No proximity to harvest units.
Canada thistle	Linear site along open road 7787 and 7700635. Borders unit 125.
diffuse knapweed	Linear site along open road 7700910 near the road end. Borders unit 10.
Scotch cottonthistle	Linear site along open road 7700620, 7700637, 7700638. Goes through units 49 and 50.
diffuse knapweed	Linear site on open road 7700730, beginning at intersection with 7700700. Borders unit 67.
Canada thistle	Linear site along open road 7700, east of intersection with 7740031. Borders unit 38.
spotted knapweed	Large linear site following open road 7700850, begins at intersection with 77 road. Borders units 33 and 123.
diffuse knapweed	Large linear site following open road 7700850, begins at intersection with 77 road. Boarders units 33S and 123.
Canada thistle	Linear site located along open road 7700910 north of intersection with 7700948. Borders units 8 and 9.
spotted knapweed	Linear site located along open road 7700910 north of intersection with 7700948. Borders units 8 and 9.

Common Name	Proximity to proposed activities
gypsyflower	Linear site located along open road 7700910 north of intersection with 7700948. Borders units 8 and 9.
spotted knapweed	Patch near intersection of open road 7700900 and 7700980. No proximity to harvest units.
whitetop	Patch near intersection of open road 7700900 and 7700980. No proximity to harvest units.
gypsyflower	Linear site found along entire length of open road 7700980. No proximity to harvest units.
nodding plumeless thistle	Patch near intersection of open road 7700900 and 7700980. No proximity to harvest units.
gypsyflower	Large linear site spanning entire length of open 77 within project area. Borders or goes through all units that intersect or touch the 77 road.
	Large linear site spanning entire length of open 77 within project area. Borders or goes through all units that intersect or touch the 77 road.
gypsyflower	Linear site along open road 7787 and 7700635. Site runs through unit 126 and borders units 61, 115, 116, 125, and is a main haul route.
whitetop	Linear site along open road 7787 and 7700635. Borders unit 125.
diffuse knapweed	Linear site found along entire length of open road 7700945. Borders unit 125.
spotted knapweed	Linear site along open road 7787 and 77. Goes through unit 9.
Canada thistle	Linear site found along entire length of open road 7700945. Goes through unit 9.
gypsyflower	Linear site found along entire length of open road 7700945. Goes through unit 9.

For the complete analysis of these resources refer to the invasive non-native plant documents in the Sandbox Analysis File.

Effects Analysis

Methodology & Assumptions

The descriptions, resources, and effects (expected and potential) were assessed using field surveys, literature documentation, documented site information, and professional judgment. Throughout this document, the intensity of the effect is graded on a qualitative scale using the effect levels of low, moderate, and high. Those effects identified as low intensity will create little to no bare soils, and extremely limited potential for introduction of invasive plant material to the project area. If left untreated invasive species within these areas would not spread from current locations or expand from current levels at rates higher than those found in the absence of project activities. Moderate level activities are those that, with proposed mitigation measures, could be treated and reduced to pre-project levels, but without the implementation of these measures could begin to spread beyond current levels. Finally, a high intensity effect is one that could create opportunities for spread and introduction of invasive species that could not be mitigated with normal effort or proposed measures. A high intensity effect, if controllable, would likely require significant increase in invasive treatment activities or funding in order to control the infestations.

The analysis for the Sandbox project covers the entire area within the project boundary. Individual site-specific consultation with project managers must be conducted after all sale and burn plans are finalized. Mitigation measures contained in this document will be used to deal with specific issues after completion of final planning, and before landing, road, burn unit, and haul route activities are begun.

The effects of project activities on vegetation and habitats can be temporary or permanent with effects measured by duration as well as magnitude. Short-lived effects are those that last one to two growing seasons while long-term effects are those that last more than two years. Impacts to individual plants, soils, or habitat areas from the actions of animals, machinery, fire, or other human activities are direct effects, while indirect effects are those associated with changes in habitat composition and plant community dynamics. For this analysis, specific project activities and the associated disturbance are direct effects, while changes in the competitive balance due to modifications of existing plant communities are indirect effects.

While direct effects of timber harvest projects on non-native plants are difficult to predict and quantify, they would occur through ground disturbance and introduction of invaders into new areas. Disturbance is defined as a punctuated event or series of events that kill or damage existing organisms, directly or in-directly increase resource availability, and create an opportunity for new individuals to become established (Sousa, 1984). Disturbance associated with timber harvest and fuels reduction projects are expected through movement of heavy equipment, soil displacement, vegetation compression, and burnt ground from prescribed fire activities; but the amount of disturbance can vary depending on activity density and type. For example, the effects of pre-commercial thinning are generally much less severe, due to the minimal level of soil disturbance, than the effects associated with commercial harvest or yarding activities. Further, project activities can introduce new species into areas by transporting non-native plant material on machinery or personnel. Many of the techniques used in harvest projects (Slash-busters, Thinning, Harvest, etc.) require the use of large machinery or equipment that disturb ground or transport invasive plant material if not cleaned properly prior to each use.

Indirect effects include the possible increase in "invasibility" of a plant community after disturbance. With invasive plants spreading at an estimated 8-12 percent a year on NFS land (USDA 2005), we would expect (without the implementation of the proposed mitigations and the above standards) changes in community dynamics (i.e. reduced competition) from project activities to continue or possibly increase the spread of invasive non-native species. According to the R6 ROD (USDA, 2005) the adoption and use of the standards shown above should reduce the rate of spread of invasive plants by over 50% (down to 4-6%).

The following table shows the effect and rationale of specific elements found within the alternatives 2 and 3.

Table 3.45 - Element specific effects of the action alternatives.

Alternative Elements	Potential Effects	Effect Intensity	Rationale
Prescribed Fire (including Landing and Grapple Piles)	Increase in disturbance, available resources, and short-term reduction in competition	Moderate	-Prescribed burning has the potential to increase disturbance thus favoring invasive non-native plants. The short-term reduction in fuels may also reduce competition of native plants allowing increased spread. -The degree of disturbance from burning could, depending on timing, reduce the cover of existing invasive plants and retard seed set. Burning occurring in the summer can be beneficial when conducted in conjunction with ongoing invasive species treatment, but burning in the spring and fall are generally not adept at controlling invasive plant sites. -Mitigation measures would reduce the effect intensity from "Moderate" to "Low"
Non-commercial fuels reduction (FFU)	Small scale ground disturbance and introduction of plant material on vehicles	Low	-This activity generally includes hand/saw work to remove understory fuels, but can include the use of "slashbusters". The possibility for ground disturbance as well as introduction of new plant materials with this type of activity exists but at low levels.

Alternative Elements	Potential Effects	Effect Intensity	Rationale
			-Mitigation measures and standard 2 would further reduce the risk involved with this activity element
Commercial treatments w/harvest (HIM,HOR,HPO,HSA,HSH, HTH,HFU)	Ground disturbance and introduction of plant materials on people and vehicles	Moderate	-This activity generally includes hand/saw work to remove understory fuels. The possibility of ground and soil disturbance from treatments when coupled with the larger scale disturbance associated with harvest can increase the risk of non-native plant introduction and spread. The increase in traffic along haul routes can also compound the risk of introduction or movement of unwanted plant material. -Mitigation measure and standard 2, 3 would reduce the risk associated with this element, but not enough to change the intensity from "Moderate" to "Low".
Yarding Systems (Ground, Cable, Ground & Cable,)	Ground disturbance and introduction of plant material	Moderate	-Mechanical aids to harvest increase the level of ground disturbance by producing skid trails and other bare ground areas. The possibility of creating conditions favoring invasive plant introduction is increased with this type of activity. Movement of plant material to new areas is also a risk. -See mitigation associated with Commercial Treatments
Road Work (Reconstruction, Construction, and Re-opening)	Increase in spread and new introduction of plant material	Moderate	-Road use creates situations that favor the spread of invasive plants by disturbing roadsides and carrying seeds to un-infested areas. Re-opening of roads can allow for the spread of invasive non-native plants to previously un-infested areas. -Mitigations measures and standards 2, 4, 5, 6, 7 would help moderate the risk associated with this activity element, but would not reduce the intensity of that risk.

*Other activities involved with this project like re-planting after harvest, and hazard tree falling will have "no effect" to current conditions of invasive plants within the Sandbox project area.

For activities like prescribed fire and pre-commercial thinning the effects can also vary depending on the specific technique and the timing of the activity. Prescribed burning can affect the invasive non-native plants differently (Table 5) depending on the time of occurrence. Fall burning has been shown to increase (although not significantly) the number of native species when compared to spring burning, while spring burning tends towards a decrease in the number of non-natives (Potts & Stephens, 2009). Effects of thinning treatments (i.e. NCT) also depend on the timing as well as the type of activity. Heavy equipment use has the largest possibility of disturbing soil and introducing plant material to an area, while mechanical thinning by way of mastication has the lowest chance. Timing of mastication however, can affect the non-

native plants differently. Spring thinning by mastication could result in decreased non-native introductions when compared to similar activities in the fall. Interestingly, thinning by hand crews has a slightly increased chance of negative effects. This generally occurs through a larger reduction of cover than compared to mastication treatments (Merriam et al., 2006; Potts & Stephens, 2009). Timing of activities within this project should consider, when feasible, these variable effects.

Table 3.46 - Effects of prescribed fire on invasive non-native plants (USDA Fire Effects Information)

Scientific/Common name	Timing	Effect
Cardaria draba Whitetop	Spring	No effect on plant frequency or control
	Fall	No effect on plant frequency or control
Centaurea diffusa Diffuse Knapweed	Spring	Increased in seasons following fire
	Fall	Doubled two years after fire
Hypercium perforatum Common St. Johnswort	Spring	Quickly increased after fire
	Fall	Increased albeit at a lower rate than spring burning
Ventenata dubia Ventenata	Spring	Unknown
	Fall	Unknown
Bromus tectorum Cheatgrass	Spring	Little effect due to the difficulty in burning early in the season.
	Fall	Trend of increased seed production in the seasons following the fire
Cirsium arvense Canada Thistle	Spring	Potential discouragement of growth during late spring burning
	Fall	Frequency of fire can affect the growth of this and other thistles
Potentilla recta Sulfur Cinquefoil	Spring	Plant density increased more slowly but was higher after 5 years
	Fall	Plant density was higher than spring burns 1 year after fire but lower after 5 years
Onopordum acanthium Scotch Cottonthistle	Spring	Unknown
	Fall	Unknown
Cirsium nutans Nodding Plumless Thistle	Spring	Unknown
	Fall	Unknown
Centaurea bierberstinii Spotted Knapweed	Spring	See diffuse knapweed
	Fall	See diffuse knapweed
Cynoglossum officinale gypsyflower	Spring	Fires of lower severity may favor establishment and spread of this species, but disturbance in general favors its establishment
	Fall	Fires of lower severity may favor establishment and spread of this species, but disturbance in general favors its establishment
Senecea jacobea Stinking willie	Spring	Unknown
	Fall	Unknown

No Direct, Indirect, or Cumulative Effects

The following restoration activities associated with the Sandbox project are of such limited and constrained nature that they would not create introduction sites and would therefore have no effect on noxious weed prevention resources or activities.

- Precommercial Hand Thinning/Cleaning
- Planting

These activities and their effects will not be discussed further in this section.

