CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the environmental consequences and effects of implementing the Proposed Action and other alternatives analyzed in detail. This chapter focuses in most detail on the Key Issues, which were raised by the public and used to develop alternatives to the Proposed Action. Effects of the Alternatives are also discussed as they relate to numerous other resources commonly assessed in Environmental Analyses, though not as relevant as the Key Issues to this action.

The consideration of key issues below starts with a discussion of the existing condition, followed by the project's actions, impacts, and effects relevant to that issue. This is then followed by a comparative discussion of the effects of each alternative. Finally, within each, is a discussion of the cumulative effects. Within the discussion of effects between alternatives, the impacts are most thoroughly described for the Proposed Action, which treats more acres of forest and constructs more temporary roads than any other. Effects of other Alternatives are generally described in comparison to those of the Proposed Action.

Discussion of effects that relate to other resources (not the Key Issues) is organized according to the elements germane to that resource, not necessarily like that of the key issues as described above.

The Forest Plan requires mitigation measures for all ground disturbing activities. Site-specific project design criteria and mitigation measures are described in Chapter II. The following assessment of effects assumes the effective application of these criteria and measures. It provides the deciding official with information needed to compare alternatives and select an appropriate course of action.

It should be noted that the depiction of effects varies, depending on the resource and the context in which the analysis was relevant. Therefore, if pertinent, environmental consequences are presented in the context of multiple scales, over various timeframes. The following terms are used to describe relevant spatial and temporal effects:

- **Short-term effects** *address environmental, social or economic consequences, which could occur during operations, and/or that arise within two-years post operations.*
- **Long-term effects** *address environmental, social or economic consequences, which are delayed, periodic, and/or arise two-years after operations are completed.*
- **Direct effects** *refer to consequences caused by the activities themselves, occurring concurrently and in the same location.*
- **Indirect effects** *include consequences, occurring later in time or are farther removed in distance from the point of contact, but are still reasonably foreseeable.*
- **Cumulative effects** *address incremental environmental consequences resulting from multiple, past, present, and reasonably foreseeable future actions, regardless of land ownership, or which agency, or person initiated the action (40 CFR 1508.7). Cumulative effects analysis begins with the following list of likely relevant past, present, and likely foreseeable actions:*
    - *Historic sales (not specified) that created the collection of old clearcut and shelterwood regeneration units of varying ages within the planning area.*

  - *Recent and ongoing Big Butte Springs Timber Sales to the south,*
  - *Recent and ongoing Mill Creek Timber Sales, to the north,*
  - *Cascade Managed Stands Timber Sales, throughout the High Cascades Ranger District,*
  - *Fish Lake Rancheria Allotment Management Update,*
  - *The large-scale, with areas of high intensity/stand replacement results, Middle Fork fire of 2008,*
  - *BLM timber sales to the west (Choke, North Fish, Big Butte, and Salix), and*
  - *Likely continued intensive forest treatment on adjacent private lands*
- *Not all of these actions are relevant to the cumulative effects of every Issue or Resource addressed. Nor are the distinctions between them relevant in most discussions. Each discussion of cumulative effects below identifies those relevant actions, and discusses the reasonably probable cumulative effects accordingly. Near the end of this chapter, an additional discussion of cumulative effects pulls together the complete picture of cumulative effects considering all the parts discussed within the sections below.*

Effects of Implementation: Key Issues

This Section describes the environmental considerations and analysis conducted for this project. It focuses on the resources and issues that are most relevant to or affected by the Proposed Action as presented in Chapter I, and used to develop Alternatives to the Proposed Action.

Key Issues as used in this environmental analysis are those that have been determined to be applicable to the actions being analyzed, are used to disclose consequences, may affect design of component actions, may develop a need for mitigation measures, or whose disclosure of environmental effects are required by law or policy. Some issues may describe minor and/or non-variable consequences.

Soils – Site Productivity

Will activities associated with the Proposed Action (i.e., timber harvest and activity fuels treatment) cause direct and indirect detrimental impact to soils or coarse woody material by surface erosion, compaction, over-land flow, or displacement?

Will activities associated with the Proposed Action, in combination with other past, other present, and reasonably foreseeable future actions result in adverse cumulative effects to soils (especially considering existing skid trails, road densities, and known detrimental soil areas)?

Existing Condition

Past forest management activities, using ground-based equipment for logging, site conversion, and site preparation have affected the soils in the Rustler Vegetation Management area by compaction, puddling, displacement, removal of organic matter, burning, and erosion (Central Big Butte Springs Watershed Assessment, page 6-7). From field observation and aerial photo interpretation, the degree of past impact has been observed to be extensive, thus the assumption for the Rustler project is that previously harvested areas are at or above the prescribed 20% threshold for soil compaction (Rogue River NF LRMP). As such, the design criteria for protection of soils mitigation measures discussed in Chapter 2 will be applied in all locations, and the mitigation measure of subsoiling will be applied wherever it is deemed to be effective and necessary.

Prior to the 1990 Rogue River National Forest Plan, harvest and site preparation methods tended to be harsh and would not meet present day Standards and Guidelines. Machine slash piling, machine windrowing, and subsequent burning has occurred on the southern half of the Project Area. Windrowing is an obsolete practice that utilized heavy equipment to remove and pile brush, while often severely disturbing the surface soil layer.

Though some areas within the Project Area in the past were undoubtedly detrimentally burned (mineral soil surface changed in color and the next one-half-inch of organic matter was charred), little evidence of such effects are observable today. Evidently, the soils have recovered over time, with vegetation recycling more organic matter and microbes incorporating organic matter into the mineral soil. The size of areas still exhibiting characteristics of detrimental burning is estimated to be from zero, to less than one percent of any burned area.

Erosion is evident within the planning area, though the majority of active erosion appears to be associated with roads and deferred road maintenance (Central Big Butte Springs Watershed Assessment page 20). The vast majority of sediment production in the Planning Area comes from sheet erosion off roads, cut banks, ditches, and fill slopes.

Rutting and erosion has been observed on several roads within the Project Area. This is caused by lack of adequate drainage and vehicle use of wet, unsurfaced roads. Elsewhere, sheet erosion is occurring from vehicle use on roads during the wet seasons and from unsurfaced roads.

Past management activities have greatly impacted the amount and distribution of coarse (large) woody materials in this area. The majority of tractor piled sites, sites broadcast burned, and those windrowed, can be considered deficit in coarse woody materials today. The current timber stands occupying these sites have not developed to the extent that they are once again providing large coarse wood, either standing as snags or on the ground. Silvicultural treatments now can provide for additional coarse woody material to compensate for these deficits at a watershed scale.

Coarse woody material was found to be naturally deficit in the Project Area where past fires replaced much of the stands within the last 100 to 125 years and stand development has not advanced enough to begin the stand-suppression and snag cycle again. In addition, deficit in coarse wood was observed in the high elevation slopes with basalt and andesite lava flows where timber density is naturally low.

Project Actions, Impacts, and Effects for Soils and Site Productivity

Detrimental Compaction and Puddling - Ground-based logging and other equipment compact and puddle soils over which they operate (landings, skid roads, roadways, etc). Tractor, or ground based logging has the greatest potential to cause soil compaction, which leads to a denser soil with a higher bulk density. Construction of landings and temporary roads also detrimentally compacts soils. Puddling is the destruction of soil structure, primarily when wet, by compaction, to the point where ruts or imprints are made. Both can result in reduced site productivity, by limiting root penetration and preventing effective transport of moisture and air through the soil. Puddling, other than where it occurs naturally in poorly drained soils, occurs with compaction or the application of force on the soil surface.

Compaction from past management activities is routinely mitigated and repaired. It is mitigated by designating and minimizing the number of skid trails used; by requiring logging equipment to use only those roads and skid trails created during past timber harvest where feasible; using equipment and or techniques shown effective to prevent or minimize compaction; and preventing operations during conditions when soils are likely to be detrimentally compacted beyond prescribed allowances. These mitigations have been proven successful and are applied to all action alternatives. Though successful, it is doubtful that sub-soiling of compacted sites returns these soils fully to their original condition and function.

Detrimental soil compaction is repaired by subsoiling (see "Soil Restoration" in Chapter 2). Management actions such as subsoiling and providing coarse woody material (where the site is deficit), in combination with natural processes such as frost heaving and root growth, can accelerate the rate of rehabilitation in areas of detrimental compaction or disturbance.

Some areas however, may not be fully reparable by subsoiling. Compaction in these areas may be deeper than the subsoiling equipment can reach and is the result of operating heavy equipment with high contact pressure (pounds per square inch on the soil surface) under wet conditions (deep in the soil). Other areas may contain too many large boulders to effectively break up the compaction with the tool available. Such areas are not identifiable above ground and use of old skid trails there could set back whatever vegetative recovery from past management may have been underway. Subsoiling these areas however, may still improve on the past compaction, though not as effectively as soils with shallower compaction layers and fewer boulders.

Detrimental Displacement - Detrimental displacement is defined as the removal of more than 50% of the soil's 'A' horizon (topsoil) from an area greater than 100 square feet that is at least 5 feet in width. This displacement occurs by natural means, such as heavy rains that cause erosion on exposed surfaces, or by mechanical means such as churning tractor treads or dragging of logs across the ground. Disturbance from skyline yarding primarily has the potential for detrimental soil displacement.

Erosion is a form of detrimental displacement. The majority of erosion occurs by sheet erosion (the even removal of thin layers of soil by water moving across extended areas of gently sloping land) and is difficult to detect, as there are no dramatic effects to alert one to its occurrence. Ruts and gullies, however, are dramatic examples of erosion that are easily detected. The compacted surfaces of roads also contribute to erosion by allowing water to run overland rather than naturally infiltrate at the point of raindrop impact.

Erosion associated with skid trails and skyline corridors can be effectively mitigated by the placement of cross drains (water bars); drainage dips; placement of down wood and slash; and erosion control seeding (or any vegetative cover on exposed soil). These measures have been used for many decades and there has been considerable monitoring of their effectiveness. Erosion from road surfaces is usually contained by the requirement for routine road maintenance by the timber sale operator (on approved haul routes during sale operations). Maintenance of roads with designed drainage systems would have the least amount of erosion because surface flow over the road surface would be minimized.

Displacement can also occur with high intensity wildfire. Such fires have the potential to remove inches of soil from the ground surface with its own high intensity winds, consume its organic components, and loft the remaining soil particles into the atmosphere. Research on the Biscuit fire in southwestern Oregon demonstrated such loss (Borman, et al, 2008).

Detrimental Burning – Detrimental burning occurs when high intensity fire consumes organic matter above and within the soil, heating the soil to the point where the mineral soil surface changes color and the next one-half-inch deeper of soil organic matter is charred. This can happen under natural high-intensity wildfire conditions or by management actions beneath burn piles or when ‘prescribed burns’ are applied incorrectly or “escape” the parameters of their prescription and become overly intense.

Detrimental burning is most likely under extreme fire weather and fuel moisture conditions where fuel accumulations are greatest. Reduction of this fuel through management action decreases the potential of high intensity fire and detrimental burning of the soil. In areas where fuels have been treated (reduced), it is common to have only approximately 20% of the soils in a wildfire-burned area to be in a detrimentally burned condition; this is half of what has been observed in areas where fuels had not be treated.

Coarse Woody Material - Coarse woody material, such as large logs, and standing snags (future large down logs), are critical components in the development and retention of productive soils. Logging and burning have the potential to eliminate these features, particularly those in advanced degrees of decay, from the landscape if care isn’t taken to retain them in adequate sizes, numbers, and distribution across the landscape. Logging can mechanically damage downed logs in advanced decay; burning will often eliminate such logs altogether, but have little impact on large down logs with very little decay.

Under the Action Alternatives, large wood would be removed from the site (merchantable logs) and specifically prescribed amounts (by size and decay state) of large wood are required to be retained on site to meet this specific need. Logging also has the potential to provide large down logs where amounts are deficient as a result of past management activities or natural events. Thinning has the potential for hastening the development of large trees (future large snags and logs) that otherwise might not develop, or develop more slowly, if the current stands are overly dense and more prone to catastrophic loss from uncharacteristic[1] (for the site) stand-replacing fire, insect attack, or disease.

For effective mitigation, snags and coarse wood levels would be maintained within the range of natural conditions for the site’s plant association (as is required in this project; see Appendix 3). Leaving an unnaturally high amount of coarse wood results in high fuel loading that leaves the stand vulnerable to loss of vegetation and soil organic matter from stand replacing wildfire.

As discussed below in the section on Project Actions, Impacts, and Effects concerning Density Management, thinning can have detrimental or positive effects on large wood recruitment for the future. If thinning is conducted in stands of older forests with larger trees, it effectively captures mortality that otherwise would have produced large snags and future down wood. If conducted in younger stands, thinning can hasten development of larger trees, which could be future large snags and future large down wood. When thinning larger stands of trees, care must be taken to preserve an adequate number of snags or trees for future snags (perhaps girdled following thinning).

Indirect effects - The indirect effects of the changes to soil conditions described above relate primarily to its productivity – that is, its capacity in its normal environment to support plant growth. This capacity is a function of its physical, chemical and biological properties and the

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[1] The term “uncharacteristic” refers to natural events that might not otherwise occur at the same intensity or scope had natural fire been allowed to shape stand conditions over the past 100 years. Stand characteristics in the absence of logging and shaped by historic “characteristic” fire might have supported more (in moist sites), or less (on dry sites) snags and down wood than currently exist. Prescriptions calling for snag and down log enhancements require such site-specific considerations.

extensive range of interactions among its minerals, microbes, soil fauna, and plant roots. This capacity to support plant growth affects the ability of the habitat created to support animal species and communities of animals.

Indirect effects, however, also relate to the soil's effects on hydrology – its water storage capacity, its hydraulic conductivity (the ease with which water moves through its pore spaces and fractures), and its pathways for water movement. Compacted soils have impaired water storage capabilities. This increases overland flow of water rather than infiltration through the soil profile, increasing the potential for erosion. Decreased storage capacity means less water is retained in the watersheds for gradual release throughout drier seasons (drought).

Roads are an extreme example of detrimental soil compaction with significant indirect impacts on pathways for water movement. Properly designed and constructed roads (including temporary roads) require structures for channeling this now-redirected water flow to desired locations.

General - The direct and indirect effects described above, resulting from actions consistent with properly controlled and mitigated logging activities, would be spotty, and not uniformly and dominantly evident across the landscape. Wholesale changes in soil conditions across large acreages would not be expected. Skid roads, landings, and burn piles are comparatively small discrete impacted sites in a landscape otherwise dominated by a forest environment with soils functioning in their natural condition. Similarly, properly implemented prescribed fire across a landscape with diverse fuel loadings creates a patchwork of fire intensities with the resulting patchwork of soil impacts and indirectly affected vegetative responses. By contrast, agricultural practices and mining reclamation activities might create a more uniform and dominant non-natural soil condition across many dozens or hundreds of acres.

Some management actions compact and displace soils to an extent that soil productivity is irretrievably reduced. Permanent roads, where all productivity is sacrificed, are the best examples of this, but landings, with their likely deep compaction, and soil mixing from construction and recurrent disturbance are also expected to produce irretrievable reductions in soil productivity. Temporary roads are also expected to have an irretrievable reduction in soil productivity since they are bladed (soil is mixed and displaced) and compacted. Even once rehabilitated, the soil profile is modified to a degree that may take many years to return to the productive state of the undisturbed forest soils adjacent to it.

The effects on soils by the alternatives discussed below are expected to be indistinguishable in all respects, save two: amount and location of acres treated. The treatments in each alternative are the same, differing only in their amount and location, and thus the amount and location of needed skid roads, landings, temporary roads, and burn piles with their attendant soil impacts. Effects comparisons, therefore, are based on acres of each type of treatment and the expected impact per acre associated with each. Differences will be most evident concerning logging systems, and the amount of temporary road needed. Tractor logging, even when confined to existing skid roads, has more potential to disturb soils than the one-end suspension skyline logging proposed for some locations. More temporary roads mean more compacted acres with disruption to water flow, even though temporary.

More treated acres mean more potential for soil impacts. It also, however, means more potential for rehabilitation of effects from past impacts and more opportunity to create vegetative, fuel, and coarse woody conditions more conducive to long-term soil productivity on that site than may exist currently.

Direct/Indirect Effects of Alternative One, the Proposed Action

Alternative One treats more acres (10,402) of forest than any other alternative (6,328 and 9,052). This has a combination of effects on soils, both good and bad. This alternative would likely detrimentally compact and displace the largest amount of soil among the action alternatives, but it also thins more stands and treats more acres of forest fuels, thereby reducing the likelihood of wide-spread high-intensity wildfire, with its attendant detrimentally burned soils, over more acres than any other alternative.

This alternative requires more landings and temporary roads (9.90 miles) and more landings than Alternatives Two (none) and Three (5.05 miles), and as discussed above, this creates more acres of compacted and displaced soils with an irretrievable loss of some degree of soil productivity, even after rehabilitation following use. It also has the highest amount of ground-based logging, further compacting soils impacted in the past or compacting new areas of soil.

Alternative One thins more acres of forest for Density Management (5,753) and Overstory Removal (661 acres) than Alternatives Two (4,592) and Three (5,310 acres for density management, and none for overstory removal). The 'density management' treatments are those most likely to be treating acres that had been logged in the past. It therefore provides the greatest opportunity to rehabilitate more acres of compacted soil from prior management activities than other alternatives.

The project area is known to be deficit in large down woody material over many of its acres. This Alternative treats the most acres, thereby providing the most opportunity to enhance existing levels of down wood.

This Alternative includes 1,230 acres of Pre-commercial thinning. This is not commercial logging, and therefore has no need for roads, landings, or skid trails for logging, loading, and log-hauling equipment. Other than a low potential for detrimental burning where slash piles are burned, there is essentially no soil impact from these treatments.

Though benefits and mitigations opportunities are evident, they do not balance out the adverse effects to soils in this Alternative, nor for the other Alternatives. Subsoiling does not restore compacted soils to their 'virgin' state. Reducing the risk of loss to high intensity wildfire is not an acre-for-acre trade off for soil displaced in new temporary roads and landings. Increased down woody material is good, but probably does not negate the impacts of new skid trails and skyline corridors. Alternative One likely has more adverse impacts to soil productivity than do the other alternatives discussed below.

Direct/Indirect Effects of Alternative Two

This Alternative has the least amount of commercial logging treatments, and requires no temporary roads. It would be the least impacting of the Action Alternatives on the soil resource. It impacts the least acres of all alternatives (72% of Alternative One, and 87% of the acres of Alternative Three). Over ¼ of the acres treated in this alternative is Pre-commercial thinning, and, as discussed under Alternative One above, there is essentially no soil impact from these treatments.

Direct/Indirect Effects of Alternative Three

Alternative Three is most similar to Alternative One in its level of effects to soil productivity. It treats 17% fewer acres with commercial timber sales than Alternative One, but with a slightly different mix (see Table 2.11 Chapter II). Its key difference is the elimination of overstory removal on 661 acres. This is a commercial treatment on acres most likely to be impacted from prior management activities and thus could financially limit[2] the opportunity for rehabilitating compaction problems and enhancing the site with down logs.

This Alternative applies density management on 92% of the acres that Alternative One does, and 16% more than Alternative Two. As discussed above, these are the acres on which fire risk reduction treatments would be expected to protect the soil resource from detrimental burn effects. Also, these are acres likely to have had some treatment in the past and in need of subsoiling to rehabilitate compacted soils.

This Alternative requires 5.05 miles of temporary road, nearly 5 miles less than Alternative One. Alternative Two needs none. This is a big difference between Alternatives given that roads, even temporary roads that are often subsoiled and planted after use, create compaction and displacement impacts not fully repairable.

Direct/Indirect Effects of No Action

Under the no treatment scenario, the amounts of large wood would continue to increase due to growth and mortality, at unnatural rates, due to past fire exclusion. The possibility of future wildfires with increased severity would provide a future flux of dead large woody material. The absence of treatment would not improve site productivity through immediate coarse wood recruitment to sites that are deficient of coarse wood from past management. However, no additional areas of detrimental soil compaction or displacement from management activities would likely be created. Erosion from road surfaces, if not checked by routine road maintenance, may increase over time.

Future wildfires could occur with increased severity due to dense stands and organic matter accumulations. Potential wildfires could produce areas of detrimental soil conditions at a rate higher than historical wildfire behavior. It is not uncommon to have 40% or more of the burned area to be detrimental to soils in an area that has missed several fire cycles. Some soil loss through displacement in the smoke plume as discussed above would be likely.

Passive restoration of detrimentally compacted and displaced areas from past management activities would occur, and these areas would continue to recover through the action of root growth and frost heaving. There would not be an opportunity provided by this alternative to accelerate the rate of rehabilitation in areas of detrimental compaction or disturbance. No additional acres would be taken out of vegetative production.

There would be no potential for losing additional soil productivity to temporary road systems since no management activities would be implemented.

The indirect effects include the impacts on soil productivity (physical, biological, and chemical properties), the effects on hydrology, and the indirect effects on plant/animal habitats that would not occur. Nutrients would continue to be input into the system by rainfall and plants/animals. Hydrologic conditions would continue to recover from past actions as vegetation grows and recovers. The indirect effects on habitats would be a continued accumulation of large wood and organic matter. The increasing potential for severe wildfires could impact soil productivity, hydrology and plant/animal habitats. As much as 40-50% of a severe wildfire's area could adversely affect soil productivity, increasing runoff and erosion, and setting back vegetative conditions to an early seral condition.

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[2] Funding of work such as this is routinely supplied by collections from timber sale receipts within the timber sale area. With fewer receipts, fewer acres would likely be treated.

Cumulative Effects to Soil Productivity

Discussion of the effects on soil productivity from past management activities along with current proposed activities have been included throughout the sections above. This section discusses consideration of effects from ongoing and likely foreseeable actions in and adjacent to the Rustler Planning Area.

There are really only two likely foreseeable actions of this sort relevant to this discussion. The first is similar forest treatments in or near this planning area. The Bybee project, of similar scope and scale to Rustler is located 30 miles to the north and similar treatments in the Big Butte Spring Timber Sales to the south. The other is large-scale wildfire of varying intensities that may be near, adjacent to, or overlap some or all of this planning area.

Cumulatively, the effects of actions similar to those proposed here in Rustler in landscapes near or adjacent to Rustler would serve to significantly reduce the risk of large scale high-intensity wildfire altering the extensive maturing and old-growth forest character that now predominates. These treatments increase human capability to control the size and intensity of wildfires across the landscape by providing the conditions where fire spread can be contained, and wildfires are denied the fuel that would otherwise feed it to high intensity. This lowers the risk of the fire-related adverse soil effects discussed above. The more of these treatments that are implemented on this landscape, the more likely this system has the opportunity to return to a more functional balance with the presence of natural fire without catastrophic resource impacts.

There would of course, be the continuation and extension of effects on soils associated with logging that are discussed in this section. Along with that, however, would be the improvement in down woody debris amounts and the amelioration of compaction from past logging practices. These cumulative effects on soils, however, taken separately and/or together, do not point to any system-wide soil productivity or indirect hydrologic adverse effect believed to be measurable. Indeed, widespread historic actions produced no such impact, and current actions are believed to be improvements upon conditions created historically.

One condition on the landscape, however, is notable. The Cat Hill Fire, one of the 1910 fires, covered a large area of the High Cascades Ranger District. The soil impacts there were intense enough that only a brush field returned for the first few decades. Many of these brush fields were ‘wind rowed’ (brush plowed up and piled in rows) and planted to pines from unknown seed source in the 1960’s. The cumulative impact of fire (loss of organic matter) and plowing (displacement) on the soil resource was severe. This project proposes some commercial thinning of these areas, increasing the potential for compaction in areas of historic loss of organic matter and displacement. Subsoiling is prescribed to mitigate this effect.

Large-scale wildfire of varying intensities within, near, or adjacent to the planning area is certainly a foreseeable event. The Middlefork Fire of 2008 created some large areas with total loss of mature and older forest, high burn intensity soil effects across large areas, with some amount of erosion, though not enough to be problematic.

Together, these natural and management actions lead to widespread vegetation change in the High Cascades. Whether management succeeds in maintaining maturing and late-seral forests, or fire has its way and resets the clock on these forests remains to be seen. Regardless, no evidence exists for this ecosystem that impacts, either in concert or accumulation, would create effects on soil productivity to an extent where natural systems could not continue to thrive, or regenerate if needed, along the courses taken in the historic past.

Water Quality – Hydrologic Function

Will activities associated with the Proposed Action directly or indirectly affect the physical integrity of streams, wetlands, and hydrologic function such as runoff, stream flow and quantity and quality of domestic water sources?

Will activities associated with the Proposed Action affect water quality via erosion and resultant sediment delivery to streams?

Will activities associated with the Proposed Action, in combination with past, other current, and reasonably foreseeable future actions result in adverse cumulative effects to hydrologic function and water quality?

Will activities associated with the Proposed Action affect wetlands and/or impact Riparian Reserves designated under the Northwest Forest Plan (Standards and Guidelines)?

Existing Condition

Watersheds, Streams, and Flows

The Rustler Project Area is located within two 5th field watersheds in the Upper Rogue River Sub-basin (see Table 3.1). The entire project area is essentially within the Big Butte Creek Watershed, with only approximately 100 feet of temporary road that overlaps into the South Fork Rogue River Watershed. Since there is no vegetation treatment and essentially no measurable impact proposed within the South Fork Rogue River Watershed, it is not included in the following analysis. The Big Butte Creek Watershed is composed of three watershed analysis units, but the Rustler project area is located in just one of these, the Central Big Butte Watershed Analysis Area.

Table 3.1: Acres by Watershed

Watershed	Acres	Acres in Project Area	% of Watershed in Project Area
Big Butte Creek	158,331	15,184	6.6%
South Fork Rogue River	159,132	N/A	<0.5%
Watershed Analysis Unit	**Acres**	**Acres in Project Area**	**% of Analysis Unit in Project Area**
Central Big Butte	58,054	15,184	26.2%

The average annual precipitation for the Central Big Butte Watershed Analysis Area is approximately 35 inches, with most of the precipitation occurring between mid-October to Mid-April as rain or snow. The winter snow zone usually occurs above 4000 feet (USDI, Central Big Butte WAU 1995).

Based on an analysis and field review of the Project Area, there are approximately 40.9 total miles of stream in the project area. There are 10.1 miles of perennial, fish bearing streams; 9.5 miles of perennial, non-fish bearing streams; and 12.8 miles of intermittent and ephemeral streams. In addition, there are 8.3 miles of stream that have not been classified. The drainage density is approximately 1.72 miles of stream per square mile of project area.

Flow data is limited to streams with past and/or current gauge stations. The only stream within the Project Area that has a record of a USGS gauge station is Fireline Creek. This gauge was operated between 1966 and 1977 and data shows that peak flows ranged from 16 cfs to 78 cfs (USGS NWIS). Based on review of watershed analyses and USGS records, there are no flow records for the other streams within the Project Area.

According to the Central Big Butte Creek Watershed Analysis, streams within the project area have been altered from past human activities, including timber harvest, road building, and grazing. Much of the project area has been managed for timber in the past. In some areas, harvesting has occurred down to the edge of the stream, while in other areas, there were no-cut riparian buffers implemented. In addition, some of the project area includes part of an extensive burn (Cat Hill Fire) that occurred in 1910. A portion of this burn area was windrowed (the linear piling of brush and debris by tractor), leaving exposed soils (USDI, Central Big Butte WAU 1995). Although the effects from some of the past management activities are currently still present, recovery from past impacts is also occurring.

Springs and Wetlands

Several springs and wetland-type areas are present throughout the Rustler project. There is limited information on the springs, and many of them have not been officially documented in GIS or on District maps. Although Misfit Spring is the only named spring within the project area, at least 10 other springs have been identified in the field during site visits. More springs may be located as additional field visits take place.

Wetland-type areas were also observed during site visits to the project area. Observations included evidence of a shallow water table, such as the presence of water above or at the ground surface, saturated soils, and wetland-type vegetation. The sizes of these sites varied, but most were small patches, approximately one acre or less in size. None of these areas have been officially mapped or delineated as a "wetland" based on some formal evaluation process (e.g., US Army Corps of Engineers Wetlands Delineation). More wetland-type areas may be located as additional field visits take place.

Channel Morphology-Physical Characteristics

There is a lack of information on channel morphology for the streams within the project area. Neither Level 2 Stream Surveys nor Rosgen Level II surveys have been conducted. In addition, the watershed analysis that included these streams did not have any specific information on physical characteristics for these streams.

Roads

There are 92 miles of roads across all ownerships within the project area. The road density for all roads is 3.88 miles of road per square mile. Watershed slope influences the potential for groundwater interception and redistribution of flows. Watershed relief is determined by calculating the difference in elevation between the highest and lowest points of the basin divided by the length of the basin in a line approximately parallel to the major drainage. Watershed risk can be evaluated by assessing road density relative to overall watershed relief (UDSA 1993). The watershed relief in the project area is 5.5%. The project area is in the moderate watershed risk category because watershed relief is less than 30% and current road densities are between 3.1 and 4.5 miles of road per square mile. (Watershed risk is considered low when road density is less than 2.0 miles of road per square mile where watershed relief is <u>greater than 30%</u>, and when road density is less than 3.0 miles of road per square mile where watershed relief is <u>less than 30%</u>; (UDSA 1993).

There are 64 road stream crossings and 0.70 road crossings per mile of road. There are 4.18 miles of road within 100 feet of streams; thus, 4.5% of existing roads are within 100 feet of streams. Most of these road segments are on slopes less than 30%. There is 0.27 mile of road on slopes greater than 30% within 100 feet of streams in the project area. Generally speaking, the steeper the slope, the more risk there is of erosion problems from the roadway.

Water Quality

None of the streams in the project area are on the 303(d) list and considered water quality limited by the Oregon Department of Environmental Quality (ODEQ). Information on water quality in the project area is limited. According to the Central Big Butte Creek Watershed Analysis, macro-invertebrate studies indicate that overall, the streams have good water quality. Since most of the streams in the watershed analyzed are spring-fed, there are generally cool year-round temperatures (1995).

Hazardous Materials

Based on review of the Central Big Butte Creek Watershed Analysis, there are no records of sites where hazardous materials would be entering streams within the project area (1995). On lands managed by the Forest Service, Best Management Practices are required which minimize risk of chemical spills during equipment use.

Riparian Reserves – Vegetation

The vegetation in Riparian Reserves is comprised of riparian and upland forest communities. Generally where riparian areas are present, they are functioning properly with a variety of conifers, hardwoods, riparian shrubs, and wetland plant species providing shade and stability to stream banks. Along some of the streams, however, there are few large conifers in the riparian areas due to past management activities or wildfire.

Overall, there is a lack of large woody debris in streams and riparian areas where timber was intensively harvested. In areas where there is sparse to no riparian vegetation, the plant community is similar to the adjacent upland forest. At some sites, this is due to the effects of roads located near the streams. The forest vegetation is overstocked in some of the Riparian Reserves due to past fire exclusion and harvesting practices. In their present state, some of the Riparian Reserves are as vulnerable to stand replacement wildfires as the adjacent uplands.

