2.0 DESCRIPTION OF ALTERNATIVES

2.1 INTRODUCTION

An ID Team, representing various resources and uses of the Forest, developed a range of reasonable alternatives for the proposed project. The ID Team identified relevant issues and reviewed concerns presented during the public scoping period, and then formulated alternatives in response to these issues. Consistent with the HFRA, this EA will consider a minimum of three alternatives: No Action, Proposed Action, and one other action alternative. This chapter describes the alternative development process and the various components of each alternative. Descriptions of the resources potentially affected by the project and an analysis of the potential impacts is provided in Chapter 3, Affected Environment and Environmental Consequences.

The proposed project would comply with all laws and regulations including, but not limited to, the PSICC 1984 Forest Plan and subsequent amendments and Forest Service Directives (see also Section 1.5).

2.2 ALTERNATIVE DEVELOPMENT: GOALS AND OBJECTIVES

2.2.1 Stand Considerations

U.S. Forest Service Region 2 Vegetation data (R2VEG) was used to determine the primary/dominant vegetation types within the analysis area. All cover types were grouped into "Forest" or "Non-Forest" categories. "Non-Forest" is comprised of all grass and shrub cover types; "Forest" is comprised of various tree cover types, including pinyon pine and juniper. The following cover types are present within the analysis area; a general characterization of the cover type's fire ecology is also provided (see Map 5). Detailed discussions on fire ecology and fire regime characteristics are provided by cover type in the Wildland Fire and Hazardous Fuels section in Chapter 3 (Section 3.11).

2.2.1(a) Non-Forest Types (Grass and shrub cover types)

Grass and shrubland diversity is maintained by fire intervals ranging from 2-35 years for grass communities and from 35-100 years for shrub communities, depending on the species and community type. The health of these ecosystems has been declining for years due to fire suppression, encroachment of trees, and competition from exotic cool season grasses and noxious weeds. Typically, a heavy thatch layer develops in the absence of natural disturbances like wildland fire. Spring and fall burning has a stimulating effect on the growth and competitive vigor of native grasses and associated shrubs.

2.2.1(b) Forest Types

Aspen

Aspen communities are recognized for numerous values, including recreation, aesthetics, water yield, water quality, wood products, wildlife habitat, and landscape diversity (Kilpatrick et al. 2003).

Aspen is also important for its ability to stabilize soils, due to its extensive root structure, and provide habitat for many bird and mammal species. Aspen stands provide important nesting, roosting, foraging, or hiding cover for beaver, grouse, doves, warblers, juncos, and numerous

cavity dependent birds and mammals. Deer and elk browse aspen year-round, but they are especially dependent on the species during fall and winter when aspen protein levels are high relative to other browse species.

Aspen reproduces from seed, but root sprouts are the most common mode of regeneration. Aspen form clones that are connected by a common parental root system; this characteristic allows it to sprout vigorously after fire events, cutting, or other disturbances. Healthy stands also act as natural fuel breaks, which reduce fire intensity and severity, providing land managers with additional control options (Kilpatrick et al. 2003).

Before settlement, large expanses of aspen and aspen parkland existed throughout the west. These stands were often perpetuated as a shrublike cover by light to moderate intensity fires that swept across the prairie grasslands and ignited the aspen stands on a regular 3-15 year basis (Howard 1996).

Fire suppression since the 19th century has altered dynamics in aspen stands in the intermountain west by significantly changing fire return frequencies (Brown and Smith 2000). Without the occurrence of regular disturbance, aspen clones mature in about 80-100 years and regeneration for this species is threatened (Brown and Smith 2000). The dying back of mature stands is now favoring shade-tolerant conifers or, in some cases, grasses, forbs, or shrubs, depending on seed sources (Brown and Smith 2000).

Recent research shows a 50-96% decline in aspen in the western U.S., with a 49% decline in Colorado (Bartos 2001). Rapid mortality of trembling aspen (*Populus tremuloides*) has been reported from multiple locales throughout Colorado by varied observers since 2004 (Worrall et. al. 2008). This phenomenon, termed “sudden aspen decline,” or SAD, affected 139,000 acres of Colorado aspen in 2006. In 2007, substantial new areas of mortality were seen and the affected area statewide more than doubled, affecting more than 358,000 acres (13% of the aspen acreage). The southwestern and northwestern Colorado mountains are experiencing the worst damage (USDA 2008a); no SAD has been observed in the analysis area. Other potential contributing factors to widespread aspen dieback include the impacts of historic fire suppression, excessive livestock grazing and ungulate browsing, disease, insects, drought, logging, and possibly global climate change. In the absence of periodic moderate intensity fire, aspen will succeed to conifers or other vegetative types (Jones et al. 1985). For these reasons, aspen restoration should be considered a high priority throughout the western U.S. (Bartos 2001).

Limber Pine

Limber pine is common near ridgelines, although it grows well in many other sites also and is commonly multi-stemmed. It can be found in clumps with other species at any position on the slope. Limber pine does best with full sunlight and on drier sites. However, it is tolerant of some shade and will grow in the understory and on cooler, moister sites.

Limber pine trees can be infected by white pine blister rust (*Cronartium ribicola*). Increasing regeneration rates improves the chances of having some trees that are resistant to the disease. Limber pine is also susceptible to mountain pine beetle (MPB) infestation.

Pine nuts produced by limber pine are an important source of food for squirrels and other small rodents. Numerous bird species also consume the nuts as a food source. Clark’s nutcracker (*Nucifraga columbiana*) aids in dispersal and regeneration by caching pine seeds that later

germinate. In addition to its importance to wildlife, limber pine provides a hydrological benefit. Their spreading crowns and ability to grow on windy ridges result in snow accumulation and retention in drainages below. These attributes provide higher, deeper snowpack and delayed meltoff (USGS 2008). Limber pine has limited commercial value because of the poor form relative to traditional timber uses; however, some trees do attain saw log quality.

Young limber pine trees are susceptible to mortality, even from low-severity fires, due to their thin bark. Older trees, with bark up to 2 inches thick, can withstand scorching from low-severity fires (Johnson 2001).

Wildfires are less frequent in limber pine communities than in other conifer habitats because of limited productivity and fuel accumulation associated with poor soil development, short growing seasons, and/or late snowmelt (Johnson 2001). Where limber pine grows in association with other trees, the fire regimes of those species are relevant. In the analysis area, relevant fire regimes for limber pine include: Douglas-fir, ponderosa pine, and aspen (Johnson 2001).

Generally, limber pine growing in open stands can be maintained by periodic fires that reduce understory growth. Where limber pine and Douglas-fir codominate, fire can be a thinning agent that slightly favors limber pine over Douglas-fir in the younger age classes (Johnson 2001).

Pinyon Pine-Juniper Woodland

The range and density of pinyon pine and juniper (pinyon-juniper) woodland communities have expanded considerably over the last century in many parts of Colorado. Pinyon-juniper communities have expanded upslope into ponderosa pine forests and downslope into grass and shrub communities. In some areas, stand densities have increased to the point that larger proportions of pinyon pine-juniper woodland can now support crown fires. Because there is very little understory growth in these stands, fires typically move through the crowns only in the presence of moderate to strong winds.

There are relatively few vertebrates endemic to pinyon-juniper woodlands, but there are significant levels of biodiversity in less prominent organisms, such as herbaceous vegetation and soil organisms (Grahame and Sisk 2002).

Pinyon-juniper communities offer little commercial timber value other than fire wood (Grahame and Sisk 2002). In some areas throughout the southwestern U.S., pinyon pine nuts can be harvested and sold commercially; however, there is little evidence to suggest that this is happening within the analysis area at any measurable scale.

Fire events typically open pinyon-juniper stands, increase diversity and productivity in understory species, and create a mosaic of stands of different sizes and ages across the landscape. In addition, fire helps to maintain the boundaries between the woodlands and adjacent shrub- or grasslands (Anderson 2002 and Scher 2002). The accumulated fuel in the crowns due to the lack of self-pruning mechanisms, thin bark, and the relative flammability of the foliage make individual trees susceptible to fire (Anderson 2002 and Scher 2002). Fire kill of pinyon-juniper communities may be more extensive on flat to gently rolling terrain; in rough terrain, islands of unburned trees may be left on ridges and hills. Crown fires, or high severity fire, generally kill trees of all age classes (Anderson 2002 and Scher 2002). The reestablishment of pinyon-juniper communities following fire occurs solely by seed. Seedlings may appear within the first year following fire, but several decades may be required before many seedlings establish (Anderson 2002 and Scher 2002). Where stand-replacing fires do

occur and potential seed sources are removed, the dispersal of seeds by animals becomes particularly important in the reestablishment of tree seedlings (Anderson 2002 and Scher 2002).

Fire return interval (FRI) estimates for pinyon-juniper communities vary widely from <30 years to over 300 years (Anderson 2002 and Scher 2002). The variation in fire intervals is largely the result of differences in fuel loading and species composition; where vegetation is sparse and unable to carry fire, fire-free intervals are much longer than in areas with a well-developed understory or greater tree density. In the analysis area, pinyon-juniper communities are generally associated with mountain mahogany – Gambel oak – scrub communities with a FRI of <35 to <100 years.

After fire in pinyon-juniper habitat, junipers will usually reestablishes the area first, followed by pinyon, which may eventually replace juniper on higher sites (Scher 2002).

Ponderosa Pine

Ponderosa pine is found at lower elevations on a wide variety of soils, but mostly on sandy loams. It prefers south, west, and east aspects, but can be found on north aspects interspersed with other conifers. This tree is well adapted to grow on bare rock, with its roots following crevices or cracks in the rock and soil deposits.

Ponderosa pine forests have changed dramatically during the past 100 years. Since European settlement, activities such as logging, grazing, road and residential construction, and fire suppression have resulted in ponderosa forests typically composed of dense timber with numerous small diameter trees with thin bark, thick layers of ground litter and ladder fuels (Howard 2003 and Brown and Smith 2000). The dead and down material can increase fire intensity and make wildland fires difficult to extinguish.

Ponderosa pine forests provide habitats for various wildlife species, including Abert's squirrel. Ponderosa pine snags are consistently preferred over other species' snags for snag retention. Snags in the mature pine forest provide a large number of species with nesting and roosting sites. Big game, such as deer and elk, also use the pine forests for food and shelter.

Ponderosa pine makes excellent lumber for cabinet and construction work. It is used for veneer, core stock, and sheathing. It is used for paper pulp but demand is low. It is used for poles and has fair durability for posts. It is also used for fuelwood.

Among all conifer species within its range, ponderosa pine is best adapted to survive surface fires (Howard 2003). Specific fire adaptations include open crowns, self-pruning branches, thick insulative and relatively inflammable bark, thick bud scales, tight needle bunches, high moisture, and deep rooting. Periodic surface fire prepares a favorable seedbed for interior ponderosa pine regeneration by removing heavy litter and duff accumulation (Howard 2003). Ponderosa cannot survive crown fire, but mature trees can survive considerable scorching (Howard 2003).

Interior ponderosa pine evolved under a regime of frequent surface fires and infrequent mixed-severity and stand-replacement fires. Prior to the 1900s, interior ponderosa pine was perpetuated by surface fires that recurred every 5-30 years (Howard 2003). Fire return intervals tended to be shorter in the warm, dry forests of the Southwest than in the cool, dry forests of the central Rocky Mountains or the cool, relatively moist forests east of the northern Rocky Mountains. A fire history study of a 10,000-acre (4000 hectare) interior ponderosa pine-Douglas-fir site in central Colorado showed a pattern of frequent surface fires from 1197 to 1851

(Howard 2003). Large stand-replacement fires were rare, but several landscape-level fires were documented. FRI ranged from 1-128 years at the landscape scale and from 1-58 years for individual stands. There have been no extensive fires in the study area since 1851, and most stands have not experienced fire for nearly 100 years. Absence of fire in interior ponderosa pine and mixed-conifer forests has led to uncharacteristically large accumulations of surface and ground fuels. Structurally, fire exclusion has led to vertical continuity, with firs and other shade-tolerant, less fire-resistant species in the understory (Howard 2003). These late-successional species become ladder fuels that encourage crown fires in interior ponderosa pine and mixed-conifer forests (Howard 2003).

Douglas-Fir

Douglas-fir grows primarily on north aspects in cooler, moister sites. However, it will also grow in the understory on drier slopes with ponderosa pine. It can, in the absence of disturbance, replace ponderosa pine. Douglas-fir stands are usually mixed with other conifers of different age classes. This creates a potential for crown fire due to the presence of ladder fuels and heavy fuel loading.

The winged seeds are eaten by western squirrels, the red tree mouse, and the dusky-foot woodrat. The foliage and twigs are browsed by antelope, mule and white-tailed deer, elk, and mountain sheep. The staminate cones and needles of Douglas-fir provide a significant winter food of the blue grouse.

Douglas-fir is one of the world's most important and valuable timber trees. Historically, it was generally used by Westerners for telephone poles and railway ties; today, Douglas-fir is also grown for Christmas trees, and the tree's lumber is excellent for construction. A variety of construction grades of veneer are manufactured, and the pulp generally used for Kraft paper.

Douglas-fir is slower growing and much less fire resistant than ponderosa pine sapling and pole stages (Steinberg 2002). In the pole and sapling stages, Douglas-fir is susceptible to fire damage as its bark is thin, photosynthetic, and resin-filled (Steinberg 2002). Crown scorching of Douglas-fir often leads to infestation and subsequent mortality by Douglas-fir beetle. As the trees mature, they develop a relatively fire-resistance thick bark; however, fire resistance offered by the thick bark is often offset by low-growing branches, which may be retained even when shaded out and no longer green (Steinberg 2002).

During pre-settlement times, frequent fire often maintained ponderosa pine rather than Douglas-fir on drier sites, as Douglas-fir did not reach fire resistant size before the next fire (Steinberg 2002).

Douglas-fir relies on wind-dispersed seeds to colonize burned areas where trees have been killed. Mineral soil exposed by burning provides a good seedbed. Seedling establishment begins a few years after fire and is restricted to within a few hundred yards of seed trees adjacent to the fire or relatively undamaged by the fire.

Fire regimes in moist Douglas-fir habitat types are mixed, ranging from low to moderate severity surface fires at relatively frequent intervals (7-20 years) to severe crown fires at long intervals (50-400 years) (Steinberg 2002). Intense crown fires, or repeat fires, generally favor seral associates such as quaking aspen or Rocky Mountain lodgepole pine.