Direct and Indirect Effects to Invasive Non-Native Plants

Invasive non-native plants pose a significant risk to healthy native plant communities and are currently damaging biological diversity. This can affect wildlife, habitat health, and recreation values (Vitousek et al., 1996; Chapin et al., 2000). Further, the presence of invasive species, both on and off NFS lands, can displace native species, reduce suitable habitat, reduce forage for livestock, destroy habitat and further the loss of TES species, increase soil erosion, reduce water quality, and significantly reduce soil productivity. However, predicting a specific response (direct or indirect) of non-native species to activities such as pre-commercial thinning, mechanical thinning, prescribed burning, and timber harvest is exceedingly complex. A variety of factors such as intensity and frequency of disturbance, ongoing activities in the area, and lack of consensus of biologically important changes in non-native species leads to difficulty in determining effects of specific projects (D' Antonio, 2000). In general, however, disturbance can increase the rate of invasion and chance of successful establishment of non-native species (Vitousek et al., 1996; Mack & D' Antonio, 1998; Chapin et al., 2000; D' Antonio, 2000).

The establishment and spread of non-native plants is a dynamic event that incorporates many diverse variables. Invasion theory, as it pertains to non-native species, contains three main principles: disturbance, propagule pressure, and competition (Hobbs & Huenneke, 1992; Lockwood et al., 2005; Sutherland, 2008).

Invasive species are quick to colonize an area of disturbance and can use their "weedy" life-history traits to establish within novel habitats. Disturbance such as fire, construction, and commercial timber harvest can alter native plant communities and increase the chance of invasion by non-natives. Several factors such as type of disturbance, proximity to propagule source, and size or magnitude of disturbance can increase the propensity for invasion of an otherwise healthy plant community by non-natives.

The second factor in the invasion theory is propagule pressure. Propagule pressure is defined as the number of possible individuals (seeds, seedlings, etc.) released into a region in which they are not native and the number of such release events (Lockwood et al., 2005). In essence, the higher the propagule pressure (more seeds or more opportunities for a release) the greater the likelihood of a successful colonization. Many factors can lead to increased propagule pressure but the most likely cause is an increase in the number of release events. Many of the activities conducted on NFS lands can lead to an increase in the propagule pressure including fire suppression activities, timber sales and salvage, road construction, recreation, and grazing.

Finally, the last principle of invasion theory is competition. Even though the ability of an invasive to spread or colonize new sites is generally species dependent, all invasive non-natives are considered potential threats to native plant communities.

ALTERNATIVE 1

This alternative is the no action alternative. All inventoried weed sites would continue to be managed in accordance with the Wallowa-Whitman Invasive Plant Program and the Wallowa-Whitman Forest Plan as amended by Regional Forester Amendment #5 that incorporates the Pacific Northwest Region Preventing and Managing Invasive Plants Record of Decision (USDA, 1990; USDA, 2005).

Many vectors for spread of known populations would exist with recreation and vehicle travel, livestock and big game transport, uncontrolled wildfire, and fire suppression activities. However, the potential risk of spread from project related equipment used for harvest, roadwork, and prescribed fire would not exist. Over time, without additional disturbances to known sites, further treatment success, and no reduction to existing desirable vegetation cover and vigor the known sites could be eradicated or significantly reduced.

There are no new direct or indirect effects to established noxious weed infestations, under

Alternative 1.

ALTERNATIVES 2 and 3

The activities proposed in Alternatives 2 and 3 for the Sandbox project consists of vegetation treatments including commercial harvest, pre-commercial thinning, and associated fuels treatments such as grapple pile, hand pile, and prescribed fire. The proposed actions also include temporary road construction, road reconstruction, and road maintenance.

Alternatives 3 is similar to Alternative 2 and does not vary significantly in the number of acres of commercial harvest and prescribed burning, however, the re-opening of closed roads, temporary road construction, and road reconstruction vary in the number of miles of disturbed ground. Because these activities have the greatest potential for affecting noxious weeds in the project area, and the acres and miles of disturbance vary slightly between Alternatives 2 and 3, the effects are discussed as such.

Although risks are present with or without project activities, the danger of invasive species spread due to project activities under Alternatives 2 and 3 are increased. With implementation of project design features to reduce and control the introduction and spread of non-native species we can minimize the impacts that do exist. Specific mitigations and required standards would continue to reduce the chances of new introductions, spread, and establishment of invasive non-native plants and we could predict a spread and establishment rate at the upper end of the natural level or about 6-8%. This level of risk with mitigations, while higher than that found under the no-action alternative, would be lower than the risk under Alternatives 2 or 3 without required mitigations. However, under Alternative 3 there would be no temporary road construction which would constitute less ground disturbance reducing the potential for invasive species establishment in the project area under this alternative as compared to Alternative 2.

Table 3.47 - Summary of Potential Invasive Non-native Plant Establishment/Spread Effects by Alternative

Est. Effect*	No-Action	Alt. 2	Alt. 3
Establishment Potential	Low	Moderate	Moderate
Spread Potential	Low	High	Moderate

* Estimated effect is based on increases (from pre-project levels) in establishment and spread of invasive non-native species due to project level activities.

It is possible that the Sandbox project may actually reduce the likelihood of invasion through increases in the health of native plant communities by returning them to their historic range of variability. As stated, healthy native plant communities are generally more resistant to invasion by non-native plants.

Cumulative Effects to Invasive Non-Native Plants

Past activities including logging, grazing, prescribed fire and road construction activities, as well as wildlife, fisheries and watershed restoration projects, and miscellaneous recreation uses. Past, ongoing and future activities are considered in the cumulative effects analysis. Activities proposed under the project may have impacts and will add to negative impacts that have already taken place, but are at a small scale and occur over a fairly localized area. The expected duration of the effects is variable based on site and alternative, and impacts. These projects categories are described in more detail in Appendix D of the EA.

There are invasive plant species documented within the project area. Treatments, both manual and chemical, have been ongoing for several noxious weed species.

ALTERNATIVE 1

Because no management would occur under the no action alternative, there will be no cumulative impacts.

ALTERNATIVES 2 and 3

This section will examine the cumulative effects on non-native plants as a result of activities proposed in Alternatives 2 and 3. The following past, present, and reasonably foreseeable future activities may present increased risks to non-native plant spread and establishment within the project area:

- **Road Maintenance** – creates situations that favor the spread of invasive plants by disturbing roadsides and carrying seeds to un-infested areas.
- **Recreation Activities & Big Game Hunting** – Low potential exists for the spread or new introduction of invasive plants through the movement of seeds on individual users. Seeds attached to tools, clothes or equipment could be moved to new habitats.
- **Timber Harvest** – has the highest potential for cumulative effects on invasive non-native plants because increases in disturbances due to the creation of log landings, skid trails, and increased access on roadways. Movement of heavy equipment increases the risk of introduction or spread of invasive plant material onto NFS lands.
- **Prescribed Fire/Fuels Reduction** – has the potential to increase disturbance thus favoring invasive non-native plants. The short-term reduction in fuels may also reduce competition of native plants allowing the spread of the non-native plants. The burning could however, reduce the cover of the invasive plants all ready in place and retard seed set, and in conjunction with ongoing treatment allow native plants to establish.
- **Large Fires & Wildfire Suppression** – High potential for large scale disturbance and introduction of new species. The extreme size and temperatures of wildfire can create optimal locations for invasive plant establishment. The removal of native vegetation coupled with the speed of movement of non-native plants creates ideal invasion conditions. Introduction of weedy material is also a risk during suppression operations due to the movement of equipment, engines, aircraft, etc.
- **Dispersed Camping** – has minor risks for the movement and spread of invasive plant material by people and equipment. This risk is further minimized by a focused treatment of invasive plants in and around camping and gathering areas.
- **Grazing** – Moderate potential for ground disturbance due to gathering or trailing livestock can create disturbance areas susceptible to invasive plant establishment. Direct transport of invasive plant material could introduce new species or new infestations onto forestlands. Improved management, alternative salting and trailing methods, and quarantine of livestock before moving to NFS lands can reduce the risk of invasive non-native plant establishment. Ongoing treatment of infested sites and restoration of disturbed areas will also reduce the possibility of spread.

The above activities coupled with specific project activities can create situations for increased risk of introduction and spread of non-native plant material. Ongoing treatments of non-native species help to mitigate the risks posed by management activities. Manual or mechanical treatment will continue on an annual basis within previously inventoried invasive sites until the Wallowa-Whitman National Forest Invasive Plants Treatment Project Environmental Impact Statement decision has been completed (expected FY2014). Continued direction would be taken from the Region 6 Preventing and Managing Invasive Plants Environmental Impact Statement (USDA, 2005).

Wildfire and project activities have the greatest chance for cumulative effects on non-native plants within the Sandbox project area. Should a large scale and intense wildfire disturbance occur within the project area it would create ideal areas for the introduction and spread of non-native plants. With increasing numbers of wildfires the numbers of non-native species could increase (Merriam et al., 2006), with the largest increases found in those areas with pre-existing non-native plant populations. One benefit of this project is the decrease of current fuel loading which can reduce fire behavior and

increase suppression options providing for an increased potential to keep fire size small in the event of a wildfire start.

Of the activities with predictable timetables, this project coupled with roads, grazing, and timber harvest have the highest possibility of cumulative effects within Sandbox. Roads are a vector of weed spread and transport, thus unregulated road use, construction of temporary roads, and re-opening of previously closed roads increases the risk. Travel management decisions (expected in 2-3 years) should reduce this risk by ending unregulated road use and cross-country motor vehicle use. Further, the immediate closure and restoration of temporary and closed roads after project use will reduce the risk to non-native species.

Grazing could also increase the risk of spread and introduction of non-native species. Livestock are vectors of plant material and can transport seeds and other plant reproductive material over distances. The possible increase in the number of non-natives due to project activities coupled with transport by livestock could increase the risk for areas outside of the actual project and treatment area boundaries (Merriam et al., 2006). These impacts along with timber harvest disturbance; log landings, skid trails, etc.; could compound the situation for invasive plants. These disturbed areas are likely sites of invasive plant infestations and surveys of completed timber sales, restoration of disturbed areas, and treatment of infestations would reduce the overall risk of establishment and spread of invasive plants.

Increased flexibility and treatment options as part of the WWNF Invasive Plant EIS will increase the effectiveness of on-going treatment and mitigate many of the effects of project activities. Specific mitigations within this project and the WWNF EIS can also help reduce the rate and risk of introduction of non-native species.

Summary: There are documented sites for invasive non-native species associated with project activities. The ground disturbing project activities would create seedbeds and open stands providing for additional access for motor vehicles, livestock, and recreating publics. Alternative 2 has more risk of introduction, establishment or spread of invasive plant species. The primary difference is the amount of commercial harvest treatments and opening of closed roads.

Forest Plan Consistency

The Wallowa-Whitman Forest Plan (page 4-55) (as amended by the 2005 Region 6 ROD, Regional Forester Amendment #5) provides direction for the control of noxious weeds and other competing vegetation where such activities are not precluded by management area direction. The goals focus on maintaining or enhancing ecosystem function to provide for long-term integrity and productivity of biological communities, treatment of priority infestations, and monitoring the effects of all activities to reduce the impacts of non-native plants. The Sandbox project is consistent with these goals through adherence to the Forest Plan.

Climate Change

The Sandbox Vegetation Management project would affect 1,465 to 2,193 acres of forest by commercially removing trees from treated stands, retaining a residual stand of about 50-70 percent of the original stand by basal area. This scope and degree of change would be minor relative to the amount of forested land (51,000 acre watershed) which encompasses this project area. A project of this magnitude would have such minimal contributions of greenhouse gasses that its impact on global climate change would be infinitesimal. Therefore, at the global scale, this projects' direct and indirect contribution to greenhouse gasses and climate change would be negligible.