Some of the Riparian Reserves have infestations of laminated root rot. These sites have been initially identified in field visits as openings where infected trees are dead and standing, or down. Infestation sites in Riparian Reserves range in size from approximately 1/4 acre to several acres in size. Thus far, identified disease sites appear to occur in discrete pockets. Thorough mapping of the disease pockets has not yet occurred, and is likely to take place during implementation of this project. In the sites that have been currently identified in the field, most of the trees present are highly susceptible species (fir species). Few non-susceptible trees (pines and cedar) are present in these areas.

Peak Flows

Increases in peak flows can be associated with some forest management activities. Many studies have shown that certain methods of timber harvest can result in increased peak flows. Recent literature from Grant addresses the effects of forest practices on peak flows and the consequent channel response in western Oregon and Washington (Grant et al 2008). Grant synthesizes the findings of an extensive array of existing literature linking forest practices in the Pacific Northwest with changes to peak flow.

Grant evaluated the reported change in peak flow based on the percentage of the basin harvested for basins with roads and without roads. Based on the hydro-regions developed by Grant, the project area would be located in the transitional hydro-region. For basins within the transitional zone, Grant found that the detection threshold for mean reported change (for all data) in peak flow occurs at 19% of watershed area harvested. Thus, changes in peak flows cannot be detected at harvest levels of less than 19% when assessing areas with both roads and no roads.

Grant proposes that the mean response lines may provide good guidance in the prediction of likely changes in peak flow from treatments that have less disturbance intensities and overall reductions in basal and leaf area than clear-cutting. Further, for basins with no roads, Grant found that the maximum reported change in peak flow was detected at 15% of watershed area harvested. In addition, the analysis showed that peak flow increases decrease with decreasing percent of basin area harvested (Grant et al 2008).

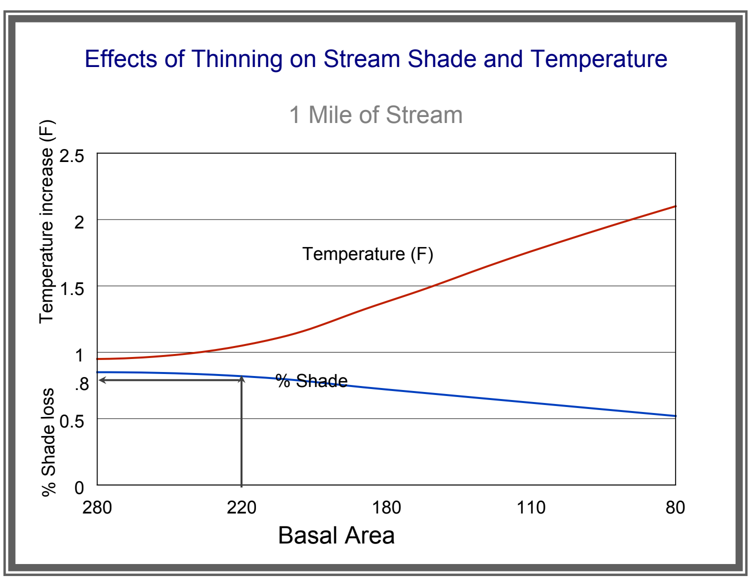
Although most of the existing studies examined clear-cut and shelterwood harvests, evaluating this type of treatment provides a frame of reference for interpreting the maximum likely effects of harvest practices more common today (e.g., extensive riparian buffers, limited ground disturbance logging methods, and fire.) Grant concludes that partial cutting and thinning should result in peak flow changes that are commensurately lower than those indicated and may be undetectable in some basins (Grant et al 2008).

Project Actions, Impacts, and Effects on Water Quality and Hydrologic Function Common to all Action Alternatives.

Stream Temperature

Stream temperature is affected by riparian vegetation shading and channel form. Riparian Reserves act as buffer strips, moderating water temperature by intercepting incoming solar radiation (Brazier and Brown, 1973). For a given treatment, the amount of shade lost following vegetation removal is dependent on stream width, tree height, vegetation proximity to the stream, and stream orientation. Thinning can remove trees that are providing stream shade, which can increase summer stream temperatures. Figure 1 illustrates the effects of riparian thinning (e.g., reduced basal area) on increasing stream temperature.

Figure 3.1: Modeled effects of thinning on stream temperature (SHADOW).



Implementation of the Northwest Forest Plan accommodates vegetation treatment necessary or desirable to restore ecological health in Riparian Reserves that have been harvested or affected by fire exclusion or other disturbance. The Northwest Forest Plan Temperature Strategy, developed for the Forest Service, Bureau of Land Management and Oregon Department of Environmental Quality, demonstrates that thinning can occur in the Riparian Reserve without affecting stream shade if the overstory canopy in the primary shade zone is not treated. The following table from the NWFP Temperature Strategy defines the primary shade zone and area where no overstory treatment should be applied to protect shade on perennial streams (USFS, DEQ, and BLM, 2005).

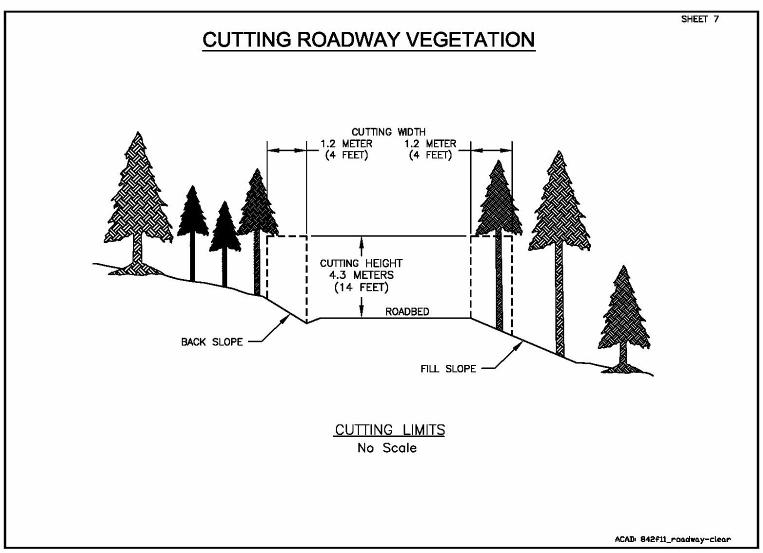
Table 3.2: Minimum Width of Primary Shade Zone for Perennial Streams

Height of Tree	Hill slope <30%	Hill slope 30 to 60%	Hill slope >60%
Trees < 20 feet	12 feet	14 feet	15 feet
Trees 20 to 60 feet	28 feet	33 feet	55 feet
Trees >60 to 100 feet	50 feet	55 feet	60 feet

No impacts to stream temperature would be expected from thinning because existing stream shade would be maintained. Activities would be implemented according to the parameters in Table 3.2 above and the Project Design Criteria listed in Appendix 5, such that the primary shade zone is not treated.

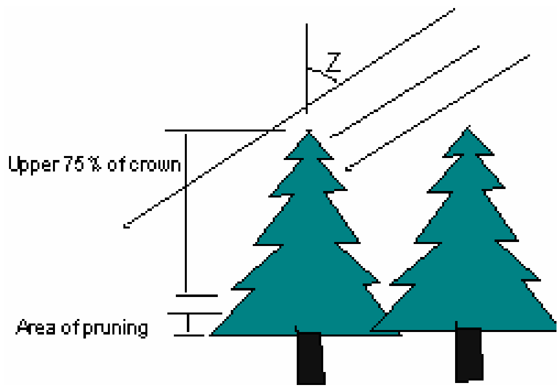
Forest Service regulations require that haul roads be maintained for safe travel. Roadside brushing is necessary for visual safety. This requires the cutting of roadside vegetation and could include riparian vegetation at stream crossings.

Figure 3.2: Typical Cross-section Showing Roadside Brushing Area



Vegetation pruning is the removal of branches from the ground up to a height of fourteen feet (but no more than half the height of the tree). The treatment will remove only the bottom branches of the tree and maintain the overstory canopy. Since roads are usually constructed outside the flood zone of a stream and trees are located back away from the stream, trees that can provide stream shade along a roadside are typically 50 feet or taller. For trees 50 feet tall, pruning will not remove branches in the upper 75% of the crown. Thus, the portion of the tree that provides most of the shade throughout the day would not be affected (Figure III-3). Further, none of the trees that are proposed for treatment overhang the stream. For stream crossings, the road fill over the culvert shades the stream, not riparian vegetation. Thus, road maintenance activities would not affect stream temperature.

Figure 3.3: Tree shading



There is no new permanent or system road construction proposed in this project. There would be a maximum of approximately 9.90 miles of temporary road construction in an estimated 29 segments. Road segments would range from less than one tenth of a mile to slightly over one mile in length. Most of the segments would be less than one -half mile or shorter in length. Temporary roads would be defined as a created travel way, for the purpose of transporting logs that is built, utilized, and decommissioned (obliterated) over the course of the treatment. Obliteration of these roads would occur at the completion of their intended use. Generally, temporary roads would only include reconstruction of existing (unclassified) roads where there is an existing road template. These temporary roads would be located near ridgelines. In addition, the temporary roads would not be located within Riparian Reserves or within 100 feet of ephemeral streams. Therefore, there is no loss of vegetation within the primary shade zone and no effect to stream temperature from temporary roads. No sediment from temporary road construction would affect stream channel morphology of perennial, intermittent, or ephemeral streams. Thus, no increase in stream temperature would occur from channel widening due to temporary roads.

Fuels treatment in Riparian Reserves would be accomplished by manual thinning and backing prescribed fire into the riparian area. Ignition points would not occur closer than 100 feet from perennial streams or as determined at the site to meet burn objectives and protect ground vegetation within 25 feet of the stream. In addition, no hand piles would be burned within 25 feet of a stream.

Similar treatments were implemented on the Rogue River-Siskiyou National Forest for the 1995 Waters Thin Hazardous Fuels Reduction Project (Waters Thin Project). For that project, monitoring sites were established to determine if there were any changes in the stream channel or shade as a result of the thinning and fuels treatment. The monitoring sites were established to validate the findings in the 1995 Waters Thin Hydrology Cumulative Effects Analysis that concluded there would not be a significant risk to the integrity of the aquatic system if the treatments occurred. Sites were monitored before thinning and fuels treatment began. Monitoring included measuring stream shade using a solar pathfinder and tracking channel changes using photo points. This baseline data was then compared to data collected in 2005 after treatment and several winter storms including the 1997 50-year event (Park and Jubas 2005).

Based on monitoring results of past prescribed fire treatments in the Waters Thin Project (Park and Jubas 2005), fire in Riparian Reserves for the Rustler Project would be a low intensity ground burn stopping at least 25 feet from the stream. In addition, no primary shade zone overstory riparian canopy would be affected by the prescribed burning activities. Therefore, there would be no increase in stream temperature from prescribed burning.

Sediment Delivery – Fine Sediment and Turbidity (Suspended Sediment)

Soil disturbance from management activities can cause sediment to be delivered to a stream. Sediment delivered to a stream most often is comprised of both suspended sediment (silt and clays) and coarser materials (sand and gravels) that are transported as bedload. Suspended sediment that can affect water clarity is usually quickly transported through the stream system.

Sediment can either be delivered by mass wasting or surface erosion. Mass wasting can deliver large amounts of sediment in a short time. Following mass wasting to a stream, there is an accompanying increase in turbidity from fine sediment. Surface erosion delivers a smaller amount of sediment over a longer time period. Rather than affecting whole stream systems, such as mass wasting, fine sediment from erosion usually causes localized increases in turbidity or it is so small that it is undetectable.

Several studies have been conducted to determine the effectiveness of riparian buffers in reducing sediment delivery to a stream from upslope skyline timber harvest. All of the studies used clear cut harvest methods, and not the less impacting method of thinning as proposed in this project. In these studies, buffer widths of 100 feet were found to be effective in preventing sediment delivery from timber harvest (Lynch et al. 1985, Moring 1982).

Following salvage logging of the fire killed trees from the 1987 Silver Fire on the Siskiyou National Forest, the effectiveness of riparian buffers was monitored before and after helicopter harvest. The Silver Fire used the following Siskiyou Forest Plan buffer widths: 150 feet on fish bearing streams; 100 feet on perennial streams; and 25 feet on intermittent streams. A summary of the monitoring results found that buffer areas were very effective in maintaining stream bank integrity as well as blocking sediment delivery (Kormeier 1995).

For the Rustler Project, all units where thinning and subsequent harvest of merchantable trees would occur would have a designated Riparian Reserve of 312 feet on fish-bearing perennial streams, 156 feet on non fish-bearing perennial streams, and 156 feet on intermittent streams and wetlands greater than one acre. These Riparian Reserve widths are greater than or equal to the widths found in the studies described above (Corbett and Lynch 1985, Lynch et al. 1985, Moring 1982, Kormeier 1995) to prevent sediment delivery to streams and maintain stream bank integrity. Further, with the less disturbing activity of thinning (as compared to clear cut methods used in published studies), the Riparian Reserves would be more than adequate to prevent any fine sediment from reaching a stream. By implementing the Riparian Reserve widths and the Project Design Criteria, there would be no increase in fine sediment delivery to a stream or associated increase in turbidity from thinning activities.

Road maintenance such as blading, ditch cleaning, and haul traffic are two activities that affect sediment production from forest roads. Road grading can break up the armor layers on the road surface or the ditch and temporarily increase road surface erosion. The Rocky Mountain Research Station conducted a study on the effects of traffic and road maintenance on forest road sediment production in the Oregon Coast Range. The study compared the sediment production from road maintenance (blading) and the combination of road maintenance with heavy traffic. The study concluded that the difference between grading-only and grading with traffic was not statistically significant (Luce and Black 2001). These conclusions are based on the assumption that there would be wet weather haul. Although road maintenance is programmatic and does not require a project level cumulative effects analysis, the study by Luce et al. demonstrates that traffic on these roads does not increase sediment production. Thus, there would be no further impacts from road sediments as a result of log hauling on maintained roads if there is no wet weather haul.

In the project area, there are 64 road stream crossings (0.70 road crossings per mile of road). The current number of road crossings per mile of road is considered low. There are 4.2 miles of road within 100 feet of streams; thus, 4.5% of existing roads are within 100 feet of streams. Most of these road segments are on slopes less than 30%. Most of the roads are not near streams and most of these roads are not on steep slopes. Based on the locations of existing roads and implementation of BMPs (USDA 1988), effects of sediment to streams from haul of logs and road maintenance would be minimal.

There is no new road construction proposed in this project. There would be a maximum of 9.98 miles of temporary road construction. Temporary roads would be defined as a created travel way, for the purpose of transporting logs that is built, utilized, and decommissioned (obliterated) over the course of the treatment. Obliteration of these roads would occur at the completion of their intended use. Temporary roads would only include reconstruction of existing (Unclassified) roads where there is an existing road template. These temporary roads would be located near ridgelines. In addition, the temporary roads would not be located within Riparian Reserves or within 100 feet of streams. No sediment from temporary road construction will affect stream channel morphology of perennial, intermittent, or ephemeral streams.

Fuels treatment in riparian areas will be accomplished by manual thinning and then backing prescribed fire into Riparian Reserves to reduce fuels. Monitoring results of past prescribed fire activities in the 1995 Waters Thin Project show that the fire will be a low intensity ground burn, stopping at least 25 feet from the stream. No surface erosion, that could deliver fine sediment to a stream, has been detected in the monitoring of that project (Park and Jubas 2005). Based on the similarity in treatments between the Waters Thin Project and the Proposed Project, no effects from fine sediment as a result of prescribed burning would be expected.

Even with some loss of short term infiltration associated with moderate and high intensity wildfires burns, it is rare to observe overland flow and surface erosion on the Rogue River-Siskiyou National Forest-managed lands. Turbidity was monitored following the 1987 Silver Fire and subsequent salvage logging. A summary of the data concluded, “There have been no noticeable effects in increases in turbidity or sediment” and “Turbidity does not appear to be a significant area of concern” (Kormeier, 1995). In addition, after the Biscuit wildfire in 2002, no changes in turbidity were observed or monitored following the first winter (Jubas 2005). Thus, since prescribed burning activities are less disturbing than wildfire burns, prescribed fire (as implemented according to PDCs in Chapter II) in Riparian Reserves would not cause fine sediment to be delivered to streams. Therefore, there would be no resulting increase in turbidity.

Hazardous Material Spills

The project does not place equipment near stream channels where it would be possible for chemicals to spill. A spill plan will be in place prior to any activity that would cause a risk for a spill and would incorporate appropriate BMPs for minimizing any risk of spills associated with equipment use.

Channel Morphology – Coarse Sediment

Coarse sediment, sands, and gravels are transported in a stream as bed-load. Excessive amounts of coarse sediment in a stream as compared to the stream's ability to transport it can cause channel changes such as pool filling, channel widening, and stream bank failures. Logging activities can increase the rate of erosion through soil displacement by logging equipment, cable yarding, and skidding of logs.

To detect changes in channel morphology from sediment delivery following riparian thinning and burning, photo points were established on a stream prior to activities for the 1995 Waters Thin Project. Monitoring sites on the stream included areas sensitive to increases in sediment delivery and flow from the project activities. This included a pool, a vertical stream bank on a bend, and a vegetated low gradient section. In January 1997, two years after the project activities, there was a 50-year storm event. Comparison of the 1995 and 2005 photo points showed no change in the stream channel. There were no sediment deposits in the pool or low gradient stream section. The stream bank was unchanged. No evidence of sediment movement was present in the 25-foot no treatment area or in the riparian area where thinning and burning occurred (Park and Jubas 2005). Based on the similarity in treatments between the Waters Thin Project and the Proposed Project, no effects from coarse sediment as a result of thinning and prescribed burning would be expected.

The proposed buffers are more than adequate to prevent any sediment from reaching a stream (See Fine Sediment section). There would be no increase in coarse sediment delivery to a stream from thinning or prescribed burning activities.

Riparian Vegetation and Large Wood

Since much of the project area has been harvested, there is a shortage of large wood for recruitment. Thinning would increase tree growth and lessen the time needed to establish future large wood delivery. Both thinning and fuels treatment would lower the likelihood of a stand replacement fire in the overstocked Riparian Reserves.

Corridors for cable rigging needed for skyline operations would be allowed to pass through Riparian Reserves. A maximum clearing width of 12 feet is required and logs may be yarded through these corridors. Corridors should be spaced at an average of 200 feet apart. If skyline operations occur through Riparian Reserves, vegetation would be impacted by this clearing and subsequent yarding. Loss of vegetation through these areas would occur. Corridor "rub trees" would be left on site if impacted or felled.

By implementing PDCs (Chapter II), the Northwest Forest Plan Temperature TMDL Implementation Strategies, and BMPs (USDA 1988), impacts to riparian vegetation would be minimal. No timber harvest or fuels treatments would be allowed within 25 feet of streams. Since most of the riparian areas on streams within the project area are located within 25 feet of the stream channel, the riparian vegetation would not be impacted by the proposed treatments.

Laminated root rot in Riparian Reserves would be treated through regeneration harvest activities. Final harvest would remove all (or most) susceptible species and species of low susceptibility would be retained and established in the stand. A rotation of non-susceptible species for a time period greater than 50 years should remove *Phellinus weirii* from the site or reduce it to acceptable levels if no susceptible species are retained to harbor the disease. On the High Cascades Ranger District, tolerant or resistant species include ponderosa pine, sugar pine, western white pine, incense-cedar, western red cedar, and hardwoods. Due to these species being native, a natural successional component, and having a historical presence across the District, success of this treatment is expected.

The short-term effects of regeneration treatments include large created openings and reduced canopy cover. This would reduce stream shading and large wood recruitment in the short-term. However, over the long-term, this treatment option may create stands without disease that have mature, old growth characteristics. This would create and maintain stream shading in the long-term and allow for a future supply of large wood. Harvest may retain some over-story trees (modified shelter-wood) at a level appropriate for the desired regeneration.

Peak Flows

Recent literature from Grant addresses the effects of forest practices on peak flows and the consequent channel response in western Oregon (Grant et al, 2008). Grant synthesizes the findings of an extensive array of existing literature linking forest practices in the Pacific Northwest with changes to peak flow.

For basins within the transitional zone, Grant found that the detection threshold for the mean change in peak flows occurs at 19% of watershed area harvested. The detection threshold for the maximum reported change in peak flow occurs when 15% of the basin is harvested. Thus, changes in peak flows cannot be detected at harvest levels of less than 15% to 19% (Grant et al 2008). Based on the hydro-regions developed by Grant, the project area would be located in the transitional hydro-region. All treatments combined would be implemented over 26.2% of the Central Big Butte Watershed Analysis Area over a 10-year time period. Although the percent of the watershed treated is greater than the percentage determined by Grant to detect any increase in peak flow due to harvest, most of the existing studies examined clear-cut and shelterwood harvests. Thus, evaluating this type of treatment would interpret the maximum likely effects of the harvest practices proposed for the Rustler project.

Grant also concludes that partial cutting and thinning should result in peak flow changes that are commensurately lower than those indicated and may be undetectable in some basins (Grant et al, 2008). Therefore, since the majority of the types of treatments proposed are density management, prescribed fire, and surface fuels treatment, no increase in peak flows would be expected.

Direct/Indirect Effects of No Action

Water Quality

No Action would have no direct effects to water quality since there would be no harvest or prescribed fire activities implemented. Natural recovery and processes would continue to occur. The composition and character of forest stands adjacent to streams would not be altered. Thus, there would be no effect to stream shading and no change to stream temperature. The risk of stand replacement fire would remain unchanged in overstocked stands which could result in extensive mortality within Riparian Reserves if this type of fire occurred. Stand replacement wildfire could reduce the supply of future large wood recruitment and reduce stream shade. Therefore, there could be an indirect effect on stream temperature in the project area. There could also be effects to stream temperature from channel widening (See Channel Morphology – Coarse Sediment section below.)

There would be no direct effects from fine sediment to streams from no action. Since there would be no soil disturbance from management activities, there would be no fine sediment delivery. Indirect effects could occur from the increased risk of stand replacement fire in Riparian Reserves (See above.) Stand replacement wildfire could trigger erosion and increase fine sediment inputs to stream channels.

Channel Morphology – Coarse Sediment

There would be no direct effects to channel morphology from implementation of no action. Since there would be no treatment and no erosion through soil displacement, there would be no adverse impacts. Natural recovery and processes would continue to occur. If stand replacement wildfire occurred in Riparian Reserves (See above), there could be indirect effects on coarse sediment. Erosion triggered by this type of wildfire could cause channel changes, such as pool filling, channel widening, and stream bank failures. Channel widening could have subsequent effects on water quality by causing increases in stream temperature.

Riparian Vegetation and Large Wood

'No action' would have no direct effects to riparian vegetation and large wood recruitment in Riparian Reserves. There would be no direct loss of vegetation through thinning or prescribed burning activities. Natural recovery and processes would continue to occur. However, the risk of stand replacement fire would remain unchanged in overstocked stands, which could result in extensive mortality within Riparian Reserves if this type of fire occurred. Although the future supply of large wood to stream channels could be reduced due to extensive mortality from fire, there could be in increase in the amount of large wood in the stream channels in the short term, depending on the severity to which trees are burned.

Laminated Root Rot

If laminated root rot sites are not treated, the disease would kill infected trees creating an increase of snags and down woody material. This could cause an increase in the amount of large wood in the stream channels in the short-term, depending on the fall line and the proximity of the dead trees to the channel. The area infected with laminated root rot would eventually become an opening. These slow growing openings would naturally regenerate with mostly shade tolerant species that tend to be highly susceptible to *Phellinus weirii* infections and therefore the site would retain infection. It is likely the stand would not regenerate into mature trees, although any non-susceptible species may grow to maturity as individuals. Some cedar and occasionally some pine regeneration may occur in laminated root rot openings, but the majority of the regeneration tends to be white fir and Douglas-fir. This would not allow for future recruitment of large wood. This could also reduce stream shade and have an indirect effect on stream temperature in the project area. The *Phellinus weirii* infection would continue to spread until it reaches natural or manmade barriers, site conditions become unfavorable, or stand composition changes to non-susceptible species. Infected areas would provide host material for beetles and become infestation centers when conditions are favorable for an epidemic. Thus, regeneration of non-susceptible species for future large wood and stream shading would not be expected in the long-term.

Peak Flows

No action would have no direct effects to peak flows since there would be no harvest or prescribed fire activities implemented. Natural recovery and processes would continue to occur. However, the risk of stand replacement fire would remain unchanged in overstocked stands, which could result in extensive mortality within Riparian Reserves if this type of fire occurred. Depending on the extent and severity of the wildfire, there could be a subsequent increase in peak flows. There would be an increase in young stands if a stand replacement fire occurred, and the watershed would not be considered hydrologically recovered.

Cumulative Effects to Water Quality and Hydrologic Function

The concept of hydrologic recovery is commonly applied to assess cumulative effects. By assessing the percent of watershed with young stands, or stands less than 30 years old, the relative risks of the watershed can be identified. Hydrologic recovery can be assessed in terms of relative watershed risks. If less than 15% of the watershed is young stands, the watershed risk is considered low. If 15-30% of the watershed is young stands, there is a moderate risk, and there is a high risk if greater than 30% of the watershed is comprised of young stands (USDA 1993).

Cumulative effects for the project area encompass the Central Big Butte Watershed Analysis Area. This watershed is comprised of private land (27,014 acres, 46%), BLM land (15,237 acres, 26%), and Forest Service lands (15,776 acres, 27%). The detailed cumulative effects analysis below does not include the South Fork Rogue River 5th field watershed because only approximately 100 feet of temporary road in the watershed is included in the project area. The proposed action would have no effect on cumulative effects in this watershed as no young stands would be created no treatment would occur.

Past Activities

Geographic Information Systems (GIS) analysis of stand age on Forest Service managed lands in the Central Big Butte Watershed Analysis Area showed that there are 456 acres of stands less than 30 years old (0.8%). The acres of BLM managed lands that are characterized as young stands were determined based on analysis completed for four 5th field watersheds. Regeneration harvest occurred on approximately 740 acres over the past 14 years. Since this acreage includes four watersheds, the amount of young stands in the Central Big Butte Watershed Analysis area is expected to be much smaller. Thus on BLM managed land, less than 740 acres are currently characterized as young stands within the watershed. On private land, 75% of stands are assumed to be young (20,261 acres, 35% of the watershed.) This assumption was made because the Forest Service does not have accurate data for stand age on private lands, and harvest is generally managed on a shorter rotation than that which occurs on public lands. Therefore, since approximately 37% of the watershed is likely young stands, there would be a moderate to high watershed risk; however, the main driver in this watershed is activity on private lands.

Present Activities

There are two projects currently being implemented on Forest Service-managed lands in the Central Big Butte Watershed Analysis Area. These projects include Cascade Managed Stands (five density management units within the Rustler project area) and the Fish Lake Rancheria Allotment Management Update. Neither of these activities would create new young stands. On BLM lands, several projects are assumed to be implemented because a NEPA Decision Record has been completed and signed. Although there are no management activities associated with these projects currently occurring, implementation could begin in the near future. Both of these projects include thinning and fuels reduction, non-commercial fuels reduction, and pre-commercial thinning of pole-sized commercial stands. None of these projects would increase the amount of young stands within the watershed. Harvest on private lands is assumed to be on-going with management occurring on a 60-year rotation.

Future Activities

Cumulative effects include all activities in the foreseeable future. Other future activities planned on Forest Service-managed lands include various fuels treatment projects and noxious weed control. There may also be stream restoration projects implemented, such as in-stream large wood placement. None of these activities would create new young stands.

On BLM-managed lands and private lands current harvest practices would be expected to continue. On BLM lands there would continue to be a focus on thinning and prescribed fire. Thus, no new young stands would be created. On private lands, harvest levels are expected to be maintained at the current intensity and rotation. In general, if private lands are harvested on a 60-year rotation, there would continue to be young stands on private land about half of the time.

No predictable effects are expected to occur to the streams within the project area or the downstream Rogue River from the Rustler project. As described in the previous sections of this report, activities associated with thinning and prescribed burning would have relatively low impacts. There would be no increase in negative cumulative effects when combined with activities presently occurring or planned for the foreseeable future. The current watershed risk of moderate to high would likely decrease over time as no increase in young stands is projected for public lands and private lands would recover. Overall the streams within the watershed would be considered hydrologically recovered from past timber harvest.

Comparison of Alternatives

As discussed above, properly applied project design criteria (described in Chapter 2) effectively prevents any meaningful adverse effect from the Rustler project on stream shade/temperature, sediment delivery, channel morphology, and peak flows from any action alternative. There remains, however, some slight differences between these alternatives that relate to the amount of management activity that will be applied by each, and how much of that will occur in Riparian Reserves. The differences between alternatives relevant to water quality and hydrologic function are related to:

- Amount of density management in Riparian Reserves
- Amount of overstory treatments, and
- Amount of acres of fuel management zones in Riparian Reserves

Table 2.11 at the end of Chapter 2 that compares alternatives demonstrates clearly how these differ[3].

Alternative One applies more density management within Riparian Reserves, and overstory treatments elsewhere, than do Alternatives Two (none) and Three (about 57% of Alternative One's acres). This creates more skid roads and skyline corridors within Riparian Reserves, though the primary shade zone should remain intact in all of them (see PDCs, which call for designing these corridors to retain the primary shade zone). Of these impacts, the likely increase in skyline corridors across riparian areas in Alternative One would likely be the biggest difference in adverse effect. There would be more potential shade loss immediately adjacent to streams in Alternative One as a result. There would also be more potential for soil compaction within Riparian Reserves in Alternative One (see Soils discussion, above), considering the increase in log felling and skidding. Alternative Two would have the least of these impacts among the three Alternatives.

On the positive effect side, Alternative One treats more acres for density reduction to achieve a higher degree of forest health and insect/disease/fire resistance within Riparian Reserves than does Alternative Two (the least) or Alternative Three. Where this is applied to younger stands,

3 One other element, precommercial thinning, appears to differ, but in reality is simply an artifact of how acres are tallied. The apparent increase in precommercial thinning in Alternatives Two and Tree over Alternative One, is merely the result of dropping overstory treatments/PCT from the latter alternatives, and counting those acres only as precommercial thinning (PCT).

there would also be the increased potential to hasten development of larger trees in Riparian Reserves in Alternative One over Alternatives Two (the least) and Three.

Forest Health

Activities associated with the Proposed Action (location, extent, and type of treatments) may affect the current distribution of seral stages, density, crown closure, species composition and the long-term health of forested stands.

Will activities associated with the Proposed Action (location, extent, and type of treatments) affect the current levels of root diseases, insect populations (pine and Douglas-fir beetles), blister rust, and Douglas-fir dwarf mistletoe, all of which are affecting the current and long-term health of forested stands?

Existing Condition

Past land use activities (including harvesting, thinning, windrowing, grazing, and fire suppression) and natural disturbances (including wildfire, blow down, insects, and disease) shaped the existing vegetation in the Rustler Project Area. The landscape is now nearly all forested with a small amount of open meadows, wet meadows, and rocky outcrops. The forest vegetation condition varies across the planning area including early successional regeneration, windrowed plantations, dense second growth, thinned second growth, and some late successional conditions. The forested stands are mostly Douglas-fir/White fir with a moderate amount of Ponderosa pine and Sugar pine. There are small amounts of Shasta red fir, Engelmann spruce, Mountain Hemlock, madrone, and chinquapin. Aggressive fire suppression has contributed to the increase in the amount of species with higher shade tolerance and has also increased stand densities overall. Grazing has reduced grass and forb competition with young trees for moisture, as well as decreasing the abundance of fine fuels necessary to carry periodic, low intensity ground fires (Belsky and Blumenthal 1997). This reduction in low intensity ground fires allowed conditions to develop that now support less frequent but higher intensity fires.