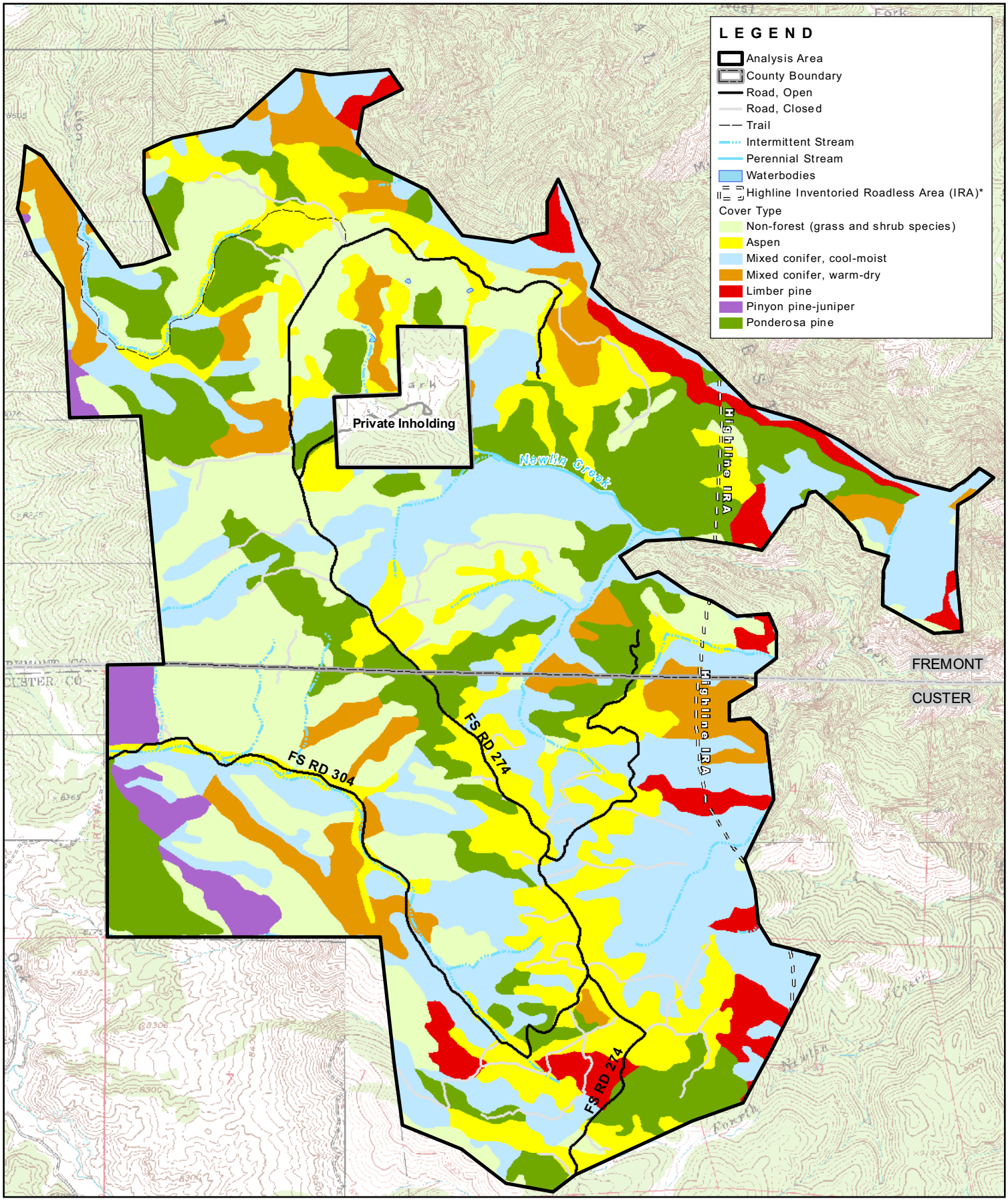
In central Colorado, there is no evidence of high frequency surface fires as is seen in the interior ponderosa pine/bunchgrass types of the southern part of the range (Steinberg 2002). Fire suppression has allowed the development of dense, Douglas-fir sapling thickets and increased risk of stand-replacement fire. Frequent fire prevented Douglas-fir and white fir from replacing ponderosa pine. Surface fires have been excluded for about 60-90 years in these stands, increasing the likelihood of stand-replacing fire (Steinberg 2002).

Mixed Conifer

Mixed conifer forests are dominated by Douglas-fir and/or white fir, with codominant species including limber pine and ponderosa pine. The understory often contains these coniferous species as well as broadleaved species such as Gambel's oak. Mixed conifer stands typically are moist and shaded. Fires are infrequent but are usually stand replacing with torching and crowning when they do occur. Mixed conifer forest types in the Locke Mountain analysis area consist of Douglas-fir, white fir, Colorado blue spruce, and Engelmann's spruce.

Spruce-Fir

R2VEG did not indicate that spruce-fir was a dominant cover type in the analysis area, such that it would appear as a stand alone cover type on Map 5 or in tables organized by cover type. However, field visits and groundtruthing efforts by both USFS and USFWS personnel have confirmed that this forest type is indeed present throughout the analysis area and is a considerable component in some stands, particularly in those areas identified by R2VEG as cool-moist mixed conifer and Douglas-fir.



0 0.25 0.5 1 Miles

Portions of the Highline IRA are located in the analysis area east of the white dashed line.

MAP 5

COVER TYPE

LOCKE MOUNTAIN FUELS MANAGEMENT EA
San Carlos Ranger District

Source Data: USFS Roads, USFS R2Veg, NHD Streams and Waterbodies (24k), USGS 10m DEM

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January 7, 2009

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2.2.2 Goals and Objectives

Goals and objectives for the fuels treatments were developed in direct response to the issues and opportunities identified during internal and public scoping and within the management and environmental constraints. Additionally, goals and objectives identified in the 2007 *PSICC Fire Management Plan* were also included. (A description of environmental constraints considered for the analysis area is provided in Section 2.3.2.)

Fuels treatment and biological objectives were established by habitat type to guide the development of distinct action alternatives. Table 2-1 summarizes the overall project objectives by dominant cover type.

Table 2-1. Overall Project Objectives for Fuels Treatments and Biological Improvements.

Cover Type	Fuels Objectives	Biological Objectives	Proposed Treatment to Achieve Objective
Non-Forest: Grassland/Meadows	• Reduce conifer encroachment	• *Penstemon degneri* – use established study plots to assess fire association/dependency • Improve the health of montane grasslands • Improve forage value	• Prescribed fire would be allowed within these sites where appropriate and/or feasible
Non-Forest: Shrubland (Gambel's Oak and Mountain Mahogany)	• Remove decadent shrubs • Stimulate new growth • Improve structural diversity	• Create openings in the shrub canopy	• Prescribed fire would be allowed within these sites where appropriate and/or feasible • Mechanical thinning with heavy and/or hand equipment, where necessary and where site conditions permit
Aspen: Young Stands	• Maintain the aspen clone by removing noncommercial conifer tree species (less than 8" diameter breast height [DBH]) • Reduce conifer encroachment • Species needs disturbance, emphasize mechanical treatments • Reduce fuel loading	• Create another age class by patch cutting selected stands • Stimulate regeneration of the aspen clone	• Prescribed fire would be allowed within these sites where appropriate and/or feasible • Mechanical thinning with heavy and/or hand equipment • Public fuelwood • 1-3 acre patch cuts
Aspen: Mature Stands (successional to aspen, conifer encroachment)	• Reduce conifer density • Open up for more clones • Enhance/increase the size of the aspen clone • Species needs disturbance, emphasize mechanical • Reduce fuel loading	• Clear cut where pathological reasons require; otherwise, maintain the larger diameter aspen trees by implementing size prescription guidelines (maximum DBH limits for cutting to preserve larger nesting trees and improve likelihood of suckering) • Stimulate regeneration of the aspen clone • Preserve snags	• Prescribed fire would be allowed within these sites where appropriate and/or feasible • Mechanical thinning with heavy and/or hand equipment • Mechanical harvest would be allowed • Public fuelwood
Limber Pine	• Thin stands	• Thin around clumps to	• Public fuelwood

Cover Type	Fuels Objectives	Biological Objectives	Proposed Treatment to Achieve Objective
	• Limb remaining trees • Reduce overall stand density to improve the health and vigor of the remaining limber pine	release limber pine • Stimulate regeneration • Prune or thin blister rust infected trees	• 1-3 acre patch cuts • Release cut • Prescribed fire follow up
Pinyon pine-Juniper Woodlands	• Remove decadent shrubs • Stimulate new growth • Reduce stand height • Improve structural diversity	• Create openings within the pinyon pine and juniper stands to improve habitat for wildlife	• Prescribed fire would be allowed within these sites where appropriate and/or feasible • Mechanical thinning with heavy and/or hand equipment • Public fuelwood
Ponderosa Pine	• Thin from below (reduce white fir, Douglas-fir, some ponderosa pine regeneration) • Increase canopy spacing (open stand) • Limb up remaining stand (raise CBH [crown base height], reduce ladder fuels, reduce torching) • Aspen and ponderosa pine are preferred leave trees/favored for retention • Reduce overall stand density to improve the health and vigor of the remaining ponderosa pine	• Preserve snags • Maintain clump diversity (Abert's squirrel) • Promote mosaic habitat	• Prescribed fire would be allowed within these sites where appropriate and/or feasible • Mechanical thinning with heavy and/or hand equipment • Mechanical harvest would be allowed • Public fuelwood
Douglas-fir (assume no remnant aspen stands)	• Remove white fir • Limb up remaining stand (raise CBH) • Create patchcuts • Increase canopy spacing (open stand)	• Promote openings by creating patchcuts • Promote additional age class diversity • Maintain clumps for red squirrel middens	• Prescribed fire would be allowed within these sites where appropriate and/or feasible • Mechanical thinning with heavy and/or hand equipment • Mechanical harvest would be allowed • Public fuelwood • Christmas tree sales, where accessible • 1-3 acre patch cuts
Mixed Conifer (assume no remnant aspen stands)	• See Fuels Objectives for Douglas-fir	• See Biological Objectives for Douglas-fir	• See Proposed Treatments for Douglas-fir

2.3 ALTERNATIVE DEVELOPMENT: CONSTRAINTS

2.3.1 Introduction

In addition to the applicable laws, policies, and regulations identified in Section 1.5, various environmental constraints dictate where treatments are feasible and what types of treatments are appropriate within the analysis area.

Geographic Information System (GIS) mapping was used to delineate specific environmental resources within the analysis area that present constraints or limitations for fuels treatments. Various resource limitations were compiled into a constraints composite used to exclude sensitive areas from certain treatment types.

2.3.2 Constraint Considerations

2.3.2(a) Steep Slopes and Sensitive Soils

Slope is the primary constraint for fuels treatment activities in the analysis area. Slope dictates where machinery can safely travel and operate, thereby limiting mechanical treatment opportunities. Slope was classified into three categories for this analysis: 0-30%, >30-40%, and >40% (Map 6). Approximate acreages in each slope category are presented in Table 2-2.

Soil Erosion Hazard Ratings indicate each soil map unit's susceptibility to erosion. This rating is intended for use in the planning of management activities to evaluate relative potential erosion hazards. The rating does not reflect natural or current erosion occurring on a soil unit. Instead, it is an indication of potential hazard, assuming that the surface cover of vegetation or leaf litter has been disturbed or destroyed and that bare surface soils are exposed to the elements of erosion, as would be the case after a fire or along a skid trail. A rating of **high** indicates that soils have moderate to high inherent erodibility, and are usually on moderate to very steep slopes. Soil particles are readily moved by overland flow after disturbance. These soils may require considerable expense to control erosion and sedimentation when management activities are planned for such areas (Irvine, in preparation). Within the analysis area, there are approximately 1,010 acres of **high erosion hazard soils;** approximately 764 acres (or 75%) occur on slopes greater than 30% (Map 7).

Steep slopes (either >30% or >40%, depending on the alternative) and soil units with **high** erosion hazard ratings have been excluded from all treatment types but prescribed fire. Pre-fire manipulation (e.g., hand thinning) may occur if site conditions permit the safe operation of crews and machinery.

Table 2-2. Analysis Area Slope and Sensitive Soil Acreages.

Slope Category	Approximate Acres	% of Analysis Area	% of Sensitive Soils within Slope Category*
0% - 30%	2,900	62%	25% (246 acres)
>30 - 40%	700	15%	21% (216 acres)
>40%	1,080	23%	54% (548 acres)

Source: USGS 10m Digital Elevation Model (DEM); EDAW GIS; Irvine, in preparation.
*Sensitive soils are those soil units with an Erosion Hazard Rating of high.