In addition, because the direct and indirect effects would be negligible, the projects' contribution to cumulative effects on greenhouse gasses and climate change would also be negligible.

The Intergovernmental Panel on Climate Change has summarized the contributions to climate change of global human activity sectors in its Fourth Assessment Report (IPCC 2007). The top three anthropogenic (human-caused) contributors to greenhouse gas emissions (from 1970-2004) are: fossil fuel combustion (56.6% of global total), deforestation (17.3%), and agriculture/waste/energy (14.3%). IPCC subdivides the deforestation category into land use conversions, and large scale deforestation. Deforestation is defined as removal of all trees, most notably the conversion of forest and grassland into agricultural land or developed landscapes (IPCC 2000).

This vegetation management project does not fall within any of these main contributors of greenhouse gas emissions. Forested land will not be converted into a developed or agricultural condition. In fact, forest stands are being retained and thinned to maintain a vigorous forested condition that can continue to support trees and sequester carbon long-term.

This project is also consistent with IPCC recommendations for land use to help mitigate climate change. The 2007 IPCC report summarizes sector-specific key mitigation "technologies". For the forestry sector, the report recommends forest management including management to "improve tree species" and increase biomass. The actions proposed in this project are consistent with these recommendations because it focuses on silvicultural prescriptions which will improve stand health and vigor contributing to tree growth and increased biomass production.

Timber management projects can influence carbon dioxide sequestration in three main ways: (1) by increasing new forests (afforestation), (2) by avoiding their damage or destruction (avoided deforestation), and (3) by manipulating existing forest cover (managed forests). Land-use changes, specifically deforestation and regrowth, are by far the biggest factors on a global scale in forests' role as sources or sinks of carbon dioxide, respectively (IPCC, Intergovernmental Panel on Climate Change, 2000). Projects that create forests or improve forest conditions and capacity to grow trees are positive factors in carbon sequestration. The project falls into this category.

Potential Wilderness/Unroaded Areas

Introduction

This document discloses the affected environment and environmental consequences for Upper Catherine Creek and Boulder Park inventoried roadless area (IRAs), and Upper Catherine Creek Forest Plan Revision potential wilderness area (PWA), and other remaining undeveloped lands. These three resource topics (IRA, PWA, other undeveloped lands) are grouped and discussed together because they share a complicated set of terminology and interrelated history. Appendix E discloses additional narrative and maps in support of these topics.

During public involvement for this project, and in past similar projects, a wide range of terms have been used by respondents, the courts, and the Forest Service when referring to these topics. Some of these are roadless, inventoried roadless area, unroaded area, un-inventoried roadless, potential wilderness area, undeveloped lands, and roadless expanse.

From the mid-1970s through 2001 the Forest Service maintained a roadless area inventory of undeveloped lands that we used and updated for RARE, RARE II, and in support of Land and Resource Management Planning completed in 1990. During that time, these lands were called "roadless areas" or "inventoried roadless areas" (IRA). With completion of the Roadless Area Conservation Rule (RACR) in 2001, these lands ceased being an "inventory", and IRAs became a designation with fixed boundaries and prohibitions set by that rule and Forest Service regulation (36 CFR 294). Confusion ensued because the same areas were located on two Forest Service maps, meaning two very different things but with the same name; IRA. One map had fixed boundaries set by RACR, and the other had changeable boundaries based on inventory criteria.

To address the situation, the Forest Service created a new term for the inventory of undeveloped lands called “potential wilderness area” (PWA) to make a distinction between the IRA term used by the 2001 RACR. This terminology addition was made policy by changing the 2006 handbook for wilderness evaluation (FSH 1909.12 Chapter 70) and is reflected in the 2008 Forest Service NEPA regulations (36 CFR 220). In the regulations, potential effects to “inventoried roadless areas” and “potential wilderness areas” are factors in determining whether a CE, EA, or EIS is the appropriate NEPA document for a project. The term “other undeveloped lands” is presented and used in this document to provide a consideration for the balance of those remaining lands that did not meet the inventory criteria for PWA, were not designated an IRA under RACR, and do not contain roads and evidence of timber harvest (see definitions below).

In the early 2000s, Oregon Wild, a local interest group, conducted their own inventory across Oregon, including the Wallowa-Whitman National Forest, using inventory criteria they developed for their purposes. The Sierra Club, a national interest group, has also produced an inventory using inventory criteria they developed for their purposes. Polygons on both maps are referred to as “inventoried roadless areas” , “roadless areas”, “unroaded”, or “un-inventoried roadless areas”. Each map produced is based on different definitions and inventory criteria and looks very different from maps produced by the Forest Service based on the criteria from agency law, regulation, and direction. The Forest Service relies on agency policy, agency definitions of terms, and agency procedures for the inventory of resources and facilities. Inventory criteria and procedures for potential wilderness areas are found in Forest Service Handbook 1909.12, Chapter 71.

The terms and definitions as stated below will be used in this site-specific analysis. The four resource topics are based on current law, regulation, agency policy, and the Wallowa-Whitman Land and Resource Management as amended.

Wilderness: A wilderness area is designated by congressional action under the Wilderness Act of 1964 and other wilderness acts. Wilderness is undeveloped Federal land retaining primeval character and influence without permanent improvements or human habitation.

Inventoried Roadless Areas (IRA): These areas were identified by the 2001 Roadless Area Conservation Rule in a set of inventoried roadless area maps contained in Forest Service Roadless Area Conservation Final Environmental Impact Statement, Volume 2, dated November 2000. These areas were set aside through administrative rulemaking and have provisions, within the context of multiple use management, for the protection of inventoried roadless areas. Most IRA boundaries are substantially the same as those identified as “roadless areas” as referred to in the 1982 planning rule (36 CFR 219.17) and identified in the 1990 Wallowa-Whitman Forest Plan, FEIS, Appendix C; however some localized, minor differences in boundaries may exist.

All roadless area acres were allocated to various management areas strategies as disclosed in the Wallowa-Whitman Forest Plan FEIS and described in the Record of Decision.

Potential Wilderness Area (PWA): Areas of potential wilderness identified using inventory procedures found in Forest Service Handbook (FSH) 1909.12, Chapter 71 are called potential wilderness areas. The inventory is conducted by the Forest Service with the purpose of identifying potential wilderness areas in the National Forest System. The Wallowa-Whitman 1990 Forest Plan, as amended, directs roadless areas be evaluated and considered for wilderness recommendation during the forest planning process. PWA is not a land designation decision. They do not imply or impart any particular level of management direction or protection. They are not an evaluation of potential wilderness (Chapter 72). Lastly, they are not preliminary administrative recommendations for wilderness designation (Chapter 73). PWA inventories do not change the administrative boundary of any IRA, but they may substantially overlap and/or be contiguous with an IRA. PWA may be contiguous with designated wilderness where the boundaries touch. Newly inventoried PWA may stand alone and my not have been previously identified in Appendix C of the 1990 Wallowa-Whitman Forest Plan or the 2001 RACR. PWA overlaps inventoried roadless areas only where those acres of land are consistent with the inventory criteria set out in the handbook, and may extend beyond IRA boundaries and wilderness boundaries where consistent with those criteria.

Background

Oregon Wild submitted a map depicting the areas with the Sandbox project area that meets the criteria they developed and used for their purposes. It identified unroaded areas along the South Fork of Catherine Creek, as well as areas contiguous to the Upper Catherine Creek inventoried roadless areas (see map and letter dated April 24, 2012 in the project file). Oregon Wild did not provide the inventory criteria they used to develop their map submitted during public comment for this project. Confusion surrounds this issue, because there are conflicts between Forest Service maps and the map presented by Oregon Wild. Each map uses similar terms with very different definitions, as well as different methodology and criteria used for the inventory. Confusion continues with the request to disclose the impacts to “roadless characteristics” on lands that Forest Service determines does not meet agency inventory criteria.

To resolve this confusion the Forest Service uses its discretion to rely on agency policy, agency definitions of terms, and agency procedures to the inventory. Inventory criteria and procedures for PWA are found in FSH 1909.12, Chapter 71, with the application of these procedures to the Sandbox project found in Appendix E of this document.

Appendix E

Appendix E of this document describes the process and rationale used to inventory for and identify potential wilderness and other undeveloped lands. It also considers the potential effects of the alternatives for the Sandbox Vegetation Management Project. Maps included in Appendix E show a visual progression of the inventory process, final results, and any additions to the Potential Wilderness Area inventory in the final map. The inventory is based on, and consistent with criteria found at Forest Service Handbook (FSH) 1909.12 Chapter 71. The Forest Service used professional judgment and local knowledge regarding unique, site-specific conditions of each area being considered for placement in the inventory of potential wilderness areas.

The effect to inventoried roadless areas (IRAs), potential wilderness areas (PWAs), and other undeveloped lands are based on maps and polygons created using agency inventory procedures (Appendix E) and are considered disclosed here. The descriptions of environmental consequences disclosed in this section for IRA/PWA and other undeveloped lands applies to the areas of Oregon Wild polygons that overlap with IRA/PWA polygons and other undeveloped lands polygons.

An outcome of the PWA inventory process was the identification of isolated polygons of other undeveloped lands. These polygons did not meet inventory criteria as potential wilderness areas and they are not inventoried roadless areas or a designated wilderness area. Each individual polygon of isolated land has no history of harvest activity and does not contain forest roads. They are stand-alone polygons of varying acreages which individually are less than or equal to 4,999 acres. Other undeveloped lands are displayed on Map 5 of Appendix E. The description of environmental consequences to the intrinsic physical and social values are disclosed in this chapter for other undeveloped lands, which applies to the acres described in Oregon Wild’s scoping letter and map that overlap with other undeveloped lands polygons displayed in Appendix E. Timber harvest and prescribed fire are proposed within other undeveloped lands and the consequences are described. Proposed vegetation management treatments may affect characteristics of undeveloped lands within the Sandbox Project area. This analysis will disclose any potential effects resulting from the proposed treatments.

The Wallowa-Whitman National Forest, in coordination with the Umatilla and Malheur National Forests, is involved in a tri-forest plan revision process, referred to as the Blue Mountain Forest Plan Revision (BMFPR). During the revision process the BMFPR team conducted public meetings and accepted scoping comments on the Potential Wilderness Area inventory. The Upper Catherine Creek IRA was the starting point for creating the Upper Catherine Creek PWA. This process follows the inventory criteria outlined in FSH 1909.12 Chapter 71.

Upper Catherine Creek IRA and PWA

The Upper Catherine Creek Inventoried Roadless Area (IRA) refers to an area greater than 5,000 acres, without developed and maintained roads, and substantially natural conditions which was inventoried as part of the Land and Resource Management Planning process (LRMP 46 CFR 219.27 (c)). The Upper Catherine Creek roadless area is identified and mapped in Appendix C of the Wallowa-Whitman Forest Plan Final EIS, and is also identified in the set of maps for IRAs in the Forest Service Roadless Area Conservation FEIS, Volume 2, dated November 2000. There are no meaningful differences between the boundaries identified in Appendix C of the Forest Plan and the RACR IRA boundaries, therefore these two topics will be discussed together.