Initial reconnaissance of the Project Area revealed high priority areas that are the focus of the project. These areas include: a large amount of mature stands with high tree densities (density management units), overstocked and/or brushy regeneration areas (timber stand improvement units), shelterwood areas requiring additional treatments (shelterwood overstory removal units), and disease infestations (sanitation units).

Further detailed field reconnaissance and data collection revealed differing stand conditions throughout these identified units. For example, units identified for density management treatments may have areas that have high tree densities and some areas of relatively low tree densities.

Widespread disease was also found during these stand examinations. Sparse sampling and extensive walk-through exams verified mistletoe infestations in 59 of the proposed units and root diseases in 38 of the proposed units. Root diseases that exist in the Rustler Project Area are mostly laminated root rot, Armillaria root disease, and Annosus root disease. Black stain root disease was also observed. Signs of beetles were also observed in areas scattered throughout the Project Area. It is likely that more disease will be discovered during implementation.

Stand volumes were calculated for a limited number of stands using common stand exam quick plots and the Field Sampled Vegetation (FSVEG) database volume calculations. These volumes were then used to estimate volumes of similar stands throughout the Rustler Project Area. Potential harvest volumes were then estimated based on treatment prescriptions, site conditions, management objectives, and owl habitat criteria.

Project Actions, Impacts, and Effects for Forest Health

The following treatments are proposed, along with the associated effects:

Density Management (approximately 6,120 acres) – This treatment involves the selective removal of some trees within a stand to increase growth, vigor, and health in the remaining trees. This form of treatment is generally referred to as commercial thinning and favors the retention of the healthiest trees that best meet structural and compositional goals. This thinning usually includes direction to vary the spacing (variable density thinning) with the goal of retaining or creating structural diversity, species diversity, and a combination of clusters and openings. Openings would have future site prep, planting, animal damage control, and release treatments as necessary.

The major effect of density management treatments would be a reduction of tree densities. Thinning would reduce competition induced mortality and remaining trees would have access to more resources which would lead to healthier more resilient stands while also allowing for faster growth of large individual trees. “Density management of young-growth stands is important for growing large, stable trees over much of the landscape” (Muir et al., 2002).

In stands heavily impacted by past management practices, such as windrowing and dense even aged second growth, thinning would be applied to start transitioning the stand into more natural structure patterns. “Commercial thinning practices... help initiate development of diverse, multi-layered stands, which should provide habitat for a variety of plant and animal species” (Muir et al. 2002). Variable thinning would be designed to create clumps and openings that mimic a more natural stand development as opposed to grid-like spacing of trees. Variable-density thinning (which also entails leaving some areas un-thinned) would provide habitat for a diversity of plants (Muir et al. 2002). It was found that species richness of plants is consistently higher in thinned stands (Muir et al. 2002).

High tree density intensifies the impacts of many forest pathogens (as discussed under the ‘no treatment’ scenario). Many of the problems previously mentioned can be prevented or alleviated by thinning. On the contrary, density management (thinning) can increase dwarf mistletoe spread. “Thinning increases inter-tree distance, so it can favor dwarf mistletoe seed dispersal and resultant spread rates. Stands thinned to 12-foot spacing were almost optimal for mistletoe spread from tree to tree (Knutson and Tinnin 1980).

However, by targeting infected trees for removal and encouraging height growth, thinning can lessen the impacts of dwarf mistletoe (Baker 1988, Filip and others 1989b, Hawksworth and Johnson 1989). Thinning may also stimulate a dwarf mistletoe infection broom response where the infection was light or unnoticed before treatment.

Pine engravers can also infect living trees after attacking green slash created by thinning, especially thinnings completed between February and July (Startwell 1970). Also, since laminated root rot is not correlated to stand vigor, thinning would not treat or alleviate impacts from this disease. Proven management strategies unfortunately do not exist for reducing laminated root rot inoculum while maintaining highly susceptible species for a full economic rotation on infested sites (Thies and Sturrock, 1995). For this reason, openings associated with variable density management would target root rot pockets to allow the opportunity to plant non-susceptible species (incense cedar, and to a lesser extent, pines) , which would result in small-scale conversions.

The level of thinning would vary across the Project Area. The stands would not be thinned below a relative density of 0.2. This is the density at which the highest stocking is achieved while providing a low level of tree competition. This is optimal for creating conditions that would: (1) have more stand structure diversity; (2) have the ability to grow large trees; and (3) maintain moderately high stand volume production. However, most stands would only be thinned down to the lowest level of crown closure of the associated spotted owl habitat.

Overall, the effects of this treatment would be a reduction in canopy closure: below 40% for more intensive treatments (large root rot areas or structure development), 40% within spotted owl dispersal habitat, and 60% within spotted owl suitable habitat. As long as the average canopy closure remains at desired levels, openings less than two acres and less than a total of 20% of the stand can be created without downgrading spotted owl habitat and may be used to create structural diversity or treat disease areas.

Thinning treatments can also help prepare stands for other environmental variables. Decreased stand density and decreased fuel loading from mortality would decrease the intensity of wildfires and associated impacts. By lowering high height/diameter ratios often found in young growth stands, thinning may also help trees develop resistance to disturbance agents such as ice, wind, and fire (Muir et al., 2002). In units with variable stand conditions, areas that do not require thinning at desired levels would not be treated.

As discussed above in detail, density management promotes growth, enhances tree health/vigor, reduces pathogens, creates diversity, and encourages resistance to environmental variables. These impacts support the goals of the land allocations associated with these treatments including emphasizing the production of timber volumes and providing for important ecological functions.

One of the comments received when the initial Rustler EA was released refuted the premise that thinning was needed to accelerate the development of a diverse canopy structure. The commenter cited a section from General Technical Report from the Pacific Northwest Research Station[4] concerning “no evident trends between understory cover and thinning history” and the “shrub and forb cover were fairly similar among the three thinning intensities.” These quotes were taken from the ‘results’ section. A thorough reading of the report reveals that it was conducted in younger wet conifer stands of western Oregon on intensively managed private lands where disturbance history was generally of the stand replacement intensity. The existing canopy cover in these regenerating stands was mostly in the upper tree layer with little understory to stimulate. They predictably then observed “canopy structure did not differ dramatically between thinned and unthinned stands”. The authors were not testing the effects of thinning on development of a diverse canopy structure, and their analysis was not designed to evaluate the variables affecting such development. Nor were they designed to evaluate canopy development in drier forests with histories of disturbance that doesn’t replace the entire stand all at once and therefore have more diverse structures canopies to begin with (such is the forest condition of many stands in the Rustler planning area). The authors were testing the applicability of stand successional models, specifically as it relates to the development of canopy structure following severe disturbance and they concluded that there are “…potential limitations of simple stand succession models that may not account for the range of forest types, site conditions, and developmental mechanisms found across western Oregon”. The conclusion the commenter drew from the study, was not one the study was designed to test, nor a conclusion the researchers themselves drew.

Contrary to the commenter’s conclusions, the authors of the study cited research that supports the point that “The development of understory plant communities is usually related to changes in the overstory” (Franklin et al. 2002, Henderson 1981, Naesset and Okland 2002, Oliver 1981, Stewart 1988, Zamora 1981).

[4] McIntosh, Anne C.S.; Gray, Andrew N.; Garman, Steven L. 2009. Canopy Structure of Forest Lands in Western Oregon: Differences Among Forest Types and Stand Ages. PNW-GTR-794. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station. 35 p. http://www.fs.fed.us/pnw/pubs gtr794.pdf

The commenter did, however, rightly conclude that the benefits of thinning are best realized in dense stands younger than 40 years old; but this depends, of course, on the purpose of your thinning. As discussed above, thinning in Rustler is intended to increase growth, vigor, and health in the remaining trees. Thinning at less than 40 years is optimal when the goal is simply to increase growth, but Rustler thinning is also intended to reduce moisture, light, and nutrient competition among trees; and increase stand resilience to fire. Effective results from such thinning can be realized well beyond a stand age of 40 years.

Thinning Effects on Snags: While thinning can produce positive results to tree growth, forest health, and biodiversity, it also has the potential for adverse effects on snags and down wood. The obvious effect is the loss of these features through active logging and post-treatment burning, where it has been shown that prescribed fire is the primary factor in eliminating soft snags and logs in advanced stages of decay (Innes, et al, 2006; and Stephens et al 2005).

Current research, however, indicates that thinning can have an impact on the recruitment of future snags and down woody material. Thinning has the potential to remove trees that otherwise could have died in place from the competition today, or in the future, and thus provide a future standing snag or a downed log. Research has shown that large snag/log recruitment can be compromised if thinning is applied to trees that are already large, but future large snag/log recruitment can be enhanced when small trees are thinned to increase growth of remaining trees (Beechie, et al; 2000). Thus the question to be addressed concerns what size of trees are being thinned, and whether adequate live and dead trees are being retained in appropriate sizes and amounts to provide for future large snag and log recruitment.

Amounts of live and dead trees prescribed for leaving have been designed to be consistent with plant series identified for the Cascade Province (Hochhalter, 2010), and tailored to the capability of the applicable Plant Association Group. This is discussed in further detail in the sections below on Forest Plan Management Indicator Species.

Riparian Density Management (approximately 400 acres) – This treatment is proposed in overly dense stands within Riparian Reserves and is similar to the other density management treatments. The objectives and effects on vegetation are similar however special consideration is given to protect the riparian and aquatic resource, limit disturbance, and maintain stream shading. Refer to project design criteria in Chapter 2 for specific information. Thinning and treating diseases in riparian areas improves health and moves stands toward objectives outlined in the Aquatic Conservation Strategy.

Pre-commercial Thinning (approximately 1,230 acres) – This is a reforestation/restoration action where the objective of treatment is to control the density and species composition of immature stands (timber stand improvement). It is designed to maintain or improve growth rates and to reduce mortality due to suppression or from insects and disease.

This treatment would remove trees and brush by cutting to allow the release of crop trees. This would increase growth of the stand and promote the healthiest trees and the most desired species. This action would promote stand and tree growth, prevent stand stagnation, and move the stand through the early seral stages more rapidly.

Sanitation (approximately 210 acres) – This treatment is proposed primarily to treat root disease. This treatment is only being proposed in areas where the current levels of pathogens are a threat to the goal of maintaining good stocking of healthy trees. This is not an attempt to remove this pathogen from the forest; it is widespread and performs a desired function of reducing forest density, providing snags/down woody debris, and creating small openings in an otherwise overly dense forest. In places however, it is especially virulent over an area larger than desired to meet management goals such as spotted owl habitat retention or big game thermal cover. It is not desired, nor even possible to treat every root rot pocket in the planning area.

The areas identified for these treatments have extensive root rot infestations covering large areas. Because fungi that cause root diseases stay on site for up to fifty years even after hosts species are removed, stand conversion to non-susceptible species is the only option for creating a healthy stand that can develop into maturity. To alleviate the effects of slow, but total, stand replacement (by this disease) over large areas; this treatment would begin stand conversion by utilizing a series of treatments including modified shelterwood regeneration and group selection.

The effects of this treatment would often be to create small openings of up to two acres in size (only ¾ acre in Alternative Three). The openings would be planted to non-susceptible species and eventually develop into early successional forests. The purpose of these activities is to increase the amount of light to the forest floor for regeneration of the non-susceptible species such as sugar pine, ponderosa pine, western white pine, and incense cedar. In time, planted non-susceptible species can mature into healthy mature stands. In contrast, without treatment, root disease infested sites would continue to die off and regenerate with susceptible species that would likely never become healthy mature stands. These stands would need future treatments to convert areas to non-susceptible species that were not converted during this entry.

Leave trees would be comprised of non-susceptible species when available. This would provide some structure and snag recruitment for future stands. This treatment may also consist of site prep, planting, animal damage control, and pre-commercial release.

Overstory Treatments (approximately 680 acres) – This treatment is usually associated with a previous shelterwood treatment but may occur in natural stands with similar characteristics. A portion of the overstory is removed, with some trees left to provide for structure, snags, and coarse woody material recruitment. Some trees may be girdled or topped rather than removed to reduce the spread of mistletoe. The removal of overstory trees would reduce large-tree structure and amount of remnant large live trees in future stands.

Removing the overstory from previous shelterwood treatments would release the regeneration underneath. The majority of stands selected for this treatment have mistletoe infections in the overstory trees. Removing these diseased trees would prevent the spread of mistletoe to the understory. Without such treatment, development of the understory into a maturing closed-canopy forest with a diversity of species is unlikely. As discussed above concerning root rot, this treatment is not an attempt to eliminate mistletoe from the forest. It, too, has its value in the forest. Mistletoe produces snags/down wood, and provides nesting structures for many species, including the spotted owl. Removal of mistletoe is only proposed where it threatens, wholesale, the development of a maturing forest.

These units may also receive a pre-commercial release in the understory if needed. This would reduce tree densities and competition from brush species to release the healthiest crop trees of desired species. Since dwarf mistletoe varieties are host-specific, species resistant to dwarf mistletoe would be selected over others in this treatment.

Increased growth rates and reduced mistletoe supports the goals and objectives of Matrix lands. However, removal of overstory trees would detract from the remnant tree component in future stands.

Meadow Restoration (approximately 10 acres) – This treatment removes encroaching vegetation through cutting, and possibly burning, to maintain native grasses and forbs normally found in these meadows. The effect of this action is that acres are restored to open meadows conditions as opposed to being naturally converted to forest. The opposite effect, of course, is that a developing forest is being removed. This tradeoff between a meadow that would have been maintained by naturally recurring fire and the forest developing within it in the absence of naturally occurring fire is an important consideration. This action is proposed because meadow habitats are declining in the southern Cascade Mountains in the absence of fire, and this specialized vegetative community is critical for certain species of plants and animals.

Fuel Management Zones (approximately 1,780 acres, including 660 acres outside of other treated areas) – This treatment consists of commercial and non-commercial treatments such as thinning, pruning, hand piling, and burning up to 300 feet in width in strategic locations utilizing roads and ridge tops to slow an advancing fire front and to create a defensible space for fire suppression personnel in the event of a large fire. It also provides opportunities for introducing prescribed fire to large areas on the landscape. Note: this treatment overlaps other treatment areas and is integrated into treatment prescriptions.

Effects from this treatment are reduced densities, slightly lowered canopy closures, and reduced understory with the possibility of limiting damage from large catastrophic fires. The effects of these specific impacts are discussed above. Canopies may be slightly less dense and understories may be slightly more open than what might exist under natural fire regimes due to a more frequent application of fire (prescribed) than what might occur naturally.

Subsoiling – Subsoiling is prescribed for nearly all units treated to restore soil permeability where past logging activity compacted the soil in excess of standards and guidelines. Of course, subsoiling within the root zone of residual trees within a thinned stand will likely cut the roots that are now in the compacted skid trail. If the compaction is severe, the existing roots will likely die or have reduced ability to function. Some trees may die as a result (Geist and Froehlich, Appendix 6). Monitoring of subsoiled areas, however, has shown that few live roots are present in compacted soil layers. But some are, and if the trail is subsoiled, new roots will have to re-colonize the site to replace the severed roots. However, the increased infiltration capability of the soil should allow more roots to effectively infiltrate the formerly compacted areas with a greater capability of full function, with ultimate benefit to the associated trees.

Direct/Indirect Effects of Alternative One, the Proposed Action

This alternative was developed to adhere to the management goals of each land allocation and to maximize achievement of the purpose and need of the Rustler Vegetation Management project. This alternative treats more acres than all others (approximately 10,402), with the most overstory treatment for disease (661 acres) and the most sanitation treatments (154 acres). It thus develops the most amount of healthy and vigorous forest than the other alternatives

Alternative One creates 680 acres of fuel management zones with the effects as described above. This is more than Alternative Two (no acres) and the same as Alternative Three. This alternative maximizes the opportunity to increase the protection of surrounding forest from stand-replacement fire.

Direct/Indirect Effects of Alternative Two

This alternative would have similar effects as the Proposed Action with the some changes/exceptions. The associated changes and effects for this alternative are described below:

Eliminate Temporary Road Construction: Without building temporary roads, the density management areas would be reduced by approximately 1,161 acres from the Proposed Action due to the inability to remove cut trees. This alternative treats the least acres of overstocked stands, leaving more acres with a risk of stagnation, or loss to insects, disease, or fire.

Eliminate Overstory Removal Treatments: This alternative would replace overstory removal treatments (no acres treated) with understory timber stand improvement treatments only. This would allow a residual overstory to remain for structure, snag and coarse wood recruitment, and to serve as large remnants in the future stand. Growth and development of the understory would decrease as the amount of shade from overstory trees increases. The overstory trees that contain mistletoe would infect understory trees and would continue to do so throughout the development of the stand. Therefore, the future stand would contain mistletoe infection and produce lower quality timber, late-seral wildlife habitat, or big-game winter range cover. The timber stand improvement (pre-commercial release) of the understory would reduce tree density and competition. This would increase growth response in the developing stand but the effects of severe mistletoe infections would offset that increase if disease-resistant species are not favored.

Eliminate Treatment in Riparian Reserves: This alternative was developed to minimize effects of activities within the riparian areas. Under this alternative, the area treated would be reduced by approximately 400 acres from the Proposed Action. The effects on vegetation in the riparian areas would be the same as described for no treatment (below).

Eliminate Fuel Management Zones: Fuel Management Zones were not included as acres treated or total volumes in the Proposed Action as they are often integrated projects and difficult to separate. This option would eliminate the creation of approximately 680 acres of fuels breaks that could be used to prevent or lessen the effects of large wildfires. Outside of other treatment areas, vegetation would grow unimpeded and effects would be similar to no treatment.

Direct/Indirect Effects of Alternative Three

Alternative Three was developed to implement Recovery Action 32 of the 2008 Spotted Owl Recovery Plan (see description in Chapter 2) and protect suitable habitat as much as possible. This alternative treats all the same stands as Alternative One, except those meeting the intent of Recovery Action 32, and any owl nesting, roosting, or foraging, habitats in Riparian Reserves. Additionally, all commercial overstory removal treatments have been eliminated, though pre-commercial thinning, fuel management zone creation, and meadow restoration in those same stands are still included. The alternative comparison table in Chapter 2 displays this alternative as precommercially thinning more acres than all others. In actuality, the other alternatives thin the same number of acres, and the apparent increase in Alternative Three is the result of simply moving the thinning acres from the “overstory removal” category into the precommercial thinning category (though not all overstory removal acres also had precommercial thinning acres).

The effect of this reduction in treated acres is a tradeoff between two competing probabilities and concerns. In many of the acres dropped from Alternative One, the goal of keeping high quality owl habitat in an unaltered condition in the near term is met, but those same acres continue to carry a higher risk of loss to insect disease and wildfire over the long term. This Alternative addresses the near term, higher probability risk (from altered habitats) to spotted owls, and accepts the long term lower probability risk of habitat loss from insect, disease, or wildfire.

These modifications result in approximately a 13% reduction of the treated acres from those in the Proposed Action. Thus, Alternative Three leaves more acres at risk of loss to fire, insects, disease, and natural overcrowding (suppression) than does Alternative One, but it treats more than Alternative Two.

This alternative commercially thins 5,310 acres. That is 443 acres (7.7%) less than Alternative One, and 718 acres (15.6%) more than Alternative Two.

As in Alternative Two, this Alternative eliminates Overstory Removal Treatments with the same resulting effects as described for Alternative Two above.

Alternative Three creates 680 acres of fuel management zones with the effects as described above. This is more than Alternative Two (no acres) and the same as Alternative One. This alternative maximizes the opportunity to increase the protection of surrounding forest from stand-replacement fire.

Direct/Indirect Effects of No Action

No treatment within the Project Area would allow growth of the vegetation within the area to continue unimpeded and result in effects (as discussed above) associated with stand densities, growth rates, health/vigor, disease problems, structure, and development. Stands with high tree densities would remain at current levels. Also, stands with existing disease problems would not be treated or improved. Stand structure and development would also continue along current trends. These effects have negative impacts on management goals including: providing important ecological functions, meeting the aquatic conservation strategy, and late successional development.

High tree densities result in lower growth rates, smaller trees, decreased health/vigor, and increased insect and disease problems. Tree growth and size are highly correlated to stand density. Expressed in terms of relative density (Drew and Flewelling, 1979), imminent competition and mortality begins to occur at a relative density of 0.5 and individual tree and stand growth begins to decline. Stand growth is maximized at relative densities between 0.4 and 0.5. This is because there are more trees per acre. At this relative density level, there is still high competition between trees and individual tree growth is slow and individual tree size is smaller. Although volume per acre is not maximized, a good balance between individual tree growth/size and stand growth is achieved at relative densities between 0.15 and 0.4. As a result of no treatment, overly dense stands will remain unchanged, thus resulting in lower growth rates, smaller individual tree size, or a combination of both.

At high densities, competition is high which also results in stressed conditions that decrease the overall health and vigor of the stand. Stressed and overstocked stands increase the occurrence and impacts of most tree pathogens. High stand density was positively correlated with high susceptibility to Douglas-fir beetle (Weatherby and Their, 1993); in high-density stands, younger trees are attacked and killed in addition to older ones (Furniss and others, 1979).

Western pine beetle damage is strongly associated with low stand vigor, regardless of its source (Keen 1950, Miller and Keen 1960, Whiteside 1951). Stress on host trees influences susceptibility to Western spruce budworm (Carlson and Wulf 1989, Filip and others 1996, Powell 1994). Armillaria root disease has a tendency toward greater tree mortality for stands with high density (Fillip and others 1989c). The ability of laminated root rot (*Phellinus weirii*) to infect and colonize roots is not correlated with tree vigor (Goheen and Hansen, 1994), so thinning alone will not address this problem. However, increased levels of susceptible species at high densities have increased the occurrence and spread of this root disease.

With no treatment, forest diseases found throughout the project area would continue to spread and intensify at current rates. Laminated root rot infestations, and other root diseases, have large impacts on the landscape. As the fungus spreads and kills adjacent trees, openings are created. These openings expand about 30 cm (1ft) per year (Bloomberg 1984, Childs 1970, Nelson and Hartman 1975). When infected trees die, the pathogen continues to live saprophytically in large infested stumps and large roots for as long as 50 years (Childs 1963; Hansen 1976, 1979), making natural regeneration problematic. Therefore the site will not likely develop into a healthy mature stand. Impacts of root disease are detrimental to some habit objectives and adverse to the objectives of the Aquatic Conservation Strategy in Riparian Reserves.

Root rot causes pockets of mortality that continue to spread and remain on site until treated or until they naturally regenerate to non-susceptible species. This cycle creates large amounts of stressed living trees and dead (standing and downed) wood over long periods of time. For this reason, *Phellinus weirii* and other root diseases provide a continuous source of favorable host material for beetles between those times when conditions are favorable for epidemics (Thies and Sturrock, 1995). Additionally, beetle epidemics may be exacerbated by high tree densities.

Mistletoe would also continue to spread and infest current and future stands. Douglas-fir Dwarf Mistletoe is common in the Rustler planning area. Heavily infected trees are weakened, deformed, and often killed (Bega, 1978). Mistletoe reduces volume production and severely reduces the quality of timber, negatively impacting the objectives of Matrix land.

Often, stands with extremely high densities have little or no structural diversity, severely limited ground cover, and low biodiversity. Some stands have unnatural structural patterns created by past management practices, such as windrowing. Also, the age range in young stands is often quite small. These attributes would remain unchanged. Therefore, stands with unnatural structure and young regeneration would continue to develop in patterns that do not balance production, natural ecosystem attributes, and biodiversity.

Canopy closure levels that support suitable owl habitat and provide thermal cover in Big Game Winter Range would remain unchanged for the next couple of decades. However, the potential for large scale stand replacement events from insects, disease, and fires would increase which could have large impacts to these and other values.

Early successional stands at overstocked levels and/or resulting from high competition with brush species (such as *ceanothus, spp.*) would not receive pre-commercial release treatments. This would increase the time needed for such stands to develop, limit structural diversity, and limit species diversity, which has negative impacts to the goals of all land allocations.

Cumulative Effects to Forest Health

Cumulative effects for the project area encompass the Central Big Butte Watershed Analysis Area. This watershed is comprised of private land (27,014 acres, 46%), BLM land (15,237 acres, 26%), and Forest Service lands (15,776 acres, 27%). Cumulative effects for the project area encompass the Central Big Butte Watershed Analysis Area. This watershed is comprised of private land (27,014 acres, 46%), BLM land (15,237 acres, 26%), and Forest Service lands (15,776 acres, 27%). The detailed cumulative effects analysis below does not include the South Fork Rogue River 5th field watershed because only approximately 100 feet of temporary road in the watershed is included in the project area. The proposed action would have no measurable effect on cumulative effects in this watershed.

Past Activities

Geographic Information Systems (GIS) analysis of stand age on Forest Service managed lands in the Central Big Butte Watershed Analysis Area showed that there are 456 acres of stands less than 30 years old, 0.8% of the watershed. The acres of BLM managed lands that are characterized as young stands were determined based on analysis completed for four 5th field watersheds. Regeneration harvest occurred on approximately 740 acres over the past 14 years. Since this acreage includes four watersheds, the amount of young stands in the Central Big Butte Watershed Analysis area is expected to be much smaller. Thus on BLM managed land, less than 740 acres are currently characterized as young stands within the watershed (less than 2% of the watershed). On private land, 75% of stands are assumed to be young (20,261 acres, 35% of the watershed.) This assumption was made because the Forest Service does not have accurate data for stand age on private lands, and harvest is generally managed on a shorter rotation than that which occurs on public lands. In summary, approximately 37% of the watershed is likely young stands from regeneration cutting, and the remaining 63% is mostly forested with a small amount of open meadows, wet meadows, and rocky outcrops. The remaining forest vegetation condition varies from dense second growth, thinned second growth, and some late successional conditions.

Present Activities

There are two projects currently being implemented on Forest Service-managed lands in the Central Big Butte Watershed Analysis Area. These projects include Cascade Managed Stands (five density management units within the Rustler project area) and the Fish Lake Rancheria Allotment Management Update. Neither of these activities would create new young stands. On BLM lands, several projects are assumed to be implemented because a NEPA Decision Record has been completed and signed. Although there are no management activities associated with these projects currently occurring, implementation could begin in the near future. Both of these projects include thinning and fuels reduction, non-commercial fuels reduction, and pre-commercial thinning of pole-sized commercial stands. Harvest on private lands is assumed to be on-going with management occurring on a 60-year rotation.

Future Activities

Cumulative effects include all activities in the foreseeable future. Other future activities planned on Forest Service-managed lands include various fuels treatment projects and noxious weed control. The Bybee Project to the north is expected to be similar in scale and treatment.

On BLM-managed lands and private lands current harvest practices would be expected to continue. On BLM lands there would continue to be a focus on thinning and prescribed fire. On private lands, harvest levels are expected to be maintained at the current intensity and rotation. In general, if private lands are harvested on a 60-year rotation, there would continue to be young stands on private land about half of the time.

Taken together, the past, present, and likely future management activities indicate steady progress towards returning forested areas to a condition more able to resist stand replacement events such as high intensity wildfire, insects and disease. On National Forest System land, approximately 40 to 60% of the forests are proposed for some form of density management (depending on the alternative). From a forest health standpoint, this is a significant improvement toward a sustainable and resilient forest in this watershed. While protected old growth and spotted owl habitats retain some risk of loss, they also provide necessary diversity and legacy features essential to long term health of the forested landscape, and their risk of loss is significantly reduced by the improvement of healthy forest conditions around them.

Economic Values

How will activities associated with the Proposed Action or its alternatives generate economic benefits/costs? Will the economic value (cash flow) of commodities provided be less than the associated costs?

Existing Condition

Jackson County (where this project is located) is described as a metropolitan county, but the Klamath Mountains and the Cascade Range cover much of the land base, almost half of which is administered by the Forest Service and Bureau of Land Management. Another 15% of the county's land base is farmland with a relatively large number of small farms. Federal employment, visitor’s services, and trade industries play major economic roles. The wood products industries dominate the export market for this County.

Once heavily dependent on a traditional timber based economy, with many family-wage jobs available across the region, the region's economy has given way to a more diverse economy based on many sectors. Retail and medical services and non-timber related manufacturing increased over the past decade, which has helped stabilize the local economy. Forestry, timber, and wood manufacturing jobs now provide less than 6% of local employment. The area has many abundant natural and man-made resources; electricity, natural gas, water and sewer services, good transportation and a well-developed land and industrial base to attract and keep business and industry.

The recent deep recession, however, has taken its toll, with Jackson and neighboring Josephine counties taking the economic hit earlier and deeper than the rest of the state. Jackson and Josephine counties now suffer 12.4 and 14 percent unemployment respectively (April 2010 data).

Timber harvest projects such as Rustler provide raw material (logs) to feed the local and surrounding area's lumber and plywood mills and secondary wood products manufacturers (building supplies such as doors and windows, etc.). A steady and dependable supply of logs to this economy is critical to these companies and the employees that depend on them. The Rustler project could contribute to such a supply through a number of different timber sales over approximately three to five years.

The current recession, however, has severely depressed the demand for building supplies. The price for logs, in turn, has dropped precipitously. However, the need for this steady supply remains, for two reasons: First, these businesses need a supply of logs at current prices to balance the higher cost of logs they currently have in their inventory of unlogged timber sales. This mix of log costs enables them to profitably produce their product during this time of depressed prices for their goods.

More important, however, is the need to maintain such 'wood-demanding' economic capacity to provide the economically viable 'tools' necessary to treat undesirable forests conditions (discussed above). Without an economic demand for the logs, the financial capability would likely not be available to thin and burn as needed to restore these forests.

Project Actions, Impacts, and Effects for Economic Values

Under the Action Alternatives, varying amounts of commercial timber would be made available to the wood products industry. Revenue sharing from harvested timber would provide contributions to federal, state, and county budgets relative to the amount of timber offered for sale. These revenues also provide funds for the Forest Service to conduct non-commercial post-sale treatments such as burning and thinning. These tasks are routinely accomplished using contracts, though some is accomplished using Forest Service employees. Either way, these funds are used to achieve valued work in the forest and provide jobs.

Direct/Indirect Effects of the Alternatives

A benefit-cost analysis was performed for each of the Action Alternatives. The following table contains a summary analysis and comparison of the costs and benefits associated directly with the timber harvest aspects of the proposal, including access needs. Other costs and benefits are recognized but they are generally not amenable to a quantitative analysis. These include values associated with the transportation system, the changes in ecosystem services associated with standing timber as natural ecosystems, the opportunity and existence values of undisturbed areas and large trees and the future growth benefits of reduced competition in thinned stands.

The following table displays, for each of the Action Alternatives, preliminary estimates of:

- The amount of raw resource (saw timber) available for extraction under each of the alternatives described in Chapter II;
- The aggregate monetary value of this resource which, for the purposes of this analysis, is equated with benefits (recognizing that there are additional non-quantified benefits resulting from each of the alternatives);
- The acres treated by each harvest method (tractor/rubber tired skidder, or, skyline) which is the major determinant of cost per unit of timber production;
- The direct monetary costs associated with the proposed activities; and
- Comparative statistics: benefit/cost ratio including the net benefits.