2.3.2(b) Mexican Spotted Owl Protected Habitat

The range of the Mexican spotted owl (MSO) was divided into six Recovery Units by the U.S. Fish and Wildlife Service (USFWS) in the 1995 *Mexican Spotted Owl Recovery Plan* (USFWS

1995). The San Isabel National Forest is within the Southern Rocky Mountains–Colorado Recovery Unit. The Recovery Plan recommends three levels of habitat protection:

1. *Protected Habitat:* Protected Activity Centers (PACs), steep sloped areas (greater than 40%) with no timber harvest in the last 20 years, and reserved lands
2. *Restricted Habitat*
3. *Other Forest and Woodland Types*

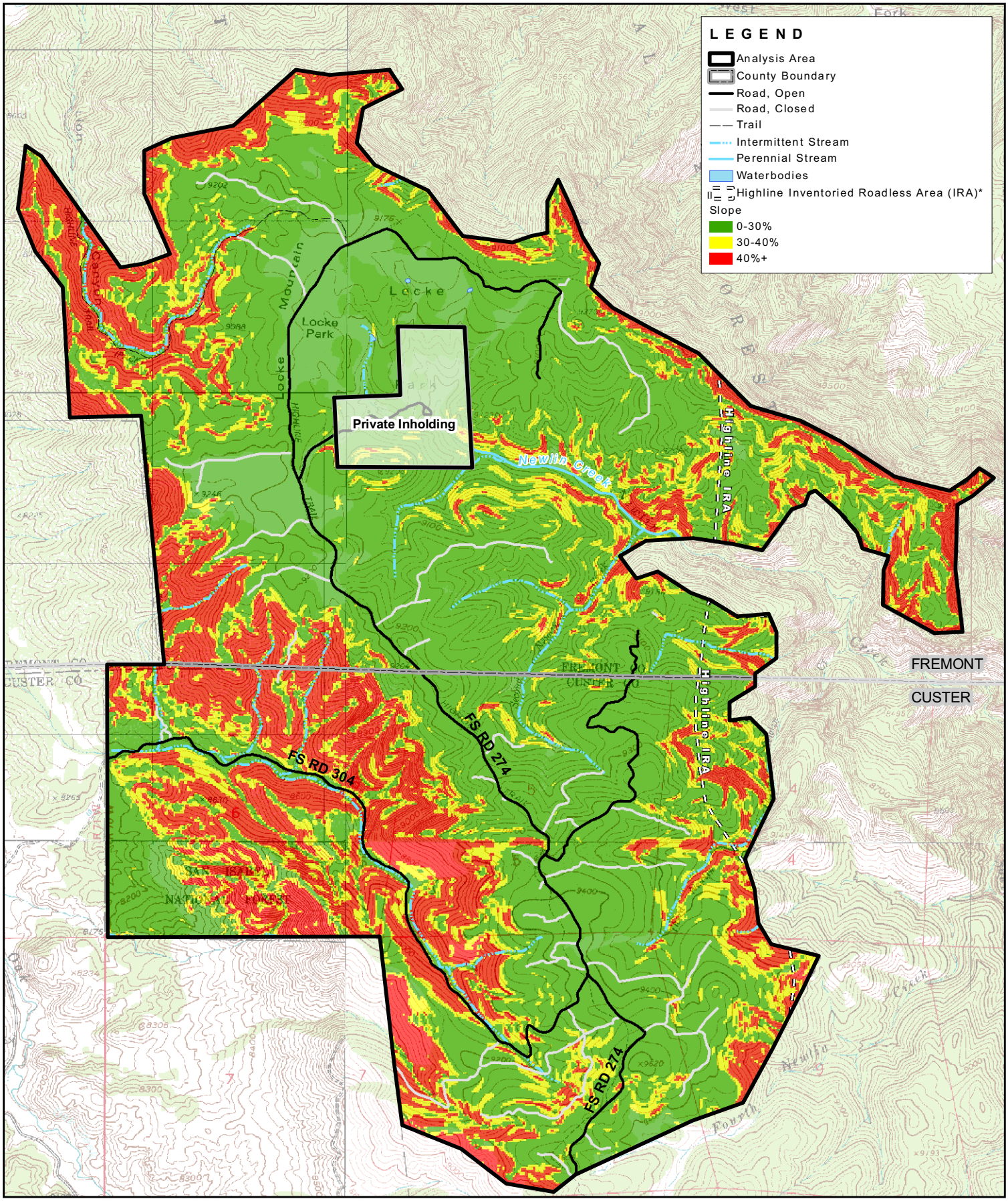
Protected Habitat, as defined in the 1995 Recovery Plan, refers to PACs and all other areas that are in mixed conifer and pine-oak types with slope >40% where timber harvest has not occurred in the past 20 years, and all legally and administratively reserved lands. Protected Habitat receives the highest level of protection under the Recovery Plan; most management activities are very restricted or disallowed altogether (USFWS 1995). Protected Habitat guidelines are intended to protect all occupied nesting and roosting habitat areas, as well as all unoccupied steep slopes and reserved lands (USFWS 1995).

The Locke Mountain analysis area does not contain any designated PACs; however, because of the steep slopes (>40%) and mixed-conifer and pine-oak cover types present, the analysis area does contain approximately 183 acres of Protected Habitat for MSO. Protected Habitat within the analysis area is shown on Map 11, located in Section 3.6.

The objective of Protected Habitat guidelines (in Protected Habitat areas located outside of designated PACs), which prohibits timber harvest but allows prescribed burning and pre-fire manipulation of fuels up to 9” DBH, is to retain habitat with existing conditions similar to MSO nesting/roosting habitat while simultaneously reducing fire risks.

The vast majority (81%) of MSO Protected Habitat in the analysis area is excluded from mechanical thinning and harvest treatments that utilize heavy equipment or machinery because of the slope and sensitive soils constraints discussed in Section 2.3.2(a). Therefore, the additional contribution of MSO Protected Habitat to the overall “constrained” area (34 acres) is relatively small. The differences in acreage between the 40% slope threshold and the MSO Protected Habitat are the result of various GIS mapping techniques and data sources for slope calculations.

All MSO Protected Habitat areas would be excluded from all treatment types but prescribed fire and hand thinning activities. Pre-fire mechanical preparation may occur through hand thinning operations if site conditions permit, but would not exceed the 9” DBH criteria as specified in the 1995 Recovery Plan guidelines. In MSO Protected Habitat areas located outside of PACs, no seasonal restrictions on management activities apply (USFWS 1995, Vol. I Part III, pg. 89).



0 0.25 0.5 1 Miles

*Portions of the Highline IRA are located in the analysis area east of the white dashed line.

MAP 6
SLOPE

LOCKE MOUNTAIN FUELS MANAGEMENT EA
San Carlos Ranger District

Source Data: USFS Roads, NHD Streams and Waterbodies (24k), USGS 10m DEM

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November 12, 2008

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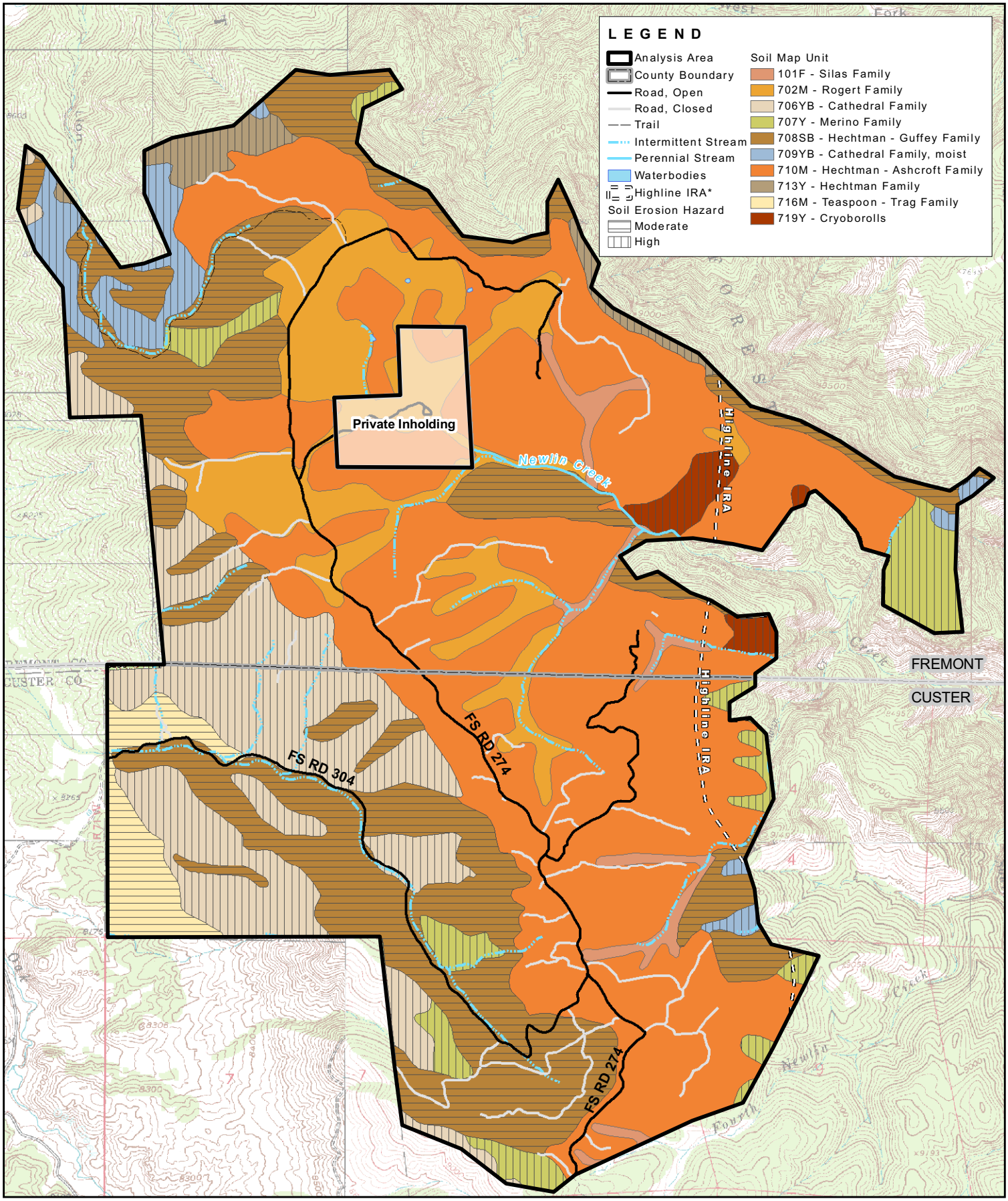

0 0.25 0.5 1 Miles

*Portions of the Highline IRA are located in the analysis area east of the white dashed line.

MAP 7

SOILS / EROSION

LOCKE MOUNTAIN FUELS MANAGEMENT EA
San Carlos Ranger District

Source Data: USFS Roads; NHD Streams and Waterbodies (24k); USFS Soils; Irvine, in preparation

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November 12, 2008

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2.3.3 Other Considerations

Various other potential constraints were considered for the development of alternatives. Ultimately, these considerations did not prohibit treatment types or locations, but nonetheless have been factored into the alternatives as described below.

2.3.3(a) Riparian and Water Influence Zone Areas

"The Water Influence Zone (WIZ) protects interacting aquatic, riparian, and upland functions by maintaining natural processes and resilience of soil, water, and vegetation systems," (USDA 2006b). A 100-foot buffer defining the water influence zone (WIZ) was applied to both sides of all perennial and intermittent streams and waterbodies within the analysis area, consistent with the U.S. Forest Service's Watershed Conservation Practices Handbook (Forest Service Handbook [FSH] 2509.25). Perennial and intermittent stream length totals are shown in Table 2-3.

Additionally, there are 332 acres of mapped riparian habitat within the analysis area (Table 2-3).

> Riparian areas are those plant communities adjacent to and affected by surface or ground water of perennial or ephemeral water bodies such as rivers, streams, lakes, ponds, playas, or drainage ways. These areas have distinctly different vegetation than adjacent areas, or have species similar to surrounding areas that exhibit a more vigorous or robust growth form. Riparian sites typically support a more diverse group of wildlife species [than wetlands]... Approximately 75% of the wildlife species known or likely to occur in Colorado are dependent on riparian areas during all or a portion of their life cycle. This is especially significant [given] that riparian areas make up less than 1% of the land mass in Colorado (NDIS 2004).

Table 2-3. Stream Types and Riparian Habitat Present in the Analysis Area.

Resource Type	Total of Stream Lengths and Riparian Area
Intermittent streams	10.5 miles
Perennial streams	0.9 miles
Riparian area*	332 acres

Source: National Hydrology Dataset (NHD) Streams, USFS Riparian data, EDAW GIS
*Riparian area includes mapped habitat only; it does not include the 25-foot protection buffer.

Combined, there are approximately 580 acres of mapped riparian habitat and WIZ in the analysis area. Approximately 90% of these areas are currently mapped as FRCC 1 or 2 (230 acres and 295 acres, respectively). The majority of the riparian and WIZ areas mapped as FRCC 3 occur in the western half of the analysis area. Mechanical treatment activities in the riparian and WIZ areas should be conducted for the purposes of reducing the likelihood of a riparian crown fire and to return the stand to within the historical range of variability (HRV). No riparian area treatments should be implemented if the area is currently within the HRV fire regimes. The decision to implement mechanical treatments in riparian and WIZ areas should be determined on a stand and drainage basin at the time of implementation.

For those riparian and WIZ areas where mechanical treatments are necessary, appropriate treatments have been developed consistent with the Hydrology and Soils and Wetlands and Riparian Design Criteria presented in Section 2.4.2. To minimize impacts to these sensitive resource areas, mechanical treatments in riparian and WIZ areas would be limited to hand treatments only. Additionally, heavy machinery, skidders, or other vehicles would not be

allowed to operate in these areas. If riparian or WIZ crossings are necessary, the least-damaging crossing locations would be identified by the Forest Hydrologist or Fisheries Biologist at the time of treatment. The removal of forest products would not be prohibited in these areas, but must occur through cable harvesting methods and directional falling. Riparian and WIZ areas are eligible for prescribed fire treatments; however, the ignition of prescribed fires within the WIZ is prohibited. Prescribed fires are allowed to move into and through these areas, but cannot be ignited within riparian and WIZ buffers.

Treatment type exceptions may be allowed, depending on site conditions, at the time of treatment; all treatment exceptions must first be reviewed and permitted by the Forest Hydrologist or Fisheries Biologist. Treatment type exceptions on Newlin Creek and any of it tributaries must also be reviewed with the USFWS due to greenback cutthroat trout concerns downstream.

2.3.3(b) Mexican Spotted Owl Restricted Habitat

Restricted Habitat, as defined in the 1995 Recovery Plan, refers to potential nesting and roosting habitat in unoccupied areas. Restricted Habitat areas include ponderosa pine-Gambel oak and mixed-conifer forests and riparian environments. In Restricted Habitat areas, the landscape should be managed to sustain or promote nesting habitat that is well distributed spatially. The Locke Mountain analysis area contains approximately 1,598 acres of Restricted Habitat. Restricted Habitat within the analysis area is shown on Map 11, located in Section 3.6.

The objective of the Restricted Habitat guidelines is to manage the landscape to maintain and create replacement MSO habitat where appropriate, while providing a diversity of stand conditions and stand sizes across the landscape; and to minimize threats to the MSO, retain and enhance important but difficult-to-replace habitat elements, and provide management flexibility.

The following Restricted Habitat guidelines are applicable to all proposed treatments in the analysis area; these guidelines are reiterated in Section 2.4.2, Design Criteria:

- Retain all trees >24” DBH.
- Retain hardwoods, large down logs, large trees, and snags.
- No stand that meets threshold conditions can be treated in such a way as to lower that stand below those conditions until ecosystem assessments can document that a surplus of these stands exist on larger landscape levels (e.g., no less than the size of a FS District). This does not preclude use of treatments to reduce fire risks or lessen insect or disease problems, nor does it preclude management to meet other ecosystem objectives as long as stand-level conditions remain at or above the threshold values shown in Table III.B.1 of the Recovery Plan.