In the case of the Upper Catherine Creek area, most of the IRA is a PWA, but not all acres meet the PWA inventory criteria, because the lands within the IRA were allocated to a 1990 Forest Plan management area that provided for timber harvest and road construction. The Upper Catherine Creek IRA and PWA are contiguous to the northern and eastern boundaries of the Sandbox project area. As mentioned previously, neither the status nor the boundary of the IRA changes, because some acres do not meet the inventory criteria of a PWA. The boundary remains as mapped in the Forest Service Roadless Area Conservation FEIS.

Existing Condition

Wilderness

There are no designated wilderness areas within the project boundary. Wilderness evaluation and wilderness recommendations are a forest planning issue and outside the scope of this site specific analysis and decision. Only Congress has the statutory authority to designate wilderness. It is within the authority of Congress to designate wilderness areas that do not meet the potential wilderness inventory criteria. Areas recommended to Congress for wilderness study or designation are those areas identified on the potential wilderness inventory and evaluated for wilderness suitability for potential addition to the National Wilderness Preservation System by forests during the Land Management Planning process using wilderness inventory criteria, outlined in Forest Service Handbook 1909.12, Chapter 71.

Inventoried Roadless Area

There are two Forest Service inventoried roadless areas (Upper Catherine Creek and Boulder Park) adjacent to but outside the project boundary. The very tip of the northern edge of the Boulder Park IRA touches the Sandbox project area. It was considered in this analysis; however, only one small unroaded polygon less than one acre in size is contiguous to this IRA. No changes were made to these boundaries. No activities or projects (timber harvest, prescribed fire, etc.) are proposed within the inventoried roadless areas.

Potential Wilderness Area Inventory

Inventory of potential wilderness areas and identification of other undeveloped areas within the Sandbox project area was done using a process and rationale described in Appendix E. The inventory is based on, and consistent with criteria found at Forest Service Handbook (FSH) 1909.2 Ch. 71.

There are two PWAs (315 acres) identified in the BMFPR potential wilderness inventory contiguous to the Upper Catherine Creek IRA (6,844 acres). No timber harvest, mechanical fuel activities, or road construction are proposed within this PWA. More than half of the BMFPR PWAs are within the Sandbox project boundary. Lands with values and features that often characterize inventoried roadless areas are increasingly important within developed landscapes in order to provide clean drinking water and function as biological strongholds for populations of threatened and endangered species. They provide areas that are important for biological diversity, dispersed outdoor recreation; and also serve as bulwarks against the spread of non-native invasive species and provide reference areas for study and research. (36 CFR 294, pg. 3245).

Within PWAs human influences have had less impact on the natural appearance or long-term ecological process compared to managed lands. The current condition of soil, water quality, air quality; plant and animal communities; habitat for threatened, endangered, and sensitive species; and noxious weeds, recreation, and cultural resources are described in the various sections elsewhere in Chapter 3 of this EA. Disturbance by insects and fire has been and most likely, and will continue to be the factors with the most potential to impact the naturalness and undeveloped nature of the area. Opportunities for primitive recreation are limited to hiking, mostly cross-country, and hunting.

The inventory for Sandbox project identifies areas that meet potential wilderness inventory criteria within the Sandbox analysis area and those lands lying adjacent to and abutting the Upper Catherine Creek IRA, totaling 8,044 acres. It also discloses effects of proposed project activities on those potential wilderness areas. The evaluation of potential wilderness, and review and approval of wilderness recommendations are steps that occur during the Land Management Planning process. All are outside the scope of this analysis. Criteria listed in FSH 1909.12, section 71.11 guided the inventory process for the Sandbox Project analysis. ArcMap geographic information system (GIS) was used to identify past and proposed activities in regards to potential wilderness areas. The potential impacts to areas meeting potential wilderness inventory criteria from this project were determined based on use and interpretation of GIS data and review of proposed treatment locations for the following proposed treatments: overstory removal, intermediate harvest, and non commercial thinning. See the complete inventory process in Appendix E.

For about 100 years, lands within the Sandbox project area have been actively managed to meet a variety of resource objectives. Evidence of past management is quite apparent with the existence of roads and other developments for recreational activities such as campgrounds and trailheads. Recent evidence, within the last 35 years, of timber management exists across the analysis area in the form of cut stumps, skid trails, and log landings and roads. Appendix E Map 1 displays the position of the analysis area relative to the Eagle Cap Wilderness Area and the Upper Catherine Creek and Boulder Park IRAs. It also displays the roaded nature of the analysis area. Appendix E Map 2 depicts the recent past harvest areas within the Sandbox project area. As shown by this map, most of the analysis area has been harvested in the recent past. Appendix E Map 3 is a combination of past harvest areas and existing system roads with identifiable 300 foot boundaries. Appendix E, Map 4 shows those areas between roads and past harvest activities. Appendix E, Table 2 lists those polygons located between roads and harvested areas with their acreages. These were evaluated as Potential Wilderness Areas. Ten polygons, totaling 797 acres, met one criterion for potential wilderness (Appendix E, Tables 3 & 4), 9 of which are contiguous with Upper Catherine Creek IRA which when added into the Catherine Creek PWA would result in a PWA of 7,502 acres.

Effects Analysis

Introduction and Assumptions

The scope of this potential wilderness analysis included all acres contained within the project planning area boundary and 939 acres of lands outside the boundary (along the northern edge) sufficient to consider contiguous inventoried roadless areas. While it does not include the Upper Catherine Creek IRA, it does consider this IRA which is immediately adjacent along the entire eastern edge of the project area.

Indicators for IRA and PWA

These indicators show the values and features that often characterize inventoried roadless area:

1. High quality or undisturbed soil, water, and air
2. Source of public drinking water
3. Diversity of plant and animal communities
4. Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large undisturbed areas of land
5. Primitive, semi-primitive, non-motorized, and semi-primitive motorized classes of dispersed recreation
6. Reference landscapes
7. Natural appearing landscapes with high scenic quality

8. Traditional cultural properties and sacred sites
9. Change in acres of IRA
10. Change in inventoried acres of PWA

Indicators for other undeveloped lands

1. Intrinsic physical and biological resources (soils, water, wildlife, recreation fisheries, etc.)
2. Intrinsic social values (apparent naturalness, solitude, remoteness)
3. Change in acres of other undeveloped lands

Direct and Indirect Effects on PWAs

ALTERNATIVE 1

Alternative 1 proposes no action and initiates no human caused changes to designated wilderness.

Alternative 1 proposes no action and initiates no human caused changes to the potential wilderness areas north of the project area. The areas meeting potential wilderness criteria as inventoried during this process would not be impacted under Alternative 1. Natural conditions and undeveloped character of the project area would be the same as the existing condition. Ongoing activities would not substantially alter the character of these areas that could hinder the future consideration as PWAs.

Alternative 1 proposes no action that would result in human caused changes to other undeveloped areas with the project area.

ALTERNATIVES 2 and 3

Wilderness

Alternatives 2 and 3 propose no action, and initiate no human caused changes to designated wilderness.

Potential Wilderness Area and Inventoried Roadless Areas

No road construction would occur in the Upper Catherine Creek IRA or PWA. Three closed roads exist in the Upper Catherine Creek IRA impacting 315 acres (See Map 4, Appendix E). No roads exist in the remainder of this area, therefore no road use or maintenance would occur in these areas. No timber harvest would occur in the Upper Catherine Creek IRA or PWA under either action alternative. With no activity occurring within the PWA or IRA, there will be no effect on the quality of soil, water, air, or sources of public drinking water within area. There will be no activity reducing the diversity of plant and animal communities, threatened and endangered species, and species dependent on large undisturbed areas of land. Recreation opportunities will not change in the PWA or IRA. There will be no changes to the scenic quality or traditional cultural properties.

The PWA located in the South Fork Catherine Creek area is proposed for commercial thinning treatment under Alternative 2 (Appendix E, Map 6) in treatment units 26, 27, and 28 (68 acres) and construction of 0.96 miles of temporary roads (T-7 and T-8) along the eastern edge. Short segments of T-7 (0.08 miles) and nearly all of T-8 (0.17 miles) entering into this PWA boundary. T-7 is entirely within the proposed harvest units, while the 300 foot buffer on half of T-8 (0.09 miles) could affect the PWA boundary along the central eastern edge. Alternative 3 does not build any temporary roads or treat these units; therefore, the PWA in this area would not be affected under Alternative 3.

Impacts to soil, water, habitat for plant and animal communities, PETS species, cultural resources, and sacred sites by the temporary road construction and treatments within this area are discussed

under the resource areas discussed within this chapter of the EA. There is no source of public drinking water in this area. This PWA is in a very steep area with slopes ranging from 40-70% going from the ridge top down into the South Fork Catherine Creek and Camp Creek along the western edge. The temporary road construction in Alternative 2 would be along the ridge top which would be along the edge of this PWA and would therefore impact PWA characteristics for 300 feet along this ridgetop.

Treatment units in Alternative 2 within this area are along the less steep portions along the ridge on the western side. Beyond these areas PWA characteristic would not be impacted outside of these areas due to the steepness of the slopes. Because of the slopes in this area there are limited available dispersed recreation opportunities. Treatment within this area would provide more access to the area; however, would not promote primitive, semi-primitive, or non-motorized recreation opportunities after treatment. These treatments would leave stumps, skid trails, slash and obliterated temporary roads when completed which would impact the natural appearing landscapes within the treatment units for at least 50 years. Although treatment of these units would not impact other undeveloped lands within the area it would essentially reduce this PWA in half.

Change in PWA Acres

All acres within the Upper Catherine Creek PWA would remain in the PWA inventory following the implementation of all action alternatives. With the new inventory that has been conducted for the Sandbox project, additional acres associated with polygons 1, 2, 3, 23, 64, 71, 78 and 92 (Appendix E, Table 4) would increase the size of Upper Catherine Creek PWA by approximately 858 acres. Thus, following implementation, all acres within the Upper Catherine Creek PWA would be available for consideration in an evaluation of potential wilderness (FSH 1909.12, Ch 72) and preliminary administrative recommendations for wilderness designation (FSH 1909.12, Ch 73) during forest plan revision.

The South Fork Catherine PWA in the center of the project area would remain the same under Alternative 3 as there are no overlapping treatments other than possible prescribed burning. This PWA would be reduced in half under Alternative 2 following treatments proposed in Units 26, 27, and 28 due to temporary road construction, timber harvest, grapple piling or slashbusting, and prescribed burning activities.

Change In Other Undeveloped areas

There are no forest-wide or management area standards specific to other undeveloped lands on the Wallowa-Whitman Forest Plan. The Sandbox project area consists primarily of acres allocated to management areas that provide for timber production (management areas 1 and 3). Alternative 2 proposes to cut trees (commercially and non-commercially) from approximately 17 percent of the project area and prescribe burn about an additional 46 percent, while Alternative 3 would cut trees on approximately 13% of the project area (see Chapter 2 for specific acreages and locations under each alternative). The removal methods include ground-based logging, using tractor or skyline harvest systems. In some areas under Alternative 2, temporary roads would be built to facilitate the removal of commercial logs. Most of these roads would be built within proposed harvest units or on existing wheel tracks/road beds (from firewood cutting). Landings associated with the ground-based systems would be located adjacent to existing and proposed roads and at existing landings where possible. Ground-based landings would range in size from 0.10 to about one acre. Where ground-based logging occurs, evidence of logging would be apparent. Possible effects include skid trails which often create exposed soils across the forest floor. These effects are generally noticeable until grasses and shrubs in the understory reestablish and lessen the effects of ground-based equipment. In this area that would take 3 to 5 years.