Table 3.3: Comparison of Benefits/Costs for the Action Alternatives

	Alternative		
	One	**Two**	**Three**
Total acres treated	10,402	6,328	9,052
Non-commercial acres treated	3,827	1,586	3,581
Total acres commercial treatment	6,575	4,742	3,581
Skyline	638	227	546
Ground based	5,937	4,515	4,925
Total Volume (MBF)	72.614	53.690	62.340
Mbf/Acre	11.0	11.3	11.4
Costs			
Harvest	$ 13,375,670	$ 10,262,377	$ 11,587,156
Temporary Road Construction	$ 76,409	$ 0	$ 67,682
Haul Costs	$ 4,833,789	$ 3,588,638	$ 4,166,811
Brush Disposal Costs	$ 2,511,632	$ 1,864,653	$ 2,165,071
Road Maintenance	$ 773,088	$ 573,946	$ 666, 415
Total Costs	**$ 21,761,677**	**$ 16,289,615**	**$ 18,653,135**
Cost per acre	$ 3,309	$ 3,435	$ 3,409
Cost per MBF	$ 298.26	$ 303.40	$ 299.22
Benefits			
Total Benefits	**$ 29,343,353**	**$ 21,784,709**	**$ 25,294,486**
Benefits per MBF	$ 411.18	$ 405.75	$ 405.75
Benefit/Cost Comparison			
Net Benefits	**$ 8,199,197**	**$ 5,495,095**	**6,641,351**
Harvest Costs per MBF	$ 184.95	$ 191.14	$ 185.87
Net Benefits per acre	$ 1,247	$ 1,159	$ 1,214
Net Benefits per MBF	$ 112.91	$ 102.35	$ 106.53
Benefit/Cost ratio	1.38	1.34	1.36

This analysis indicates that the Proposed Action would provide $1.38 for every $1.00 invested, while Alternative Two would return $1.34, and Alternative Three would return $1.36. These numbers seem strikingly similar, but they produce substantially different target accomplishments and economic benefits.

If we set the Proposed Action Harvest Volume at 100%, then Alternative Two produces 74% of that volume, and Alternative Three produces about 86%.

If we set the Proposed Action Net Benefits at 100%, then Alternative Two produces 67% of that benefit, and Alternative Three produces about 81%.

The Proposed Action produces the greatest amount of revenue with the lowest harvesting cost, owing to the treatment of more overall acres, and judicious use of temporary roads resulting in shorter average skidding distances, and the inclusion of a few stands where larger trees having slightly higher values were being removed.

The lower value of Alternative Two is deemed to be the result of longer average skidding distances causing higher logging costs, and the conversion of all overstory removal prescriptions to TSI treatments which had a slight effect on the average size (and therefore value) of the timber being removed.

The middle value of Alternative Three is the result of having a mid-range total volume being removed, incorporating the use of some of the more cost-effective temporary roads while dropping the less cost-effective ones, and the fact that it would treat fewer acres than the Proposed Action, but more acres than Alternative Two.

The preceding economic (cash flow) analysis was presented from the limited point of view of resource utilization, which sees the wood-fiber as a market commodity, then weighs the direct benefits and costs of producing the commodity and making it available to the timber industry for processing. The economic principles are fairly well understood and are an important consideration in overall project design and resulting consequences.

Natural resource economists have, in recent years, begun to place their focus on another aspect of resource management, which sees natural ecosystems as essential components of the planetary life support system and attempts to quantify these functions under the general term “ecosystem services”. Direct relationships and clear principles for accounting for such things are only beginning to be developed. The goal, however, is to understand the true value of the standing timber as a form of “natural capital”, the biophysical structures that provide these critical services (Hawken et al. 1999). A fairly inclusive and broad list of such services is shown below. Ecosystem Services can include:

- Purification of air and water
- Mitigation of droughts and floods
- Generation and preservation of soils and renewal of their fertility
- Detoxification and decomposition of wastes
- Pollination of crops and natural vegetation
- Cycling and movement of nutrients
- Control of the vast majority of potential agricultural pests
- Maintenance of biodiversity
- Protection of stream channels and banks from erosion during high water
- Protection from the sun’s harmful ultraviolet rays
- Partial stabilization of climate
- Moderation of weather extremes and their impacts
- Provision of aesthetic beauty and intellectual stimulation that lift the human spirit

(Adapted from G. Daily et al., Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems, ESA: Issues in Ecology)

This listing seems to embrace the concept of ecosystem management. An additional definition of ecosystem health might well be: the continuing ability to provide a wide range of unimpaired ecosystem services.

Cumulative Effects to the Economic Values

What is most important in a cumulative effects discussion here is the steady supply of ample raw material over time to the local wood products manufacturing industry (from Roseburg, Oregon south to Yreka, California and west to the coast) for the reasons discussed above. A significant and rapid reduction in the availability of raw logs in the 1990s and early 2000s led to significant restructuring of the local industry (closing of mills). At that time, the cumulative effect of a steady supply of logs over the prior three or more decades allowed for the development of a broad diverse wood products industry. The drastic change to that flow of material created much local economic hardship, though the local economy has since diversified and recovered considerably in the more populous areas from that hit.

Today's local wood products industry has no such resiliency. Only one mill remains in Josephine County. A few remain in Jackson County and surrounding areas. They are specialized however, with each mill filling a unique niche in the market. Loss of one mill, likely means the market for the material that mill used now shifts to mills further away. If they are further away, the profitability of local logs to them is lower, and the ability of local forest managers to use commercial logging as a tool may be reduced. Replacement of such capacity could take decades if at all. The cumulative effect (steady supply of logs over time) of the Rustler Vegetation management project, with the supply from other timber projects on National Forest, Bureau of Land Management and private lands is to maintain the currently adequate log supply to which the local industry has restructured.

Effects of Implementation: Other Resource Evaluations and Discussion

Aquatic Conservation Strategy

Will activities associated with the Proposed Action affect attainment of NWFP Standards and Guidelines for Riparian Reserves and/or prevent attainment of the Aquatic Conservation Strategy (ACS) Objectives?

The existing condition of riparian areas was discussed in depth under the Water Quality and Hydrologic Function Issue (above).

According to the Northwest Forest Plan Standards and Guidelines, the Aquatic Conservation Strategy (ACS) was developed to improve and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The four primary components of the ACS are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems; they include: 1) Riparian Reserves; 2) Key Watersheds; 3) Watershed Analysis; and 4) Watershed Restoration.

Riparian Reserves are established as a component of the Aquatic Conservation Strategy, designed primarily to restore and maintain the health of aquatic systems and their dependent species.

Riparian Reserves also help to maintain riparian structures and functions and conserve habitat for organisms dependent on the transition zone between riparian and upland areas.

Riparian Reserves include lands along all streams, lakes, ponds, wetlands, unstable areas, and potentially unstable areas that are subject to special Standards and Guidelines designed to conserve aquatic and riparian-dependent species. Standards and Guidelines apply to activities in Riparian Reserves that may otherwise retard or prevent attainment of Aquatic Conservation Strategy (ACS) objectives, as defined in the 1994 ROD.

Widths for Riparian Reserves necessary to ensure ACS objectives for different water bodies are established based on ecological and geomorphic factors. Widths are typically one site potential tree height (156 feet for this portion of the Forest, see RRNF White Paper #36) along each side of stream channels. Widths are twice this distance along fish bearing streams. These widths are designed to provide a high level of protection to fish and riparian habitats.

Key Watershed designation is an additional component of the ACS that is applied to watersheds that contain at-risk fish species or anadromous stocks and that provide high quality water and fish habitat. None of the area has been designated as a Key Watershed.

Applicable Riparian Reserve Standards and Guidelines

An analysis of the existing conditions relative to Riparian Reserve Standards and Guidelines (1994 NWFP ROD, pages C-31 through C-39) was completed for all alternatives considered in detail. These Standards and Guidelines were reviewed for applicability relative to the types of actions being proposed under Rustler Vegetation Management.

The **Timber Management** Standards and Guidelines (NWFP page C-31) were determined to be applicable because timber management is proposed.

The **Roads Management** Standards and Guidelines (NWFP page C-32) were determined to be applicable because of the maintenance and/or reconstruction of existing roads for access and hauling needs (RF-2, RF-4, RF-6, and RF-7 are determined to be applicable). Existing roads cross stream courses and Riparian Reserves.

Although under the Proposed Action temporary roads are being proposed to access new landings, these new roads are not being proposed within or adjacent to Riparian Reserves.

The **Grazing Management** Standards and Guidelines (NWFP page C-33) were determined to *not* be applicable because grazing management is not the goal of this project.

The **Recreation Management** Standards and Guidelines (NWFP page C-34) were determined to *not* be applicable because recreation management is not the goal of the Rustler Vegetation Management project.

The **Fire/Fuels Management** Standards and Guidelines (NWFP C-35) were determined to be applicable because fuels management is part the goal of this project, and some hazardous fuel reduction treatments are being proposed within Riparian Reserves.

The **Lands** Standards and Guidelines (NWFP page C-36) were determined to *not* be applicable because no actions associated with these Standards and Guidelines are part of the Proposed Action.

The **General Riparian Management** Standards and Guidelines (NWFP page C-37) were determined to be applicable to all projects under the NWFP that include actions proposed within Riparian Reserves.

The **Watershed and Habitat Restoration** and **Fish and Wildlife Management** Standards and Guidelines (NWFP page C-37) were determined to be applicable because some of these Standards and Guidelines are associated with parts of the proposed treatments.

The **Research** Standards and Guideline (NWFP page C-38) RS-1 was determined to be not applicable because research is not proposed.

Consistency with the Aquatic Conservation Strategy

The Northwest Forest Plan requires project consistency with ACS with specific reference to nine ACS Objectives. As such, mitigation measures and design criteria are identical across all action alternatives with the intent to ensure compliance of each and there is therefore, no alternative-by-alternative discussion here. The discussions below speak to how these measures achieve that compliance. Below, is a summation of the environmental analysis regarding consistency with the elements and components of the ACS Objectives (ACSOs). Additional discussion and rationale may be found in analysis documented under other issues in this Chapter including soils, hydrology, water quality, fisheries, and terrestrial wildlife.

ACS Objective 1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Density management (thinning) could occur within portions of Riparian Reserves; however canopy closure would not be reduced overall. Treatments are designed to improve stand health, environmental resiliency, structure, and composition. The stands receiving the highest impacts, the root rot pockets and meadow restoration treatments, are small in size and scattered across the landscape. There is no large-scale forest cover removal or regeneration harvest. Connected actions such as temporary roads would be developed outside of Riparian Reserves, utilized and decommissioned after use. Logging systems and use of temporary and existing roads for haul would employ Project Design Criteria and Mitigation Measures. All of the Action Alternatives are designed to have a long-term beneficial effect on watershed and landscape-scale features. The Action Alternatives are, therefore, expected to have no effect on watershed and landscape-scale features.

ACS Objective 2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Though this Standard does not describe how this connectivity is to be maintained, it does describe the functions that connectivity must provide. For the purposes of this assessment, a continuous canopy, atop a functional forest with an adequate supply of critical habitat elements such as down wood and properly functioning soils was considered adequate to provide the necessary functions listed in the paragraph above.

Density management (thinning) could occur within portions of Riparian Reserves, however canopy closure would not be reduced. Soils compacted from past and current actions would be treated to eliminate or reduce that compaction.

Treatments would improve stand structure and composition. Connected actions such as temporary roads would be developed outside of Riparian Reserves, utilized and decommissioned after use.

Logging systems and use of temporary and existing roads for haul would employ Project Design Criteria and Mitigation Measures (see Chapter 2).

Application of these actions and design criteria are expected to prevent the development of any barrier or hindrance to aquatic network connectivity. There would be no measurable effect on aquatic and riparian dependent species, with a long-term beneficial effect. The Action Alternatives are, therefore, expected to maintain spatial and temporal connectivity within and between watersheds.

ACS Objective 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Density management (thinning) could occur within portions of Riparian Reserves; however no activity would occur within 25 feet of the stream course. Treatments would improve stand structure, composition and maintain the integrity of the forest stands along the aquatic system. Connected actions such as temporary roads would be developed outside of Riparian Reserves, utilized and decommissioned after use. Logging systems and use of temporary and existing roads for haul would employ extensive Project Design Criteria and Mitigation Measures to protect soils and hydrologic function.

Project design criteria including retention of snags and large trees capable of becoming future “pool-forming” logs within the stream are integral to the treatments proposed in Rustler riparian areas.

The Action Alternatives are therefore expected to maintain physical integrity of the aquatic system.

ACS Objective 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Density management (thinning) could occur within portions of intermittent, non-fish bearing Riparian Reserves, however no activity would occur within 25 feet of the stream course. Vegetative treatments are designed to protect or improve the forests within the riparian areas, and thus protect the biological, physical and chemical integrity of the aquatic system. Connected actions such as temporary roads would be developed outside of Riparian Reserves, utilized and decommissioned after use. Logging systems and use of temporary and existing roads for haul would employ extensive Project Design Criteria and Mitigation Measures. Past and recent soil compaction may be treated. The mitigations and design features are in place to avoid any measurable effect on water quality. The Action Alternatives are therefore expected to maintain water quality.

ACS Objective 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

The Action Alternatives are expected to maintain the sediment regime under which aquatic ecosystems evolved, with an insignificant and undetectable effect on sediment regime. Density management (thinning) could occur within portions of Riparian Reserves, however no activity would occur within 25 feet of the stream course. Connected actions such as temporary roads would be developed outside of Riparian Reserves, utilized and decommissioned after use. Logging systems and use of temporary and existing roads for haul would employ extensive Project Design Criteria and Mitigation Measures deigned to prevent input of sediment into any stream course. Soil compaction measures are designed to prevent new soil compaction where possible and treat past compaction where practicable. These measures are designed to avoid any measurable effect on the sediment regime.

ACS Objective 6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

The Action Alternatives are expected to maintain stream flow. Density management (thinning) could occur within portions of Riparian Reserves, however no activity would occur within 25 feet of the stream course. Connected actions such as temporary roads would be developed outside of Riparian Reserves, utilized and decommissioned after use. Logging systems and use of temporary and existing roads for haul would employ extensive Project Design Criteria and Mitigation Measures. With the application of these measures there is expected to be no measurable effect on stream flow.

ACS Objective 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

As described above, forest treatments in all action alternatives are designed to maintain or promote a functional, resilient, mature or late seral forest following treatment. Though some disease treatments and meadow restoration actions are designed to remove forest cover, those areas are small in size, scattered across the watershed, and believed to be consistent with historic conditions of a healthy watershed here. Runoff from this landscape, and the resulting timing, variability and duration of floodplain inundation is thus not expected to vary from historic parameters. Indirect effects to floodplain inundation and water table elevation in meadows and wetlands are not anticipated.

ACS Objective 8. Maintain and restore the species composition and structural diversity of plant communities in Riparian Reserves and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

The Action Alternatives are all designed to improve or maintain the species composition and structural diversity of plant communities in Riparian Reserves, wetlands, and uplands (see Chapter 2, and the Forest Health discussions above). No effects are anticipated that would adversely affect species composition and structural diversity of plant communities within Riparian Reserves and wetlands.

As discussed above in the section on Effect Mechanisms concerning Density Management, thinning can have detrimental or positive effects on large wood recruitment for the future. If thinning is conducted in stands of older forests with larger trees, it effectively captures mortality that otherwise would have produced large snags and future coarse woody material for streams wood. If conducted in younger stands, with smaller trees, thinning can hasten development of larger trees, which could be future large snags and future large coarse wood. In the Rustler project, only precommercial (small tree) thinning is proposed within one hundred feet of any stream.

ACS Objective 9. Maintain and restore habitat to support well-distributed populations of native plants, vertebrate and invertebrate riparian-dependent species.

The Action Alternatives are all designed to improve or maintain the species composition and structural diversity of plant communities in Riparian Reserves, wetlands, and uplands (see Chapter 2, and the Forest Health discussions above). Though the alternatives differ in the degree of retention of unthinned late-seral forest, the Action Alternatives are designed to maintain a structurally diverse and resilient forest cover, which is believed will provide habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species. Changes in forest structure benefits certain species over others. No alternative is expected to threaten the ability of the watersheds here to support any native plant, invertebrate, or vertebrate riparian-dependent, or upland, species. There are no anticipated measurable adverse effects; long-term beneficial effects are intended and expected.

Therefore, as an overall determination, the impacts associated with any of the Action Alternatives, either directly, indirectly, individually or cumulatively, would not prevent attainment of Aquatic Conservation Strategy, nor the nine ACS Objectives, at the site (Project Area), watershed (Central Big Butte Watershed Analysis Area) or landscape (Big Butte Creek Watershed fifth-field) scales.

Cumulative Effects

The relevant cumulative effects discussion that relates to the Aquatic Conservation Strategy is detailed above in the section on Water Quality and Hydrology.

Air Quality

Will activities associated with the Proposed Action affect current air quality conditions via proposed burning associated with activity fuels treatments?

Air Quality Laws and Regulations

Air pollution is defined as the presence in the atmosphere of substances added directly by human actions in such amounts as to adversely affect humans, animals, vegetation, or materials (Williamson, 1973 in NWCG, 2001). Air pollutants are classified into two major categories: primary and secondary. Primary pollutants are those emitted directly into the air. Under certain conditions, primary pollutants can undergo chemical reactions within the atmosphere and produce new substances, which are secondary pollutants. Smoke generated from prescribed burn activities in considered a primary pollutant.

Congress passed the first Federal Clean Air Act (Public Law 95-95) in 1955 to regulate air quality across the nation and protect public health and welfare from air pollution. The law was amended in 1967, 1970, 1977 and 1990. The Act gave the Environmental Protection Agency (EPA) the task of setting limits, or National Ambient Air Quality Standards (NAAQS), on how much of various pollutants can be in the air where the public has access (ambient air).

The major pollutant of concern in smoke from wildland and prescribed fire is fine particulate matter. NAAQS have been established for particulate matter 10 microns or less in diameter (PM_{10}), and particulates 2.5 micrometers or less ($PM_{2.5}$). Studies indicate that 90 percent of smoke particles emitted during burning of wildland fuels is PM_{10} and about 90 percent of the pm 10 is $PM_{2.5}$ (Ward and Hardy, 1991 in NWCG, 2001). Recent studies of the effects of particulate matter on human health indicate that it is the fine particles, especially $PM_{2.5}$, that are largely responsible for effects to public health (Dockery and others 1993, EPA 1996 in NWCG, 2001).

Local Air Quality Conditions

The Oregon Smoke Management Plan (OAR 629-43-043) is the key link between fire management practices and the Clean Air Act. The objective is to "prevent smoke resulting from burning on forest lands from being carried to or accumulating in designated areas… or other areas sensitive to smoke, and to provide maximum opportunity for essential forest land burning while minimizing emissions; to coordinate with other state smoke management programs; to conform with state and federal air quality and visibility requirements; to protect public health; and to encourage the reduction of emissions". Designated areas are "high population centers of air quality concern." The locally designated areas include the cities of Eagle Point and Medford. Other areas of concern are Crater Lake National Park and the Sky Lakes wilderness; and Klamath Falls further east.

Air quality in Jackson County, once known as being very poor, has been improving greatly over the past decade. Weather patterns and the shape of the Rogue Valley provide many days of weather inversions with accompanying air stagnation that creates an environment highly vulnerable to air pollution problems. Pollutants from industrial plants, ozone levels on days with weather inversions, and wood smoke from home heating stoves all contributed to the historic poor conditions, but all are improving. Large summertime wildfires have been a recent contribution to air quality problems here in the past decade.

Effects of Action Alternatives, Activity Fuels Treatment

The Mitigations section of Chapter 2 specifies that all prescribed burning will be conducted under an approved burn plan to ensure compliance with the State of Oregon Smoke Management Plan to best ensure that any prescribed burning associated with this project will avoid or minimize impacts to areas of air quality concern. The measures typical in such burn plans consider factors such as seasonal burning, weather patterns, use of rapid ignition methods, burning piles or concentrations rather than broadcast burning etc. and have been in practice for many years. These measures are known, from experience, to be effective (greater than 90%) when applied correctly, and technically feasible.

These smoke management measures will be applied equally to all action alternatives, with the relevant variable between alternatives being the likely number of acres to be burned. From an effects evaluation standpoint, the more acres needing burning, the more time required to do so, and the more risk is run that some of that burning might escape the best smoke prescription to avoid affecting areas of concern. Alternative One therefore runs the highest risk of this occurring, and Alternative Two has the least. Beyond this simple characterization, there is no meaningful way to further distinguish between these alternatives concerning air quality matters as it relates to smoke from prescribed burning of activity or natural fuels.

Effects of Action Alternatives, Smoke from Wildfire

Wildland fire is mentioned in numerous historical accounts of life in southwest Oregon in reference to burning, burned landscapes, or smoke. Wildland fires were a common event in this area, as was the smoke they created. As a decomposition process, wildland fire produces combustion by products in the form of smoke (gases, and particulate emissions) that can be harmful to human health and welfare (National Wildfire Coordinating Group, 2001). Because of this, as residents of Medford, Ashland and surrounding communities in the summer of 2002 and 2008 can testify, wildland fire also plays a significant role in air quality.

This raises the question: how much smoke is “natural”? According to Peterson in Smoke Management Guide for Prescribed and Wildland Fire (NWCG, 2001), historic fire regimes and historic fire frequencies can be used as a starting point for a definition of natural emissions. In many parts of the country, however, historic fire frequency would be likely to produce much more emissions than would be acceptable in today’s society. Most approaches to estimating natural emissions from fire will start with historic fire frequency (discussed below, under “Wildfire Risk”).

A primary purpose and need of this action is to reduce the risk of large-scale stand-replacing wildfires that can pump high amounts of smoke into the Rogue Valley. Use of prescribed burning to reduce fuels, as opposed to allowing wildfire to consume them, produces less particulates because only targeted fuels are burned, and most green, live, vegetation is not. To that end, approximately 3,500 acres within the Planning Area have been proposed for natural fuels reduction treatments and portions of the planning area have been proposed for Fuel Modification Zones

Alternative One treats more acres of fire-prone forest densities and fuel accumulations than either Alternative Two (the least) or Three, and therefore provides the highest amount of protection from wildfire smoke. Alternative Two provides the least.

Cumulative Effects

The primary concern for air quality cumulative effects here are for those effects that accumulate in time, not over time. No records or reports were found for southern Oregon to indicate air quality problems in the past are exacerbated by or are magnifying any air quality challenges today in southern Oregon. Air quality problems only accumulate in time, such as when smoke from slash treatments is created during times of air inversions when other air pollutants (e.g. woodstove smoke, auto or other emissions) are already trapped in the basin. None of the alternatives would create this cumulative problem since implementation of burning is driven by compliance with the State of Oregon Smoke Management Plan, which targets these potential problems and requires measures, which the Forest Service will implement, to prevent them from occurring. That’s not to say that burning by itself won’t affect air quality, even when in compliance with Stat or Oregon Smoke Management Plan.

The secondary effects of air quality problems, such as effects to human health or health of local ecosystems, of long-term exposure to high pollutant levels could conceivably accumulate over time. There is no indication, however, that any such long-term high intensity levels of pollutants are a local problem of sufficient relevance or measurability to meaningfully discuss concerning this project.

Wildfire Risk

Current Condition

The primary purpose of re-introducing fire onto the landscape in the analysis area is to approach the historic range of variability of vegetation types, habitat, and fire occurrence. This is summarized by two concepts. The Fire Regime describes the historic fire return interval and the severity of these fires. The historic fire regime throughout this area is a Fire Regime III. This regime shows a large variability in fire severity and a fire return interval of moderate duration (35-100+ years).

Fire Regime	Frequency (Fire Return Interval)	Severity
I	0-35 years	Low
II	0-35 years	Stand Replacement
III	35-100 + years	Mixed
IV	35-100 + years	Stand replacement
V	>200 years	Stand replacement

Fire Regime Condition Classes (FRCC) are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, grazing, introduction and establishment of exotic plant species, insects and disease (introduced or native), or other past management activities.

Table 3.4: Fire Regime Condition Classes

Condition class	Attributes	Example management options
Condition Class 1	Fire regimes are within or near an historical range. The risk of losing key ecosystem components is low. Fire frequencies have departed from historical frequencies by no more than one return interval. Vegetation attributes (species composition and structure) are intact and functioning within an historical range.	Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use.
Condition Class 2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components has increased to moderate. Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Vegetation attributes have been moderately altered from their historical range.	Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime.

Condition class	Attributes	Example management options
Condition Class 3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Vegetation attributes have been significantly altered from their historical range.	Where appropriate, these areas may need high levels of restoration treatments, such as hand or mechanical treatments. These treatments may be necessary before fire is used to restore the historical fire regime.

The FRCC of a vast majority of this area is Condition Class 3. Vegetation has been significant altered from the historical range of variability mainly by two processes. The first is fire exclusion. This has been occurring for almost 100 years. The other process has been the timber harvests that have occurred within this area.

Historically fire has played a major role in shaping the vegetation succession and landscape within the Rustler planning area (Central Big Butte Springs Watershed Assessment, page 7). Prior to 1900 (before organized fire suppression) fires burned at a low intensity started primarily from lightning in the higher elevations and by Native Americans at the lower elevations as a tool for improving gathering areas, and hunting.

The historical fire regime of the area included both stand replacement events, usually in the denser, smaller diameter stands, and low-intensity surface fires that naturally reduced timber litter without major effects upon the overstory. Due to the frequency of light surface fires, the surface fuels were consumed leaving what can be described as light loading of needles and small limbs. Small amounts of large woody material were present on the forest floor. Low volume of fuel accumulation did not create conditions favorable for stand replacement fires and the forest were more resistance to insects and disease than the dense stands that dominate these sites today. The long return interval fires occurred at the higher elevations and within the steep canyons where climatic conditions along with additional fuels build-up created conditions for a stand replacement event. Fire as a disturbance mechanism then was not as damaging as it is today because of fire exclusion and the resulting high fuels accumulation.

After 1900 (the age of fire suppression) the need for fire suppression increased due to expanding homesteads and to protect grazing lands and timber resources. Even though the fire frequency and size decreased, the potential for a large fire event still existed, as evidenced by the Cat Hill fire in 1910 which was a stand replacement fire that burned 12,800 acres south of the Project Area with approximately 5,000 of those acres were in the southern portion of the planning area, and the Rustler fire in 1915 that burned approximately 2,300 acres in the northwest portion of the Project Area.

The effect of reduced fuel loading from wildfire has gradually deteriorated due to aggressive firefighting over the past 60 years. This has resulted in overstocked, overly dense, and stressed timber stands susceptible to insect and disease infestations which, in turn, lead to elevated levels of tree mortality and the unnatural high accumulation of ground fuels (twigs, limbs, branches), crowded understory, ladder fuels, and a decadent brush component throughout the forest (Central Big Butte Springs Watershed assessment, page 25)

There are three fuel models (Anderson 1985) present within the Rustler Project Area. The largest portion of the area is covered by Fuel Model 8 (approximately 80% of the planning area). This fuel model can be described as closed canopy stands of short-needled mixed conifers and hardwoods. Fire behavior generally consists of a slow burning ground fire with low flame lengths (1-2 feet). Independent crown fires are the most significant threat, not the relatively benign surface fire behavior exhibited by this fuel model. Only under severe weather conditions involving high temperatures, low humidity, and high winds would the fuels pose a fire hazard. The fuel loading for this fuel model is generally between 8 to 12 tons per acre.

Fuel Models 10 and 11 are also represented in this area. These Fuel Models have the most potential for producing a large fire event with greater than four foot flame lengths and a rate of spread greater than 7 chains per hour. Fuel Model 10 (occurs on approximately 7% of the Project Area) is characterized by large amounts of down and dead material such as tree tops, limbs and whole trees resulting from mortality or adverse events such as the snow-down/ blow-down event of the 1995-96 winter.

Crown fires, spotting, and torching of individual trees is more frequent in this fuel situation. Under normal conditions, the fuel loading would be expected to be 12 to 20 tons per acre. The fuel loading has dramatically increased in this fuel model, within the project area, due to snow-down/blow-down events. The loading has increased to 25-50 tons per acre on some of the steeper slopes, in some of the smaller drainages, and on the ridgetops, which are particularly susceptible to lightning-caused ignitions. These events have greatly increased the risk for stand-replacement fires within this fuel model in the analysis area.

Fuel Model 11 (occurring on approximately 13% of the Project Area) is classified in this light logging slash group. Fires in this fuel model type are fairly active in the slash and herbaceous material intermixed with the slash. The spacing of the rather light fuel load, shading from overstory, or the aging of the fine fuels can contribute to limiting the fire potential.

Insect and disease activity has increased since the turn of the century as a result of fire exclusion, introduction of exotic organisms, and management activities. In historical times, periodic fires kept stocking levels low to moderate, kept dwarf mistletoe infections relatively low, and limited the development of shade tolerant trees (which are generally more susceptible to root diseases and stem decay). In many areas of the Rustler Project Area, shade tolerant species are abundant. Root disease centers are maintained by this steady in-growth of susceptible species and are most likely larger in these areas than would have occurred in a frequent-fire regime. Many of these stands are at high risk of a major fire event due to root disease, dwarf mistletoe, natural fuels build up, and dense stocking levels, which resulted from aggressive fire suppression.

The desired future condition of the stands within this planning area is not a snapshot in time, but rather is an unfolding process that will be accomplished over the course of many years. The complex nature of these stands, and extreme departure from the historic range of variability, may require high levels of restoration activity. A typical stand in this area could require a commercial thin, followed by undesirable tree removal (slashing), then an underburn to return to an FRCC of 1 from an FRCC of 3 at the present time. Some stands will demand less intensive treatments, as in riparian areas, and plantations.

Project Actions, Impacts, and Effects for Wildfire Risk

Thinning, Overstory Removal, Sanitation Treatments – Thinning (precommercial or commercial) or any other tree removal action alone has been shown to be ineffective in minimizing wildfire intensity (Stephens, et al, 2005). It is, however, a critical first step in reducing overall fuel loading on a site. Some form of slash and natural fuels treatment routinely follows thinning and is essential to achieve any reduction of wildfire intensity. When done together, risk of forest canopy loss to future wildfire can be reduced (Graham et al, 2004). A goal of the mechanical tree density reduction with slash treatment in this project is to prepare for future opportunities to apply prescribed underburning, then to allow wildfire to move through without wholesale stand destruction.

FMZ creation - the goal of creating an FMZ is to provide a defensible space where fire management resources could safely create fire lines and initiate prescribed burns to stop wildland fires or meet land management objectives in the LRMP. FMZ creation also allows decision space for the fire managers to consider and plan for the use of wildland fire to actually accomplish the land management objectives in a more cost effective manner than traditional fuels treatments.

The desired condition within these FMZs is low surface fuel loading, minimal resistance to fire line construction, minimal ladder fuels, moderate canopy closure of overstory trees, and reduced amounts of snags and down wood within a maximum width of 300 feet along ridge tops or roads. Desired species composition is fire resilient species, such as pines and Douglas-fir. Typical stands within completed FMZs would resemble Fuel Model 2 (short grass with open timber and/or shrub overstory) in open pine and Douglas-fir stands or Fuel Model 8 (short needle timber litter) in tighter canopy Douglas-fir stands. Actual width of the FMZs would be variable, depending on the slope, but would generally not exceed 150 feet either side of the FMZ centerline.