Because the MSO Restricted Habitat guidelines are generally consistent with the fuels and habitat objectives of the project, the guidelines had very little bearing on the constraints or alternative development processes. However, the requirement to retain all trees >24” DBH and hardwoods, large down logs, large trees, and snags will be incorporated into the action alternative treatment types and project Design Criteria. Additional MSO habitat protection measures incorporated into the project Design Criteria for Fish and Wildlife can be found in Section 2.4.2.

2.3.3(c) Canada Lynx

The Canada lynx (*Lynx canadensis*), a Federally threatened species, was listed as a distinct population segment threatened species in portions of the lower 48 states by USFWS on April 24, 2000 (Ruediger et al. 2000) (see Section 3.6 for more information).

Lynx Analysis Units (LAUs) have been developed for the PSICC National Forests. Potential habitat is defined as having the capability to provide necessary habitat components. Dry forest types (i.e., ponderosa pine) were mapped as nonhabitat (Wrigley et al. 2007).

The Locke Mountain analysis area is located at the northern end of the Wet Mountain LAU. Approximately 3,872 acres of the analysis area are located in the LAU's boundaries. The potential habitat within the analysis area comprises approximately 2.4% of the total potential habitat within the LAU (see Table 3-6 and Map 10, both located in Section 3.6.)

The Southern Rockies Lynx Amendment (SRLA) was signed in October 2008. The SRLA decision amends eight Forest Plans in Colorado and Wyoming, including the Pike and San Isabel Forest Plan. This decision supersedes the 2000 Lynx Conservation Assessment Strategy (LCAS) in the SRLA area (USDA 2008b). The LCAS remains a valuable reference for lynx biology, behavior, and recent research. This EA will consider both the SRLA management direction and factors affecting lynx and recommended conservation measures identified in the LCAS (pertinent SRLA and LCAS guidelines can be found in Appendix C).

As stated in Section 1.2.3, approximately 92% of the analysis area (4,300 acres) is located within the 1.5-mile WUI buffer (See Map 3). The Wet Mountain LAU and WUI area overlap on approximately 3,500 acres within the analysis area; the remaining areas (8% or 380 acres of the analysis area) are non-WUI but are still within the Wet Mountain LAU.

The SRLA decision exempts fuels treatment projects in the WUI from vegetation management standards VEG S1, S2, S5, and S6 on up to 3% of lynx habitat by national forest, as well as allowing other exceptions including additional forest thinning (up to 1% by LAU) within lynx habitat (USDA 2008b). However, according to Guideline VEG G10, fuels treatments in the WUI should be designed *considering* standards VEG S1, S2, S5, and S6. It should be recognized that while these standards are not required for treatment projects within the WUI, this VEG G10 ensures that lynx are considered in project design and also underscores that, in many cases, these projects can be designed to reduce hazardous fuels while still providing for lynx needs (USDA 2008b). Fuels treatments within the non-WUI areas (approximately 380 acres or 8% of the analysis area) are not exempt from any vegetation management standards.

2.3.3(d) Degener's Beardtongue (Penstemon degneri)

Degener's beardtongue is a perennial herb in the figwort family (Scrophulariaceae), flowering in June and July, and fruiting in late July (Wrigley et al. 2007). Degener's beardtongue (*Penstemon degeneri*) is a regionally endemic species, is listed on the Regional Forester's Sensitive Species list, and is known to occur in the analysis area. It is geographically restricted to south-central Colorado. By 2004, 14 occurrence sites had been identified, although a few of those were suspected to be based on incorrect identifications (USDA 2008c). Only one known site is located in a protected area (Royal Gorge Park, near Canon City) (USDA 2008c). Five known sites occur on the San Isabel National Forest, and the other known sites are on BLM land (USDA 2008c). There are several known populations of Degener's beardtongue in the analysis area in the vicinity of Locke Park. All known occurrences are located in non-forest cover types (i.e., grasslands or meadow) or aspen stands within the analysis area. There is also potential for this species to occur in open ponderosa pine, limber pine, and pinyon pine-

juniper stands. These populations were a key contributing factor to the establishment of the Locke Park Potential Conservation Area (PCA) (CNHP 2008). The species may need fire to maintain open site conditions.

Because the known populations occur in a non-forest cover type that is not suitable for heavy mechanical thinning or harvest (see Section 2.2.1(a)), the species' occurrences were not considered to be treatment constraints. Treatments in these areas (under all action alternatives) would consist of "Meadow Enhancement" activities, including prescribed fire and hand treatments in conifer encroachment sites. Additional protection measures for the Degener's beardtongue are provided in the Vegetation Design Criteria, Section 2.4.2.

2.3.3(e) Inventoried Roadless Area

The Highline Inventoried Roadless Area (IRA) encompasses approximately 364 acres on the east side of the analysis area. IRAs consist of Forest Service lands that have been identified through government review processes as lands without existing roads that could be suitable for roadless area conservation as wilderness or other non-standard protections in the future. The 2001 Roadless Area Rule prohibits new road construction and reconstruction in IRAs on NFS lands and prohibits the cutting, sale, and removal of timber in IRAs, with the following exception:

> [For] the cutting, sale, or removal of generally small diameter trees which maintains or improves roadless characteristics (36 CFR 294.13(b)(1)):
> - To improve habitat for threatened, endangered, proposed, or sensitive species, or
> - To maintain or restore ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period (36 CFR 294.13(b)(1)(ii)).

The proposed project is consistent with the exceptions noted above. Neither alternative proposed would require the construction or reconstruction of roads within the Highline IRA; however, some cross-country travel by personnel vehicles and/or heavy machinery may be required within the IRA boundary in order to carry out proposed the proposed treatments.

The Forest Service is in the process of developing a state-specific rule to provide management direction for conserving Colorado roadless areas. On July 14, 2005, the State of Colorado announced it would submit a petition requesting specific regulatory protections for the inventoried roadless areas within the State. Since 2005, the petition has evolved through several iterations. The Roadless Area Conservation National Advisory Committee reviewed the 2007 petition in June 2007. In August 2007, the National Advisory Committee issued a unanimous consensus-based recommendation to the Secretary of the Department of Agriculture to direct the Forest Service, with the State of Colorado as a cooperating agency, to proceed with rulemaking based on the 2007 petition. The proposed rule would respond to the 2007 petition by establishing a system of Colorado Roadless Areas with protections for these areas that would supersede the 2001 Roadless Rule. The Notice of Availability for the DEIS for Rulemaking for Colorado Roadless Areas was published in the Federal Register on August, 1 2008. A Colorado Roadless Area rule is reasonably foreseeable, but the final guidelines are still largely uncertain. The Locke Mountain Fuels Management project has been designed consistent with the 2001 Roadless Rule, however, the Forest Service recognizes the final Colorado Roadless Area rule may require adjustments to the proposed treatment strategies at the time of implementation in order to conform to the final rules guidelines and requirements. All potential

project impacts discussed in Chapter 3 will be assessed against the guidelines of the 2001 Roadless Rule.

2.4 ALTERNATIVE DESCRIPTIONS

The treatment types proposed for specific areas were selected by ID Team specialists based on the physical and natural characteristics of the area, including the slope, soils, drainages, cover type, cover density, and proximity to access roads. The alternatives are described below; detailed treatment type descriptions, implementation parameters, and activities common to both action alternatives are included in the section immediately preceding the action alternatives (Sections 2.4.2 and 2.4.3).

2.4.1 Alternative A, No Action Alternative

The No Action Alternative provides a baseline for comparing the relative changes and effects that would occur with implementation of any action alternative. It considers what may result if the proposed project is not implemented. It is defined as a continuation of existing management practices. Current management plans would continue to guide management activities in the analysis area.

Under the No Action Alternative, no vegetation or fuels reduction treatments would be implemented within the analysis area. Natural processes, such as succession, insect and disease epidemics, or wildfires, would continue to occur under the No Action Alternative.

Summary of Treated Acres Under Alternative A – No Action

- 0 acres would be treated.

2.4.2 Design Criteria Common to Alternatives B and C (All Action Alternatives)

Design Criteria are management practices that can minimize or eliminate adverse effects of project implementation. Design Criteria Common to All Alternatives and Common to All Action Alternatives are discussed below. Design Criteria specific to one alternative only, are discussed within the respective alternative description.

Design Criteria and monitoring requirements have been incorporated into the action alternatives to reflect different ways of responding to relevant issues raised internally and externally. They **are not** intended to replace or substitute Forest Plan Standard and Guides but to support where Forest Plan direction is absent or outdated because of recent scientific research. They **are** intended to ensure compliance with the Forest Plan to avoid, minimize, rectify, reduce, eliminate, and/or compensate for adverse impacts of the proposed activity. This includes specific monitoring requirements for the avoidance of unexpected resource effects and the completion of project design and implementation as planned. The effectiveness of all Design Criteria, mitigation and monitoring will be assessed in more detail in Chapter 3 – *Affected Environment and Environmental Consequences.*

Air Quality

1. All prescribed burning would be conducted in a manner that complies with State of Colorado permit process for prescribed burns.
2. In accordance with state air quality regulations, the public will be notified prior to prescribed burning activities.

3. Minimize the potential for smoke impacts by burning only while fuels moistures are low.
4. Conduct prescribed fire activities during daylight hours only.
5. Avoid igniting fires less than two hours prior to sunset.
6. Ignite prescribed fires when mixing height and winds are most favorable for dispersal of smoke away from populated areas and/or other sensitive areas; avoid conducting prescribed fires during periods of temperature inversions.

Cultural / Heritage Resources

As stated in Chapter 1, no cultural properties eligible for listing on the NRHP have been identified within the analysis area. Any cultural property found eligible for the National Register of Historic Places (NRHP) will be protected through avoidance or treatment modification. In accordance with the National Historic Preservation Act (NHPA) and *Forest Service Manual* 2360 (FSM), all significant archeological sites will be protected (USDA 1990). The following Design Criteria are intended to protect any cultural property identified during project implementation:

7. All eligible archeological sites, including a minimum of 30- to 50-foot buffer (depending on slope and fuel loading), would be avoided and protected from damage by equipment traveling in the area and pile burning activities. The Zone Archeologist would determine the buffer and mark the area.
8. If artifacts, features, or other indications of previously unrecorded heritage resources are identified in the course of ground-disturbing activities, all work in the vicinity of those materials would cease and the Zone Archaeologist would be notified immediately. Appropriate measures would be implemented to preserve the integrity of the site.
9. The Zone Archeologist would identify areas where prescribed fire is not allowed, to avoid impacts to eligible sites. In areas with eligible sites, the Zone Archeologist would assist in identifying staging areas to avoid impacts to sites.
10. If heavy fuel loads exist on any of the archeological sites for which avoidance is stipulated, then those fuels may be removed by hand with a Zone Archeologist present.
11. Wood chips may be used on identified cultural sites to retard erosion and increase effective moisture, encouraging the growth of grasses and small forbs that act as stabilizing agents. The depth of the chips would be determined by the Zone Archeologist. The Zone Archeologist would supervise and monitor these activities.

Fish and Wildlife

12. Avoid cutting any trees (>8” DBH) that have evidence of being used as a nest tree (i.e., presence of constructed, natural, or excavated nesting cavities).
13. Leave a minimum of 8 snags/recruitment snags per acre (4 dead and 4 live [disease or insect prone, fork-topped, “wolfy”, broken-topped, crooked, etc. preferred]. Snags/recruitment trees should be the largest available DBH (ponderosa pines, preferably), or largest DBH and greatest number available, if less than 8 snags/acre present) in the treatment area. Snags and recruitment snags are to provide for nesting, roosting, and foraging habitat for small mammals and birds such as bats, woodpeckers, owls, songbirds, etc. Clumping (versus even spacing) of snags is preferable if desired snag species and larger DBH snags are available for the snag retention clump.
14. Paint a ring around all leave snags at DBH level and a butt mark at the base of each with timber marking paint. Record number of snags painted at the project site in project file. As an alternative option, if cut trees are to be marked, then verify and record or document that residual snag numbers and size class meet criteria in above.

15. Maintain at least 200 linear ft/ac of CWD, 12-inch or larger diameter at the small end; or largest and longest available.
16. To the greatest extend practical and feasible, restrict mechanical treatments (logging/thinning activities) and prescribed burning from May 1 to August 15, with some flexibility if burning windows and (to much a lesser degree) logging/thinning contractors/crews are not available outside of this period, in order to avoid disrupting migratory bird nesting and breeding.
17. Avoid implementing project activities in and near all raptor nest sites that show signs of recent activity over the last 0-3 years (i.e., fecal whitewash, feathers, bolus pellets, skeletal bones, or fur of prey species present at or around the base of a tree).
18. Contact a qualified wildlife biologist if any active/inactive raptor nests are located during project implementation.
19. Establish a nest area no activity buffer zone consistent with CDOW's *2002 Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors* around any active raptor nest (CDOW 2002; located in Appendix H).
20. Leave a variety of tree stockings per acre over the analysis area as a whole with some areas containing clumps of larger trees and others more open-canopied forest, creating a multi-aged multi-structured natural mosaic over the landscape to promote biological diversity for flora and fauna utilizing a variety of habitat types and structural stages of vegetation. Attempt to mimic natural/historical structural and seral conditions in the area. Avoid creating large uniform forested stands with little or no heterogeneity of horizontal and vertical structure.
21. Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx (VEG O1, USDA 2008b).
22. Provide a mosaic of habitat conditions through time that support dense horizontal cover and high densities of snowshoe hare. Provide winter snowshoe hare habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation (VEG O2, USDA 2008b).
23. Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover (VEG O4, USDA 2008b).
24. Retain all trees greater than 9" DBH in MSO Protected Habitat areas.
25. Retain all trees greater than 24" DBH in MSO Restricted Habitat areas.
26. Retain hardwoods, large down logs, large trees, and snags.
27. No stand that meets MSO threshold conditions can be treated in such a way as to lower that stand below those conditions until ecosystem assessments can document that a surplus of these stands exist on larger landscape levels (e.g., no less than the size of a FS District). This does not preclude use of treatments to reduce fire risks or lessen insect or disease problems, nor does it preclude management to meet other ecosystem objectives as long as stand-level conditions remain at or above the threshold values shown in Table III.B.1 of the Recovery Plan (Appendix D).
28. Prior to project implementation, all mapped MSO Protected Habitat areas north of Locke Park would be surveyed by a qualified wildlife biologist or all treatments in these areas must occur outside of the April 1 – August 31 breeding season.
29. The red-tailed hawk breeding season extends from February 15 through July 15 annually. The following seasonal restrictions and buffer requirements for fuels management activities will apply:

- >0.5 mile from active nest site: burning activities are permissible, regardless of breeding season
- <0.5 mile from active nest site: burning activities must occur outside of the breeding season
- Outside of the breeding season, vegetation manipulation or mechanical thinning is permissible anywhere in the vicinity of nest sites.