Nearly 91% of the polygons identified on Map 5 as other undeveloped lands are less than 50 acres in size. Of the remaining 9% larger than 50 acres, most range from 101 to 366 acres with the largest

at 584 acres (Polygon 49). Polygon 49 is steep, does not meet any of the PWA criteria, and there are no treatment units overlapping it.

In the undeveloped areas where treatment units are proposed (Appendix E, Maps 6 and 7) effects would be minimal, consisting of visible stumps and skid trails, but no new permanent roads. Since these areas do not currently meet PWA criteria, the proposed harvest would have no effect on their ability to qualify as a PWA.

Other undeveloped lands include soils, water, and fish and wildlife habitat not impacted directly by past harvest and road building. The current condition of soil, water quality, air quality, plant and animal communities; habitat for threatened, endangered, and sensitive species; noxious weeds, recreation, and cultural resources within the project planning area are described elsewhere in this chapter 3. Human influences have had limited impact to long-term processes within the other undeveloped lands. Disturbance by insects and fire has been and most likely will continue to be the factors with the most potential to impact the area. Opportunities for primitive recreation are limited to hiking, mostly cross-country, and hunting. Opportunities for a feeling of solitude, the spirit of adventure and awareness, serenity, and self-reliance are limited by the size and shape of the polygon. Distance and topographic screening are also a factor. The optimum shape and location to retain solitude and a sense of isolation from noise and sights of other humans and their activities would be at the center of a circle. Most of the polygons within the project area are long and narrow, providing less distance from noise at their midpoint. Nearby, non-conforming sights and sounds of roads and timber harvest can be heard and seen from the undeveloped lands, because they are all much less than one square mile in size.

The existing condition of all undeveloped areas within the Sandbox project area presents a landscape that has been managed. It generally developed in nature, reflecting the multiple-use intent and decisions made in the Forest Plan (1990 as amended). It reflects consistency with Forest Plan Management area allocations.

Danger Tree Removal and Firewood Cutting/Removal Area

Danger trees would be removed from along haul routes used for timber sale activity and all roads within the project area that remain open after sale activities have finished. No danger tree removal is proposed in potential wilderness areas in any of the action alternatives. The potential wilderness inventory incorporates a 300 feet boundary from all forest roads. All danger tree removal would occur within 300 feet of a forest road. Danger tree removal treatment would cause no effects on potential wilderness inventory areas.

Firewood cutting in the firewood removal area proposed in this project would occur within the 300 foot buffer of open/closed roads and is expected to have no effect on PWAs. Traditionally, firewood cutting within this project area has been very aggressive by the public going well beyond 300 feet from open and closed roads and resulting in extensive and obvious user built roads and trails throughout the area impacting many of the areas not previously harvested and without system roads. This activity would continue to occur under all alternatives within this project area.

Prescribed burning

There would be no effect of prescribed burning to wilderness, potential wilderness areas, or other undeveloped lands due to the temporary nature of the effects. Effects of burning would be similar under each alternative. Evidence of burning includes charring on tree boles, scorched needles and some mortality, normally 10 percent of the standing trees or less. For a period of 2 to 5 years there would be some evidence of fire but no signs of other management activity related to the burning. Prescribed burning normally utilizes roads as control lines but occasionally installs fuel breaks to connect control features. These breaks cause minimal ground disturbance and normally recover within 1 to 3 years.

Summary

Through a systematic process of elimination, ten areas of land were identified as meeting one PWA criteria. These areas are identified on Map 4 (Appendix E) as polygons 1, 2, 3, 23, 62, 64, 65, 71, 78, and 92. Under Alternative 3, none of the treatment activities identified in the action alternatives would impact these areas so as to prevent their inclusion in future PWA inventory. Treatments adjacent to PWAs occur on lands previously harvested, still showing evidence of past harvest activities. If the past harvest activities were excluded for, the existing road system greatly limits the PWA.

The largest polygon of other undeveloped lands identified on Maps 4 and 5 of Appendix E, polygon 65 (South Fork Catherine PWA), overlaps a polygon also identified by Oregon Wild during scoping for this project. Under Alternative 2, treatments in Units 26, 27, and 28 would reduce the South Fork Catherine PWA area in half post-harvest.

The Upper Catherine Creek Inventoried Roadless Area PWA would not be affected by the action alternatives. No harvesting or road building would occur within the Upper Catherine Creek IRA altering its potential for wilderness consideration. Activities adjacent to the IRA are in keeping with activities occurring in the past and would not change the character of the Upper Catherine Creek IRA.

Cumulative Effects on PWAs

The cumulative effects analysis area for potential wilderness area criteria is the same as the analysis area described for direct and indirect effects above.. Road building, which began in the early 1900s, has affected which lands meet potential wilderness criteria. Past harvest of timbered slopes is generally noticeable for up to 35 years depending on soils, aspect, and vegetative species composition. At the end of this time period, the re-growth of vegetation begins to develop characteristics of a closed canopy and begins to appear similar to surrounding uncut areas. The existing road system itself substantially limits the area available for PWA consideration and has been incorporated into the analysis described in Appendix A.

Present activities in the analysis area include: firewood cutting, livestock grazing, use and maintenance of forest roads, fire suppression, noxious weed assessment and control, summer and fall recreation including hunting, hiking, driving for pleasure, gathering, and dispersed camping. Areas containing extensive forest roads, such as the Sandbox Planning Area, would not meet potential wilderness inventory criteria.

ALTERNATIVE 1

Natural conditions and undeveloped character of the PWA would be the same as the existing conditions. The No Action Alternative along with the projects and activities listed above would have no cumulative effects to the inventory criteria for the identified PWA. There are no irreversible or irretrievable commitments related to PWA from this alternative.

ALTERNATIVE 2

The activities which limit areas being considered as potential wilderness within this area are the extensive amount of firewood gathering and user created roads. Those activities in addition to the units proposed for treatment in the South Fork Catherine PWA have the potential to increase impacts to the apparent naturalness of this area. Other activities listed would not affect the inventory criteria for the identified potential wilderness areas and would have no cumulative effects causing portions of identified potential wilderness areas to no longer meet potential wilderness inventory criteria. There would be no irreversible/irretrievable loss of potential wilderness suitability for any potential wilderness areas under Alternatives 2 as the areas proposed for treatment would eventually recover over time.

Areas meeting potential wilderness inventory criteria would qualify for placement on the potential wilderness inventory, and therefore could be evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or as a potential addition to the National Wilderness Preservation System during the ongoing Blue Mountain Forest Plan Revision process.

ALTERNATIVE 3

Proposed harvest and temporary road building activities described in Chapter 2 of this EA for Alternative 3 would have no cumulative effects causing portions of identified potential wilderness areas to no longer meet potential wilderness inventory criteria. There would be no irreversible/irretrievable loss of potential wilderness suitability for any potential wilderness areas under Alternatives 3. Areas meeting potential wilderness inventory criteria would qualify for placement on the potential wilderness inventory, and therefore could be evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or as a potential addition to the National Wilderness Preservation System during the ongoing Blue Mt Forest Plan Revision process.

Recreation/Scenery

Introduction

The recreation activities within the Sandbox project area are predominately dispersed in nature, however, developed sites, trail use and special use permitted activities occur within the project area. There are three developed recreation sites including Buck Creek campground, Buck Creek Trailhead, and Sand Pass Trailhead. Other recreation activities are focused on day use activities such as OHV use, snowmobile use, hunting, firewood gathering, mushroom picking, and viewing scenery. The highest use in this area occurs during the big game hunting seasons when hunters occupy many of the dispersed campsites within the area.

Because the construction of new recreation facilities or reconstruction of existing recreation facilities is not proposed for Sandbox, this document focuses on the harvest activities and fuel treatments and their effect on the recreation setting, scenery, and visitor opportunities.

The analysis area is the project area as described in Chapter 1 of this EA. This analysis area is characterized by a diverse range of habitats. Northern aspects and higher elevations consist of mixed conifer types, ridge tops and southern aspects transition into ponderosa pine, Douglas-fir, and dry grand fir types.

The 1990 Wallowa-Whitman National Forest Land and Resource Management Plan (Forest Plan; WWNF 1990) uses the recreation opportunity spectrum (ROS) framework for stratifying and defining classes of outdoor recreation environments, activities and experience opportunities. There are seven ROS classes arranged along a continuum from primitive to urban. Sandbox lies within the ROS class Roaded Natural.

Other Forest Plan Recreation standards and guidelines that apply to the proposed activities in Sandbox include winter recreation; recreation site development; outfitter/guide services; special places such water features, rock or unique landform features, historic sites, etc.; and road, trail and area motor vehicle use in accordance with the forest travel management plan.

Existing Condition

Although no specific recreation use studies were completed for Sandbox, inferences can be made to the typical types of activities that occur in the project area based on a national recreation survey. In 2008 the Wallowa-Whitman National Forest (WWNF) conducted the National Visitor Use Monitoring (NVUM) (WWNF, 2009) survey to gather information about recreation visitor satisfaction, activities and use levels. One product of the survey revealed the primary and overall participation levels for various activities.

Table 3.48 - Participation in WWNF Recreational Activities (top 10 only)

Top activities on the WWNF	Percent of visitors who participated in this activity	Percent of visitors who participated in this as primary activity
Viewing natural features	49.9%	13.3%
Viewing wildlife	46.8%	3.5%
Hiking and walking	46.5%	15.3%
Relaxing	39.4%	5.7%
Driving for pleasure	30.0%	11.2%
Fishing	24.7%	13.2%
Visiting historic sites	17.0%	0.5%
Picnicking	15.7%	1.4%
Developed Camping	13.4%	1.9%
Backpacking	12.9%	6.6%

Some of the least participated in activities which occur on the WWNF are; Off-Highway Vehicle (OHV) use (2.6%), bicycling (1.5%), horseback riding (1.8%), and snowmobiling (0.8%).

The highest percent of survey respondents were from; Baker County, OR (8.8%), Union County, OR (7.1 %), Foreign Countries (2.5%), Nez Perce County, ID (2.5%), Wallowa County, OR (2.0%) and other counties in and around the WWNF in Idaho, Oregon and Washington. During their time on the forest, visitors spent an average 2.0 hours at developed recreation sites, 44.3 hours at overnight sites, and 27.3 hours in undesignated areas.

Dispersed Recreation

Visitors participating in dispersed recreation activities do not primarily use or rely upon developed sites such as campgrounds, or picnic areas. However they may use a developed site to support their activity, such as parking at a trailhead, but their main time is spent away from the developed sites. All of the activities listed in Table 3.48 (except developed camping) could be viewed as dispersed recreation activities. Other activities may include OHV use, snowmobiling, horseback riding, and cross country skiing. Visitation for these dispersed activities in areas known as 'general forest areas' (non-wilderness areas) account for over 54% of the total Forest visits according to the NVUM survey (WWNF, 2009).

Dispersed camping is a popular activity for overnight users who do not camp in a developed campground. There are numerous dispersed camping opportunities in Sandbox. These campsites receive low to moderate use beginning in late spring with the majority of sites showing heaviest use during the fall hunting season. Many of these campsites have been used for decades with some sites showing soil compaction and a loss of vegetation.

As shown in Table 3.48, other types of dispersed recreation occur year-round. Visitors enjoying these recreational pursuits may use forest roads as transportation networks (i.e. OHV riders, snowmobile riders, cross-country skiers, driving for pleasure, viewing wildlife), or just travel cross-country away from roads and trails (i.e. hunters, viewing nature, fishing, hiking or walking).