Surface and ladder fuels (such as small trees and brush), and snags are the most important variables to have removed or reduced. Cutting green trees, especially small understory trees, would be an important element in creating an effective Fuel Management Zone.

Except under the most extreme conditions, fires burning into or from these areas should have low surface fire intensity, minimal crown fire and spot fire potential, and low resistance to fire line construction. They would be the beginning step in restoring historic forest structure, which was a forested landscape generally resilient to stand replacement fires. They could decrease future fire suppression costs and increase options for allowing fire to reclaim its historic role in developing and sustaining habitats.

Underburning - Following the advice of Franklin and Agee (2003), a separate but related proposal is to initiate and maintain large, landscape-scale prescribed burning projects within the fire recovery area and adjacent to many of the proposed Fuels Management Zones and associated road systems. These authors suggest that designing treatments as part of a strategic landscape plan, such as locating fuel breaks to limit fire spread and to serve as anchor points for more widespread prescribed fire use, is critical to affect the behavior of future wildland fires at a sufficient scale. Additionally, some areas where thinning has been accomplished may allow for underburning to treat both activity ad natural fuels. Post-treatment loadings will dictate where this might be possible, but it is expected to be uncommon.

Effects of Action Alternatives

Given the mechanisms described above, the relative effectiveness of each alternative in reducing risk from future wildfires is tied directly to the number of acres on which fuels and stand densities are reduced, and the acres of FMZ created. Given this, Alternative One achieves the highest potential for reducing risk from future wildfires with Alternative Three running a close second. Alternative Two proposes to create no FMZs and thus would significantly lower its effectiveness in minimizing future wildfire risk below either Alternatives One or Three.

Cumulative Effects

The cumulative effect of fire suppression over the last hundred years and failure to thin developing forests following the last stand replacement fire has already left its mark on this landscape. The forest is now at risk, under the right conditions, for a large-scale fire with some stand-replacement results with the potential loss of late seral forest, and damage to other wildlife, fisheries, and recreation values provided by this landscape.

The proposals of the Rustler Vegetation Management Project alleviate the cumulative effects already realized: reducing the increased wildfire risk that has built up over time. Likewise, the Big Butte Springs (to the south) and Mill Creek (to the north) timber sale actions, the proposed Bybee timber sale actions to the north, the Cascade Managed Stands projects throughout the area, and the proposed BLM timber sales and fuels treatments to the east all combine to begin to restore forest conditions more capable of resisting wholesale loss to fire. Together, these treatments serve to break up the continuity of dense fuels across the landscape. It is not possible; perhaps not even desirable, to have such fuel-reduction treatments on every acre across the National Forest. As it is, however, such fire-resilient conditions are the exception, not the rule in the southern Cascades, and there is much work to be done, even after these vegetation treatments have succeeded.

Terrestrial Wildlife – Threatened and Forest Service Sensitive Species

What are the effects of this action on Sensitive terrestrial animal species listed by the Forest Service?

Wildlife surveys, including those for survey and manage species under the Northwest Forest Plan, were completed in 2008. A Biological Evaluation process was then conducted for listed[5] animal species for this analysis and the final report is included as a critical part of this Environmental Assessment in Appendix 7. Information and findings from that evaluation are discussed here.

The US Fish and Wildlife Service (FWS) designates Proposed, Endangered or Threatened species under authority of the Endangered Species Act (ESA) of 1973 (Public Law 93-205), as amended. The Forest Service in the Pacific Northwest Region (FS Region 6) identifies and designates Sensitive species. It is Forest Service policy to minimize adverse effects to listed Threatened or Endangered species and to minimize adverse effects to designated Critical Habitat for listed species as well as to protect individual organisms from harm or harassment as appropriate. The Biological Evaluation discloses impacts to those listed animals that: 1) are known or are suspected to occur inside the action area based on confirmed sightings or geographic range, 2) have suitable habitat in or near the action area, and 3) would be affected by the proposed action or other alternatives.

The January 31, 2008 Pacific Northwest Region (R6) listing of species applicable to this National Forest was reviewed in regard to potential effects on any of these Sensitive species by actions associated with this proposal. Pre-field and reconnaissance results and determinations are summarized below. Table 3.5 displays a list of those species and their relevance to the Rustler Vegetation Management Project. Table 3.6 includes a summary of effect to these species from this project.

[5] "Listed" species refers to those species listed as 'proposed for listing', 'Endangered', 'Threatened' or 'sensitive' by either the US Fish and Wildlife Service or the US Forest Service. The acronym 'PETS' is used to described this list of species.

Table 3.5: Terrestrial Wildlife "listed" species

Wildlife Species (Common name)	Scientific Name	Pre-field Review	Field Surveys
		Existing Sighting or Potential Habitat	Habitat or Species Present
Threatened Species			
Northern spotted owl	*Strix occidentalis caurina*	Yes	Species
Marbled Murrelet	*Brachyramphus marmoratus*	No	No
Sensitive Species			
Pacific Fisher	*Martes pennanti*	Yes	Species/Habitat
Wolverine	*Gulo gulo luteus*	Yes	Habitat
Pallid Bat	*Antrozous pallidus*	Yes	Habitat
Townsend's Big-Eared Bat	*Corynorhinus townsendii*	Yes	Habitat
Pacific Fringe-tailed bat	*Myotis thysanodes*	Yes	Habitat
Northern bald eagle	*Haliaeetus leucocephalus*	No	No
American Peregrine Falcon	*Falco peregrinus anatum*	No	No
Harlequin Duck	*Histrionicus histrionicus*	No	No
Lewis' Woodpecker	*Melanerpes lewis*	Yes	Habitat
White-headed Woodpecker	*Picoides albolarvatus*	Yes	Habitat
Northern Waterthrush	*Seiurus noveboracensis*	Yes	Habitat
Black Salamander	*Aneides flavipunctatus*	No	No
California Slender Salamander	*Batrachoseps attenuatus*	No	No
Siskiyou Mtn. Salamander	*Plethodon stormi*	No	No
Foothill yellow-legged frog	*Rana boylii*	No	No
Oregon Spotted Frog	*Rana pretiosa*	No	No
Northwestern Pond Turtle	*Actinemys marmorata marmorata*	No	No
Western Ridged Mussel	*Gonidea angulata*	No	No
Evening Fieldslug	*Deroceras hesperium (*)*	Yes	Habitat
Klamath Rim Pebblesnail	*Ffluminicola sp. nov. 3 (*)*	No	No
Oregon Shoulderband	*Helminthoglypta hertleini*	Yes	Habitat
Highcap Lanx	*Lanx alta*	Yes	No
Scale Lanx	*Lanx klamathensis*	No	No
Chase Sideband	*Monadenia chaceana*	Yes	Species/Habitat
Green Sideband	*Monadenia fidelis beryllica*	No	No
Traveling Sideband	*Monadenia fidelis celeuthia*	Yes	Species/Habitat
Robust Walker	*Pomatiopsis binneyi*	No	No
Pacific Walker	*Pomatiopsis californica*	No	No
Crater Lake Tightcoil	*Pristiloma arcticum crateris*	Yes	Habitat
Siskiyou Hesperian	*Vespericola sierranus*	Yes	Species/Habitat
Johnson's Hairstreak	*Callophrys johnsoni*	Yes	Habitat
Hoary Elfin	*Callophrys polios maritima*	Yes	Habitat
Insular Blue Butterfly	*Plebejus saepiolus littoralis*	No	No
Mardon Skipper	*Polites mardon*	Yes	No
Franklin's Bumblebee	*Bombus franklini*	Yes	Habitat
Coronis Fritillary	*Speyeria coronis coronis*	No	No
Siskiyou Short-horned Grasshopper	*Chloealtis aspasma*	Yes	Habitat

Table 3.6 Summary of Effects to Threatened and Sensitive Animals

Wildlife Species (Common name)	Determination of Effects
Threatened Species and CHU	
Northern Spotted Owl	LAA
Critical Habitat Unit	NLAA
Forest Service Sensitive Species	
Pacific Fisher	MIIH
Wolverine	NI
Pacific Pallid Bat	MIIH
Townsend's Big-Eared Bat	MIIH
Pacific Fringe-tailed Bat	MIIH
Lewis' Woodpecker	BI
White-Headed Woodpecker	BI
Northern Water Thrush	NI
Evening Fieldslug	NI
Oregon Shoulderband	MIIH
Chace Sideband	MIIH
Traveling Sideband	MIIH
Crater Lake Tightcoil	NI
Siskiyou Hesperian	MIIH
Johnson's Hairstreak	MIIH
Franklin's Bumblebee	NI
Short-Horned Grasshopper	NI

Legend for codes used in table:
NI = No Effect or Impact
LAA = May affect, likely to adversely affect
MIIH = May adversely impact individuals or habitat, but would not likely result in a loss of viability on the planning area (Rogue River NF) nor cause a trend to federal listing or a loss of species viability range wide
BI = Beneficial Effect or Impact

Listed Species for which there is NO EFFECT

Because the Project Area is outside their range, or a field reconnaissance revealed that no species or habitat is present, a "**no impact**" determination is made for the Marbled murrelet, American peregrine falcon, Bald eagle, Harlequin duck, California wolverine, California slender salamander, Black salamander, Siskiyou Mountain salamander, Foothill yellow-legged frog, Oregon spotted frog, Northwestern pond turtle, western ridged mussel, Klamath rim pebblesnail, Highcap lanx, scale lanx, green sideband, Pacific walker, robust walker, Coronus fritillary, insular blue butterfly, and Mardon skipper. No actions of this project will have an effect on these species and they are discussed no more in this chapter.

Because the proposed treatments are designed to avoid impacts to aquatic habitats and wetland riparian areas, there would be "**no impact**" on the Northern water thrush, hoary elfin, or highcap lanx.

Because the only proposed meadow restoration is Stanley Meadows, and field surveys determined it to be unsuitable habitat, there would be "**no impact**" on Franklin's bumblebee, or the Siskiyou Short-horned grasshopper.

The Evening field slug and Crater Lake tightcoil mollusks are associated with seeps and springs (USDI BLM 2008). Field surveys initially found that several areas proposed for treatment contained large areas with seeps and springs. Most of these areas have been dropped from the proposal and mitigation measures call for buffering others to protect habitat and hydrologic values. Because none of these sites would be within treatment units, no surveys have been carried out. In units where surveys were completed, no specimens were located. There would be "**no impact**" to either of these species.

Effects on other listed species

The Rustler project "**may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, (Rogue River-Siskiyou NF), nor cause a trend to federal listing or a loss of species viability range wide**" for Pacific fisher, Pacific pallid bat, Townsend's big-eared bat, Pacific fringe-tailed bat, Siskiyou hesperian, traveling sideband, Chace sideband snail, Oregon shoulderband, and Johnson's hairstreak.

Other species will likely benefit from the habitat modifications proposed in this project. Among those are the Lewis' woodpecker and the white-headed woodpecker.

Overall, the determinations for affected species are generally minor, because primary habitats are either very abundant in the Project Area (e.g. Siskiyou Hesperian), protected by Project Design Criteria (e.g. spotted owl seasonal restrictions), mitigation measures (snag creation for cavity nesters), or would receive minimal, limited or negligible impacts (aquatic species).

For example, downed wood is protected by design criteria; shrub/sapling, small, and mature forest habitats are abundant; and unique niche habitats are generally avoided during density management operations. Minor effects include changes to a relatively small amount of downed wood habitat, and activities that could affect individuals during breeding seasons. These disturbance effects are minimized for Threatened and Sensitive species by seasonal restrictions near known or potential breeding sites. Typical of these species is their vulnerability to specific actions, such as pile burning, or specific effects, such as effects to shading on a pond. Generally speaking, the alternative with the most acres treated, Alternative One, will create the most such impact or benefits as regards these effects. The Alternative with the least, Alternative Two, creates the least such impacts or benefits. The alternatives are really not distinguishable in their impacts or effects in any other way. Details are discussed below.

Northern spotted owl: Direct, Indirect, and Cumulative Effects

A very thorough discussion and evaluation of this project's impacts on spotted owls and spotted owl habitat are included in the Biological Evaluation found in Appendix 7. This section of Chapter 3 does not duplicate the detail found there, but is a summary of that assessment. In comparing the documents in Appendix 7 with the text in this chapter it is important to distinguish the term "Proposed Action" as it is used in different laws. Under NEPA, the Proposed Action is the initial project concept to meet the purpose and need that is presented to the public during scoping, and discussed in Chapter 1. Under the Endangered Species Act, the Proposed Action is used in reference to the action alternative (usually described in Chapters Two and Three) that the Agency intends to take, which correlates under NEPA to the Alternative chosen and ultimately presented in the Decision Notice or Record of Decision. They may be one and the same, if the agency chooses to implement the original Proposed Action, but they generally are not.

The Forest has identified 12 known, historic, or suspected spotted owl sites in or adjacent to the Rustler project area from historic information, protocol surveys, NEPA field evaluations, or incidental observations.

Eight activity centers fall within the Project Area boundary and the home ranges of another four spotted owl overlap the proposed project area. Six of these 12 activity centers have recent survey data since 2003 (unpublished data, OSU demographic study) while the status of the other six of the activity centers has been unverified since 1993 or earlier. All suitable habitats not already being surveyed by OSU for the demographic study within the Rustler planning area were surveyed in 2008 with no additional owls detected, though it should be noted that 2008 was an extremely poor year for breeding owls due to weather concerns and detections were abnormally low, according to both OSU and Forest survey data. No owls were detected at any of the historic sites in 2008. A second year of surveys in 2009 also failed to detect any owls at the Forest surveyed sites.

Breeding pairs of Barred owls have been found in the Oak Mountain area (the southwestern most corner of the project area and adjacent to private land), and a barred owl was heard in 2008 on the west flank of Rustler Peak (at the northernmost boundary of the project area). Across the region, barred owl numbers are increasing and the conclusion that local barred owl levels were not a serious threat in the 2004 study by Courtney et al., may no longer be valid.

In 2004, the FWS conducted a status review of the spotted owl across its range, which summarized the biology, ecology, habitat associations and trends, as well as current and potential threats to the species (Courtney et al. 2004). They found that the rate of habitat loss, the primary reason for listing of the spotted owl, had declined significantly across the range, however, there was some concern as to the potential lag effects to spotted owl populations from past timber harvest. The greatest amount of habitat loss due to timber harvest had occurred in the Oregon Klamath and Cascade provinces. The three major operational threats they identified were timber harvest, catastrophic wildfire, and barred owls. All three of these threats apply to the Rustler Vegetation Management project area.

The 2008 Middle Fork Fire on the Middle Fork of the Rogue River occurred in habitats very similar to those found in the Rustler analysis area and the neighboring Sky Lakes Wilderness. This emphasizes the susceptibility of this region to large fires that, though good for some species of wildlife, can destroy or seriously degrade spotted owl habitat. It is because of this concern that the Rustler proposal looks at developing an extensive network of Fuel Management Zones along the wilderness boundary, major ridges, and major roads.

The effects of the barred owl on spotted owl survival and reproduction is unknown, however, there is a trend of increasing numbers of barred owls within the Medford portion of the Klamath Study Area. Barred owls are detected opportunistically. In the South Cascades study, the annual percentage of historic spotted owl territories with barred owls has increased from 4.1 to 22 percent since 1991. Cumulatively, 56% of the sites have had at least one year and up to as many as 14 years with a barred owl detections (Anthony 2009).

Forsman et al. (2007) notes,

> "Barred owls compete with spotted owls for space. In some study areas where barred owl populations are higher than the Tyee DSA, spotted owl populations are declining more rapidly (Anthony et al. 2006). The Tyee "study area has experienced rapid increases in barred owls recently and it appears that this may be causing increased social instability with the spotted owl population."

Project Actions, Impacts, and Effects on Spotted Owl Habitat

Overstory Treatments

Overstory treatments would be applied to diseased trees in the overstory above regenerating stands that were shelterwood harvested within the past 20 to 30 years. Additionally, thinning is to be applied to the understory trees. The density of the overstory is much less than 40%, and the understory is too young to provide habitat for foraging or roosting. As such, this is not spotted owl habitat and the treatments here would have no effect.

Density Management

This treatment would likely have the greatest potential to affect spotted owl habitat. Thinning, however, could be applied to stands of various sizes and ages, including older forests that provide suitable nesting roosting and foraging habitat. It could also be applied to stands of dense young trees that provide only dispersal habitat for the owl. The post-thinning forest could vary greatly in its density with varying degrees of impact on owl use.

Opening a stand through tree removal can provide more light to the ground and increase understory trees and shrubs. The result of this treatment on owl habitat and ecology depends on the current stand condition (and how close it approximates late-successional characteristics important to owls), how many trees are removed, the residual overstory, the time year the treatment occurs, and the method of yarding/tree removal. The following text defines effect mechanisms for suitable habitat (nesting, roosting, and foraging), and for dispersal habitat.

Nesting, Roosting, Foraging Habitat (NRF)

Within suitable NRF habitat, treatments that reduce the overstory canopy to less than 40%, would ***remove suitable NRF habitat***.

Within suitable NRF habitat, where the canopy cover is greater than 60% and understory treatments such as pruning, underburning, handpile/burn, and removal of small diameter trees < 8” diameter occur, ***suitable NRF habitat would be maintained.***

Dispersal Habitat

Stands not considered as suitable nesting, roosting, and foraging habitat with canopies of ≥40% and 11” average dbh, are considered to provide dispersal habitat for northern spotted owls. Where understory treatments occur in these stands, and canopy closure remains ≥ 40%, ***dispersal habitat would be maintained***.

In stands considered to be dispersal habitat where canopy closures are reduced to <40%, ***dispersal habitat would be removed***.

Generally speaking, thinning of older forest that leaves a canopy closure at 60% or greater with no more than 20% of the area with up to 3/4-acre openings would retain spotted owl habitat suitable for nesting roosting and foraging. One threat to this result could be the taking of too many larger trees that might otherwise have provided large snags, a critical feature of suitable owl habitat, and often deficit in this landscape. There may be some short-term downgrading of habitat quality, but habitat utility would be maintained.

Thinning of younger forest, 20 to 40 years old, would likely have a positive effect on owls, as long as canopy closure remains above 40%. This thinning would not be affecting currently suitable owl habitat, but would hasten the development of larger trees, a more diverse canopy structure, and species diversity in a suitably dense forest that would become suitable for nesting, roosting, and foraging sooner than if left to natural processes. As discussed elsewhere in this document, care needs be taken to ensure an adequate number of large trees are retained and adequate amounts of snags and down wood where present need to be retained to achieve this goal.

Thinning, of either older or younger forests increases the biodiversity of the stand and improves its resilience to wildfire, improving its likelihood of currently providing, or growing into spotted owl nesting, roosting, and foraging habitat.

Sanitation

Spotted Owl habitat would likely be removed where sanitation would be applied, as part of this silvicultural prescription for a stand. These treatments are likely to create openings of 1 to three acres in size, depending on the size of the disease pocket, in which canopy closure would likely be reduced well below 40%. The utility of the surrounding stand for owl use may likewise be compromised, depending on the number and arrangement of such openings in the overall stand. It should be noted however, that owl habitat in the root rot disease pockets to be treated is likely to become non-suitable over time, and for a long period of time, even if not treated.

Precommercial Thinning

This would be applied to stands that currently do not provide spotted owl habitat, and as discussed above, would not impact owl habitat today, but could hasten the development of larger trees in a suitably dense forest that would become suitable for nesting roosting and foraging sooner than if left to natural processes. Again, this thinning also increases the biodiversity of the stand and improves its resilience to wildfire, improving its likelihood of ultimately providing spotted owl nesting roosting and foraging habitat.

Release

The thinning or removal of competing trees and vegetation around desired large old-growth pine and Douglas-fir, even if in currently suitable nesting roosting and foraging habitat, is not expected to adversely affect owl habitat if the surrounding stand (80% of it at least) is left in suitable condition. The openings created by this action are within the ¼ to 1-acre size, generally consistent with naturally occurring openings in spotted owl habitat.

Treatment of Activity Fuels

Fuels generated by silvicultural treatments, either commercial or non-commercial will be treated. This activity will create noise, smoke, and human-presence disturbance to spotted owls. The resulting fires may also consume habitat features such as down logs that are essential habitat components for owl prey. Careful timing of these activities can reduce the impact of the disturbance elements, and careful adherence to proper burn prescriptions can minimize loss of down logs and snags. The effects however, cannot be entirely avoided.

Meadow Restoration

These treatments are applied to trees neither dense enough nor large enough to currently provide spotted owl habitat. There would be no impact to spotted owl habitat.

Fuel Management Zones

These treatments, where applied to currently suitable spotted owl habitat, could remove spotted owl habitat entirely if the traditional approaches of reducing canopy closure, and removing ladder ground fuels were widely applied. Modified approaches, however, could be applied, that retained canopy closure, reduced overly dense ladder and ground fuels thus retaining utility of the habitat for owls, while still reducing some of the fire risk.

Effects of No Action

If no action alternatives were implemented there would be no removal or modification of northern spotted owl nesting, roosting, and foraging habitat. No spotted owl pairs would be affected by reductions in habitat and dispersal opportunities would not be reduced from current conditions. In the absence of large-scale disturbance (wildfire, insects, and disease) the densities of northern spotted owls would likely remain stable, notwithstanding other threats identified by the Sustainable Ecosystems Institute report (Courtney et al. 2004) which include barred owls and West Nile Virus.
Large scale, stand-replacement fire, insect infestations or disease could remove large blocks of late-and mid-successional habitat and likely reduce northern spotted owl presence and pair density within the Rustler Planning area. Connectivity and dispersal within and between late-successional patches and the LSR network would likely be adversely affected, albeit to an unknown extent.

Effects of the Action Alternatives on Spotted Owl Habitat

Treatments that remove NRF are summarized in Table 3.7. The Action Alternatives include the removal of up to 54 acres (<1 percent) of spotted owl NRF habitat from the approximately 163,053 total NRF acres within the Upper Rogue watershed on the Forest. In addition, the Action Alternatives would treat and maintain up to 2,666 acres of NRF habitat (Table 3.7), but the amount of NRF habitat will not change as a result of maintenance treatments.

The Action Alternatives could remove a maximum of 54 acres of NRF habitat due to proposed root rot sanitation treatments within the action area. This is a small portion (<1%) of extant NRF habitat on the District and while this will be a short term affect to owls and habitat, longer term benefits will result by reducing the spread of the disease within these stands and reducing spread to uninfected stands of NRF and dispersal within the watershed.

The Forest has determined that the removal of up to 54 acres of spotted owl NRF habitat will reduce nesting, roosting, and foraging opportunities for spotted owls, will contribute somewhat to fragmentation of NRF habitat within the Planning Area, and is likely to adversely affect spotted owls. However, spotted owls will likely continue to persist in the action area given that up to 162,999 acres of NRF habitat that will remain after the proposed action is implemented.

The Forest has determined the removal of NRF habitat associated with this project is likely to adversely affect (LAA) northern spotted owls because:

- The removal of NRF habitat through sanitation harvest could remove habitat elements, including large-diameter trees with nesting cavities or platforms, multiple canopy layers, adequate cover, and hunting perches.
- Sanitation harvest would reduce the overall canopy below 40 percent and the existing multi-canopy, uneven age tree structure would not remain post treatment.
- The removal of these key habitat features would reduce the nesting, roosting, foraging, and dispersal opportunities for owls within the project area, and lead to increased predation risk.
- Loss of habitat will reduce opportunities for future reproduction and survival of young.

Removal of NRF would reduce the amount of existing NRF in the Section Seven Watershed.

Table 3.7: Effects to Spotted Owl habitat within the Upper Rogue Section 7 Watershed

Watershed	NRF baseline	NRF Remove	NRF Downgrade	NRF maintain	NRF Percent change	Dispersal baseline	NRF-Dispersal-only Removed	Dispersal Maintained	Dispersal Percent change
Alternative One	163,053	54	0	2,666	<1	85,665	80	4,027	<1
Alternative Two	163,053	51	0	1,377	<1	85,665	79	1,914	<1
Alternative Three	163,053	53	0	1,661	<1	85,665	80	3,748	<1

Up to 2,666 acres of NRF will be treated and maintained across the watershed due to the Action Alternatives (Table 3.7).

The proposed treatments that treat and maintain up to 2,666 acres of NRF habitat will have an insignificant effect to spotted owl habitat because:

1. Canopy cover within treated NRF stands will be retained at or above 60 percent which according to the Forest's definition of spotted owl NRF is the minimum canopy closure at which spotted owl would likely continue to use these stands as NRF due to the maintenance of cover from predators and micro habitat conditions for spotted owls.
2. Decadent woody material in the treatment area, such as large snags and down wood, which provide key habitat elements for spotted owl prey species will remain post-treatment.
3. Multi-canopy, uneven-aged tree structure that was present prior to treatment and provides for cover from predators, nesting opportunities, and prey habitat will remain post-treatment.
4. No spotted owl nest trees will be removed.

Concerning dispersal habitat, the project likewise has a minimal impact. Dispersal habitat is widely distributed and abundant throughout the Action Area. All-dispersal includes both NRF and dispersal since NRF also functions as dispersal. Table 3.7 summarizes NRF and spotted owl dispersal effects from the Action Alternatives.

The Forest has determined that the effects of treating and maintaining up to 4,027 acres of spotted owl dispersal-only habitat will be insignificant because:

1. Canopy cover within affected stands will be maintained at 40 percent or greater post-treatment and spotted owls should be able to continue to disperse throughout these stands.
2. Decadent woody material, such as large snags and down wood, will be retained in the same condition as prior to the treatment, there by continuing to provide key habitat for spotted owl prey species and benefits for spotted owls.

Further analysis in the Biological Evaluation in Appendix 7 reveals that there are also limited impacts (<1%) to Spotted owl critical habitat, both that designated in 1992 and that from the 2008 designation; likewise with the Managed Owl Occupancy Areas (MOCAs).

Beneficial Effects

The following beneficial effects may be realized as a result of implementation of the proposed action:

1. Very dense stands will be opened by thinning, thereby improving the ability for spotted owls to disperse and forage within these stands. Thinning stands that currently provide poor quality dispersal habitat will improve the dispersal function for spotted owls by providing more "flying space," and encouraging residual trees to develop more size and structural diversity.
2. The quality of spotted owl foraging habitat in treated stands may improve in response to the relatively more open structure of the treated stands that may result in better access for spotted owls to forage than prior to treatment when they were at stem exclusion and up to 100 percent canopy closure.

Thinning treatments are likely to contribute to reducing the rate of spread and intensity of wildland fires common to the action area.

The lack of meaningful distinction between the alternatives in this analysis is owed to the fact that all treatments in all alternatives in functional owl habitat, be it nesting/roosting/foraging or dispersal, is designed to at least maintain that habitat's minimum definitional requirements after treatment. Though modified from pretreatment condition, it will still meet the criteria established by the US Fish and Wildlife Service for spotted owl habitat. Its utility by owls following treatment is expected, but unknown. The real difference between alternatives comes in the retention of owl habitat left unaffected by any treatment. If owls are using it in its current condition, it's reasonable to expect them to continue to be able to use it if not treated. In that regard Alternative Three best retains spotted owl habitat well over that protected in either Alternatives One or Two. Though much is said in this document about the benefits of treatment for long term retention of owl habitat through increasing a stand's resistance to loss from wildfire, insects, and disease (through treatment), it could be said that retaining current occupancy by a declining population might be of more immediate importance in some habitats. These habitats were identified in Alternative Three, and left untreated.

Cumulative Effects to Spotted Owl Habitat

Timber harvest practices on private lands within and adjacent to the National Forest boundary have removed most large trees and snags across the land base. The majority of state and private forests in Washington, Oregon, and Northern California is managed for timber production (Thomas et al. 1990; USDA and USDI 1994a). Historically, non-Federal landowners practiced even-aged management (clear-cutting) of timber over extensive acreages. The Forest assumes these past management practices will continue and reduce the amount of NRF habitat for spotted owls on non-Federal lands over time. Harvest activities on state and private lands can be expected to impact spotted owls located within adjacent Federal lands by removing and fragmenting habitat and through disturbance activities adjacent to occupied sites during sensitive periods.

Cutting cycles on private lands in western Oregon generally run 30 to 50 years depending on site and tree growing conditions. For many areas in western Oregon, including Southwest Oregon, the next cutting cycle is beginning, with new clearcuts regularly appearing on hillsides as they did in the 1970's and 1980's. While the majority of these lands have not provided owl habitat in the recent past, some may have provided habitat for dispersal or foraging, and these conditions can be expected to be lost to owls over the next two decades, increasing the importance of publicly managed lands to the conservation of spotted owls.

The BLM is proposing commercial thinning and selective cutting, likely in a manner similar to Rustler, near the western edge of the Project Area that could further affect, in the short term, the conditions of suitable habitat in the immediate vicinity. Additional National Forest timber harvest is occurring to the south in the Big Butte Springs project area, and proposed to the north in the Bybee project (a project nearly identical to Rustler in its approach to treatment of forest conditions). Overall, however, this vegetation management on public lands is designed to maintain or improve spotted owl for the long term; it is not removing habitat. Owl habitat, therefore, is expected to remain available and in usable condition on these lands in higher amounts and for longer periods than it otherwise might without the proposed treatments.

A more detailed discussion of cumulative effects on spotted owls can be found in Appendix 7.

Lewis' Woodpecker: Direct, Indirect, and Cumulative Effects

Lewis' woodpeckers are migratory in southwestern Oregon, with sporadically large populations in the winter and scattered breeding pairs in the summer reported. Gilligan et al. (1994) reports that they are common breeders in summer in Jackson and Josephine Counties but in the last 10 years they have not been documented (N. Barrett 2008, pers. com.) and there are few recent breeding records (Janes et al. 2002). This species is closely tied to the ponderosa pine/oak savannah habitats of eastern and southwest Oregon.

Nests are often in the large Ponderosa Pine snags or mature oaks while the birds forage on insects and acorn meat. In winter they store acorn meat in crevices in trees and power poles. Because this woodpecker does not usually excavate its own cavity, they have a close tie to older snags within the forest that are likely to contain cavities and have crevices for food storage.

There is very little suitable habitat within the Rustler Analysis area, with most of it concentrated in the southwest portion near Oak Mountain. There are no records of breeding at this site. The proposed conversion, north of Oak Mountain, of large patches of fir forest to pine and hardwoods due to root rot should have a long-term positive impact on suitable habitat. Because of the stand conversions, the proposed alternatives will have a "**beneficial impact**" on Lewis' Woodpecker.

Cumulative Effects – A decline in numbers of old growth pine from past logging on federal lands and extensive removal on private lands has contributed to a loss of suitable pine snag habitat for this species in the project area. Large pine snags, however, are now being recruited at a faster than normal rate because the overcrowding of forests across the southern Cascades, which this project is designed to address, is creating moisture stress on the remaining large pines, and their mortality is increasing. This may be good for this species in the short term, but it is not for the long term. There could likely be window of time when large pine snag habitat could be in critically short supply. Treatments in Rustler are designed to remove this stress from these pines in the thinning treatments, and to plant new pine stands in treated root rot pockets.