Hydrology and Soils

30. The Rocky Mountain Region (Region 2) of the Forest Service has developed the *Watershed Conservation Practices Handbook*, FSH 2509.25 (USDA 2006b), which provides standards, Design Criteria, monitoring direction, and recommendations for remedial actions to protect soil, water, and aquatic life. Region 2 has also established Soil Quality Monitoring Standards to be used for all forest and grassland management activities. The policy for these monitoring standards follows:
    - Management activities will be conducted to not exceed the Soil Quality Standards. The emphasis is on protecting the soil resource before excessive damage occurs.
    - Where excessive soil impacts exist from prior activity, the emphasis shall be on preventing any additional detrimental impact and on reclamation, where feasible.
31. A minimum 100-foot buffer on either side of perennial and intermittent streams and ephemeral areas would define the WIZ, as specified in the *Watershed Conservation Practices Handbook* (FSH 2509.25, Chapter 10; USDA 2006b). The WIZ includes the geomorphic floodplain, riparian ecosystem, and inner gorge.
32. All treatments would be conducted consistent with *Watershed Conservation Practices Handbook* guidelines (FSH 2509.25, Chapter 10; USDA 2006b).
33. Mechanical thinning treatments in the WIZ would be limited to hand treatments only.
34. If mechanical treatments are necessary in the WIZ areas on Newlin Creek or any of its tributaries, USFWS would be contacted prior to implementation to discuss proposed treatment activities and to reassess potential impacts to greenback cutthroat trout habitat.
35. Prescribed burning would be allowed to migrate into the WIZ from adjacent slopes, but would not be encouraged to do so; ignition of prescribed fire would not occur in the WIZ.
36. Heavy equipment and vehicles would be kept out of the WIZ, streams, swales, and lakes, except to cross at designated points, building crossing structures as needed, or if protected by at least 1 foot of packed snow or 2 inches of frozen soil.
37. Before heavy equipment and vehicles would be allowed to cross streams, the Fishery Biologist or Hydrologist would be consulted to determine where crossings would occur or be constructed, and to specify any stipulations necessary to minimize negative impacts on aquatic resources.
38. Heavy equipment and vehicles would not be allowed in streams during fish spawning, incubation, and emergence periods.
39. No coarse woody debris (CWD) (>6-inch diameter and >20-foot length) that is within 25 horizontal feet of live waters will be cut or removed.
40. No overstory trees providing shade to the riparian area are to be cut or removed (with the possible exception of disease or insect infested trees that need to be removed ensure operator and/or public safety and to prevent future crown fires in the riparian area).
41. No activities (i.e., skidding or dragging trees, equipment crossing stream channel, and potentially pile burning, etc.) that have a reasonable likelihood of causing sediment to

enter into perennial or intermittent stream waters are to be conducted in or immediately adjacent to (site-specific distances ~25-75 feet) riparian areas.

42. Any treatment activities in the riparian area would be limited to hand operations only (i.e., chainsaw or hand thinning/piling), and would be conducted for the purposes of reducing the likelihood of a riparian crown fire and to return the stand to within the HRV. No riparian area treatments are to be implemented if the area is currently within the HRV fire regimes.
43. Rehabilitate all project related skid trails per all applicable Design Criteria and restoration standards in the Watershed Conservation Practices Handbook (FSH 2509.25; USDA 2006b). In addition, use only Forest Service approved native grass/forb seed mixes for reseeding and scatter, or place residual CWD on old skid trails approximately every 100 feet.
44. Soil and water resources will be monitored by a qualified hydrologist or soil scientist during and after construction.
45. Avoid soil-disturbing actions during periods of heavy rain or wet soils. This includes times where severe puddling or runoff occurs along the trail, or obvious tracks or ruts can be seen following passage. Periods of heavy snowmelt should also be considered. Apply travel restrictions to protect soil and water during these times.
46. Construction equipment will be decontaminated before entering different sixth-level watersheds.
47. To minimize disturbance to riparian plants, soil, and wildlife, work camps will be located at least 300 feet from any waterway. All solid human waste from the crews and associated volunteers will be hauled to a sanitary dump station.

Range / Noxious Weeds

48. Best Management Practices (BMPs) for weed prevention practices will be followed according to Region 2, Guide to Noxious Weed Prevention Practices.
49. To reduce the risk of spreading noxious weeds, heavy equipment would be cleaned and inspected prior to entering NFS lands. All mud, dirt, and plant parts would be removed.
50. Treatment areas would be monitored pre- and post-treatment for noxious weeds. Weed locations identified would be scheduled for treatment by the Noxious Weeds Coordinator.
51. Protect range improvements; replace or repair if damaged by treatment activities.
52. Prior to implementation, the specific location, size, and timing of fuels reduction project will be coordinated with the Rangeland Management Specialist to avoid conflicts with permittees.
53. Avoid or minimize all types of travel and work in weed infested areas, if possible. Postpone travel and work until weeds have been eliminated from the site(s). To the extent possible, perform treatments working from uninfested areas to infested areas. This will help prevent the movement of weed propagules from infested areas to adjacent uninfested areas. Known weed infestations should be avoided if possible when locating fire lines.
54. Reseed after soil disturbing activities. Only certified weed-free Forest Service approved native grass/forb seed mixes will be used revegetation efforts.
55. Minimize sources of weed seed. If straw is used for stabilization and erosion control, it must be certified weed-free or weed-seed free.
56. Use only clean fill material from a weed-free source rather than borrowing fill from a weed-infested stockpile, road shoulder, or ditch line.

57. Landing sites should be located outside of weed infested areas to avoid spreading weed seeds.

Recreation

58. Crews will inform users of potential hazards and construction work to minimize delays for users passing through the analysis area. Portable warning signs will be placed above and below active work areas. Information notices about the project will be posted at the main trailheads.
59. Temporary trail and road closures may be necessary when pre-haul road maintenance or road rehabilitation pose a risk to visitor safety.

Roads and Access

60. Access routes would be designated within public firewood areas.
61. Only administrative and permitted access would be allowed on temporary roads (previously closed roads reopened for project purposes).
62. Temporary roads used during project activities would be closed by ripping and seeding with a Forest Service approved seed mix, and then signed to inform the public that vegetative restoration is in progress. Road closures would occur within six months after completion of the treatment(s) in that unit.
63. Gates and/or barricades would be installed on temporary roads and existing closed roads to restrict use by the public during operations and until final road closures occur.
64. Existing trails and roads would be maintained and used as control lines whenever possible to reduce the need for additional site disturbance. Decommissioned roads may be temporarily reopened to facilitate project activities; however, these roads would be closed and restored following project implementation.
65. No new road construction would occur within the Highline IRA.
66. Minimize cross-country travel by project vehicle and heavy machinery in the Highline IRA.
67. In areas where heavy machinery or vehicular cross-country travel is necessary, avoid routes that are perpendicular to the topographic contours.

Scenic Resources

68. Mark trees on the side opposite of roads and trails for 200 feet or sight distance. Mark cut trees instead of leave-trees where reasonable.
69. Vary spacing and blend thinned areas with untreated areas.
70. Leave stumps no higher than 8 inches; scatter or spread soil on the tops of fresh stumps when exiting mechanical treatment units.
71. Bury or scatter stumps that are pulled up as a part of roadwork.
72. Leave trees in natural patterns around rock outcrops.
73. Treatments should mimic natural landscape patterns, such as retaining elements of a park-like setting (larger ponderosa pines, random tree spacing, understory grasses and shrubs) for visual variety.
74. Return skid trails to as near natural condition as possible.
75. Slash depth would be retained at less than 18 inches and scattered to mimic natural surroundings.
76. Use whole-tree harvesting to minimize slash, where possible.

77. Minimize and screen slash piles, skid trails, and landing areas for 200 feet or sight distance from roads and trails.
78. Minimize the contrast between private and Forest Service land boundaries by avoiding straight lines in the treatment unit boundary layout.
79. Bury ashes of burned slash piles.

Vegetation

80. Prior to any fuels treatment, known threatened, endangered, or Regional Forester's sensitive species (RFSS) would be marked by the Forest Botanist.
81. Pile burning will not occur within 25 feet of known threatened, endangered, or RFSS plant populations.
82. Before heavy equipment and vehicles would be allowed to operate within 25 feet of wetland vegetation, the Forest Botanist would be consulted to determine appropriate travelways and to specify any stipulations necessary to minimize negative impacts on wetland vegetation.
83. The Forest Botanist would be consulted prior to prescribed fire activities in wetland vegetation to specify any stipulations necessary to minimize negative impacts on wetland vegetation.

Wetlands and Riparian

84. Avoid actions that may dewater or reduce water budget in wetlands.
85. Avoid any loss of rare wetlands, such as fens and springs.
86. The action alternatives will be designed to reduce adverse impacts in riparian habitats, including both direct and indirect effects resulting from damage to vegetation, increased erosion, increased sedimentation, and disturbance.

2.4.3 Activities Common to Alternatives B and C

2.4.3(a) Roads and Access

Existing county and USFS system roads would be used to access the analysis area; potential access roads (open and closed) are shown on the alternative maps (Maps 8 and 9). Analysis area access roads are shown on all maps. Access to and from the analysis area would be via County Roads (CR) 271, 143, and 401B and Forest Development Roads (FDR) 274 and 304. County roads would be maintained according to Custer and Fremont County Road and Bridge Department standards; Forest Roads would be maintained as needed for safety and environmental considerations.

No new permanent NFS or county roads would be constructed for the proposed project. Within the analysis area, there are 10.2 miles of existing open NFS roads. No existing open NFS roads in the analysis area would be decommissioned after the project is complete. As discussed in Section 2.3.3(e), no new roads would be constructed with the Highline IRA.

All NFS roads are maintained at one of five maintenance levels or standards. Maintenance levels are defined by FSH 7709.58,10,12.3 as the level of service provided by, and maintenance required for, a specific road (USDA 2003). Maintenance levels must be consistent with road management objectives and maintenance criteria.

All open roads in the analysis area are maintained at the level 2 standard. Road maintenance level 2 is defined in the FSH 7709.58,10,12.3 as:

> Assigned to roads open for use by high-clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to (1) discourage or prohibit passenger cars, or (2) accept or discourage high-clearance vehicles (USDA 2003).

Approximately 8 miles of FDR 274 (maintenance level 2) would be rehabilitated to accommodate log trucks and other project vehicles. Pre-haul rehabilitation and maintenance would include grading and curve widening. The rehabilitation and maintenance activities would not change the road classification; all activities would be consistent with the maintenance level 2 standard:

> The implementation of road rehabilitation and maintenance activities associated with the proposed project does not require a roads analysis prior to implementation. However, the Responsible Official has the discretion and duty to determine whether or not a roads analysis below the Forest scale is needed and the degree of detail that is appropriate and practicable (FSM 7712.12 and 7712.13; USDA 2003).

Approximately 11 miles of maintenance level 1 roads (decommissioned) would be temporarily reopened to access treatment areas.

All closed roads in the analysis area are maintained at the level 1 standard. Road maintenance level 1 is defined in the FSH 7709.58,10,12.3 as:

> Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are “prohibit” and “eliminate.”
>
> Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for nonmotorized uses (USDA 2003).

Closed roads would be reconstructed to the minimum standard necessary (maintenance level 2) for safe and efficient use by project equipment and personnel; this would likely include some vegetation clearing and minor earth movement. During project implementation, these temporary roads would be gated and locked when treatments are not in progress to ensure public safety and to prevent unauthorized recreational or off-highway vehicle (OHV) use. The temporary roads would be closed, obliterated, and barricaded with earthen berms within 12 months of project completion. Upon successful restoration, as specified in the Roads and Access Design Criteria (Section 2.4.2), these temporary roads would resume maintenance level 1 or decommissioned status. Temporary roads do not require the completion of a roads analysis for their use.

Heavy equipment, including skidders, feller bunchers, and other harvest machinery and vehicles would be allowed, but not encouraged, to travel cross-country in treatment units if existing or temporary access roads are not available (with the exception of in riparian habitat or WIZ areas where crossings and travel ways must be pre-determined by a Forest Hydrologist and/or Botanist).

2.4.3(b) Limber Pine Enhancement

Limber pine is a slow growing, long-lived species. Currently, white pine blister rust is a significant threat to the species throughout its entire range. In all areas, limber pine stands would be improved, enhanced, or promoted regardless of the alternative selected for implementation. Patch cuts ranging from 0.25- to 1-acre in size followed by fire would favor limber pine regeneration.

2.4.3(c) Treatment Options

Nine possible treatment options (Table 2-4) are proposed for the analysis area. The alternative descriptions (Sections 2.4.4 and 2.4.5) will identify which treatments are proposed for the respective alternatives and the acreages identified for that particular treatment method. The potential treatment options include:

Table 2-4. Treatment Types Proposed for Alternatives B & C.

Treatment Type	Applicable Alternative(s)
FIRE TREATMENTS	
Prescribed fire (non-forest cover types)	Alternatives B & C
MECHANICAL TREATMENTS	
Mechanical thinning	Alternative C only
Mechanical harvest and public fuelwood	Alternative C only
Mechanical enhancement	Alternative C only
COMBINATION TREATMENTS	
Meadow enhancement	Alternatives B & C
Mechanical thinning followed by prescribed fire	Alternative B only
Mechanical harvest and public fuelwood followed by prescribed fire	Alternative B only
Mechanical enhancement followed by prescribed fire	Alternative B only
LIMITED TREATMENT	
Limited area treatment / No treatment	Alternatives B & C

Fire Treatments

Prescribed Fire

Prescribed fire would be used to reduce hazardous fuel accumulation, promote and enhance regeneration (grasses, forbs, shrubs, and trees), and reintroduce fire into fire-dependent ecosystems. This treatment type is proposed for non-forest cover types; no removal of forest products would occur under this treatment type.