Currently OHV use can occur both on designated open roads, closed roads, trails and in many cross-country locations in Sandbox. Overall motor-vehicle use in the area is light yet it does increase during the big-game hunting season.

Developed Recreation Sites and Trails

There are three developed recreation sites located in Sandbox including Buck Creek Campground, Buck Creek Trailhead and Sand Pass Trailhead. The Buck Creek Campground and Trailhead are located in the northeast portion of Sandbox. Buck Creek Trailhead (#1944) and Sand Pass Trailhead (#1912; located in

the eastern portion of Sandbox) access the Eagle Cap Wilderness. Overall use of these facilities is low except during fall hunting season when it may be used at a moderate level.

A designated and groomed snowmobile trail is located along the 7700 road that borders the southern portion of the project area. This is part of a larger trail system that attracts touring snowmobilers throughout the winter months, December through April. The staging area for this trail is located out of the project area on Catherine Summit.

Permitted Uses

Some recreational activities are managed under permits which allow recreationists or operators to do certain activities under the terms of the permits. These permits include; gathering firewood, gathering forest products like mushrooms, hunting and recreation special use activities. Use of these permits can be considered 'recreational' since visitors often participate in them for primary or secondary forms of enjoyment.

Annually the WWNF sells over 2,500 of personal use firewood permits and over 1,900 forest product permits like mushroom and Christmas tree tags. Each permit has terms and conditions which guide uses and locations for the activities. Although no data is available for how many permits are used in Sandbox, these activities can generally occur in most areas outside of riparian areas, old growth area, tree plantations, and other special designated location described on the permits. There are no long-term recreation special use permits such as outfitter and guides inside the project area.

Sandbox lies within the Catherine Creek Big Game Management Unit. The area is popular during big game bow and rifle seasons in late summer and fall, and turkey hunting in the late fall and early spring. Oregon Department of Fish and Wildlife will continue to offer hunting opportunities in this area as part of their management of big game.

The following effects analysis is based on field surveys, data review and professional judgment.

Effects Analysis

The following activities associated with the Sandbox project are of such limited and constrained nature that they would not be easily seen upon implementation and therefore have no effect on Recreation and Scenery resources or activities.

- Planting
- Whipfelling
- Forage Enhancement
- Invasive Species Treatment

These activities and their effects will not be discussed further in this section.

A. Recreation

Direct and Indirect Effects to Recreation

ALTERNATIVE 1 – NO ACTION

There would be no direct or indirect effects under Alternative 1 – No Action. Vegetation densities or characteristics would not be modified and the forest would continue to be influenced by natural processes and limited management actions, such as fire suppression. Because no implementation activities would result under this alternative, no change is anticipated in the number of visitors, frequency or season use in dispersed recreation activities, developed recreation sites, trails, or permitted uses. Recreational visits within the project area would remain near the same levels as previous years and under this alternative traditional use patterns and recreational opportunities

would not be affected. Hunting, hiking and other dispersed recreation and permitted uses access and opportunities are expected to remain unchanged.

In the long term, there is increasing risk to to forested areas by insect and disease epidemics and greater fuel loads increasing the risk of large stand replacement fires. Sustainability of long term scenery resources would continue to diminish over time.

ALTERNATIVES 2 and 3

Approximately 21.9 miles of closed roads will be reopened under Alternative 2 and 12.4 miles under Alternative 3 and 5.2 miles of temporary road would be constructed with Alternative 2, Alternative 3 does not propose any temporary roads to facilitate timber harvest activities. All roads would be closed after units are harvested and released. This would have a short-term effect as road densities would return to 1.8 mi/sq.mi. post-harvest.

Alternatives would not change the ROS- Roaded Natural recreation opportunity spectrum.

Dispersed Recreation - Timber harvest, post-harvest, and prescribed fire activities may restrict user access into a treatment unit due to safety purposes, or users may be discouraged from entering a unit due to the presence of equipment and workers. This may occur in peak summer visitations or during the fall hunting seasons. Downed trees, slash piles, loss of forest-products (i.e. mushrooms, berries), active fire and residual smoke will also discourage visitor use in an area. Noise and other disturbances may affect the quality of the recreation experience for an individual regardless of the proximity to the activity.

A change in natural features or landscape characteristics may elict different responses in visitors. A visitor's sense of place includes attachments to external factors like natural features or landscape characteristics. Important landscape features may consist of large old growth trees and groves, variety of trees species, an open or closed tree canopy, rock formations, water bodies, and natural appearing openings. The proposed treatments such as harvesting trees, reducing slash or altering canopy cover would change or remove some of these natural features. In some cases the changing landscape would displace or discourage certain types of dispersed recreational activities (i.e. studying nature, viewing wildlife). In other areas it may encourage new dispersed recreational activities (i.e. big game hunting, photography) not available under the previous landscape.

Direct effects to recreationists accessing dispersed camps in the project area or other areas will occur on roads during haul periods. The presence of large trucks or an increased frequency of traffic may discourage road use to these sites until the road work subsides. When roads are being constructed/reconstructed visitors may expect delays or closures during work periods.

Developed Recreation - Although similar to the effects of dispersed recreation, developed recreation is more limited due to the number of sites in Sandbox. Access to developed sites may be delayed or restricted during haul periods, or road construction. The presence of large log trucks and other equipment on haul routes may discourage users from driving the main access route to developed sites or other associated activities outside of the developed recreation area. The noise, dust, smoke and equipment activity during harvest, post-harvest and prescribed fires may affect the quality of the recreation experience for a visitor regardless of the proximity to the activity. The frequency and intensity of these activities may vary from a few hours to several weeks. Some loss or change of vistas, scenery, natural features or wildlife viewing opportunities may result with the vegetation treatments and prescribed fire activities visible from the developed sites.

Developed Trails – Unit 116, proposed as a noncommercial fuels treatment and prescribed burn unit, in Alternative 2 and 3 lies adjacent to the Buck Creek trail for less than 0.25 mi. Slash piles and prescribed burning would change some of the natural features and may discourage trail user activities. Noise and other disturbances may affect the quality of the recreation experience. Effects to this portion of the Buck Creek trail may be reduced by locating project activity away from the trail

(i.e., 50 ft or more). No other portions of the Buck Creek or Sand Pass trails would be affected by Alternative 2 or 3.

The Catherine Creek snowmobile trail along the 7700 road would have the potential to be affected if it is plowed for winter haul. Coordination with the local snowmobile clubs may alleviate the concern if alternate temporary routes are groomed during the short term.

Permitted Uses – All permitted uses are authorized under the term and conditions of a permit which allow activities not available to a non-permitted user. Most of these uses are tied to road access, and the removal of forest products is dependent on specific areas or vegetation. Permitted uses may be affected by project activities. Similar to dispersed recreation, timber harvest, post-harvest, and prescribed fire activities have short term effects and may restrict or discourage entry into a harvest unit. Depending on the level of treatment activity, permit users may be displaced to other areas inside or outside Sandbox. The incorporation of a fuelwood removal area would provide the public with additional opportunities for gathering firewood while helping to meet the goals for reducing fuel loadings within the project area. Although these opportunities would be short term they would help meet the growing need for firewood in Union and Baker County.

Increased obstacles like downed trees and slash piles, or loss of forest-products (i.e. mushrooms, berries) will also change harvest patterns. Residual smoke, dust, fire, noise and equipment activity is also not conducive to a quality recreation experience. The same effects for road use described in 'Dispersed Recreation' are also applicable to this recreation use. If roads are used for winter haul, they may be available for access by winter recreationist like Christmas tree cutters who normally do not have access in many roads during the winter due to deep snow packs.

Long term effects of harvest and post-harvest treatments will solicit various responses from permit users. Permit holders like mushroom pickers, will find short term benefits from open, disturbed mixed-conifer forest stands, whereas berry pickers may view the loss of berry patches as a negative effect.

Cumulative Effects on Recreation

ALTERNATIVE 1 - No Action

Past projects and actions which have affected recreation uses include timber harvest, road construction, and recreation uses. Residual effects of past timber harvest influences dispersed recreation activities by displacing some uses (i.e. big game hunters may go to areas with more denser canopy covering, berry pickers may go to areas where plants are more abundant) whereas it may have encouraged other uses (i.e. open areas allow better viewing background scenery). Road construction has had both a positive and negative effect and has been viewed by some users as increasing access to areas, yet has had a negative affect for non-motorized users who may have previously used an unroaded area. The allowance of cross country travel has affected some non-motorized recreation activities due to sight, sound and emissions of vehicles. The establishment of dispersed camps has provided traditional camp sites by making user created routes to the sites and expanding areas for camping. These things would continue under the no action alternative; therefore there are no cumulative effects associated with the no action alternative.

ALTERNATIVES 2 and 3

Past projects and actions which have affected recreation uses include timber harvest, road construction, and recreation uses and have been incorporated into the existing condition for this project. This project in combination with current projects have a slight potential to influence dispersed recreation activities by displacing big game hunters, berry pickers, open areas for viewing scenery, etc. Decommissioning the two roads proposed in this project would not impact these motorized users on their own because they have grown in and are not currently being used; however, the Forest Travel Management Plan (TMP) has the most potential to impact motorized and

non-motorized users as it will designate roads, trails, and areas where the public may recreate with their motor vehicles. Restrictions on cross-country motor vehicle travel could reduce the effect to non-motorized recreation activities from the sight, sound and emissions of vehicles. It may also impact special uses such as firewood gathering and dispersed camping. Cross-country travel restrictions while possibly impacting firewood gathering, would provide additional protection to snags which may be more available due to the more open nature of the treated stands post-harvest and slash treatments.

B. Scenery

Introduction

Approximately 1 miles of road 7785, a level 2 visual sensitivity travel route is located along the northwest corner of the Sandbox project area and approximately 12 miles of the 7700 road (visual sensitivity level 1) is located along the southern border of the project area. Both of these roads receive high levels of summer and fall recreational use.

Assumptions and Methodology

The scenery effects analyses used for this report are those found in the Scenery Management Handbook #701, Appendix J. Scenery management is based on the classic aesthetic factors of form, line, color and texture, as well as the principles of sense of place. “Scenic integrity measures the amount of natural or socially valued appearance in a landscape along with the amount of visual disturbance that contrasts with and detracts from the appearance (the valued scenic character) existing at the time of measurement.” “Scenic stability is an indicator of the ecological sustainability of the scenic character’s valued attributes.” (Landscape Aesthetics, USDA, 1995, Appendix J, 2007)

No vegetation management treatments are proposed of the stands along road 7785; therefore, there will be no direct, indirect or cumulative effects to the scenery resources in that area and it will not be discussed any further in this analysis.

The project analysis area is the area from which the proposed treatments can be visibly discerned. All of the analysis is done within the project boundary.

The effects to the scenery resources can be short term and long term. Short term is usually less than 5 years, and long term is 5 years to 50 years. Effects that are eliminated by the natural course of a single growing season are not considered effects because they are a so short lived. Harvest treatments have long term effects while the other logging activities such as cable yarding, skidding and slash burning are usually short term effects lasting less than 5 years. Prescribed fire activities create short term effects to the landscape related to scorching of trunks and needles which are consistent with natural fire occurrence. Precommercial thinning affects are minimal and short term as well, reduced by regrowth of the understory vegetation that occurs within 1 to 2 years.