White-headed woodpecker: Direct, Indirect, and Cumulative Effects

White-headed woodpeckers have been confirmed breeding on Mount Ashland, Dead Indian Plateau, and along the California border into Josephine County. Primarily a Ponderosa Pine habitat breeder on the East side of the Cascades, they locally breed in the Shasta fir zone in Jackson County (Marshall et al. 2003) and in mixed conifer forest (Cooper 2008, pers. com.). White-headed woodpeckers are not migratory and can be found on the forest year round (Janes et al. 2002). Thinned stands with large remnant trees are suitable habitat, as well as old growth forests. On the Rogue River –Siskiyou National Forest any dry, open forest stand with large trees may serve as suitable foraging breeding habitat for the species, though breeding is probably limited to Ponderosa pine and true fir stands.

Known breeding sites on the forest include the meadow complexes around the Mt. Ashland Ski area and a mixed conifer shelterwood (appx. 6 trees/ac.) east of Howard Prairie. One Mt. Ashland nest was in a 5-foot tall stump within a campground. Suitable habitat in the Rustler Analysis area can be found in the open shelterwoods that closely resemble the known habitat on the Dead Indian Plateau. No birds have ever been reported from this site, but that could be due to lack of survey effort.

Thinning of mature timber generally improves the habitat components used by White-headed woodpeckers. Stand conversion in disease pockets to ponderosa pine and other pines would also result in higher quality habitat, as long as adequate snag levels are maintained. The lack of sightings within the analysis area during general field surveys, combined with the beneficial effects of the proposed treatments means that overall the proposed action should have a slight "**beneficial impact**" on the species. Alternative One treats the most acres, with likely the most benefit to this species. Alternative Two would have the least. Alternative Three would be more similar in effect to Alternative One than Alternative Two, but retains more late seral forest than Alternative One which would not likely be used by this species.

Cumulative Effects – A decline in numbers of old growth pine from past logging on federal lands and extensive removal on private lands has contributed to a loss of suitable pine snag habitat for this species in the project area. Large pine snags, however, are now being recruited at a faster than normal rate because the overcrowding of forests across the southern Cascades, which this project is designed to address, is creating moisture stress on the remaining large pines, and their mortality is increasing. This may be good for the White-headed woodpecker in the short term, but it is not for the long term. There could likely be a window of time in the future when large pine snag habitat could be in critically short supply. Treatments in Rustler are designed to remove this stress from these pines in the thinning treatments and plant new pine stands in treated root rot pockets.

Pacific Fisher: Direct, Indirect, and Cumulative Effects

Pacific fishers were petitioned for listing by the Center for Biological Diversity and several other environmental organizations in November 2000. After a 12 month review, the U.S. Fish and Wildlife Service found Pacific fisher to be a distinct population segment and gave a "warranted but precluded" decision to the petition, designating the West Coast distinct population segment a Federal Candidate species (USDI 2004).

The geographic distribution of fishers in Oregon has been greatly reduced in extent from pre-settlement conditions. Prior to extensive European settlement, the fisher occupied most coniferous forest habitats in Washington, Oregon, and California (Aubry and Lewis 2003). Currently, there are two documented populations in southern Oregon, which appear to be genetically isolated from each other due to the presence of potentially strong ecological and human created barriers, which include the white oak savanna habitat of the Rogue Valley and Interstate 5 (Aubry et al. 2003).

Individuals in the southern Oregon Cascades appear to be descendents of animals re-introduced from British Columbia and Minnesota during the late 1970's and early 1980's by the Oregon Department of Fish and Wildlife (Aubry et al. 2003). Based on the available information, it appears that the core population is centered on the High Cascades Ranger District of the Rogue

River-Siskiyou National Forest near Prospect, Oregon. This is the population affected by this project. Animals in the northern Siskiyou Mountains are genetically related to individuals in the northwestern California population, which is indigenous.

The fisher is one of the most habitat-specialized mammals in western North America (Buskirk and Powell 1994). Specialization appears to be tied primarily to denning and resting habitats. Aubry et al. (2002) identified 14 natal dens and 18 maternal dens in the southern Oregon Cascades. Natal dens were all found in standing live or dead trees with an average dbh of 93 cm. Height of the cavity opening of natal dens may also be important for protection from potential predators. The average height of natal den cavity openings in the southern Oregon Cascades was 16.2 m. Sites used as maternal dens were more variable than those used as natal dens and included cavities in the lower bole or butt of live and dead trees, and large (>50 cm dbh) hollow logs (Aubry et al. 2002).

Fishers appear to be highly selective of resting structures. In the northern California coastal analysis area, Zielinski et al. (2004) found that rest sites used by fisher had significantly greater maximum tree dbh, greater standard deviation of dbh, smaller standard deviation of canopy closure and greater number of large conifer snags than random sites. Zielinski et al. (2004) reported that approximately 75% of resting structures on two California analysis areas were in standing trees, and most of them were large (average >100 cm dbh). Zielinski et al. (2004) hypothesized that trees must be old enough to have suffered the type of stresses that initiate cavities, and must be subjected to the ecological processes that form cavities of sufficient size. In the southern Oregon Cascades, Aubry et al. (2002) located 654 individual rest sites. Male fishers primarily used live trees for resting and, to a much lesser extent, logs and snags. Most of the female rest sites were also in live trees, but females used snags more often than males did. Large mistletoe clusters that form solid platforms are one of the preferred rest sites for this species. As intensive mistletoe control is one of the proposed objectives of Alternative One, care must be given to preserving adequate structures both in form and spatially.

High canopy closures have been shown to be important to fishers for resting and den sites. Based on the literature, reduction in canopy closure to below 80% could result in the loss of den or resting habitats at a fine-scale. Research that has quantified canopy closure at rest and den sites in northern Oregon and California has focused on a very fine scale, generally 1 acre or less (Aubry and Raley 2006, Yeager 2005, and Zielinski 2004). Reduction of canopy closure to below 80% around large live trees and snags that are clumped and large logs where there is a multi-storied stand component likely has the potential to have the most detrimental effect on potential den and rest sites. Since fishers use the largest live and dead trees for den and resting habitats, loss of these structures can also reduce habitat quality for resident animals. Alternative Three, preserves most of this habitat than the other alternatives in relation to spotted owl habitat protection.

Older trees must also have the types of structures that provide for den and rest sites such as cavities, rust and mistletoe brooms, and large, clumped branches. These types of habitats are common within treatment units and are widely available in the analysis area. Habitat for the fisher can be enhanced by minimizing forest fragmentation, both in remaining old-growth and in second-growth forest, maintaining a high degree of forest floor structural diversity in intensively managed plantations, preserving large snags and live trees with dead tops, maintaining continuous canopies in riparian zones, and protecting swamps and other forest wetlands (Zielinski and Kucera 1995 GTR PSW 157, Aubrey and Lewis 2003).

Fishers appear to be a generalist predator and opportunistic in their foraging strategies, which is reflected in their diverse diet (Zielinski and Duncan 2004, Aubry et al. 2002, Zielinski et al. 1999, Powell 1993). There is some indication of seasonal variation in the fisher's diet (Zielinski et al. 1999) which is likely linked to seasonal abundance of prey and forage species. While fishers require structures provided by older aged or residual stands for denning and resting, they appear to use a wider variety of stands for foraging. Jones and Garton (1994) found that fishers did not use non-forested sites while resting or hunting, but they did use pole-sapling forests for hunting significantly more than for resting. The inclusion of berries in the diet of fishers suggests that they do forage, at least occasionally or seasonally, in more open stands where many fruit-bearing shrubs and forbs are found. None of the treatments proposed should result in areas that would be unsuitable for foraging by fishers. The potential for increasing downed wood in areas that had been previously completely cleared of downed wood (common during logging in the 1950s-1970s) should improve the overall foraging habitat across the landscape.

The abundance and distribution of appropriate prey species and suitable den sites likely contribute to the ability of habitats to support fisher populations (USDA 1994 GTR RM 254, Aubrey and Lewis 2003). Positive direct and indirect impacts could occur by providing large down wood habitat where currently none exists. This may also provide some denning habitat and prey habitat, if felled trees are retained as large down wood.

Effects of No Action

This “no-action” assessment serves to analyze the consequences and effects that may occur without the implementation of currently proposed vegetation management treatments. This alternative represents the current level of management within the Analysis Area with no additional vegetation management or hazardous fuel reduction activities.

Excluding large stand-replacement events such as wildfire, insect infestations, and disease, the Rustler Planning Area would continue to provide a similar level of fisher habitat over the next few decades. Resting and denning habitat would likely increase slightly as previously managed stands continue to mature and develop into mid- and late-successional habitats.

Natural events that have the greatest potential to affect fishers negatively are those that reduce canopy closure below approximately 60%, remove standing, large, decadent trees that have the potential to form cavities, large standing snags, trees that provide complex limb structures and mistletoe brooms for rest sites, large woody debris, and removal/reduction of understory structure.

Active crown fires typically lead to high acreage burned and adverse environmental effects, and offer the most challenge to fire managers (Scott and Reinhardt 2001). An active crown fire is one in which the entire surface/canopy fuel complex becomes involved. Late-successional habitat is often adversely affected or removed as a result of an active crown fire.

High severity fire would likely adversely affect late-successional habitat and late successional species including fisher by removing down material, small trees that contribute to the stand structure and potentially killing large trees.

Effects of the Action Alternatives

Maintenance of habitat at multiple spatial scales is important for fishers (Weir and Harestad 2003). We define the spatial (habitat) scales that are important to fishers as 1) landscape, 2) home range, 3) stand, 4) site, and 5) structure. The fuel management zones (FMZ’s) within the Rustler project are designed to reduce the effects of large-scale wildfire on habitat at all scales important to fishers, northern spotted owls, and other late-successional species. The population area has been defined and, for this analysis, is considered to occur at the landscape scale. After implementation of the Rustler project, remaining habitats would continue to allow fishers to emigrate and immigrate through the Planning Area to interact with and exchange genetic material with animals in the population area.

At the home range scale, a large portion of the National Forest System lands would not be treated. We expect some shifting or expansion of fisher home ranges due to treatments; particularly in the southwestern portion of the Planning Area where sanitation-salvage treatments are proposed. This is due to higher reduction of canopy closures and understory treatments which may have some effect on fisher prey species, the potential reduction of forage areas, and the potential of increased competition from other carnivores. However, habitat components that are important to fishers at the home range scale (i.e., vegetative composition, habitat patches) should remain after treatment.

The stand scale is defined as a distinct area composed of relatively homogeneous vegetative characteristics. This is the scale at which implementation of the Rustler project is likely to have the greatest effect on fisher habitat. Fishers are generally associated with mid- to high canopy closures. It is difficult to determine from the published literature what constitutes the minimum canopy closure value at which fishers are no longer likely to use the stand. Estimates range to as low as 30%. Some of the stands in these areas would be reduced to between 40-60% canopy closure which may reduce the quality of these stands for fisher life-history requirements (i.e., denning/resting and potentially dispersal/foraging habitats). Movement and dispersal by fishers through stands that have been treated and are reduced to between 40-60% canopy closure is still likely because many of these stands would have a shrub component which is not included in the canopy closure estimate. These would effectively increase canopy closure for fishers. Because treatment prescriptions are based on retention of large trees, some areas within the stand would remain ≥60% canopy closure and would provide dispersal corridors.

The site scale is the immediate vicinity surrounding specific locations used by fishers (dens, rest structures, foraging sites). For the majority of habitat studies, this has been at a scale of 1 acre or less, and generally focuses on the immediate patch of habitat where the fisher was located. The structure scale is the smallest scale at which we considered impacts to fishers. It is defined as the type of structures used by fishers for resting and denning (i.e., individual tree or log) as well as the associated microstructures (i.e., mistletoe broom, cavities).

Effects Related to Disturbance

Impacts to fishers from human activities are not well documented. However, it can be expected that fishers, as with most wild animals, would exhibit aversive reactions to direct human contact or unnaturally loud noises. It can also be expected that avoidance reactions to human-caused disturbance would be elevated for females in dens or accompanied by young kits. Aubry and Raley (2006) identified the seasonal activity patterns for fishers in the southern Oregon Cascades. Females give birth in late March and generally move kits from the natal den to maternal dens at about 8-10 weeks. Near the end of July when kits are approximately 4 months old, they are more mobile and begin to travel with their mothers. Activities associated with project implementation such as felling, skidding, hauling, piling of fuels, and burning are likely to have the greatest negative effects on reproductive females during the denning and early kit rearing periods.

Effects Related to Burning and Smoke

Surface fuel treatments, particularly underburning, pile burning, and the associated smoke could have negative effects on fishers during the denning period. In southwest Oregon, the denning period is from approximately late March, when females give birth, to late July, when juveniles are more mobile and able to travel with their mothers (Aubry and Raley 2006). Burning can potentially remove natal den structures (large trees and snags) and maternal den structures (large down wood). The effects of smoke on denning fishers and their young have not been studied. However, it is assumed that heavy smoke concentrations could require females to move their kits if they are still altricial (requiring nourishment from the mother) or could cause mortality in the young through excessive smoke inhalation or destruction of the den structure by fire.

It is recommended to burn later in the denning period when juveniles are more mobile, or during the fall after the denning period. Where possible, suppression of fire that is consuming large (> 20 inches DBH) snags, trees, and down logs is recommended. Burning restrictions are required within ¼ mile of nest sites for 12 northern spotted owl pairs. Such restrictions would also provide benefits for denning fishers in these areas. In addition, efforts would be made to reduce impacts to fisher mitigation areas during underburning operations.

Effects Related to Fisher Habitat/Canopy Reduction

Moderate to high canopy closure (defined as ≥60 %) has been shown to be important for all aspects of fisher biology and ecology. Fisher home ranges are relatively large and may have inclusions of non-forested habitats or low canopy closure. High canopy closure has been shown to be important to fishers for resting and den sites in northern California and southern Oregon. Research quantifying canopy closure at rest and den sites in southern Oregon and northern California has focused on a very fine scale, generally 1 acre or less (Aubry and Raley 2006, Yeager 2005, and Zielinski et al. 2004). Retention of large live trees and snags that are clumped and large logs where there is a multi-storied stand component and ≥80% overall canopy closure at a fine scale (<1 acre) provides opportunities for fishers to locate suitable den and rest sites. Since fishers use the largest live and dead trees for den and rest structures, their loss reduces habitat quality for resident and transient animals. Older trees must have the types of structures that provide for den and rest sites such as cavities, rust and mistletoe brooms, and large clumped branches. Large decadent trees, and snags (≥ 24"dbh), and areas of high canopy closure are widely available in the Planning Area. The RRSNF recognizes the need to maintain these late-successional characteristics in the Planning Area for both the fisher and the northern spotted owl. Careful consideration has been given to these and other late-successional species during project design.

In stands where treatments would reduce overall canopy closure to approximately 60%, opportunities for fishers to locate suitable den and rest sites within the stand may be reduced. However, due to variation in canopy closure within stands after treatment, and mitigation measures provided for fisher throughout the Project Areas, clumps of large trees with canopy closures >80% would be preserved within the stand. Therefore, stands that are reduced to approximately 60% canopy closure overall should retain patches of trees and snags that provide den and rest sites for fisher based on the following mitigations.

In stands where treatments reduce overall canopy closure to between 40% and 60%, opportunities for fishers to locate suitable areas for den and rest sites within the stand become more limited. Movement and dispersal by fishers through stands that are reduced to between 40-60% is likely because scheduled treatments are not homogeneous and they would still provide travel corridors that are at or above 60%. Use of these stands by fishers would likely depend on overall canopy closure (including understory canopy closure above breast height (1.4m), and the availability of CWM and shrub/hardwood structure after treatment. Based on the requirement of moderate to high canopy closure, we can expect that at least some of the areas that are reduced to below 60% overstory canopy closure may lower the habitat suitability of that stand for fishers.

Following the initial treatments, it is anticipated that future fuel maintenance treatments would occur in order to continue the trend toward more natural conditions, but at this time there is no reasonable way to predict what methodology, extent, or consequences those future actions would have. Treatments would be designed to maintain a closed canopy over time.

The Rustler project proposes to reduce fisher habitat (≥60% canopy closure) by up to 2,785 acres (11.3 km^2) under Alternative One (Table 3.8). These acres are dispersed across 15,186 acres of the Planning Area. Late-successional habitats on southwest portion of the Planning Area would be most affected due to reduction of canopy closure from sanitation-salvage treatments in root-rot infected areas. . Within these areas, there may be some shifting or expansion of fisher home ranges from reductions in habitat quality. Because treatments are dispersed across the entire Planning Area, this could potentially influence up to 3 female home ranges (mean 6,178 acres) and one male home range (mean 15,321 acres) if habitat within the Planning Area were fully occupied, and the home ranges were centered within the Planning Area.

Effects on Denning/Resting/Foraging Habitat

Alternative One reduces fisher denning/resting habitat by 148 acres. This represents a 5% reduction of resting/denning habitat in Rustler Planning Area, and 0.03% within the population area. Dispersal/foraging habitat is degraded by 2,637 acres, a reduction of 0.05% within the population area and 53% percent in the Rustler Planning Area.

Alternative Two reduces fisher denning/resting habitat by 80 acres. This represents a reduction of resting/denning habitat by 0.02 % within the population area, and a 2% reduction within the Rustler Planning Area on National Forest System lands. Dispersal/foraging habitat is degraded by 2,335 acres, a reduction of 0.4% within the population area, and 47% in the Rustler Planning Area.

Alternative Three reduces fisher denning/resting habitat by 82 acres. This represents a reduction of resting/denning habitat by 0.02% within the population area, and a 2% reduction within the Rustler Area on National Forest System lands. Dispersal/foraging habitat is degraded by 2,489 acres, a reduction of 0.5% within the population area, and 50% in the Rustler Planning Area.

Table 3.8 Baseline habitat and effects to fisher habitat by Alternative

	High-quality denning/resting habitat acres	Denning/Resting Habitat acres	Foraging Habitat acres
Baseline-Rustler Planning Area	2,307	976	4,938
Alternative One	-97	-51	-2,637
Alternative Two	-35	-45	-2,335
Alternative Three	-36	-46	-2,489

Based on current research, fishers are generally associated with mid- to high canopy closures. However, nearly all research has focused on resting and denning habitat of fishers. Foraging habitat requirements are difficult to study because it is harder to locate moving animals and because once they are located it is difficult to determine whether or not they are simply traveling through an area or hunting (Center for Biological Diversity, 2008). Because fisher foraging and dispersal habitat is poorly understood, it is difficult to determine the minimum level of canopy closure reduction and patch size at which fishers will no longer will travel or forage in a stand. Estimates of these parameters vary widely across the range of fishers. The Rogue River-Siskiyou National Forest has taken a conservative approach and determined that reducing canopy closure in Resting/Denning habitats below 60% is likely to have an effect on fishers, and reducing canopy closure to below 60% in foraging/dispersal habitat may have an effect on fishers. In the Rustler project, the vast majority of acres impacted are young stands (<20"dbh) where density management prescriptions will reduce overstory canopy closures from above 60% to between 40% and 50%. Some of these stands may still exceed 60% canopy closure if understory canopy closure (shrubs/seedlings) is included. Because thinning is expected to increase vigor in these stands, it is expected that they will attain 60% overstory canopy closure again within 2-3 decades. Information on foraging/dispersal habitats is a critical research need for managing forested stands for fisher. Until further research is conducted in the southern Oregon Cascades and/or Siskiyou Mountains which provides new information on the effects of canopy closure reduction and patch size on fisher, the Rogue River-Siskiyou National Forest will track acres reduced below 40% as foraging/dispersal habitat downgraded. If new information becomes available, baseline habitat will be re-evaluated.

Effects on Large Trees to Fisher

All three Action Alternatives would result in the loss of some large trees which may reduce resting and denning opportunities for fishers. Research has shown that fishers use the largest trees available for both natal and maternal dens and rest sites (Aubry and Raley 2006, Yaeger 2005).

Effects on Large Snags to Fisher

Reduction of large snags can also reduce the availability of fisher den sites. Aubry and Raley (2006) found that large snags were used for both natal and maternal den sites in southern Oregon. Snag retention is important for fisher and other species. Within harvest units, snags can be a safety hazard to operators and equipment. Maintaining large and medium-sized snags requires consideration of the need to maintain a reasonable level of safety for operators and equipment, and the need to retain snags for dependent species. Because human safety is priority, snag retention can fall below Forest PAG guidelines. Knutsen-Vanderburg (KV) funds will be requested for post-harvest snag surveys. If snag levels fall below Forest guidelines within harvest units, additional funding will be requested to implement snag creation activities in those units. Green-tree retention (GTR) patches are required in all units that are not even-aged, young stands. These leave tree patches require 15% of the area with the largest trees and snags available to be retained. GTR's provide the type of micro-sites with the largest trees and snags available that fishers use for denning and resting.

Effects on Coarse Woody Material to Fisher

Down logs are important for fishers and their prey. Under all Action Alternatives, coarse woody material would be retained within Forest PAG guidelines.

Effects on Fisher Prey Species

Effects on prey species from density management and hazardous fuel reduction treatments are variable. Because fishers are known to prey upon a wide variety of small mammal species, it is difficult to quantify how treatments may affect their prey base. The effects on small mammal populations are dependent on numerous factors which include amount of remaining canopy closure, course woody material (CWM), fine woody material (FWM), shrub and forb layers, and fungi. Small mammals occupy a wide variety of habitat types. Some species are considered to be associated with late-successional or closed canopy habitats, while others are generally associated with early successional habitats. Other species are considered habitat generalists.

Gitzen et al. (2007) studied responses of small mammals to thinning in mature forests in Washington and Oregon. Treatments varied in basal area retention and retention patterns. Gitzen et al. (2007) expected closed canopy species to decrease as retention decreased, early successional species to increase as retention decreased and generalist species to show weak or no response to treatments. They found that only 3 of 12 species showed the expected response, and 1 showed an unexpected decrease. They did not detect differences in responses of small mammals between aggregated (clumped) and dispersed retention blocks. Gitzen et al (2007) concluded that in the Washington Cascades 15-40% retention may be sufficient to benefit small rodents and insectivores, but that in the Southern Oregon Cascades, managers may need to retain higher amounts of trees to achieve similar benefits.

Manning and Edge (2008) studied responses of deer mice (*Peromyscus maniculatus*) and western red-backed voles (*Clethrionomys californicus*) to fuels treatments in southwest Oregon. Fuels reduction treatments included piled, pile burning, and lop and scattered. They found that deer mice captures increased and home range size decreased near FWM piles. Voles used all FWM cover classes in proportion to availability, and there was some evidence that lopped and scattered fuels treatments increased survival. Voles are most abundant in older forests that provide large down wood, cool temperatures, and shaded forest floors.

These structures and habitats would remain after implementation of the Rustler project. In general, the Rustler project would retain a minimum of 40% or greater canopy closure throughout the treated areas. Mitigation measures include leaving 3-5 unburned piles/acre where fuels are treated. Based on information presented in Gitzen et al. (2007) and Manning and Edge (2008), combined with mitigation measures for FWM and CWM it is expected that species diversity would remain similar and species richness may experience some change after treatments occur. We do not expect the overall biomass of small mammal populations in the Rustler treatment areas to experience significant change. Therefore, the effects of the project on the small mammal prey base of fishers would likely be negligible.

Similar to that for small mammals, the effects of density management and hazardous fuel reduction treatments on birds would vary depending on their habitat associations. Some species are expected to show no response to treatments while others are expected to increase or decrease. For specific information on effects of the project on avian communities, please refer to neo-tropical migratory bird section of the Environmental Assessment for this project. It is not expected that the overall biomass of neo-tropical migratory birds would experience significant change. Therefore, effects of the project on the avian prey base of fishers would be negligible.

Reduction of overstory canopy closure and fuel-reduction projects are likely to increase sunlight to the forest floor. It is expected that the shrub and forb component within treated stands would increase or be invigorated by understory treatments, such as density management and hazardous fuel reduction treatments. These treatments are likely to improve forage for both elk and black-tailed deer. This, in turn, could potentially increase the presence of, or populations of their predators such as cougars, bobcats, black bears, and coyotes. It is possible that competition for prey may increase between fishers and other predators, or that fisher mortalities could result from predation or competition with larger predators. Predation on fishers by cougars, bobcats, and coyotes has been reported (Weir and Corbould 2008, Buck et al. 1983, Truex et al. 1998, Higley and Matthews 2006).

Cumulative Effects

Based on available verifiable records, the southern Oregon Cascades fisher population is centered near the town of Prospect on the High Cascades Ranger District of the Rogue River-Siskiyou National Forest. Other verifiable records are available from the Umpqua and Winema National Forests, and the Butte Falls and Ashland Resource Areas of the Medford BLM as well as some private timberlands. The GNN satellite imagery was used to query habitat quality across Federal ownerships within the known range of the population. Where private lands were located within the exterior boundaries of these ownerships, they were included in the analysis. Because fishers are considered to occupy low- to mid-elevation habitats, we only queried habitats ≤ 5,000 ft. elevation for the fisher baseline (Table 23, Appendix 7).

The GNN satellite imagery was developed in Calendar Year 2000. This imagery includes natural and anthropogenic modifications (effects) to fisher habitats up to that period in time (Table 23, Appendix 7). We requested information on management actions since Calendar Year 2000 from all Administrative Units within what we have defined as the population area. Because not all units were able to break-out information for areas below 5,000 ft, the information we report in Table 3.9 is for all lands within the Administrative Units including areas above 5,000 ft. elevation.

Generally, fishers use the highest-quality habitats available for den and rest sites. Defining resting/denning habitat and foraging habitats across a large and diverse landscape such as the southern Oregon Cascades population area, which includes multiple ownerships, requires a means to identify the highest-quality habitats. Because all units within the population area are required to report effects of projects on northern spotted owl habitats we use these acres for the fisher cumulative effects analysis across the population area. For all units, Nesting, Roosting, and Foraging (NRF) habitat tends to include the largest, oldest trees with canopy closures generally ≥60%, and multiple vertical layers. For this analysis we consider NRF as denning/resting habitat for fishers. Dispersal habitat for spotted owls generally includes stands with trees ≥ 11" dbh and ≥60% canopy closure. We equate spotted owl dispersal habitat with fisher foraging habitat.

Table 3.9 Reported effects to fisher habitat by Administrative Unit, southern Oregon Cascades population.

Administrative Unit	Denning/Resting habitat acres maintained	Denning/Resting habitat acres downgraded or removed	Foraging habitat acres downgraded or removed
Rogue River-Siskiyou National Forest			
High Cascades RD	13,490	1,618	23,455
Umpqua National Forest			
Diamond Lake RD	0	2,899	7,859
Tiller RD	435	205	5,379
Winema National Forest			
Klamath RD	366	1,835	7,473
Medford BLM			
Butte Falls RA	0	3,112	300
Ashland RA	0	200	300
TOTAL	**14,291**	**9,869**	**44,766**

The baseline habitat for fisher in the population area was derived from GNN satellite imagery taken in Calendar Year 2000. This imagery includes effects to fisher habitats up to that date. For the cumulative effects analysis, we requested information on all actions since 2000, and reasonably foreseeable actions from the Umpqua (Diamond Lake and Tiller Ranger Districts) and Winema (Klamath Ranger District) National Forests, as well as the Ashland and Butte Falls Resource Areas of the Medford BLM. They provided information from their respective Biological Assessments and/or Biological Opinions for all actions consulted on since Calendar Year 2000. We also incorporated all actions consulted on since 2000 on the High Cascades Ranger District of the Rogue River-Siskiyou National Forest (Table 3.9).

The acres reported in Table 3.9 are likely to overestimate acres affected for several reasons including: 1) federal agencies generally consult on the alternative that has the most impact on habitats, ultimately this may not be the alternative that is selected by the decision maker, 2) most projects do not impact all acres consulted on because project acres are generally reduced during layout due to unforeseen circumstances such as special habitats (i.e., springs, seeps, sensitive plants), logging system issues, etc., 3) some low-value projects are dropped due to market conditions, and 4) litigation on some projects may either reduce or eliminate acres affected.

Some of the actions reported in Table 3.9 are less likely to actually have an effect on fishers than others. For example, the nearly 14,000 acres of denning/resting habitat maintained on the High Cascades Ranger District is associated with either road maintenance/danger tree removal or pre-commercial thinning. Removing occasional single trees along a road side, or thinning very young trees under an older stand is probably much less likely to have an impact on fishers than reducing canopy closure in stands of high-quality denning/resting habitat if it is within a female's home range.

Federal actions proposed within the southern Oregon Cascades population area vary widely in their expected effects to fisher populations. Commercial thinning can reduce quality of habitat for both denning/resting and foraging in the short-term, yet may protect these habitats from stand-replacement fires over time. Regeneration harvests likely eliminate habitat for fishers until the stand becomes re-established with seedlings or saplings. However, fishers are highly mobile and unless the patch size is very large, (i.e., salvage on a large fire or wind event) it probably does not constitute a barrier for movements or dispersals. However, if the stand is within a female's home range, it would likely constitute a detrimental effect to that individual. The published fisher literature provides land managers with relatively consistent information on what fisher requirements are for denning and resting. Specifically, fishers utilize the largest, oldest stands or structures with the highest canopy closures available. This information provides the basis for making effects determinations when federal agencies propose treatments in stands with these attributes. However, foraging habitat is not well studied and the published literature varies widely on what constitutes these habitats. For land managers, this is a critical research need. What constitutes a barrier to fisher movement and dispersal (i.e., minimum canopy closure, patch size, etc.) is even less understood.

Activities on federal lands within the southern Oregon Cascades population propose to maintain 14,291 acres (3%) of denning/resting habitats. Nearly 10,000 of these acres were consulted on by the Rogue River-Siskiyou National Forest for road maintenance/hazard tree removal. Removing individual hazard trees and conducting road maintenance is not likely to reduce denning/resting habitat effectiveness for fishers unless an active den tree is removed. The remaining approximately 4,000 treatment acres are spread over approximately 1.4 million acres. This distribution of effects is not likely to reduce the quality of denning/resting habitats across the southern Oregon Cascades population area.

Approximately 9,869 acres (39 km²) of denning/resting habitats are scheduled for downgrade or removal across the population area. This represents approximately 2.5% of the available denning/resting habitat in the population area. The average home range for male fishers in the southern Oregon Cascades is 62 km² and home ranges for females average 25 km² (Aubry and Raley, 2006). If these acres were adjoining, this would remove denning/resting habitat for up to 2 female fishers and 1 male fisher. However, these acres are spread across >1.8 million acres. Assuming that 45 % of a fisher's home range is denning/resting habitat, this could affect up to 4 female home ranges and up to 2 male home ranges.

Approximately 44,766 acres of foraging habitat will be downgraded or removed across the population area. This represents approximately 8.5% of the available habitat. Assuming 55% of a fisher's home range consists of foraging habitat, this could affect up to 14 female fisher home ranges and 6 male fisher home ranges.

Private lands in southern Oregon currently contribute approximately 23% of suitable fisher habitat within the population area. Fishers generally use the largest trees and snags for available for resting and denning habitats. In northern California, fishers are known to use large remnant trees and snags in second growth stands for denning and resting. Fishers may avoid areas with little or no forest cover but may use patches of habitat if they are connected by forested stands. Private timberlands do provide some patches of older structure in wildlife leave patches and riparian habitats. These remnant stands/structures could potentially provide den or rest sites for fisher if surrounding stands provide enough canopy cover for fisher foraging habitat and dispersal.