Prescribed fire units would be prepared during project implementation using natural fuel breaks, roads and trails, blackline, handline, and wetline. If crews, chainsaws, or other mechanized equipment can be operated safely in prescribed fire only areas (typically designated because of steep slope constraints), pre-fire mechanical treatments and light mechanical preparation work

may be completed prior to ignition to improve holding features and to ensure that the prescribed fire is maintained within the prescription set forth in the prescribed fire plan.

Pre-fire mechanical treatments may be necessary to construct control features, fuel breaks, delineate treatment zones, or to reduce existing fuels to loads that can be safely and predictably treated with prescribed fire. Pre-fire mechanical treatments would be conducted where necessary and where site conditions (e.g., site-specific slope or soil conditions) permit the safe operation of machinery and crews without excessive resource damage. On steep slopes and in MSO Protected Habitat areas, pre-fire mechanical treatments would be limited to hand treatments only.

Specific examples of pre-fire mechanical preparation work include: 1) limbing trees to a height of approximately 6-8 feet (primarily along firelines and at critical holding points), 2) construction of handline and/or all-terrain vehicle dragline, to mineral soil, as a boundary between burn units, 3) bucking and removing large concentrations of dead and down material from beneath larger live trees and snags (dead and down material would be moved to open areas within the unit), 4) falling snags near holding lines to ensure control of the prescribed burn, and 5) blacklining - burning off along the control lines prior to the ignition of the main fire, creating a large swath of burned fuels that will improve holding. This could be done several days before the main ignition or on the same day. Natural and existing fuel breaks would be used when possible.

Aerial ignition (plastic sphere dispensers, helitorch), hand ignition (drip torches, fusees) and/or all-terrain vehicle torch ignition may be used alone or in combination. Fire managers would work with resource specialists to determine if holding lines need to be rehabilitated.

A prescribed fire plan and appropriate smoke permits would be completed and approved prior to burning. The prescribed fire plan would address such items as unit delineation, weather parameters, necessary holding resources, sensitive areas (i.e., power lines, highways, and improvements), public safety, and smoke concerns. Prescribed burning of individual units would likely be completed in 2-3 days, with residual smoke lasting 1-3 days.

Broadcast burning would not be implemented in mechanically treated areas that do not meet minimum criteria for prescribed burning operations. These could include areas in proximity to private or developed lands and/or areas that exhibit other characteristics, such as unsuitable terrain, erratic wind patterns, smoke dispersal issues, or other factors that increase risk during broadcast burns. Broadcast burns would typically occur during daytime hours in the spring once the surface fuels have dried out from snow; however, snow may also be used to provide additional control features.

Pile burning would occur in areas where broadcast burning is not desired or where fuels must be reduced prior to broadcast burning. The average size of hand piles would be approximately 8 feet long x 8 feet wide x 6 feet high. The average size of mechanical piles would be approximately 30 feet long x 15 feet x 10 feet high. Pile burning would typically occur during daytime hours in the fall and winter months, ideally when there is a minimum of 2-4 inches of snow on the ground. Piles would be burned within 12 months of treatment unit completion.

Fire treatment activities in riparian habitat areas would consist of hand lighting low-severity back burn-type prescribed fire, and would be conducted for the sole purposes of reducing the likelihood of a riparian crown fire or to return the area to within the HRV.

Mechanical Treatments

Mechanical Thinning

Mechanical thinning would be used to reduce hazardous fuel accumulation, promote a diversified forest structure and composition, and enhance regeneration. Mechanical thinning (and harvest) treatments would employ uneven-aged management strategies such as small group selection/patch cuts to encourage multi-story attributes and ensure that several age-classes and tree sizes remain in the stands throughout the analysis area.

The removal of forest products would occur under this treatment type, but is not the primary objective of the treatment type. The primary focus of the mechanical thinning treatment is to open the stands such that they are more conducive to regeneration by removing the sub-dominant, understory species, and dead and down fuel.

Precise treatment prescriptions would vary by species and geographic area. Slope, density, road access, and season would dictate the actual prescriptions. All mechanical thinning activities would emphasize the use of patch cuts or small group selection and targeting of stem exclusion areas. Stem exclusion usually occurs upon canopy closure, when one or more growth factors, most commonly light, is limited and new stems cannot become established. Specific treatment prescriptions would be generated through a series of criteria and then further refined during field visits with other specialists, such as foresters, wildlife biologists, and botanists.

Mechanical thinning activities would emphasize uneven aged management through the creation of scattered 1 to 3-acre patch cuts (or small group selection), particularly in the non-WUI portions of the analysis area. These patch cuts would create larger openings that are more conducive to regeneration than those created under a single-tree selection strategy. Patch cuts would be used to create a matrix of forested and open areas or “micro-habitats” in various stages of succession. The total acreage of these treatments should not exceed 25% of the stand area proposed for thinning, including the construction of temporary roads or access routes; in effect, this would reduce the total threshold to a maximum of approximately 20% of the stand area (Ellwood 2008 and Picard 2008). The specific locations of patch cuts would be identified by the Forest Silviculturist, Wildlife Biologist, and Fire Ecologist at the time of implementation, and would be designed to maximize potential wildlife habitat and silvicultural benefits.

Where site conditions permit, some areas may be left untreated altogether or as “reserves” if it would not detract from the primary project objective of reducing hazardous fuels and associated fire risks. The specific locations of reserve or untreated areas would be identified by the Forest Silviculturist, Wildlife Biologist, and Fire Ecologist at the time of implementation, and would be designed to maximize potential wildlife habitat and silvicultural benefits. For example, stands that exhibit dense, old growth characteristics or dense horizontal cover suitable for snowshoe hare would be considered for reserves during site selection and/or the overall development of treatment prescriptions.

Mechanical treatments would be implemented with the assistance of heavy equipment, such as harvesters, feller bunchers, hydro-ax or bullhog heads, skidders, cables, or by hand operations including hand and power saws. As stated in Sections 2.3.3 and 2.4.2, with the exception of riparian or WIZ areas, cross-country travel would be allowed, but not encouraged, where established access routes are not available.

Mechanical thinning activities may include limbing trees and/or falling trees. Examples of pre-treatment preparation work include: 1) bucking and removing large concentrations of dead and down material from beneath larger trees (dead and down material would be moved to open areas within the unit), and 2) falling snags near unit boundaries.

Several timber landing sites, approximately 0.25-0.5 acre each, would be established prior to treatment activities. Landing sites are open areas with good access used for processing and stacking logs before they are loaded onto haul trucks. Machinery and equipment would be stored in these areas when treatments are not occurring. The exact number and locations of landing sites would be dependent on the type of machinery or equipment used. As such, exact landing sites cannot be determined until after contracting for the treatment is complete. As stated in Section 2.4.2, landing sites would be located outside of weed infested areas.

Mechanical treatment activities in riparian habitat areas would consist of hand operations only, such as chainsaw or hand thinning/piling, and would be conducted for the sole purposes of reducing the likelihood of a riparian crown fire or to return the area to within the HRV.

Harvest and Public Fuelwood

Harvesting is a method of promoting and restoring forest structure, composition, and processes through the removal of mature and merchantable timber products. The removal of forest products is the major component of this treatment type. Although forest products will vary from site to site, typical products would include saw logs, post and pole, pulp, and firewood. A primary objective of this treatment type is to remove the co-dominant and dominant species, subsequently releasing and enhancing growth of sub-dominant species. As discussed under the mechanical thinning description, harvest treatments would employ uneven-aged management strategies to ensure that several age-classes and tree sizes remain in stands and throughout the analysis area.

Treatment prescriptions would vary by species and geographic area. Slope, density, road access, and season would dictate the prescriptions. Treatment prescriptions will be generated through a series of criteria and then further refined during field visits with other specialists, such as foresters, wildlife biologists, botanists.

The harvest method by forest cover type is clearcutting in aspen and Engelmann spruce in areas located outside of lynx habitat; shelterwood in interior ponderosa pine, pinyon pine-juniper, and warm-dry mixed conifer; and patch cuts (small group selection) of approximately 1-3 acres in lynx habitat areas.

Examples of pre-harvest preparation work include: 1) bucking and removing large concentrations of dead and down material from beneath larger trees (dead and down material would be moved to open areas within the unit), and 2) falling snags near unit boundaries.

Methods of tree removal include, but are not limited to, chainsaws, harvesters, feller bunchers, skidders, dozers, cable harvesters, and log trucks. As stated in Sections 2.3.3 and 2.4.2, with the exception of riparian or WIZ areas, cross-country travel would be allowed, but not encouraged, where established access routes are not available.

Several timber landing sites, approximately 0.25-0.5 acre each, would be established prior to treatment activities. Landing sites are open areas with good access used for processing and stacking logs before they are loaded onto haul trucks. Machinery and equipment would be

stored in these areas when treatments are not occurring. The exact locations of the landing sites would be dependent on the type of machinery or equipment used. As such, exact landing sites cannot be determined until after contracting for the treatment is complete. As stated in Section 2.4.2, landing sites would be located outside of weed infested areas.

Dead and insect- or disease-infected stands that are in excess of the required snag and CWD numbers needed within treatment areas (see Fish and Wildlife Design Criteria in Section 2.4.2) may be harvested and removed from the area. Remaining stands would be thinned to reduce stand density. Openings would be created to promote natural regeneration in the area and increase structural diversity.

After harvesting is complete, the slash and hazardous fuels in the area may be reduced through public and commercial fuelwood gathering, sales, and/or prescribed fire. Prescribed fire includes pile burning, broadcast burning, or a combination of both. In areas with heavy, residual hazardous fuels, pile burning may used. See the section on prescribed fire for more details. Slash generated from harvest activities or timber sales may also be chipped or lopped and scattered.

Harvest treatment activities in riparian habitat areas would consist of hand operations only (i.e., chainsaw or hand thinning/piling, and cable harvesting), and would be conducted for the sole purpose of reducing the likelihood of a riparian crown fire or to return the area to within the HRV.

Mechanical Enhancement

Mechanical enhancement treatments would be implemented in limber pine stands to remove competing conifer species. The objective of this treatment type is to stimulate regeneration and to improve the health of limber pine stands, specifically. Mechanical enhancement includes those treatment methods described for mechanical thinning. Additionally, 0.25- to 1-acre patch cuts would encourage regeneration.

Where mechanical enhancement activities overlap with riparian habitat, treatments would consist of hand operations only (i.e., chainsaw or hand thinning/piling, hand lighting of low-severity back burn-type prescribed fire), and would be conducted for the sole purpose of reducing the likelihood of a riparian crown fire or to return the area to within the HRV.

Meadow Enhancement

Meadow enhancement would consist of removing encroaching conifer species from the meadow edge and interior. Meadow enhancement consists of mechanical treatments, including hand treatments, and/or prescribed fire. Slash resulting from mechanical treatments would be lopped and scattered and broadcast burned or piled and burned. Openings in the forest are being lost at an alarming rate; the objective of this treatment type is to maintain meadow areas in an open condition.

The operation of heavy machinery and pile burning would not be conducted in areas with known Degener's beardtongue populations. Treatments in these areas would be limited to pre-fire hand thinning and prescribed fire only. See the Vegetation Design Criteria (Section 2.4.2) for additional detail.

Treatment activities in riparian habitat areas would consist of hand operations only (i.e., chainsaw or hand thinning/piling, hand lighting of low-severity back burn-type prescribed fire),

and would be conducted for the sole purpose of reducing the likelihood of a riparian crown fire or to return the area to within the HRV.

Limited Treatment / No Treatment

Constrained areas (i.e., areas with steep slopes, sensitive soils, and/or MSO Protected Habitat) would receive either no treatment or prescribed fire treatment only, where feasible. Light mechanical preparation work may be conducted prior to ignition as necessary to prevent increased crown fire risk and as site conditions and access permit. In MSO Protected Habitat areas, pre-fire thinning of trees >9" DBH is not allowed.

2.4.4 Alternative B (Proposed Action)

In addition to the activities identified as common to all action alternatives (Sections 2.4.2 and 2.4.3), the following criteria are specific to Alternative B – Proposed Action:

- Mechanical treatments would be used on slopes up to 40%, provided that crews and machinery could operate safely and without excessive resource damage;
- Slopes greater than 40% would be treated with prescribed fire only; pre-fire mechanical treatment, limited to hand treatment only, could be used on slopes greater than 40%, provided that crews and machinery could be operated safely and without excessive resource damage;
- Mechanical treatments would be followed with prescribed fire treatments to the greatest extent possible;
- Implementation strategies would emphasize commercial treatments, including competitive bid or stewardship contracts; noncommercial strategies such as public fuelwood cutting would be allowed, but would not be emphasized.
- Implementation would occur over a period of 3-5 years.

The following treatment methods are proposed for Alternative B – Proposed Action. Treatment method descriptions are provided in Section 2.4.3. Approximate treatment method acreage is provided in parentheses in **boldface** text. These acreages do not reflect the acreage left as untreated or in reserve. Reserve area acreages would be determined during the development of treatment prescriptions. As such, the following acreages, particularly with respect to Mechanical Thinning and Mechanical Harvest represent the maximum acreage possible for the treatment type. Alternative B acreage tables (Tableset 2-5) are provided at the end of this chapter.

- Prescribed Fire (**198 Acres**; non-forest cover types)
- Meadow Enhancement (**458 Acres**)
- Combination of Mechanical Thinning followed by Prescribed Fire (**816 Acres**)
- Combination of Mechanical Harvest and followed by Prescribed Fire (**1,302 Acres**)
- Combination of Mechanical Enhancement followed by Prescribed Fire (**102 Acres**)
- Limited Treatment (**1,808 Acres**; constrained areas treated with pre-fire hand treatments and prescribed fire)

Within the areas identified for Mechanical Thinning and Mechanical Harvest, 1-3 acre patch cuts would occur on up to 109-182 acres (12-20% of the total area eligible for patch cuts, 912 acres).

Implementation Strategies

Congress has recently enacted legislation extending and expanding stewardship contracting authority with communities, the private sector, and others, allowing the Forest Service to enter into long-term contracts (up to 10 years) to meet land management objectives. This authorization allows the Forest Service to treat a greater amount of NFS lands through the use of "bundled" contracts and the treatment of vegetation at a landscape scale (Healthy Forests and Rangelands 2008).