Effects Common to all Action Alternatives

Table 3.49 – Alternative 2 and 3 Treatment units along the 77 road Visual Corridor

Units	Prescription	Acres	Logging System
1	HOR	24	Tractor
2	HIM	129	Skyline
4	HTH	50	Skyline/Tractor
8	HPO/HIM	5/18	Tractor
9	HTH	29	Tractor
11	HIM	27	Tractor

Units	Prescription	Acres	Logging System
21	HIM	11	Tractor
34	HTH	20	Tractor
36	HOR	13	Tractor
38	HTH	90	Tractor

The effects of specific prescriptions which are proposed along the 77 road are described in this section.

Patch Openings – **HPO** – Prescriptions are designed to create small canopy openings (4-6 acres) to improve a stands resilience insect and disease outbreaks, create favorable conditions for western larch and white pine, and resilience to wildfire. The patch opening prescription would create patterns that appear natural in size, shape and form, which introduces visual diversity to the scene. This is the case especially where the characteristics of the openings borrow from or repeat nearby patterns. (Bradley, pg. 10, 1996) Where patch openings are utilized to improve the stand resilience to wildfire, the prescription contributes to improving scenic stability. Improving conditions for western larch and other fire resistant species, is a beneficial effect to scenery resources. (App. J, pg. 13, 2007)

Improvement Harvest – **HIM –** prescription cutting made in stands for the purpose of improving the composition and quality by removing trees of undesirable species, form or condition from the main canopy. This prescription creates a natural visual appearance by moving conditions toward the historical range, opening up stands to a more natural stocking level, and toward a species composition that is within the historical range, and thus more expected within a natural setting and therefore more desirable. The effort to move conditions toward the historical range usually contributes to the improvement of scenic stability. (App. J, pg. 13, 2007)

Overstory Removal Harvest – **HOR** – prescription is the removal of a portion of the remaining overstory over an established young stand of trees. The established stand would be precommercially thinning to improve stand health and vigor. Removal of selected overstory trees would reduce the potential for introduction of disease such as mistletoe and competition for site resources for the growing stand. This prescription would have similar visual effects to those described for HIM and PCT treatments. Young stands would be opened up to improve views into the stands and scenic stability over time.

Thinning harvest – **HTH** - prescription is generally a “thin from below” designed to reduce competition for site nutrients and concentrate growth potential on trees left on site. This is accomplished by removing smaller over -topped trees and some poor crowned intermediates/co-dominants which compete for site resources and creating ladder fuels into the crowns of the best quality trees which would remain on site. This treatment will create stumps, slash and soil disturbance that will be visible from foreground views. These effects will be minor within the first one to two years. As regrowth of shrubs and grasses occur these effects will be significantly reduced. This prescription does not create openings that area visible from middleground or background distances. The effects of this prescription do not reduce the scenic integrity.

Precommercial thinning – **PCT** - cutting or removal by slash buster or by hand of selected trees in a young stand to stimulate the growth of the trees that will remain on the site. The positive effects of this prescription are the removal of these trees opens view into stands. The negative effects to scenery are limited to foreground view effects of stumps, and slash. The slash is treated through slash busting or hand-piling and burning which reduces the effects to visually unapparent by the casual viewer. Precommercial thinning contributes to scenic stability by reducing the ladder fuels and stand densities that put scenic attributes at risk of wildfire that burn with characteristics beyond those of fires within the historical range.

Underburning Natural Fuels or Activity Fuels - Underburning natural fuels is a treatment uses to reduce litter and ladder fuels. Effects to scenery are usually minimal and short lived. A growing season reduces the effects to the remaining scorched tree trunks, and dead saplings. This treatment most successfully conserves scenery resources when thorough site preparation is done prior to underburning. Fire, at low intensity is a natural occurrence in this area, and its effects do not degrade the scenic quality. This treatment can greatly improve a stands resiliency to large stand replacement fire which can affect the scenic quality.

Direct and Indirect Effects on Scenery

ALTERNATIVE 1 – NO ACTION

Alternative 1, which proposes no action, would not cause any short term effects to scenic integrity, or scenic stability. Existing scenery integrity and scenic stability would remain the same.

The indirect long term effects of no action, related to the existing conditions and trends could be substantial. The overstocked stands are under greater and greater stress which is likely to lead to insect and disease epidemics. Fuel loads within the stands increase the hazards of stand replacement fire. All of these conditions pose increasing risks to scenic attributes, thus reducing the scenic stability. In the event of a stand replacement fire the scenic integrity would likely be greatly reduced by uncharacteristic fire in size and severity because the fire fighting opportunities would be limited due to fuel conditions that effect flame lengths and poor access and safety zones.

Continuing trends of increased understory vegetation will reduce views in and through the forest at the eye level in foreground views and thus reducing the diversity of color and texture available to viewers.
Within the next 20 to 30 years, acres identified as Condition Class Two will convert to Condition Class Three, adding to the area of potential risk to the vegetative component of the scenery resource.

ALTERNATIVES 2 and 3

The actions proposed in Alternatives 2 and 3 are designed to reduce fuel loadings and tree stocking and are designed in a manner that would not create unnatural or uncharacteristic impacts from a middleground or background view. The impacts visible from a foreground view would include stumps less than 6 in. height, some areas of soil disturbance and evidence of tree removal. The impacts to foreground views will not be concentrated enough to degrade scenic resources. Treatments that reduce the potential of a stand replacing fire improve the potential for maintaining scenic sustainability over the long term.

Stand treatments would reduce tree densities, open the canopy and let in more light to the forest floor. Treatments to remove poor condition live trees and reduce fuel loadings would enhance the landscape character through increasing the scenery attributes such as large trees and decreasing the dense thickets of suppressed trees and dead wood. The understory views would be improved and have a more healthy appearance.

Thinning to reduce tree densities and crown fuels would not be visibly apparent from a middleground or background distance. The stands from this distance would appear less dense but general with an evenly textured canopy. Treatments in Alternative 2 and 3 will improve the ability to sustain the existing landscape character attributes in the long term.

Pile burning and underburning will create scorched and blackened underbrush, saplings, bark, grasses and forbs. These effects will continue for 1 to 5 years. There is a possibility of the prescribed fire getting into the crowns of trees. This could cause a cluster of dead scorched trees. After the following growing season, the majority of the effects would no longer be visible as new

growth of forbs and shrubs would quickly sprout. There may be some minimal long term effects such as small patches of overstory mortality; however, the patches are not expected to detract from the landscape character.

The prescribed fire would improve conditions for fire resistant species, which would indirectly improve landscape character attributes of large tree character and open stands that can withstand low intensity fires. This treatment would improve visuals into the forest understory from foreground views.

Treatments would improve the long term scenic integrity, by opening the stands up for increased visibility and visual diversity. The logging activities would cause short term effects that will reduce scenic integrity for a period of 1-3 years. Tractor yarding and skyline cable yarding will create visible effects for the first year including ground disturbance, slash and debris, but after a growing cycle these effects will be negligible. See effects common to all action alternatives under assumptions.

The mitigation measures that would minimize the effects of logging activities include:

- New temporary roads and landings may be evident but must remain subordinate to the shape and pattern of the natural appearing forest canopy. By placing and designing roads and landings in a manner that is subordinate will reduce visual impacts.

- The HPO portion of unit 8 would not be adjacent to the 7700 road and therefore would be screened from view by the remainder of the stand.

- Skid patterns, slash, and soil exposure should be visually minor or unnoticed. By piling slash and minimizing skidding in the immediate foreground will maintain minimum visual impact.

Scenic Integrity

Travelers from the valley floor will not view any treatments from a background view. Treatments along FS road 7700 would be the most visibly apparent treatments. The views from Road 77000 are within VQO levels from modification to partial retention. There are 10 units visible from the road, ranging from 11 to 129 acres in size. However, most units are not completely visible from the road, only portions that are immediately adjacent will be visible. The immediate effects of these treatments include stumps, slash and ground disturbance such as skid trails. These effects are short term ranging from 6 months to 1 year. Slash will be treated by mastication and piling and burning. The stumps and ground disturbance will diminish as flora regrowth occurs. Stumps within the immediate foreground (300ft) may be visible until regrowth occurs as well. These unit prescriptions will open and clean up the forest floor and mid canopy, giving greater viewing distances into the timbered road side areas.

This is generally preferred by the viewing public. (Bradley, pg 6, 1996) The greatest expected visual benefit is the clean-up of the existing down wood and the produced slash. There are many areas within the immediate foreground where the dead wood on the ground is distracting from the visual experience. Removing some of the dead down materials will improve the visual appearance of this heavily timbered area. Units visible from a middle ground view will create natural appearing changes in the texture and form. The treatments will favor pine and larch species which will highlight the diversity of color of the larch stands.

The stands remaining will be more open allowing for a greater potential for viewing wildlife, land features and vegetation.

It is expected that short term effects to scenic integrity, related to logging activities under both action alternatives would be negligible within one to two years, meeting partial retention and modification.

Scenic Stability

The scenic attributes that combine to create the composition of this area are the steep topography, the rock rims and the coniferous stands. The steep timbered slopes create a moderately dramatic view with the rock rims accenting the visual scene. The vegetation provides a dramatic contrast with the grassy slopes.

The proposed treatments would provide for improved stand health and reduce fuel loadings while providing more old forest single stratum stand structure within the project area. The reduced fuel loadings in strategic areas would give firefighters greater opportunity to suppress fires that would otherwise burn at greater severity and size than is expected within the historic range.

The treatments that reduce ladder fuels will directly contribute to the sustainability of scenic attributes by altering fire behavior to a much lesser impact to the canopy. Treatments that favor fire resistant species by thinning around pine and larch species and by removing trees of undesirable species (non fire resistant) contribute to sustaining scenic attributes. Treatments that thin from below to reduce competition for site nutrients and concentrate growth potential of trees left on site would increase tree size and improve stand resiliency to fire. This treatment will have an indirect effect on scenic stability.

Cumulative Effects on Scenery

ALTERNATIVE 1 – NO ACTION

There are no expected cumulative effects from Alternative 1.

ALTERNATIVES 2 and 3

There are past harvest units that have caused disturbances in areas of retention and partial retention foreground; however these disturbances were minor, short term impacts and have recovered since the last entry into the area. The effects of past harvest entries has been incorporated into the existing condition. Because the treatments along the 7700 road are intermediate harvests and do not create openings that would degrade scenic integrity this project would not cumulatively negatively impact the viewshed along this road.

The prescribed burn activities within this project and other projects such as Medical Springs WUI would create short term visual impacts before spring green up the following year. These impacts include burned ground and scorched trees. However nearly all visual impacts are gone within 3 years.

Off highway vehicles can create ground disturbance that is a visual disturbance in foreground views. There are no measurable cumulative effects associated with this use in combination with the Sandbox project. There are no cumulative effects associated with existing roads or closed roads to visual resources.

Summary of Scenery Effects - The no action alternative will not address the vegetation conditions that are the beyond the historic range of variability. Alternative 1 will not reduce the risk of uncharacteristic wildfire that could cause undue effects to scenery, nor will it move the stands toward the desired condition. Alternatives 2 and 3 would move stands toward desired future conditions, while keeping effects to scenic integrity to a minimum, meeting all standards, while improving scenic stability.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Alternative 1 is compliant with the Visual Quality Objectives (VQO) that are Forest Plan Standards. It is expected that Alternatives 2 and 3 would not reduce the scenic integrity and thus retain the existing visual quality objective standards established in the Forest Plan.