For the purposes of this analysis, it is assumed that private lands will continue to contribute somewhat to fisher habitat and populations in the near future if some habitat is maintained within the population area. However, it is unknown whether these lands will contribute to fisher habitat in the long term due to current management practices, ownership, and retention of late-successional structures over time. Given local timber harvest practices like regeneration harvest in SW Oregon on private commercial timberlands, we assume that within the southern Oregon Cascades population area, few commercial timberlands currently providing fisher habitat will be maintained as fisher denning/resting habitat over the long term. This could impact nearly 40,000 acres or nine percent of all fisher denning and resting habitat within the population area.

Private lands currently contribute 174,105 acres (33%) of foraging habitat within the population area. Fisher foraging habitats are described as having mid-to high canopy closures. Because fishers will forage in shrub and sapling/pole habitats, private timber company lands will likely continue to provide foraging habitats. Where these habitats are adjoining wildlife leave blocks or riparian leave strips, fishers are likely to occupy these habitats. It is expected that up to 50% of private timber lands will continue to provide some habitat for fishers.

Due to reductions in the extent of denning/resting and dispersal/foraging habitat for fishers within the local population area, the Rustler project "**may adversely impact individuals or habitat, but would not likely result in a loss of viability within the planning area, (RRSNF), nor cause a trend to federal listing or a loss of species viability range wide" for Pacific fisher.**

Pallid bat, Townsend's big-eared bat, and Pacific fringe-tailed myotis: Direct, Indirect, and Cumulative Effects

The nearest record for Townsend's big-eared bat (Plecotus townsendii) is near Lost Creek Lake, at a pumper pond in a forested setting. Similar sites occur throughout the planning area. Normal roost sites include caves and buildings. While no caves are known within the analysis area, there are man-made structures at Rustler Peak and caves in the Wilderness and Big Butte Springs area just to the east and south, respectively. These will not be impacted by this project. They may also use hollow trees for roosting, and these could be impacted as discussed low and in detail elsewere in this chapter,

Pallid bats are known to occur throughout southwest Oregon and northwest California. The species feeds on large, hard-bodied insects and is one of the only local bats that will land and move around on the ground in order to capture its prey. A review of current literature conducted by Verts and Carraway (1998) showed that favorite prey species in Oregon include scorpions (Scorpiones), Jerusalem crickets (*Stenopelmatus*), and several types of large beetles (Tenebrionidae, Carabidae, Silphidae, and Cerambycidae).

Miller and Allen (1928) (as reported by Verts and Carraway 1998) considered pallid bats to be a cave-dwelling species, even though most of the specimens they examined were from buildings. It appears to be adapted to living in areas with diverse vegetative substrate. Suitable roost habitat types include buildings, bridges, rock outcrops, and large decadent snags. In SW Oregon, pallid bats are known to roost under loose bark of large (>40" DBH) snags and within rock crevices (D. Clayton, pers. comm.).

District records indicate that 13 Pacific fringe-tailed bats (*Myotis thysanodes)* were captured near Willow Prairie in 1976, which is approximately 8 miles south of the project area. They have not been caught at this site subsequently and based on the large number of individuals caught during this one effort; this record may represent migratory behavior or a local roost site that no longer exists. A single individual was captured at Rye Spring in August 2007, approximately 7 miles to the east of the Willow Prairie site and 7 miles south of the analysis area. Other recent records from the watershed include Elk Creek Dam and Woodruff Bridge.

There is no reason to assume Fringe-tailed myotis do not use portions of the analysis area. In SW Oregon, *M. thysanodes* appears to be a snag obligate and they are known to roost within and under the bark of snags. Fringe-tailed myotis are suspected to occur near the project area.

The risk to these bats is primarily in the disturbance or destruction of their roosting sites. In the case of caves and dwellings, there will be no impact. The proposed actions do not impact old buildings, bridges or caves preferred as roosts and maternity colonies. In the case of snags and hollow logs or trees, however, there is a likely impact. The proposed treatments will include loss of large snags preferred by these bat species, which could be felled for safety reasons as part of logging operations. The only distinction between alternatives here is the number of acres likely to be impacted, with Alternative One, likely affecting the most acres, closely followed by Alternative Three. Alternative Two impacts the least. Standard practice is to retain as many snags as possible, and mitigation post treatment will call for creation of new snags. These created snags, however, will have little value for bats for 10-20 years. In summary, the proposed timber harvest "**may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, (RRSNF), nor cause a trend to federal listing or a loss of species viability range wide**" for bats, in general.

Cumulative Effects - Past timber harvest on National Forest System have reduced some snags in the planning area, but intensive timber harvest on neighboring private lands have removed most large trees and snags across the land base. This places the burden of maintaining species viability on the Forest Service management actions. Additional timber harvest is occurring to the south in the Mill Creek, Rustler, and Big Butte Springs analysis area, which could contribute to snag deficiency in a few areas where snags might be in low supply, though generally, forests across the District will provide for and recruit new snags in root rot pockets which are not being treated, and in large scale fires which are becoming more frequent. Because historic data for *M. thysanodes* points to a possible decline in the species locally, this additional impact on the habitat could cause these species to decline further, especially where caves, rock outcrops, or human provided structures such as bridges and buildings are unavailable.

Siskiyou Short-horned Grasshopper: Direct, Indirect, and Cumulative Effects

Chloealtis aspasma distribution is in two general areas, one from southern Oregon, near the California border and the other in Benton County. The type locality is in the Siskiyou Mountains of Jackson County, Oregon (T41S R1E Sec13) where specimens were collected on a ridge between 5,000 and 5,800 feet elevation in a bald treeless summit covered with an almost impenetrable brushy scrub through which were scattered grassy areas (Rehn and Hebard 1919).

This species occurs in grassland/herbaceous habitats. It appears to be associated with elderberry plants. Females may lay their eggs in the pith of blue elderberry plants, *Sambucus caerulea* Raf. (Foster 1974). This plant is native from Alberta, Canada to Mexico. It grows in gravelly, rather dry soils on stream banks, margins of fields, woodlands. Blue elderberry is a deciduous plant with handsome showy clusters of white flowers, and the attractive dark blue berries.

Females lay eggs in the pith of elderberry stems in the summer (Foster 1974). The eggs hatch the following year. Juvenile stages forage in open meadows near the ground. Juveniles look similar to the adults except the wings are much shorter and the individuals are smaller.

Since this species does not use forested habitats, no adverse effects will be created by the Rustler project. There may be some potential for habitat creation or improvement by the creation of Fuel

Management Zones and the meadow restoration activities in Alternatives One and Three which would open up the forest, or improve meadow habitats, providing habitat more suitable to support elderberry plants on which this species depends.

Johnson's hairstreak: Direct, Indirect, and Cumulative Effects

Johnson's hairstreak has been described as a mature and old-growth forest associated butterfly of very local and scarce distribution across the Pacific Northwest. Johnson's Hairstreak is also called the Mistletoe Hairstreak, or Brown Mistletoe Hairstreak because the larvae of this butterfly feed exclusively on the aerial shoots of dwarf mistletoes (*Arceuthobium*) (LaBonte et al. 2001). Dwarf mistletoes are highly specialized and adapted parasitic plants of a number of conifers that may limit the butterflies' occurrence and distribution to trees in stands that are infected with *Arceuthobium*. The plants and thus adult egg laying occur in the crowns of trees, which are often not readily accessible or observable from the ground.

Black and Lauvray (2005) note that Johnson's Hairstreak is called a late successional associated Lepidoptera, "at least partially because of its dependence upon *Arceuthobium*". While dwarf mistletoes can intensify and severely infest trees in old stands, especially shade-tolerant firs and hemlocks, dwarf mistletoes are found in all age classes of conifers. Claims that dwarf mistletoes occur solely in old growth or are dependent upon old growth are erroneous. Dwarf mistletoes generally increase in incidence and intensity in older stands, although even young stands readily host dwarf mistletoes and maturing stands may be severely infected if they have been continually infected by a residual overstory.

Adults are known to sip nectar at available flowers in several families in several genera (including Actostaphylos, Ceanothus, Cornus, dandelion, Fragaria, Rorippa and Spraguea) and nearby water and mud puddles (Shields 1965). It also is noted in high elevation stands in southwest Oregon and the Siskiyou Mountains on dwarf mistletoe-infected (*A. abietinum*) Brewer spruce and true fir (Miller and Hammond 2007).

Because we have not conducted survey for this species in the Project Area, and potential habitat occurs within the areas where vegetation treatment and fuel reduction projects would be implemented, all **Action Alternatives** for the Rustler project "**may adversely impact individuals or habitat, but would not likely result in a loss of viability within the planning area, (RRSNF), nor cause a trend to federal listing or a loss of species viability range wide"** due to the potential removal of trees which may have mistletoe.

Mistletoe infected trees are actually targeted in this project in Alternative One where they occur in old shelterwoods and in concentrations in stands planned for thinning. While there will be some loss of mistletoe-infected trees, and thus hairstreak breeding habitat, mistletoe will continue to persist throughout the project area as should this butterfly species.

Alternative Three would have the least impact on this species, since it retains all late seral forests and does not take the overstory from old shelterwoods. Alternative One would likely impact this species the most.

Cumulative Effects- Non-federal landowners practiced even-aged management (clear cutting) of timber over extensive acreages. It is assumed that these past management practices will continue and potentially reduce the amount of habitat used by Johnson's Hairstreak on non-federal lands over time.

At the sub watershed scale, large stand replacement fires, which have burned substantial areas in the last decade, have probably caused a significant reduction in Douglas-fir dwarf mistletoe because of its shade tolerance. In especially hot fires with complete mortality, dwarf mistletoe will have been effectively sanitized and many decades will elapse before dwarf mistletoe is reintroduced to significant levels by bird reintroduction and subsequent spread.

Alternative One could measurably increase these cumulative impacts on mistletoe, and thus the Hairstreak, but Alternatives Two and Three would likely not.

Oregon Shoulderband snail: Direct, Indirect, and Cumulative Effects

The Oregon shoulderband (*Helminthoglypta hertleini*) is endemic to northern California and southwest Oregon. In Oregon, the range includes Jackson, Josephine, and Douglas Counties, with verified locations in Roseburg and Medford BLM Districts and the Umpqua National Forest. The Type Locality is along Highway 66 east of Ashland, Oregon on BLM Medford District. *Helminthoglypta hertleini* were not detected on the Rustler Planning Area (Whiteman, 2009)

The species is associated with rocks and woody debris in moist, rocky areas within forest habitats, often adjacent to areas with substantial grass or seasonal herbaceous vegetation. Seasonal deep refugia include talus deposits and outcrops, which contain stable interstitial spaces large enough for snails to enter. Often subsurface water is present near such refugia. Temperature is lower and humidity is higher under talus than in the surrounding environment. These seasonal refugia also provide protection from fire and predation during inactive periods. Within rocky habitat, the species is also associated with herbaceous vegetation and deciduous leaf litter, generally within 30 m. (98 ft.) of stable talus deposits or rocky inclusions. Vegetation types where the species has been located include dry conifer and mixed conifer/hardwood forest communities as well as oak communities. Vegetation within the surrounding forest not only moderates the temperature and moisture conditions within the rock habitats, but provides food, loose soil and litter conditions necessary for egg laying and may provide additional moisture to the site in the form of condensation drip. Woody debris and deciduous leaf litter is often used as daily refugia during foraging and dispersal in the moist seasons. No strong riparian association has been identified, but many sites are located in areas which have at least seasonal surface water, typically in the form of small springs and seeps, which may only be apparent during the dry season due to the increase in herbaceous vegetation in the vicinity.

Habitat alteration and fragmentation leading to isolated populations is considered to be the major threat to the species. In general, land snails cannot tolerate extremely dry (xeric) conditions, have restricted ranges, and are slow to disperse. This species is found in habitats that are more xeric than most other species in western Oregon and California. Maintaining environmental conditions within refugia in these habitats may be especially critical to survival of local populations, and the species is vulnerable to activities that increase temperature, decrease moisture, or decrease food supplies available in populated sites. Habitat alteration by either human or natural means (including fire, herbicide use, recreation development, quarry development, road construction, and timber harvest), over-collecting and disturbance during aestivation may constitute threats to local populations. Catastrophic wildfire causes direct mortality in high intensity fires and may result in loss of populations over large areas.

Management recommendations include maintaining sites with cool moist temperatures during fall and spring, stable refuge sites for summer and winter aestivation, and a food supply including seasonal herbaceous vegetation, leaf and needle litter, and fungi. This includes maintaining undisturbed talus and adjacent forested areas with vegetative cover sufficient to maintain suitable environmental conditions. Due to the rarity of known populations, known sites should be protected from wildfire to the extent feasible, without degrading the current habitat condition such that the local population is lost.

No timber harvest proposed in any action alternative is expected to adversely affect habitat conditions for the Oregon Shoulderband. The Fuel management zones, however, would likely open up sites, especially adjacent to roads, to hinder this snail's use in some locations. Post treatment underburning, wherever applied would likely kill individuals. The project's effect on reducing severity and extent of wildfire, though, can be expected to benefit the species across the landscape. Large-scale wildfires with some areas with stand replacement effects such as Middle Fork and Timbered Rock are very real threats to this species and this project's effect to minimize these is a positive long-term effect.

*Chace sideband (*Monadenia chacean*): Direct, Indirect, and Cumulative Effects*

Mollusk surveys have been accomplished to protocol on many of the proposed treatment areas and five specimens of *M. chaceana* were located in the Rustler Planning Area. Chace sideband has been located across the southern half of the High Cascades Ranger District in a wide variety of habitats. The known sites within the project area include a shelterwood, young forest, and mature forest, indicating a wide range of habitats available to the species.

Within the range of this species, habitat alteration and fragmentation leading to isolated populations is considered to be the major threat to the species. This species is very vulnerable to high-intensity fire or management activities, which increase temperature, decrease moisture, or decrease food supplies available in populated sites. The degree of connectivity for dispersal within and between occupied areas depends on the density and arrangement of shaded down wood and other cover objects within forested habitats, which provide daily refugia during the wet season. Maintenance of suitable rock-on-rock refugia in areas with short fire return intervals may also be critical to allow the species to survive wild fires. Habitat alteration by either human or natural means (including fire, road construction, and timber harvest), alteration of the hydrologic patterns (which provide moisture), and disturbance during aestivation (dry periods), may constitute major threats to this species.

The Rustler Vegetation Management project "**may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, (Rogue River/Siskiyou NF), nor cause a trend to federal listing or a loss of species viability range wide**" because there would be the potential that some individuals could suffer direct impacts from falling trees, skidding equipment, and temporary road construction during commercial logging operations, especially if conducted during moist months when these mollusks might be near the surface.

The felling of trees and subsequent reduction in canopy would likely increase solar radiation in treated stands and create less desirable habitats than current conditions due to increased temperatures at ground level. Alternative One impacts more acres in this way that either Two or Three (the least).

Burning operations following logging are not likely to impact individuals unless conducted during moist times of year, or individuals took refuge in a burn pile. Burning, however, would remove some large logs that are in advanced stages of decay, some of which could have provided habitat features used by the Chase sideband.

The alternative that thins and burns the most acres, Alternative One, will likely have the greatest direct adverse effect. There is no expectation that any alternative will likely reduce the availability of deep refugia, such as rock piles and talus slopes.

However, the project will likely provide more down wood, and provide for more recruitment of the same for the long term, which could benefit this species in these stands (see discussions below concerning inadequate existing supplies of course woody debris). This will provide improved habitat conditions for these species for the long term.

Cumulative Effects - Within the range of this species (southwest Oregon and northern California, past clearcut logging has likely reduced habitat availability such that remaining populations in mature and old-growth stands are likely very important for maintaining species viability. With the combination of the Big Butte Springs Timber Sales to the south, Managed Stands treatments within the Rustler analysis area and across the district, private timber harvest on land inclusions and all along the west boundary, BLM planned timber sales to the west, there is the potential to impact a large amount of suitable habitat for *M. chaceana* in a very short period of time (within the next 10 years). Additionally, past logging in the southern Oregon Cascades have reduced the number of snags and down logs available for this species on a per acre basis.

Protection of snag habitat, however, is central to forest management today because of the spotted owl and species such as the Chase sideband. This action, Rustler, is designed to improve the sustainability of such older forest habitats across the range of this species and as such will benefit it for the long term. Treatments on the Rustler units will maintain the habitat in a condition that the snail uses based on survey samples, so the treatments here are more benign than many of the others occurring non-National Forest System lands.

Concerning the inadequate numbers of down logs and snags (future down logs) in some areas, the Rustler project contains mitigation measures to minimize further loss, and actually remedy inadequate number of down logs where it occurs in treatment units, improving habitat for this species. Conversely, however, this action is intended to open up these stands and increasing their capability of surviving more frequent low intensity wildfire, which could tend to reduce some of this large woody material.

*Traveling sideband (*Monadenia. f. celeuthia*): Direct, Indirect, and Cumulative Effects*

The High Cascade Ranger District is within the range of the traveling sideband and *M. fidelis celeuthia* was detected in 10 of 173 units on both visits to the Rustler planning area. Six percent of the units had *M. fidelis celeuthia* present (Whiteman, 2009).

Known habitats for *Monadenia fidelis celeuthia* includes dry basal talus and rock outcrops, with oak and maple overstory component; also along spring run in rocks and moist vegetation and moss, within mixed conifer-hardwood forest (*Thuja plicata* and *Acer)*; also very moist, silty alluvial bench adjacent to creek in mixed conifer-hardwood forest (*Thuja plicata*, Douglas fir and *Acer macrophyllum*).

Timber removal in commercial thinning and shelterwood removal units are not expected to alter the light and habitat quality enough to affect the species' habitat in rock and talus. Intensive fuels treatments, however, have the potential to affect individuals more than the timber removal operations as this species is known to concentrate in fuel piles as well as other down wood structures (Barrett, personal observation).

Cumulative Effects - The main impacts to this species revolve around timber and fuels practices. In addition to Rustler there are Managed Stands (district wide), Big Butte Springs timber sales (immediately to the south, two BLM timber sales (immediately to the west) and private harvest activities within the boundaries of the planning area and to the west. Activities on nearby private lands have, and continue to intensively modify natural forest conditions. Even post treatment, the Rustler area could serve as valuable refugia for this, and other, forest dependant mollusks. Nonetheless, the past, proposed, and ongoing timber activities in this region are impacting a tremendous contiguous area in a very short period of time. Because little is known about this species, it is possible that management could negatively impact the species across a large land base enough to negatively impact the local population.

Placement of green tree retention areas around known sites would protect the individuals and known pockets of habitat. The Rustler Vegetation Management project "**may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, (Rogue River/Siskiyou NF), nor cause a trend to federal listing or a loss of species viability range wide**" for *M. f. celeuthia.*

*Siskiyou Hesperian (*Vespericola sierranus*): Direct, Indirect, and Cumulative Effects*

The Siskiyou Hesperian can be found in riparian and other perennially moist habitats, in deep leaf litter and under debris and rocks. It has been collected from lower portions of slopes, but not in areas subject to regular flooding. It may occur along running water, such as small-order streams, or around permanent ponds and springs. Vegetation at sites includes Rorippa and skunk cabbage.

This *Vespericola* species was periodically identified during field surveys across the district. As *Vespericola spp* were not a target species of the surveys, it is probable that many specimens were not identified or recorded to species and it could be even more common or widespread than records indicate. Surveys completed in 2008 in the Project Area located 241 specimens in 29 treatment units scattered across the survey area.

Three of these records fall within shelterwood units. The remainder falls across the wide range of age classes of closed canopy forest found in the Project Area. Habitat within all the proposed treatment areas is suitable for this species.

Siskiyou Co-op Inc. reported that the Siskiyou Hesperian was a common species under bark on downed logs at higher elevations in the Cascade and Siskiyou Mountains and in the Rustler Planning Area. *Vespericola sierranus* was detected on 28% of the proposed Rustler units.

Threats to the species from the Rustler project could include removal of forest overstory and increased solar insulation that can result in drying of important subterranean refugia sites, and loss of aestivating individuals. The resultant stands, after treatment by the Rustler project, would be suitable as long as adequate downed wood is left. Negative impacts to individuals would be limited to accidental crushing during logging operations and burning during fuels reduction operations. It is unknown if this species occupies burn piles as fire destroys their delicate shells (making it impossible to identify them after a fire).

Alternative One would have the most impact, Alternatives Two and Three would have considerably less since they retain overstory trees (Alt Two) and the best late seral forests in the area for owls (Alt Three).

Cumulative effects - As with the Monadenia snails discussed above, the main impacts to *V. sierranus* revolve around timber and fuels practices. In addition to Rustler there are Managed Stands (district wide), Big Butte Springs timber sales (immediately to the south, 2 BLM timber sales (immediately to the west) and private harvest activities within the boundaries of the planning area and to the west. Activities on nearby private lands have, and continue to intensively modify natural forest conditions. Even post treatment, the Rustler area could serve as valuable refugia for this, and other, forest dependant mollusks. Nonetheless, the past, proposed, and ongoing timber activities in this region are impacting a tremendous contiguous area in a very short period of time. However, because this species is so numerous and widely dispersed locally, it is highly unlikely that management would negatively impact the local population to affect local viability.

Therefore the Rustler Vegetation Management project "**may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, (Rogue River/Siskiyou NF), nor cause a trend to federal listing or a loss of species viability range wide**" for *Vespericola sierranus.*

Late-Successional Habitat

Will activities associated with the Proposed Action (location, extent, and type of treatments) affect terrestrial wildlife habitat associated with or dependent on late-successional habitat and further, affect the degree of forest fragmentation and connectivity of this habitat?

Late-successional forests, as discussed here, contain both mature and old growth stand types. Late-successional forests contribute to overall biological diversity within the landscape. Within the Rustler Project Area, late-successional habitats are found only in scattered, isolated pockets in the eastern 1/3 of the planning area (middle of the aerial photo). These remnant patches have been isolated by harvest and historic fire patterns that have disrupted connections between the patches (see photo below). This fragmentation threatens the ecological value of the remaining late successional forests, including their value as habitat for forest interior plants and animals. The full effect of forest fragmentation is not completely understood, but the populations and numbers of species associated with mature and old growth forests can decrease if fragmentation, isolation, and reduction in stand size continue.

Interior forest habitat refers to late-successional forest areas that are not influenced by "edge effect." Edge effect is the result of changes in microclimate and species composition caused primarily by an increased exposure to sun and wind and accessibility/avoidance by wildlife. For many ecological processes edge effect penetrates a forested stand in to about 800 feet (Chen 1991, Chen et al. 1995). While direct light penetrates 200 feet in from an edge, wind can penetrate in up to 1,300 feet. Temperature and humidity changes from an edge drop off at around 800 feet so this is used here as the value for analysis. Approximately thirty percent of the Project Area is in mature forest habitat, but edge effect limits the interior forest habitats to less than 2.2% of the land base. Only ten of the interior forest patches within the Project Area exceed 10 acres and the largest is only 50 acres.

Even with a conservative 300-foot edge effect used by some for analysis, interior forest only accounts for 2.2% of the Project Area. This means that nearly half the mature forests in the Project Area are affected by openings enough to change the climate within the stand and the plant and animal species diversity. Some species have strong ties to interior forests. The spotted owls in the Project Area are one example. For these species past management and proposed disease treatments could minimize the value of more than 40% of the suitable habitat.

Some species require older trees without needing the mature forest ecosystems and interior forests. The Pacific Fisher dens in large, remnant trees within younger forests and many raptors nest in large trees associated with clearcuts or shelterwoods.

Forest Plan limits on opening size, in combination with historic harvest schemes aimed at providing high quality forage areas for resident big game herds, resulted in alternating cut and leave blocks across the landscape and contributed to a high degree of forest fragmentation.

Block sizes of mature forest in the Project Area range from narrow riparian leave strips and patches as small as one-half acre dominated by edge, to approximately 850 acres near Blue Rock.

The larger, contiguous stands of mature forest remaining in the Project Area are ecologically important because they can support forest dependant species with large home ranges.

The ecosystems within the Rustler Project Area do not function in isolation. Connection between blocks of mature habitat within and outside of the watershed is critical to ecosystem health and stability for plant and animal dispersion and exchange of genetic material (ensuring genetic diversity within a species) (Beier and Loe 1992). As mature forest is lost through logging on neighboring private lands and on BLM managed lands, the pockets of mature forest within the Rustler Project Area would become even more valuable as refugia.

Direct/Indirect Effects concerning Late Successional Habitat

Edge Effects: None of the alternatives in the Rustler Vegetation Management project propose to create openings as large as the clearcutting of the past. Even those stands with proposed overstory removal usually have an understory stand of dense young forest at least 10 to 15 feet high, and treating such stands would not be expected to exacerbate any existing edge effect created by the original shelterwood treatment. Nor would it likely improve on those effects.

The action most likely to create edge effects would be the disease treatments in root rot pockets that actually create small openings one to two acres in size. These, however, are limited to these sizes with the intent of mimicking naturally occurring openings in the planning area. Additionally, within these, remnant species such pine and cedar will be retained wherever available. Patches of this size, though small, are still likely to create the light penetration effects that the larger historic clearcuts did. Wind penetration should be less than that created by past clearcutting, but still have some measurable effect.

The other type of created opening, the ¼ to 1-acre openings created by variable density thinning, are considered to be consistent with natural variation within late-seral forests and not expected to create edge effects adverse to the functioning of the late seral forest.

Connectivity: No treatment is proposed that would remove blocks of existing late-successional habitat. Therefore, no connectivity between existing blocks is anticipated. Thinning and temporary road construction would not create the space within or between late-successional blocks sufficient to affect connectivity.

Block size: As with the connectivity discussion above, no treatment is proposed that would remove blocks of existing late-successional habitat, thus no existing late-successional habitat block is reduced in size.

Thinning in this project, some of which would be in stands that could be described as late seral, would modify late successional habitat. Alternative One does the most of this, Alternative Two, the least. While these treatments are intended to retain a fully functional mature or late seral forest, density and crown closure reductions would be evident, changing the character of the treated stand. This change in character could affect microhabitats or other such features sought be certain species in these habitats. Preferred Spotted Owl use of the habitat, for example, might shift from roosting to foraging in certain patches depending on the acre-by-acre conditions created. Some areas might be opened up and made more suitable for roosting or foraging, where existing condition are too dense for these activities.

Alternative Three was designed specifically to protect the best habitat available for spotted owls, which is primarily the best old-growth forest available. This alternative drops all units from commercial thinning and overstory removal that met the definition of high quality spotted owl habitat. It, therefore, does the best job of retaining late seral forest across the planning area.

Cumulative effects:

As discussed under the section above on Forest health, past timber sales and high intensity fire have done much to create the diversity of seral conditions in the Rustler planning area. The photo below is an aerial view encompassing the planning area. The planning area itself encompasses most of the lower left 2/3 of this photo. The yellow line is the Forest boundary, with private land to the left.

The different colors, and different shades of green, identify the different vegetative conditions on site. The small yellow/brown polygons identify the most recent clearcuts and shelterwoods, generally harvested over fifteen years ago. These units are dominated by brush and other low growing species. The small light green polygons are even older regeneration cutting units that now have a cover of young trees, though generally not yet old enough to consider as mature forest.

Figure 3.4: Late Seral habitat distribution, 2005

The very large area with varying shades and textures of lighter green area indicates where a high intensity fire in the past regenerated a very large amount of forest. Most of what is planned for density reduction treatments is in this area.

Of note to this discussion, however, is the remaining very dark, coarsely textured, green areas in the middle of the aerial photo. This is the remnant late seral forest. As can be seen in the photo, that which was left behind after the fire was fragmented by subsequent timber harvest (the light brown and light green polygons in the photo). All alternatives retain late seral conditions in these areas, though Alternatives One and Two proposes thinning in some to reduce overly dense patches to make them more resilient to future wildfire. The thinning proposed is designed to retain late seral forest conditions, though less dense, after treatment.

Cumulative Effects - There would be no additional loss or fragmentation of late seral forest under any alternative. As can be seen by the aerial photo, however, wildfire can be very effective in eliminating this forest condition from the landscape altogether. The Rustler treatments are intended to reduce that risk for the future.

Terrestrial Wildlife - Other Special or Rare and Uncommon and Species

Will activities associated with the Proposed Action affect other special or rare or uncommon terrestrial wildlife habitats and species?

Special species considered rare and uncommon include the flammulated owl, great gray owl, pygmy nuthatch, and Oregon red tree vole, and habitat for Neotropical migratory birds.

- **Rare and Uncommon Species**
  - Flammulated owl (*Otus flammeolus)*
  - Great gray owl (*Strix nebulosa)*
  - Pygmy nuthatch (*Sitta pygmaea)*
- **Neotropical Migratory Birds**

  Vaux's swift, pileated woodpecker, brown creeper; red crossbill; varied thrush, hermit warbler; Hammond's flycatcher; Pacific-slope flycatcher; Wilson's warbler; winter wren, black-throated gray warbler, Hutton's vireo, olive-sided flycatcher; western bluebird; orange-crowned warbler; rufous hummingbird, band-tailed pigeon, California quail, western screech-owl, Nutall's woodpecker, oak titmouse, wrentit, California thrasher, black-chinned sparrow

Flammulated Owl: Direct, Indirect, and Cumulative Effects

Flammulated owls are considered a possible breeder in the summer for Jackson County (Gilligan et al. 1994). No monitoring protocol has been established for the species and its habitat requirements are uncertain in western Oregon. The open ponderosa stands with large trees typical of its eastern Oregon habitats occur in the flats near Whiskey Springs Campground south of the Project Area. This habitat is typical for Flammulated owls (Hayward and Verner ed. 1994) in that it contains a major component of large ponderosa pine, though it has very few large snags. Past surveys for northern spotted owls across the Project Area did not incidentally detect any Flammulated owls.

One historical record of a calling Flammulated owl exists for just north of Butte Falls and BLM reports a 2004 response just east of the Analysis area. Meadow restoration at Stanley Meadows could improve habitat for this species. Timber management prescriptions that call for opening around mature oak and ponderosa pine would also benefit this species. Overall, this project is expected to have **"no impact"** on this species, directly, indirectly, or cumulatively.

Great Gray Owl: Direct, Indirect, and Cumulative Effects

This large owl species nests in mature forest adjacent to natural meadows and man-made openings. Surveys for this species are not required (Quintana-Coyer, 2004) and records for the species are incidental during survey work for other species. Great gray owls nest near the Lodgepole Guard Station, just north of the Project Area. One great gray owl was detected during 2008 spotted owl calling efforts. Suitable habitat exists at Stanley Meadows and Blue Rock Meadows, as well as in the older clearcuts and shelterwoods that are scattered across the Project Area.

The pre-commercial thinning in these past harvested stands should prolong their value as foraging habitat for great gray owls for an additional 5-15 years. Because of the potential to improve habitat, this project would have a "**beneficial impact**" for great gray owl, with Alternatives One and Three providing the most benefit based on the number of acres improved for this species. Additionally, the meadow restoration activities in these two alternatives improve foraging habitat for the owl. Likewise, the **cumulative effect** of similar actions such as the projects in Big Butte Springs, Mill Creek, Bybee, and the forest-opening actions on adjacent BLM lands could be beneficial to this species since there is also an emphasis in these projects to maintain large snags and down logs that makes this habitat change useful for the owl.