Stewardship contracts focus on producing desirable results on the ground that improve forest and rangeland health and provide benefits to communities. Additionally, the new stewardship contracting authority allows forest products to be exchanged for ecological restoration services, which may include thinning and removing brush (Healthy Forests and Rangelands 2008).

Generally, stewardship contractors remove woody biomass. Stewardship contractors' utilization of woody biomass includes its harvest, sale, offer, trade, and/or use. This utilization results in the production of a full range of wood products, including timber, engineered lumber, paper and pulp, furniture and value-added commodities, as well as bio-energy and/or bio-based products such as plastics, ethanol, and diesel (Healthy Forests and Rangelands 2008).

The competitive bid process would consist of a formal procedure in which interested parties submit a sealed bid to the Forest Service who then selects the party with the best terms, including qualifications and pricing. The competitive bid process would entail the thinning and/or removal of logs under a formal contractual arrangement with the Forest Service. Hazardous fuels reduction and standard logging contracts are two examples of competitive bid contracts. Under a standard logging contract, a timber company would submit an offer to purchase stumpage or merchantable timber from the Forest Service. These contracts typically include clauses or other provisions requiring the treatment or disposal of residual slash. Under a hazardous fuels reduction contract, the company (i.e., wildfire mitigation company) would complete fuels treatments for profit.

Summary of Treated Acres Under Alternative B – Proposed Action

- Approximately 2,876 acres are eligible for mechanical and/or prescribed fire treatments.
- Approximately 1,808 acres are excluded from treatment (due constraint criteria) or are eligible for Prescribed Fire treatments only, where feasible.

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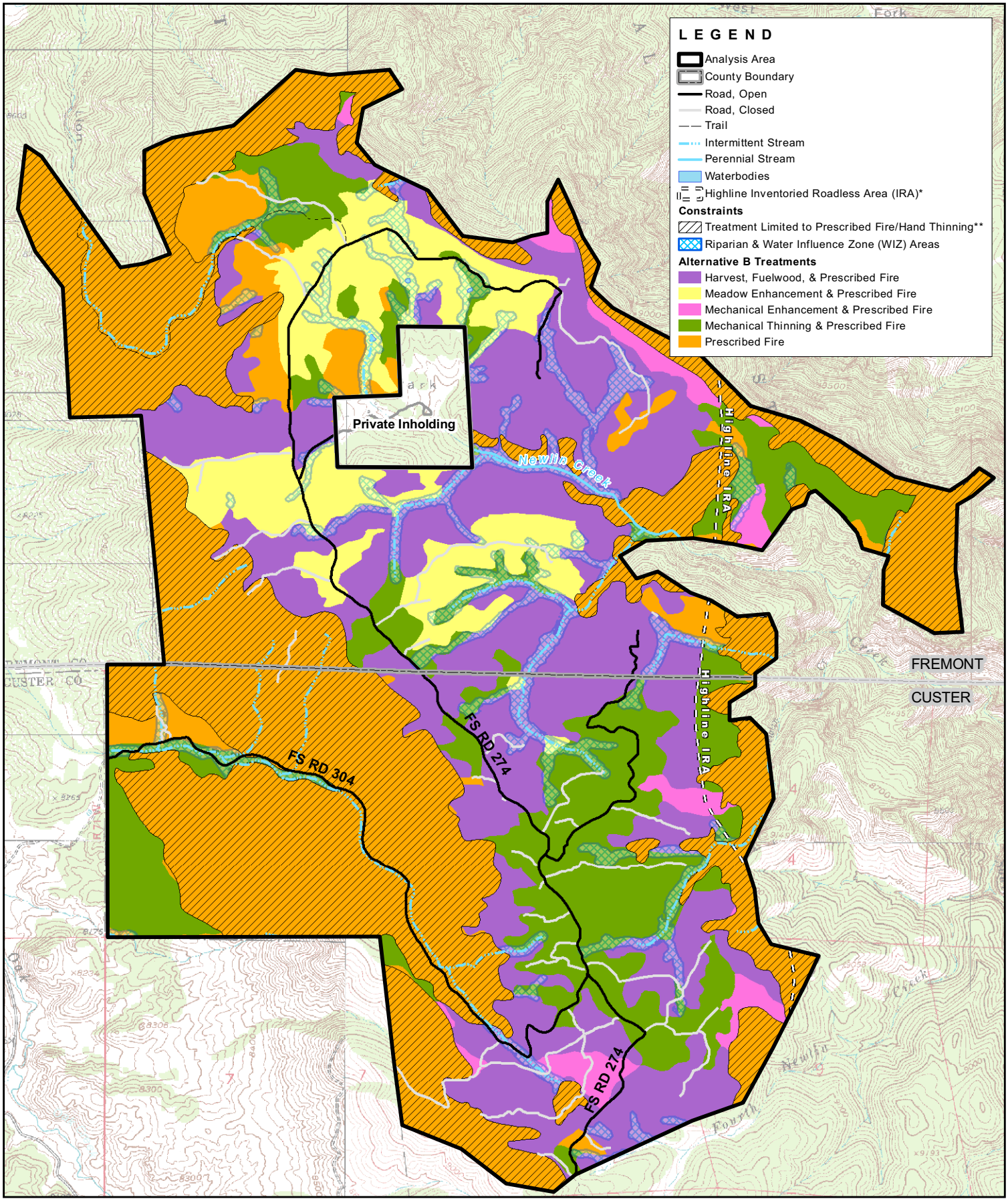

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*Portions of the Highline IRA are located in the analysis area east of the white dashed line.

**Limited treatment areas consist of steep slopes (>40%), Mexican Spotted Owl Protected Habitat, and areas where the soil erosion hazard rating is high. Treatment is limited to Prescribed Fire and pre-fire mechanical preparation by hand. Hand treatments may occur where site conditions permit safe operation of crews and equipment.

Source Data: USFS Roads, USFS R2Veg, NHD Streams and Waterbodies (24k), MSO Protected and Restricted Habitat, USGS 10m DEM, USFS Riparian Data

MAP 8
ALTERNATIVE B

LOCKE MOUNTAIN FUELS MANAGEMENT EA
San Carlos Ranger District

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November 12, 2008

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Notes on Tables 2-5a-d: Alternative B Treatments / Constraints.

1. Tables 2-5a through 2-5d show unconstrained areas (acres) only. In Alternative B, the constraint areas are those areas that exceed 40% slope, have a soil erosion hazard rating of "3", or consist of MSO Protected Habitat.
2. Constraint areas in Alternative B = 1,808 acres. These areas would either be a) left untreated or, b) be treated only with prescribed fire (pre-fire mechanical preparation may occur as necessary and where site conditions permit safe operation of equipment).
3. Under Alternative B, mechanical treatments would be supplemented with follow-up prescribed fire treatment whenever possible and practical (i.e., areas would receive both mechanical and prescribed fire treatments).
4. Table 2-5d (the last in this set) shows the constrained area (acres) only. As stated in note #2, these areas would either be a) left untreated or, b) be treated only with prescribed fire (pre-fire mechanical preparation may occur as necessary and where site conditions permit safe operation of equipment).

Table 2-5a. Alternative B: Cover type v. treatment type.

Cover Type	Harvest & Fuelwood Followed by Prescribed Fire	Meadow Enhancement	Mechanical Enhancement Followed by Prescribed Fire	Mechanical Thinning Followed by Prescribed Fire	Prescribed fire only	Grand Total
Non-forest: grassland		374			92	466
Non-forest: shrubland					51	51
Aspen	196	54		467	7	724
Mixed conifer / Douglas-fir	628	29		223		880
Limber pine			102			102
Pinyon-juniper				3	12	14
Ponderosa pine	478			122	37	638
Grand Total	**1,302**	**458**	**102**	**816**	**198**	**2,876**

Table 2-5b. Cover type v. size class.

	Large 9.0-15.9" DBH	Medium 5.0 - 8.9" DBH	Small 1.0 - 4.9" DBH	Very large >16.0" DBH	(blank)*	Grand Total
Non-forest: grassland					466	466
Non-forest: shrubland	7	39	5			51
Aspen	122	148	441	13		724
Mixed conifer / Douglas-fir	428	138	99	216		880
Limber pine	92	3		7		102
Pinyon-juniper	14					14
Ponderosa pine	189	126	37	285		638
Grand Total	**853**	**454**	**581**	**522**	**466**	**2,876**

*Non-forest cover types.

Table 2-5c. Alternative B: Treatment type v. size class.

Treatment Type	Large 9.0-15.9" DBH	Medium 5.0 - 8.9" DBH	Small 1.0 - 4.9" DBH	Very large >16.0" DBH	(blank)*	Grand Total
Harvest, fuelwood	572	347		383		1,302
Meadow enhancement	35	1	29	18	375	458
Mechanical enhancement	92	3		7		102
Mechanical thinning	130	62	510	113		816
Prescribed fire only	24	41	42		91	198
Grand Total	**853**	**454**	**581**	**522**	**466**	**2,876**

*Non-forest cover types.

Table 2-5d. Alternative B Constraint Areas: Cover type v. size class . (Refer to Note #4 above.)

Cover Type	Large 9.0-15.9" DBH	Medium 5.0 - 8.9" DBH	Small 1.0 - 4.9" DBH	Very large >16.0" DBH	(blank)*	Grand Total
Non-forest: grassland	50	479			13	13
Non-forest: shrubland	50	479				529
Aspen	39	46	6	2		93
Mixed conifer / Douglas-fir	418	295	16	52		782
Limber pine	85	1		4		91
Pinyon-juniper	85					85
Ponderosa pine	37	17		162		216
Grand Total	**715**	**838**	**22**	**220**	**13**	**1,808**

*Non-forest cover types.
Source (all tables): R2VEG, EDAW GIS

2.4.5 Alternative C

With some minor exceptions, treatment area boundaries (polygons) are the same as in Alternative B. The main difference between the treatment area boundaries proposed in the two action alternatives is a result of different constraint areas. Due to the lower steep slope threshold in Alternative C (30% in Alternative C as opposed to 40% in Alternative B), more area is identified for prescribed fire treatments only or no treatment at all. Although the prescribed fire differences are mostly subtle, there are several areas that are easily discernible: Lion Canyon, Newlin Creek, Second Newlin Creek, and the eastern edge of the analysis area, including the eastern arm.

In addition to the activities common to all action alternatives (Sections 2.4.2 and 2.4.3), including road rehabilitation activities and the enhancement of limber pine stands, the following criteria are specific to Alternative C:

- Mechanical treatments would be used on slopes up to 30%; provided that crews and machinery could operate safely and without excessive resource damage;
- Slopes greater than 30% would be treated with prescribed fire only; pre-fire mechanical treatment, limited to hand treatment only, could be used on slopes greater than 30%, provided that crews and machinery could be operated safely and without excessive resource damage;
- In areas unconstrained by slope, soils, or habitat, mechanical and prescribed fire treatments would be exclusive; there would be no overlap between these treatment types;
- Implementation strategies would emphasize noncommercial treatments, including Forest Service Force Account, seasonal fuels and timber crews, and public fuelwood sales; commercial strategies would be allowed, but would not be emphasized.
- Implementation would occur over a period of 3-5 years.

Each of the Alternative C treatment areas would receive only one treatment type, mechanical or fire (whereas Alternative B proposes to follow mechanical treatments with fire treatments to the greatest extent possible). For the purposes of discussion and analysis, the mechanical treatments proposed for the Alternative C polygons should be considered unique from the mechanical treatments described under Alternative B, with the exception of the “Mechanical Enhancement” treatment type.

The following treatment methods are proposed for Alternative C. Treatment method descriptions are provided in Section 2.4.3(c). Approximate treatment method acreage is provided in parentheses in **boldface** text. These acreages do not reflect the acreage left as untreated or reserve. Reserve area acreages would be determined during the development of treatment prescriptions. As such, the following acreages, particularly with respect to Mechanical Thinning and Mechanical Harvest represent the maximum acreage possible for the treatment type. Alternative C acreage tables (Tableset 2-6) are provided at the end of this chapter.

- Prescribed Fire (**155 Acres**)
- Mechanical Thinning (**655 Acres**)
- Mechanical Harvest and Public Fuelwood (**893 Acres**)
- Mechanical Enhancement (**44 Acres**)
- Meadow Enhancement (**431 Acres**)

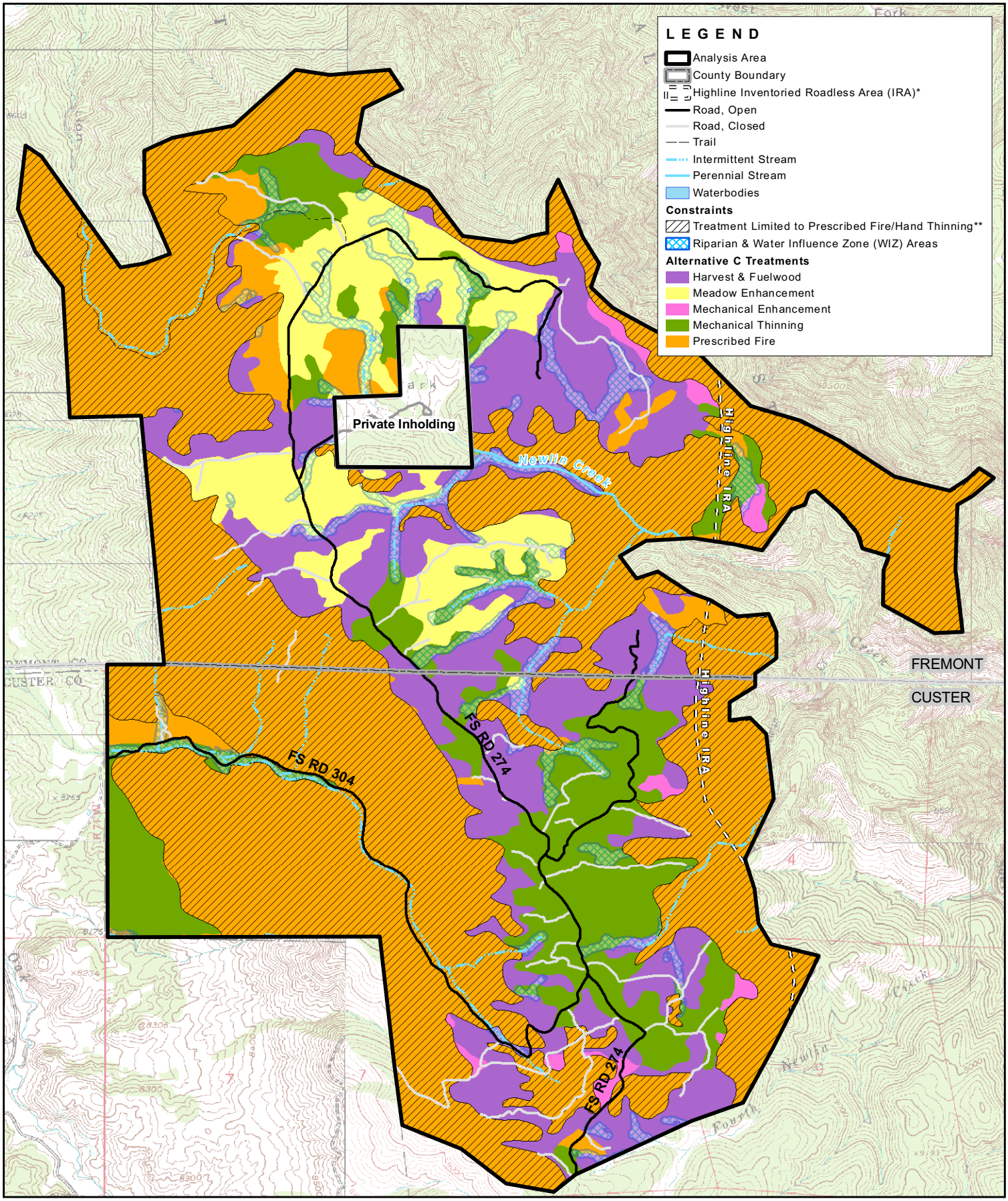
- Limited Treatment (**2,505 Acres**)

Within the areas identified for Mechanical Thinning and Mechanical Harvest, 1-3 acre patch cuts would occur on up to 70-116 acres (12-20% of the total area eligible for patch cuts, 580 acres).