Table 3.50 - Comparison of Effects by Alternative for VQO and Scenic Stability

VQOs	Alternative 1	Alternative 2	Alternative 3
Retention	Meets VQO	Meets VQO	Meets VQO
Partial Retention	Meets VQO	Meets VQO	Meets VQO
Modification	Meets VQO	Meets VQO	Meets VQO
Overall Project Area Existing Condition is Low Stability	No improvement	Improves to Moderate Stability	Improves but does not meet moderate stability

D. Required and Additional Disclosures

This section discloses the effects of the alternatives on the human environment as specified by law, regulation, policy, or Executive Order.

Cultural Resources

No impacts to any known cultural resource site would result from implementation of any of the action alternatives. Appropriate protection and avoidance measures have been designed and applied to the known sites existing within the project area in conjunction with the project Archaeologist.

Tribal Treaty Rights

Treaties provide that Native Americans will continue to have the right to erect suitable buildings for fish curing, privileges of hunting, gathering roots and berries, and pasturing stock on unclaimed lands. Indian treaty rights and privileges were considered throughout this analysis and maintained through appropriate design and layout features, especially related to first food resources such as fish, wildlife, and riparian areas.

Many plants that can be found in eastern Oregon may have cultural significance, and some of the plants may be present in the Sandbox Vegetation Management Project area. The following plants which may be of cultural significance may be found in environments similar to that of the Sandbox Vegetation Management Project: Grouse whortleberry, Blue huckleberry, Russet buffaloberry, Bulrush, Blue elderberry, Scarlet elderberry, Geyer's willow, Willow, Gooseberry/Currant, Alderleaf buckthorn, Yampah, Bolander's yampah, Bitter cherry, Common chokecherry, Lodgepole pine, Mock orange, Gray's biscutroot, Fernleaf biscutroot, Cous biscutroot, Bitterroot, Ocean spray, Strawberry, Hawthorne, Lanceleaf springbueaty, Horsehair lichen, Balsamroot, Big sagebrush, and Saskatoon serviceberry. (It should be noted that no official survey was conducted by WWNF botanists for presence/absence of these plants in the project area.) Continuation of cattle grazing at the current (2013) levels on active range allotments would likely have a neutral impact to the majority of the plants.

First foods are those individual resources, reserved in their Tribal treaties, to which Tribal members retained rights. These rights, such as hunting, fishing, and gathering roots and berries, have been acknowledged by the United States Supreme Court. The Tribes mission is to protect, restore, and enhance the first foods (including water, salmon, deer, cous, and huckleberry) for the perpetual cultural, economic, and sovereign benefit of the Tribe. They measure the success of resource management by the availability and utilization of these resources. The sustainability of these

resources is considered by them the minimum ecological condition necessary to meet the trust responsibility of the United States.

Tribal members have expressed interest in this project area specific to huckleberry gathering and the potential for maintenance and enhancement of huckleberry production for protection of tribal treaty rights. Treatment proposed under the action alternatives in the Sandbox project area (timber harvest and prescribed burning) would enhance huckleberry habitat and production. All alternatives are relatively equal in their treatment of treaty rights and are expected to maintain treaty rights and opportunities into the future. This responds to the non-key issue of Indian treaty rights and trust responsibilities.

Biological Diversity

All existing native and desirable introduced species and communities are maintained with all alternatives. Erosion control measures (seeding) would use native species when possible (EA, Chapter Two). Biological diversity is not expected to be affected.

Public Safety

No long-term public safety problems are anticipated with any of the alternatives. Short-term safety hazards such as log truck traffic and falling trees near roads would be mitigated through contract safety provisions and are not anticipated to impact public safety.

There is no expectation that there would be a change in public health and safety. Mitigation and precautions apply to the action alternative. Should a wildfire occur under any alternative, there could be an adverse impact to public health in terms of air quality and a change in the water quality. However, under Alternatives 2 and 3, safe firefighter ingress and egress would be improved and strategic areas from which to attack fires from would be created. No such improvement would occur under Alternative 1. Other safety measures are discussed in or are a standard part of sale contracts.

Standing trees that lean over or near roadways and present a hazard to public safety due to conditions such as deterioration or physical damage to roots, trunks, stems, or limbs would be removed from the project area.

There are no known effects on the human environment that are highly uncertain or involve unique or unknown risks. None of the actions threaten a violation of Federal, State, or local law. Action alternatives would comply with air and water quality regulations (laws). The effects on the quality of the human environment are not likely to be highly controversial based on public participation.

Research Natural Areas, Experimental Forests, and Wilderness

There are no research natural areas or experimental forests, associated with the Sandbox project area. There are no known significant cumulative effects from the project and other projects implemented or planned on areas separated from the affected area of the project beyond those evaluated in Chapter IV of the FEIS of the Forest Plan. The physical and biological effects are limited to this analysis area. No actions are proposed which are considered precedent setting.

The Eagle Cap Wilderness is located within 1-2 miles from the eastern edge of the Sandbox project area. The only potential impacts on the Wilderness area from this project are discussed under Fire and Fuels section of this chapter; however, any potential for smoke incursion from prescribed fire between July 4 and Labor Day would be restricted. Refer to the Potential Wilderness Area effects analysis in this chapter for a discussion of potential impacts to areas meeting potential wilderness criteria as defined by FSH 1909.12 Chapter 71.

Probable Adverse Environmental Effects that Cannot Be Avoided

Some impacts caused by implementation of management activities proposed in this analysis that cannot be avoided may be considered adverse according to individual interpretations. Stumps and disturbed areas are not a pleasing sight to some people, visually or environmentally. Truck traffic would compete with public traffic on roads used in common. Traffic and removal activities would also create dust and noise. Smoke from prescribed burning, fuels reduction, and slash disposal is an irritant and an unpleasant sight to some people. Recreation users may find changes to the areas they have visited in the past, either through reduced or increased access, changed landscape, or changes in vegetation.

Irreversible and Irretrievable Commitment of Resources

Irreversible resource commitments are actions that either deplete a non-renewable resource or disturb another resource to the point that it cannot be renewed within 100 years. There are no known significant irreversible resource commitments or irretrievable loss of timber production, wildlife habitats, soil production, or water quality from actions initiated under any of the alternatives. No heritage sites will be negatively affected.

Impacts to soil and water are controlled by management practices and mitigation measures and would not represent an irreversible resource commitment. For all practical purposes, rock is a non-renewable resource. Use of rock as surfacing represents an irretrievable commitment of a resource, although due to quantities of supply, it is not a significant commitment. Existing roads constitute a more-or-less permanent commitment of a portion of land to a purpose other than timber production.

Some non-designated old growth may be affected under the action alternatives, however, the affect is generally considered a positive one and there will be no net loss of old growth. In addition, some loss of snag habitat would occur under all action alternatives. It is not known whether this is an irretrievable or irreversible action at this time. It is also not known what impact this type of change may have on unidentified nest sites of management indicator species.

Energy Requirements of Alternatives

Management alternatives such as helicopter logging are less energy-efficient. The need for less energy-efficient and more expensive techniques is often due to the need to mitigate soil damage or adverse effects on watershed and other resources that would occur if more energy-efficient means, such as tractor yarding systems were employed. In this analysis, a combination of yarding systems and road development scenarios were developed in order to evaluate the tradeoffs of implementing various options.

Prime Farmlands, Range Land, Forest Land

Actions taken under any of the alternatives would have no impact on farmland, rangeland, or forestland inside or outside the National Forest. There are no prime farmlands affected by the proposal. Wetlands and floodplains associated with streams and springs would be protected using mitigation guidelines previously identified. No designated Wild and Scenic rivers would be affected by this project proposal.

Civil Rights, Women, Minorities, Environmental Justice

There are no known direct or adverse effects on women, minority groups, or civil rights of individuals or groups. Action alternatives are governed by sale or service contracts, which contain nondiscrimination requirements to prevent adverse impacts to these groups. The no action alternative may have some short-term adverse impacts on the local community by not providing timber sale receipts. To the greatest extent possible all populations have been provided the opportunity to comment before decisions are rendered on proposals and activities affecting human

health or the environment. The proposals within this EA would not have a direct or indirect negative effect on minority or low-income populations (Presidential Exec. Order No. 12898 on Environmental Justice).

Wetlands and Floodplains

Executive Order 11190 requires the Forest Service to "avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands". The Sandbox Project is consistent with this EO because it does not propose to destroy or modify any wetlands. Executive Order (EO) 11988 requires the Forest Service to "avoid to the extent possible the long and short term adverse impacts associated with the occupation or modification of floodplains. The Sandbox Project is consistent with this EO because it does not propose to occupy or modify any floodplain.

E. CONSULTATION WITH OTHERS

The Sandbox Vegetation Management project was published in the Wallowa-Whitman Schedule of Proposed Actions (SOPA), a quarterly publication, in 2010 and has appeared in each quarterly SOPA since then. The SOPA is available on the forest website at www.fs.fed.us/r6/w-w/projects/. It is also mailed to approximately 100 government offices, elected officials, and individuals.

A detailed description of the proposed action was mailed on March 26, 2012 to approximately 95 forest users, concerned publics, adjacent landowners, and members of the Union County Community Forest Restoration Board soliciting comments and concerns related to this project. Six letters of response were received from interested parties, which helped define the Issues identified in Chapter One and are located within the Public Comments section of the EA.

This project has been reviewed and approved by the State Historical Preservation Officer (SHPO).

Scoping and consultation for the project was initiated and is on-going with the Confederated Tribes of the Umatilla Indian Reservation.

On August 6, 2013, a field trip with interested public participants was held by the District Ranger to the project area to discuss the project activities proposed in this project area.

The Oregon Department of Fish and Wildlife (ODF&W) office was contacted as part of the Proposed Action scoping process.

Permittees who graze cattle within the Sandbox analysis area and adjacent landowners were notified of project planning activities.

An analysis file for this project is available for public review at the La Grande Ranger District. The analysis file includes specialist's reports, data specific to the project, public notifications and their responses, meeting notes, and miscellaneous documentation.

Resource specialists from the Wallowa-Whitman Forest Headquarters reviewed the project at several checkpoints along the way to provide feedback on the project design, analysis, and documentation.

Consultation with National Marine Fisheries Service and US Fish and Wildlife Service for threatened and endangered species has been completed for this project.

A 30-day Comment Period for this Environmental Assessment was published in The Observer newspaper. Comment letters received and responses are located in the appendix for this EA.

F. INTERDISCIPLINARY PARTICIPATION

We have participated in this analysis and believe the significant issues have been identified and addressed:

Name	Date	Title
Bob Clements	April 2013	Silviculturist
Tom Burry	June 2013	Logging Systems
Kat Naughton	July 2013	Fire/Fuels Specialist
Brad Lovatt	April 2013	Fisheries Biologist
Aric Johnson	April 2013	Hydrologist / Range Conservationist
Laura Navarrete	June 2013	Wildlife Biologist
Cindy Christensen	July 2013	Environmental Coordinator
Arlene Blumton	June 2013	Wildlife Biologist
Penny D. Hall	June 2013	Botanist
Erik Harvey	July 2013	Archaeologist
Randy Strohm	June 2013	Engineer – Trans Planner
Bret Yaw	July 2013	Engineer – Trans Planner
Josh White	June 2013	Invasive Species
Clayton Collins	June 2013	Invasive Species
Donna Mattson	June 2013	Landscape Architect