Implementation Strategies
Force Account labor would use Forest Service personnel and equipment or equipment leased or rented by the Forest Service.

Treatment units would be opened to the public at specific times for fuelwood gathering (under permit) and/or Christmas tree sales.

Summary of Treated Acres Under Alternative C
- Approximately 2,179 acres are eligible for mechanical or prescribed fire treatments.
- Approximately 2,505 acres are excluded from treatment (due to primary constraints) or are eligible for Prescribed Fire treatments only, where feasible.



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*Portions of the Highline IRA are located in the analysis area east of the white dashed line.

**Limited treatment areas consist of steep slopes (>30%), Mexican Spotted Owl Protected Habitat, and areas where the soil erosion hazard rating is high. Treatment is limited to Prescribed Fire and pre-fire mechanical preparation by hand. Hand treatments may occur where site conditions permit safe operation of crews and equipment.

Source Data: USFS Roads, USFS R2Veg, NHD Streams and Waterbodies (24k), MSO Protected and Restricted Habitat, USGS 10m DEM, USFS Riparian Data

MAP 9
ALTERNATIVE C

LOCKE MOUNTAIN FUELS MANAGEMENT EA
San Carlos Ranger District

EDAW | AECOM

November 12, 2008

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Notes on Tables 2-6a-d: Alternative C Treatments / Constraints.

1. The following tables show unconstrained, treatable area (acres) only. In Alternative C, the constraint areas are those areas that exceed 30% slope, have a soil erosion hazard rating of "3", or consist of MSO Protected Habitat.
2. Constraint areas in Alternative C = 2,505 acres. These areas would either be a) left untreated or, b) be treated only with prescribed fire (pre-fire mechanical preparation may occur as necessary and where site conditions permit safe operation of equipment).
3. Under Alternative C, mechanical and prescribed fire treatments would not overlap (i.e., treatment areas would only receive one treatment or the other, but not both).
4. Table 2-6d shows the constrained area (acres) only. As stated in note #2, these areas would either be a) left untreated or, b) be treated only with prescribed fire (pre-fire mechanical preparation may occur as necessary and where site conditions permit safe operation of equipment).

Table 2-6a. Alternative C: Cover Type v. Treatment Type.

Cover Type	Harvest & Fuelwood	Meadow Enhancement	Mechanical Enhancement	Mechanical Thinning	Prescribed fire only	Grand Total
Non-forest: grassland		353			67	420
Non-forest: shrubland					34	34
Aspen	154	51		448	7	660
Mixed conifer / Douglas-fir	408	26	0	107		542
Limber pine			44			44
Pinyon-juniper				1	10	11
Ponderosa pine	331			99	36	466
Grand Total	**893**	**431**	**44**	**655**	**155**	**2,179**

Table 2-6b. Cover Type v. Size Class.

	Large 9.0-15.9" DBH	Medium 5.0 - 8.9" DBH	Small 1.0 - 4.9" DBH	Very large >16.0" DBH	(blank)*	Grand Total
Non-forest: grassland					420	420
Non-forest: shrubland	3	27	5			35
Aspen	108	116	424	12		660
Mixed conifer / Douglas-fir	231	77	95	138		542
Limber pine	41	0		2		44
Pinyon-juniper	11					11
Ponderosa pine	147	92	36	191		466
Grand Total	**542**	**312**	**561**	**344**	**421**	**2,179**

*Non-forest cover types.

Table 2-6c. Alternative C: Treatment Type v. Size Class.

Treatment Type	Large 9.0-15.9" DBH	Medium 5.0 - 8.9" DBH	Small 1.0 - 4.9" DBH	Very large >16.0" DBH	(blank)*	Grand Total
Harvest, fuelwood	402	237		254	0	893
Meadow enhancement	32	1	26	18	354	431
Mechanical enhancement	41	0		2		44
Mechanical thinning	49	44	493	69		655
Prescribed fire only	17	29	42		67	155
Grand Total	**542**	**312**	**561**	**344**	**421**	**2,179**

*Non-Forest cover types.

Table 2-6d. Alternative C Constraint Areas: Cover Type v. Size Class. (Refer to Note #4 above.)

Cover Type	Large 9.0-15.9" DBH	Medium 5.0 - 8.9" DBH	Small 1.0 - 4.9" DBH	Very large >16.0" DBH	(blank)*	Grand Total
Non-forest: grassland					59	59
Non-forest: shrubland	55	491				546
Aspen	53	78	23	3		156
Mixed conifer / Douglas-fir	615	356	19	131		1,120
Limber pine	136	4		9		148
Pinyon-juniper	88					88
Ponderosa pine	80	51		256		388
Grand Total	1,025	980	42	398	59	2,505

*Non-Forest cover types.
Source (all tables): Region 2 Vegetation data, EDAW GIS

2.4.6 Comparison of Alternative Elements

Table 2-7 presents a comparison of the alternative criteria, constraint and treatment areas, and proposed treatment types.

Table 2-7. Comparison of Alternative Elements.

Element	Alternative A	Alternative B	Alternative C
Limited Treatment Area / Constrained Area (e.g., due to slopes, sensitive soils)	n/a	1,808 acres	2,505 acres
Slope Constraint	n/a	Mechanical treatments on slopes up to 40%	Mechanical treatments on slopes up to 30%
Prescribed Fire Only (non-forest cover types)	0 acres	198 acres	155 acres
Mechanical Thinning Only	0 acres	0 acres	655 acres
Mechanical Harvest	0 acres	0 acres	893 acres
Mechanical Enhancement	0 acres	0 acres	44 acres
Meadow Enhancement	0 acres	458 acres	431 acres
Mechanical Thinning followed by Prescribed Fire	0 acres	816 acres	0 acres
Mechanical Harvest followed by Prescribed Fire	0 acres	1,302 acres	0 acres
Mechanical Enhancement followed by Prescribed Fire	0 acres	102 acres	0 acres
Implementation Strategy	n/a	Commercial: stewardship contracts, competitive bid	Non-commercial: Force Account, public sales

Note: Table colors correspond to treatment types on Maps 8 and 9.

2.5 ALTERNATIVES & COMPONENTS CONSIDERED BUT ELIMINATED

The ID Team considered but eliminated two potential alternatives because they: did not meet the purpose and need of the project; were not feasible due to analysis area constraints; or would have resulted in unacceptable resource impacts. Alternatives considered but eliminated are described below.

2.5.1 Eliminated Alternative #1: *Use Broadcast Burn on Entire Analysis Area*

This alternative would use only prescribed fire to treat hazardous fuel accumulations and improve forest health conditions. Prescribed fire would help to reduce hazardous fuels in limited areas with lighter fuel loads and would re-introduce fire into portions of the watershed. However, this alternative was eliminated because it would not satisfactorily reduce hazardous fuels in the majority of the analysis area; areas with the heaviest fuel loading would not be successfully treated under this alternative due to the high likelihood of escape during prescribed fire operations, and because existing vegetative conditions are such that stands would not respond to prescribed fire without some level of mechanical manipulation. As such, this alternative would not fulfill the project Purpose and Need.

2.5.2 Eliminated Alternative #2: *Use Mechanical Thinning Only*

This alternative would use only mechanical thinning to treat hazardous fuel accumulations and improve forest health. Although mechanical thinning would reduce hazardous fuels, this alternative was eliminated because it was not practical for much of the analysis area due to slope constraints, would not re-introduce fire into the ecosystem, and would not achieve the habitat objectives of the Purpose and Need.

2.6 MONITORING AND EVALUATION

Monitoring includes both Forest-level and project-level analysis and evaluation. Forest-level monitoring is discussed at length in the Forest Plan and is not reiterated here. Project-level monitoring is the focus of the following sections.

2.6.1 Current Monitoring

Current monitoring includes monitoring activities that are presently occurring in the analysis area and will continue to occur regardless of project implementation. Current monitoring efforts include:

- Monitoring of Federally listed species, Management Indicator Species (MIS), and RFSS including, but not limited to:
  - Pre-treatment monitoring, including field surveys of MSO population status and habitat conditions.
  - Monitoring of Canada lynx distribution; per the 2000 LCAS, monitoring efforts should include documenting and evaluating lynx observations, including snow track surveys, incidental and legal trapping of lynx, and incidental observations.
  - Monitoring of the distribution and abundance of snowshoe hares across the range of the lynx would provide important insights and validation of assumptions used in this conservation strategy.
  - Inventory and monitoring of trends in recreational activities that may cause snow compaction.
- Monitoring of watersheds for proper functioning conditions.
- Monitoring of soil erosion and water quality.
- Monitoring of fire occurrence, fire weather, and fire behavior and effects from wildland fires in the vicinity of the analysis area.
- Monitoring of vegetation, disturbances, and the effects on fuels accumulation, vegetative health, FRCC, and potential fire behavior.
- Monitoring for forest insects and disease.
- Monitoring of vegetation and noxious weed infestations to determine the possible sources of noxious weed introductions, to determine the potential impacts of those introductions and infestations, and to identify and apply appropriate mitigation measures.

2.6.2 Effectiveness Monitoring

Effectiveness monitoring is long-term monitoring and focuses on determining whether the analysis area is meeting or moving toward desired future conditions, and if the rate of change is acceptable. Acceptable rates of change are determined by the Responsible Official unless otherwise specified in the Forest Plan. Effectiveness monitoring occurs at the programmatic or Forest Plan level (USDA 1984) and the project-specific level. Specific effectiveness monitoring efforts for the proposed fuels management project in the Locke Mountain analysis area would include:

Vegetation / Fire and Fuels

- Post-treatment stand characteristics such as overstory density, canopy density, crown base heights, and fuel loads would be monitored to ensure that the stand prescriptions and the Purpose and Need for the project have been met.

Wildlife

- Post-treatment monitoring of Federally listed species, MIS, and RFSS including, but not limited to:
  - Monitoring and surveys of MSO population status and habitat conditions. The objectives of pre- and post-treatment monitoring, per the 1995 Recovery Plan, are to track gross changes in habitat quality and quantity, and to evaluate whether the treatments meet the desired goal of creating replacement habitat (USFWS 1995).
  - Pre- and post-treatment monitoring of habitat conditions on steep slopes treated to reduce fire risk, either by the use of prescribed fire alone or in conjunction with removal of stems and ground fuels. Specific habitat characteristics to be measured include fuel levels, snag basal area, volume of large logs (>30 cm midpoint diameter), and live tree basal area.

2.6.3 Overall Project

To ensure that the desired future conditions are met and the Design Criteria have been successfully implemented, an Interdisciplinary Implementation Team would review treatment areas and project implementation on an annual basis. This includes specific monitoring requirements for the avoidance of unexpected resource effects and the completion of project Design Criteria and implementation as identified in Section 2.4.2. The Interdisciplinary Implementation Team would ensure that treatments are appropriately adjusted if Design Criteria are not being properly implemented, if desired future conditions are not being achieved, or if the rate of change is unacceptable. Overall project monitoring efforts for the Locke Mountain analysis area would include:

Wildlife

- Monitoring of Federally listed species, MIS, and RFSS including, but not limited to:
  - MSO population status and habitat condition monitoring and surveys
  - Monitoring distribution of lynx populations and lynx habitat
  - Monitoring distribution and abundance of snowshoe hares
- Monitoring analysis area for overall wildlife habitat improvement

Noxious Weeds

- The analysis area would be monitored for noxious weeds for at least two years after project completion.

Roads and Access

- Treatment units, and especially closed temporary roads in accessing those units, would be monitored for unauthorized OHV use. Additional measures would be developed or used to restrict OHV use and to prevent resource damage in areas where high unauthorized OHV use or damage is observed.

Hydrology and Soils

- All roads used for project activities, including existing system roads and temporary roads, would be monitored to ensure that no adverse soil erosion or other watershed impacts occur after project implementation is complete.
- Long-term monitoring of analysis area to track erosion and watershed health.

Heritage Resources

- Heritage and cultural sites identified as eligible for inclusion on the NRHP would be monitored for any significant changes in condition as a result of project implementation.

Vegetation / Fire and Fuels

- Monitoring of long-term changes to vegetative cover as is relates to the need for follow-up or maintenance treatments to maintain or further improve FRCC.
- Monitoring of Degener's beardtongue will continue at the five monitoring points established in 1994. Based on additional information about the local populations, the monitoring design may be modified to better track population dynamics, if necessary.