Pygmy Nuthatch: Direct, Indirect, and Cumulative Effects

No survey protocol has been developed for the pygmy nuthatch. There are two historical records of this species for the county (Browning 1975) and three recent records (H. Sands, pers. comm., N. Barrett, unpublished records). Four records are wintertime, with two from the valley floor. One 2001 record is three miles south of the Project Area near Whiskey Springs where some suitable habitat exists, though subsequent visits to the site have failed to relocate the species. The pygmy nuthatch requires ponderosa pines that have diameters greater than 15 inches (NWFP ROD, page C-46). This habitat is concentrated around Whiskey Springs Campground, with other small pockets scattered across the district. While there are small pockets of mature Ponderosa pine within this Project Area, none are big enough to support a population of pygmy nuthatches. Therefore, this project is expected to have **"no impact"** on this species, directly, indirectly, or cumulatively.

Neotropical Migratory Birds: Direct, Indirect, and Cumulative Effects

There has been extensive research done on the impacts of density management on Neotropical migratory birds (NTMB). Because the category covers species with a wide range of ecological needs, the results of the research have consistently shown that some species benefit from thinning of forested stands, others are negatively impacted and many do not seem to respond, at least over the short term.

Under a “no treatment” scenario, habitats would continue maturing across the landscape. Within young, previously harvested stands, brush would stay dense for several more years until regenerating conifers finally overtop them and shade them out. For most stands observed, this would be in 10-15 years. In the meantime, brush species like spotted towhees and McGillivray’s warblers would continue to be well represented across the Project Area.

Forested stands would also continue to mature. In another 50 years, the current shelterwood stands would be dense forest with a good representation of remnant trees, resembling low quality northern spotted owl NRF habitat. Snag levels would be increasing and well distributed, benefiting woodpeckers and secondary cavity nesters. These mature stands serve as primary breeding habitat for tanagers, red-breasted nuthatches and hermit warblers, among others.

Under the Proposed Action, density management and overstory removal in shelterwood stands could result in more homogenous stands. This loss of stand diversity could result in some NTMB species becoming locally less common in these stands but not likely extirpated from the area, since many other stands of similar structure exist in the area. Openings created by management of disease pockets will increase the habitat diversity across the Project Area, though it would be concentrated in the southwest portion of the area. These openings would benefit open habitat species like Oregon Juncos and bushtits. The conversion of these sites to non-fir species has the potential to increase habitat for oak woodland species like white-breasted nuthatches.

Pre-commercial thinning and brushing activities (release) would remove much of the brush component found in the Project Area, reducing populations of brush-related bird species like the spotted towhee.

Alternative Two provides diversity benefits from disease management while maintaining the stand diversity elements in the shelterwood stands. The pre-commercial brushing and thinning would be the same as in the Proposed Action so brush related species would be expected to have reduced populations. The presence of brush fields that would not be treated will ensure that these populations will not be completely lost. This alternative however, does not include meadow restoration which would be a benefit to these species.

Alternative Three likely creates the most diverse assemblage of habitats of the three alternatives and would likely provide for the widest array of Neotropical species. This alternative retains much of the late seral forest in its existing condition while thinning many, but not all, overly dense stands. It includes meadow restoration and better provides for long term retention of older forest along riparian areas than Alternative Two.

Cumulatively, the action alternatives would maintain a diversity of habitats through time. Alternative three would likely provide the best balance of habitats considering the loss of mature and late seral forests on adjacent private lands.

Forest Plan Management Indicator Species

Will activities associated with the Proposed Action affect Management Indicator Species, as identified in the 1990 RRNF LRMP?

Management Indicator Species (MIS) are used as representative surrogates in Forest Planning to track the effects of National Forest management actions on recovery of Federally listed species, continued viability of Sensitive species, and the management of wildlife and fish for commercial, recreational, scientific, subsistence, or aesthetic values or uses. Management indicators representing overall objectives for wildlife, fish, and plants may include species, groups of species with similar habitat relationships, or habitats that are of high concern (FSM 2621.1). An indicator species represents all other wildlife species, which utilize a similar habitat type.

Indicator species act as a barometer for the health of various habitats and will be monitored to quantify habitat changes predicted by implementation of the Forest Plans.

Five forest wildlife species and one species group were selected as Management Indicator Species (MIS), as detailed in the 1990 Rogue River NF Land and Resource Management Plan. Indicator species were intended to serve as habitat surrogates used to suggest qualitatively the condition of the habitat they represent.

Black-tailed deer and **Roosevelt elk** habitat will be managed to provide adequate forage, hiding cover, and thermal cover conditions throughout summer and winter range. Three species represent mature and old growth forest habitat conditions: **pine marten**, **pileated woodpecker**, and **northern spotted owl** (covered in previous section of this Chapter). Habitat (snags of varying concentrations, sizes, and decay classes) for **woodpeckers** (besides pileated) is managed based on land allocations.

Black-tailed Deer and Roosevelt Elk

For the purpose of big game analysis, the Project Area generally represents the year round range of the typical elk herd, containing winter range in the west portion of the analysis area and summer range in the Sky Lake Wilderness, immediately east of the Project Area. This represents the movement of the majority of animals that utilize the watershed. The vast majority of local elk winter outside Forest Service lands to the west of the analysis area. Both species are common throughout the area.

Random stops were surveyed along Forest Service roads within the Project Area to determine whether the stands on either side of the road provided hiding cover. Overall hiding cover is excellent across the analysis area, as regenerating trees with low branches or dense boles provide the hiding cover. Dense brush in clear-cut, thinned, and shelterwood units also reduce sight lines to the roadside.

The Rogue River Land and Resource Management Plan (LRMP) allocates the western 12% of the Rustler Project Area as big game winter range (Management Strategy 14). Forest Plan Standards and Guidelines call for 50% of winter range be thermal cover, with 30% optimal thermal cover.

The remaining lands within the Project Area are managed for big game summer range values. In summer range, the Forest Plan provides for maintaining 20% thermal cover. Winter range and summer range thermal cover values are measured for areas of generally 500-1,000 acres. For the purpose of this analysis, winter range was divided into 2 blocks along a section line. Table 3.10 summarizes the current winter range thermal cover habitat within the Rustler Project Area.

Table 3.10: Winter range thermal cover values by habitat analysis block

Analysis Block Reference Number worthless to reader	Total Acres within analysis Block	Acres of Thermal Cover	Percent Thermal Cover	Acres Optimal Thermal Cover	Percent Optimal Thermal Cover
1110	815	380.7	46.7%	96.4	11.8%
1153	1033	334.6	32.4%	139.7	13.5%

Because there currently is a deficit of thermal and optimal thermal cover in the Project Area, the only actions, across all alternatives, in areas allocated to winter range is pre-commercial thinning in stands that are not considered thermal cover. Several hundred acres of mixed conifer stands in the Project Area have been treated as shelterwoods and have canopies too open for thermal cover. The spacing between the trees, even with maximum canopy development, would not approach the 70% canopy closure needed for effective thermal cover. Options for the development of thermal cover in these stands would best include no harvest or a partial overstory removal with understory thinning to stimulate the growth of the current understory while maintaining some structure through leaving the scattered overstory. This, of course, would only be successful where mistletoe infection would not preclude development of a future forest.

Several hundred acres of Forest Service managed stands have lost forage value due to dense young tree stocking and brush. However, the winter range borders intensively managed private lands that lack the structure needed for quality thermal cover, but does provide the open foraging habitat lacking on National Forest System lands.

With reduced regeneration harvest on lands administered by the Forest Service, big game will become more dependent on the private lands during the wintering period for the higher quality forage found in open habitats (Thomas et al. 1979), and likely rely on National Forest lands for hiding and thermal cover. Management of hiding and thermal cover adjacent to private lands takes advantage of this adjacent forage/cover arrangement (Thomas et al. 1979).

Roads are probably the one factor controlled by the Forest Service that has the greatest effect on deer and elk (Lyon et al , 2002). Road densities are high throughout the Project Area, currently exceeding three miles/section, and with many areas averaging more than 4 miles/section. Road densities on the private land have comparable or higher levels of road density that affects big game animals on Forest Service lands. Research indicates that elk numbers drop as much as 25% when road densities exceed 1 mile/section and continue to drop rapidly as densities increase (Christensen et al. 1993). This greatly limits the value of the winter and summer range for big game, especially when combined with the low thermal cover levels. Some of the roads on Forest Service lands are gated to reduce vehicle traffic and the disturbance effects (harassment) on big game. Proposed road decommissioning would benefit big game.

Field surveyors identified big game trails in most of the treatment areas surveyed, indicating the dispersed nature of the seasonal movement. The areas that appeared to get the greatest or most consistent use were the ridges across the north half of the Project Area, coming down the western slopes of Rustler Peak. This is the largest unroaded portion of the Project Area and likely accounts for the heavier use.

Some deer and elk remain within the Project Area throughout the year and follow less well-defined patterns of movement, driven by availability of forage, human activities, and biological needs such as calving and fawning. Annual and daily travel corridors require connected patches of hiding and thermal cover for animals to move through while avoiding predators. Road crossings of these travel corridors expose animals to vehicles (Becker 1996; Lehnert 1996) and hunters. Past harvest has fragmented many of the contiguous blocks of older forest, concentrating corridors along riparian stringers or requiring animals to cross open areas.

Overall, activities under **Alternative One** would negatively impact big game by creating temporary impacts from road use (for as long as the road is used) along ridges currently used for seasonal movement. Density management treatments would result in a short-term reduction in thermal cover but should result in a long-term improvement in optimal thermal cover. Sanitation treatments would create small openings, which would improve forage values that are in decline across the planning area.

Vegetation treatments in winter range units are almost exclusively thinning entries. These treatments are based entirely on the silvicultural treatment needs of these stands that are compatible with LRMP direction for big game thermal cover. It is clear that forage opportunities are limited on National Forest System lands, and an argument can be made that treatments should be designed to provide forage. Adjacent private lands however, provide ample forage, but inadequate cover. The photo in the above discussion of late seral habitat, clearly displays this arrangement of forage on private lands (along the yellow boundary line) and cover on National Forest System lands. From a landscape perspective, this may not be an unreasonable balance of habitat types for winter range in this watershed.

This Alternative, as does Alternative Three, creates about 680 acres of fuel management zones. These open up the forest and apply periodic fire, creating an ideal situation for big game forage. However, where they are coincident with open roads, the total loss of hiding cover there limits the utility of that habitat and its forage, at least during daylight hours.

Alternative Two treats fewer acres, using fewer roads, with a commensurate reduction in road -associated effects to big game over that in Alternative One. This Alternative does not construct temporary roads, thereby eliminating that roading effect. The proposed treatments would have an overall benefit for big game, as they do in Alternative One by creating forage in root rot pockets, and accelerating development of optimal thermal cover as in Alternative One. This alternative also avoids treatments in riparian areas, which are habitats sought out by deer and elk. Short term disturbance here is avoided, but there is also a forgone opportunity to improve habitat for them there in the long run through the treatments included there in Alternatives One and Three. This Alternative creates no Fuel Management zones, foregoing the benefit of enhanced long term forage maintenance, but avoiding the impact of hiding cover loss where they are coincident with roads.

Alternative Three would have the most beneficial effects by retaining all high quality spotted owl habitat (which also makes the best big game thermal cover) while thinning the younger denser stands, putting them on a path to more suitable thermal cover in the long run. There are far fewer temporary road miles than Alternative One (3.5 vs. 10.4) and less acres and less road use than Alternative One. As in Alternative One, this action creates 660 acres of fuel management zones with the benefits and adverse effects described above.

Some features of this action are the same across all alternatives, and they have a combination of both beneficial and adverse consequences to big game:

Natural Fuel treatment – Each Alternative includes about 3,500 acres of natural fuel treatment as described in Chapter 2. This action greatly enhances the forage value of the lands treated, though at some cost to hiding cover along roads.

Road closures - Each Alternative proposes to close approximately 9.9 miles of existing roads. This reduction in road densities is a good thing for big game as discussed above.

Cumulative effects to big game relate to relative changes in forage, cover, and security for deer and elk over their range over time. Large scale historic fire, created a landscape of high quality big game summer habitat in the early to mid 1900's. Winter thermal cover was lacking, but forage values were high. As the forest recovered, hiding cover became predominant, winter range thermal cover was still lacking, and forage values declined rapidly. Timber cutting practices (creating forage areas), however, increased significantly in the mid to late 1900's at higher elevations (where large timber had not been lost to fire) creating a productive mix of summer range forage, thermal and hiding cover across the larger landscape. The associated road construction however, was intense, and road densities increased dramatically. Now, in the early 2000s, as regeneration cutting on public lands has ceased, and successful fire suppression has made its mark on the forests, local big game populations are faced with a habitat of dense forests with ample hiding cover, scattered inadequate amounts of both winter and summer range thermal cover, and very poor forage conditions. This is generally the situation across the broader landscape of the High Cascades Ranger District.

Into this condition now comes the broad-scale treatment of the Mill Creek and Big Butte Springs projects, to the north and south respectively, the Bybee project to the north, the Middle Fork fire, and other forest cutting on other ownerships to the west. Together, these efforts will greatly enhance the declining forage values, especially in the Middle Fork fire, though at some cost to thermal and hiding cover in many areas. The thinning actions, though compromising hiding cover to some degree (where not mitigated) will speed development of thermal cover, which has been in short supply in the Rustler area for quite some time. In all of the Forest Service projects, road management and closures are to be implemented, enhancing big game security and thus utility of more habitats. Overall, this should have a beneficial effect to wide-ranging species such as elk, while also providing the opportunity for a more diverse mix of habitats within the smaller home-range sizes of Blacktailed deer.

American Marten

Hargis et al. (1999) stated that in North America, American martens are closely associated with mature conifer stands with complete canopy closure, and small (<100m), limited, and interspersed openings that are used as forage areas. However, during helicopter surveys for wolverine in Sky Lakes and Thielsen Wilderness areas, marten tracks are frequently seen at and near timberline and in areas of more open (<60%) canopy closure. In Oregon, martens are distributed in the portions of the Coast Range and throughout the Cascade Range. Martens appear to be well-distributed across the High Cascades Ranger District and have been documented on numerous occasions in areas above 4,000 ft. elevation during forest carnivore surveys throughout the District. Marten have also been documented south of Highway 140 by USFS personnel and near Howard Prairie Lake during carnivore surveys conducted by the Medford District BLM (J. Stephens, pers. com.).

In the western United States in winter, most prey are captured beneath the snow surface, but squirrels may be caught in trees (Buskirk and Ruggiero 1994). Snags, downfall, and large woody material provide cover, denning sites, and access points to forage areas below the snow (subnivean habitat).

Diet of American marten is highly diverse. Zielinski and Duncan (2004) found that in the southern Sierra Nevada, diets of both marten and fisher were more diverse than previously reported for North America. Of the major taxonomic groups, mammals were most common followed by insects and plants (mostly fruits).

American marten occupy the upper elevation habitats within the Rustler Planning Area. During helicopter surveys conducted for wolverine, and snowmobile track surveys, marten tracks were commonly found in open harvest units on the north face of Rustler Peak and along the eastern edge of the Planning Area boundary (personal observation). Many of these tracks were found in areas with canopy closures <40% including shelterwoods and other regeneration units. These areas were interspersed with stands with canopy closures ≥60%. With the exception of the sanitation-salvage treatments, silvicultural prescriptions for the proposed units within the Rustler Planning Area will maintain ≥40% canopy closure where it currently occurs. There are up to 134 acres of sanitation-salvage treatments proposed in timbered stands that currently provide >40%

canopy closure. These stands are currently experiencing high mortality rates due to root rot infections and are not expected to retain 40% canopy closure into the future. The majority of these stands are located adjacent to, or within close proximity, to each other. It is likely that opening these stands will change the prey composition for marten in those areas and may reduce the suitability of the stand for denning and possibly resting habitats, however, CWD will be maintained within the stands. CWD retention will continue to provide habitat for some small mammal populations and subnivean foraging habitats for marten. Therefore the Rustler Vegetation Management Project will maintain sufficient well distributed habitat across the Planning Area to support marten population on the High Cascades Ranger District.

Pileated Woodpecker and Other Cavity Excavating Species

While only four species of woodpeckers were identified in the Project Area, at least two others are expected regularly in that habitat. Five species have been confirmed as breeding on the District. All nest in snags or dying trees and feed on a variety of forest insects. The nest holes excavated by these woodpeckers serve as future nest sites for a variety of other animals (Thomas et al. 1979), including nine other bird species found in the Project Area. Snag levels may be the best habitat indicator for woodpeckers and other cavity nesting species.

Snags serve as an important component in fulfilling the life history requirements of many species of birds, bats and other species (Thomas et al. 1979). They provide cavities for nesting, protection from inclement weather, foraging perches, and insect food sources. From a forest health standpoint, it is important to maintain high numbers and species of birds and bats since they are major predators on insects that can kill trees. Birds (as well as bats) consume large quantities of the invertebrate biomass, thereby reducing potential outbreaks of insect pests.

Prior to the 1980s, clear-cutting and thinning practices tended to remove all snags. These practices included burning or piling all downed wood in order to leave bare soil for planting and natural reseeding. The residual stands on these sites therefore have few snags and little coarse woody debris on the ground. Since 1980, clear-cut and shelterwood practices provided for low numbers of snags (1 – 1.5/acre) (LRMP Appendix B, p. 4-253) though downed woody material continued to be removed.

The result of past management is a mosaic snag pattern with patches of harvested stands with very low numbers of snags and down wood, intermixed with similar sized patches of snags and coarse woody material in unmanaged stands (unpublished Forest Service field observations - N. Barrett and others, 1999-2004). High snag levels are concentrated in Riparian Reserves and in the eastern half of the Project Area, though pockets occur throughout the area where root rot pockets occur and in the few remaining unmanaged stands.

High levels of disease and mistletoe infestation in the southern portion of the Project Area would quickly restore snag levels if allowed to take their natural course. Because many of these snags are associated with root rot pockets they have little value for cavity nesting species, as they fall down before developing adequate heart rot to create conditions suitable for cavity excavation.

Snag deficits are especially severe in the shelterwood and clear-cut units scattered across the drainage. Many of these stands have a scattered overstory of large trees that could be converted into snags to achieve S&G snag levels while simultaneously accomplishing some mistletoe control. Similar low numbers are found in the young pine plantations in the lower elevations, but these stands generally lack the scattered overstory and the ability for immediate snag recovery. Within the analysis area these snag deficient units are widely scattered across the landscape and have not resulted in a cumulative snag deficit over any single large acreage, as in found in other portions of the district.

Harvesting on non-Forest Service lands without any snag retention requirements has added to the snag deficit for species using the planning area. Hazard tree removal along roads has further reduced snag levels across the landscape. In stands adjacent to private lands or old Forest Service regeneration harvest units, higher than minimum snag and GTR levels may be needed to counter some of the past snag losses (LRMP Appendix B, p. 4-254; NWFP ROD, C-42).

The logging planned for Rustler, in all alternatives, would likely add to the **cumulative effects** of past snag loss to logging by removing snags for safety reasons. Snags, especially those in advanced stage of decay, would also be lost from mechanical damage and from post thinning broadcast burns where they are applied. This is mitigated to some extent by the snag retention and creation requirements outlined in Chapter 2. These are based on data specific to Plant Association Groups derived from the Southern Oregon Late Successional Reserve Assessment.

North of the project area, however, is the Middle Fork fire, which added thousands of acres of suitable habitat for cavity dependent species. Such wildfires are expected in the future as well (though hopefully of smaller scale due to projects like Rustler), so there is little risk of losing this habitat feature across the larger landscape.

As discussed in Chapter 2, snag prescriptions for retention and creation have been developed based on analysis in the Southern Oregon Late Successional Reserve Assessment.

Forest Service Sensitive Vascular Plants, Bryophytes, Lichen, & Fungi

Will activities associated with the Proposed Action affect vascular plants, bryophytes, lichens and fungi (associated with this locale) listed by the Forest Service as Sensitive?

Existing Condition

Background

Previous surveys within the project area included the 1990 survey for the Keyhole Planning Area and the 1991 survey for the Lock/Carlson Project. These surveys documented 6 subpopulations of *Collomia mazama* within the southeast corner of the Project Area near the Sky Lakes Wilderness boundary. In 2008, botanical surveys for the Project Area were conducted from May through August, 2008 by Forest Service employees Barbara Mumblo and Leah Lentz.

Threatened and Endangered Plant Species

No plants listed as Threatened or Endangered are known to occur within the Rustler Planning Area. The only listed plant found near the planning area is *Fritillaria gentneri* (Federally and State listed as Endangered) found on BLM managed lands to the southwest. Habitat within the planning area is not considered favorable for *Fritillaria gentneri*.

Sensitive Plant Species

The following table lists known and potential sensitive plants considered as part of this analysis of effects on botanical resources. Sensitive species are those listed on the Region 6 Regional Forester’s Sensitive Species List and are recognized by the US Forest Service as requiring special management provisions.

Table 3.11: Sensitive Plants within Rustler Project Area

Known Sensitive Plants within the Project Area	Sensitive plant species having potential to occur within the Project Area
Collomia mazama	*Carex abrupta*
	Carex capitata
	Cimicifuga elata var. elata or *var. alpestris*
	Navarretia leucocephala ssp. leucocephala
	Rorippa columbiae
	Chaenotheca subroscida
	Codriophorus depressus
	Orthdontium pellucens
	Schistostega pennata
	Splachnum ampullaceum
	Tayloria serrata

Collomia mazama is a purplish flowered perennial in the Phlox Family (*Polemoniaceae*), which typically occurs in partially open areas often in gaps in conifer forests at higher elevations on the High Cascades Ranger District. *Collomia mazama* is only found in Oregon within a limited range of three counties: Jackson, Douglas, and Klamath. Sites of this species are located on the High Cascades Ranger District of the Rogue River-Siskiyou National Forest as well as Crater Lake National Park and the Fremont-Winema National Forest. It may be abundant in some portions of its range but it has a narrow range of distribution primarily around the Rogue-Umpqua Divide and Sky Lakes Wildernesses.

The *Collomia mazama* population in the Rustler Project Area is at the southern end of this species' range. To the east, a few subpopulations are found within the Sky Lakes Wilderness Area. No plants have been located to the west, where the forests downhill of these plants have been extremely disturbed by past timber sale and fire activities and does not provide adequate habitat for this species. Populations in the Rustler Project Area are especially important for genetic diversity being on the southern end of its range.

Previous surveys documented 6 subpopulations of *Collomia mazama* within the southeast corner of the Project Area near the Sky Lakes Wilderness boundary. In 2008, five additional subpopulations were discovered in the same vicinity as the earlier sightings and were found in proposed units 122 (T.35S., R.4 E sec. 2 and 11) and 124 (T.35S. R.4E., section 11) and the proposed FMZ on the east side of the Project Area (T.34S., R.4E., sections 26 and 36, and T.35S., R.4E., sections 1, 2, and 11).

Direct Effects of the Action Alternatives

Collomia mazama appears to grow where openings in the overstory occur but requires some amount of shade. If growing in wetter sites, it may tolerate more sun; but if growing in dry areas, too much sun may be detrimental. It appears to survive some degree of disturbance although it may not survive extreme disturbances. Fires that create heat at a higher intensity and for a longer period of time (such as burning slash piles) disturbance from digging fire lines, and tractor logging would probably destroy individual plants. A Management Plan for *Collomia mazama*, written in 1986, concentrated on protecting larger populations (more than 75 individuals) with less emphasis on smaller scattered populations.

From observations of this species since 1986 it appears that they are more sensitive to too much sun than first thought but the proposed management of protecting larger populations and having less concern for smaller sites still appears to be adequate management, although the definition of a "larger" population may be less than 75 individuals, depending on the actual population.

Timber cutting activities such as timber felling, ground impacts from tractor logging, and piling and burning slash piles could destroy individual plants. Some openings may benefit *Collomia mazama* as long as some shade remains and plants are not directly impacted.

Alternative One would have the greatest potential to directly impact *Collomia mazama* plants because units 122, 124 (units = 418ac) and the Fuels Management Zones (FMZ) are included in this proposal. This alternative would provide the largest area of disturbance within the *Collomia mazama* sites. Alternative Two would have the least potential for detrimental impacts from timber cutting/thinning/burning activities because there is less ground impacted by units 122, 124 (units = 299 ac) and no FMZ is proposed. Alternative Three would have slightly less potential for impacts than Alternative One since units 122 and 124 would total fewer acres (384 ac) but the FMZ would still be included. Even though Alternative Two would propose less activity, some detrimental impacts could occur to some individuals in unit 122 and 124.

Under the no-treatment scenario, there would be no direct impacts to *Collomia mazama* because no actions would take place. Alternative One (Proposed Action) would have the greatest potential for detrimental impacts from timber cutting/thinning/burning activities in units 122, 124, the FMZ in the area, and a proposed temporary road that accesses unit 124 because it proposes the largest areas of disturbance within the *Collomia mazama* sites. Alternative Two would have less potential impacts to *Collomia mazama* than Alternative One because there would be no activity in unit 124 or the FMZ and no temporary road construction. Even though Alternative Two would propose less activity, some detrimental impacts could occur to some individuals in unit 122. Among the action alternatives, Alternative Three retains the most beneficial habitat conditions for Collomia mazama.

Indirect Effects

Reducing vegetative competition around *Collomia mazama* could be beneficial but reducing too much shade could also cause plants to dry out and be lost over time. Alternative One would have the greatest potential for individual effects and Alternative Two would have the least.

Cumulative Effects of the Action Alternatives

Other projects planned in the near vicinity include the projects from the Big Butte Springs analysis, meadow restoration, and on-going cattle grazing and road maintenance projects. On National Forest lands, mitigation measures are planned for these projects and where these measures are implemented, potential cumulative adverse effects would be minimized.

It is unknown if this species occurs or did occur on nearby private lands. If it does, it is expected to disappear due to the nature of projects on private lands in the surrounding area where extreme disturbance is caused by clearcut logging.

Loss of *Collomia mazama* plants could affect genetic diversity. However, protection of individuals via mitigation measures (e.g., no treatment buffers) on National Forest land is predicted to minimize potential effects.

Uncommon / Important Plant Communities

How will activities associated with the Proposed Action affect other botanical resources that are locally rare and/or species of interest to the Oregon Natural Heritage Information Center?

Existing Condition

Plant communities considered uncommon or important that occur within the Project Area are:

- Engelmann spruce
- Quaking aspen
- Riparian plant communities

Engelmann spruce - Engelman spruce (*Picea engelmannii*) is a wetland indicator and concentrations of this species are found in the southeast portion of the Rustler Project Area, in the Misfit spring vicinity. Concerns about treating these areas include loss of diversity, loss of spruce trees, the potential to change the course of the wetland, and the potential of change in moisture levels. The main concentration of Engelman spruce was excluded from commercial timber harvest/thinning units in all alternatives. Within this Engelman Spruce area, in Alternative One, riparian treatments are proposed in all riparian areas and a FMZ is proposed to cross through the upper portion of this area. In Alternative Two no treatments or FMZs are planned through the area. In Alternative Three less area of riparian treatments are proposed but the FMZ is still proposed through the area.

Quaking aspen - Quaking aspen (*Populus tremuloides*) is uncommon on the Rogue River-Siskiyou National Forest and these stands are disappearing or declining in health due generally to overcrowding, lack of fire, and browsing by deer/elk/cattle. Aspen trees were found in the upper reaches of Twincheria Creek (T.35S., R4E., sec.4) within a riparian area where timber harvesting had previously occurred. At present, dense brush is creating competition and the larger aspen trees are dying. Retention of these stands is important for biodiversity on the forest. Riparian treatments in this area, which would be considered beneficial if aspen were retained, would occur in Alternatives One and Three but not in Alternative Two.

Riparian plant communities - Riparian areas are reservoirs of biodiversity and important habitat for diversity of lichens, bryophytes, and fungi. Larger/older conifers, hardwoods, shrubs, and wood on the ground provide habitat for many of these species. Riparian Reserves are a component of the Aquatic Conservation Strategy of the Northwest Forest Plan (pages B-12&13 of the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl). Within these reserves, primary emphasis is given to riparian-dependent resources which include: lichens, fungi, bryophytes, and vascular plants. Timber harvest effects are mitigated in part by Riparian Reserves by providing for well distributed patches of late-successional forest that serve for dispersal of mobile species such as the northern spotted owl, and serve as refugia for species that disperse only short distances.

Direct/Indirect Effects of No Treatment

'No treatment' would not result in any direct effects to these plant communities because there would not be any action to provide impacts. Indirectly, the lack of any treatments to reduce the likelihood of high intensity large-scale wildfire would likely adversely affect all of these plants in the event of such a wildfire through their habitats.

Direct Effects of the Action Alternatives

Direct effects include impacting Engelman spruce, quaking aspen, or cutting substrate or habitat for lichens, bryophytes or fungi by project activities (such as cutting/burning this material).

Alternative One has the potential to directly affect these plant communities the most because more riparian treatments (2,223 ac) are proposed including FMZs through riparian areas. Alternative Two would not impact these plant communities because no riparian treatments or FMZs are proposed (although some quaking aspen may not be enhanced without thinning in dense riparian habitats). Alternative Three would impact these areas but to a lesser degree than Alternative One since less riparian treatments are proposed (1,280 ac) but FMZs would still occur through riparian areas. Mitigation measures would lessen the potential impact of Alternatives 1 and 3. Alternative Two would have little impact to these plant communities (except quaking aspen) primarily because riparian thinning and FMZs would not be included in this alternative.

Indirect Effects of the Action Alternatives

Alternative One increases the risk to these communities the most by opening up and disturbing habitat especially in riparian areas where an increased loss of moisture in microhabitats may facilitate loss of some lichen, bryophyte and fungi species in riparian areas. Alternative Two would have less indirect effect since riparian thinning and Fuel Management Zones would not be included in this alternative (exception for quaking aspen which could be enhanced by riparian thinning where located). Alternative Three would have less impact than 1 but would still have greater impact than Alternative Two.

Cumulative Effects of the Action Alternatives

Other projects within or near the Project Area include projects for Big Butte Springs, cattle grazing, road maintenance and meadow restoration. Surrounding private lands include areas of intense logging from the past and more are expected to occur. Many riparian areas in parts of the watershed (federal and non-federal lands) have been intensely disturbed in the past and it is assumed that those areas on private lands will continue to see great disturbance. Thinning in overly dense, previously managed riparian areas may be beneficial by promoting growth of remaining vegetation. Activities in previously unmanaged riparian areas, which provide refuges for many species, could continue the loss of this habitat in the watershed and reduce the ability of this habitat to be connected throughout the watershed.

Non-Native Plant Species

How will activities associated with the Proposed Action introduce or encourage exotic (non-native) and undesirable (noxious) plant species, or affect existing populations?

Existing Condition

Noxious weeds officially designated by the Oregon Department of Agriculture in the Project Area include: bull thistle, St. John's wort (Klamath weed), and yellow toadflax.

- Bull thistle (*Cirsium vulgare*) is transitory in disturbed areas and regularly found in the Project Area. It is highly mobile from wind-born seeds and the soil seed bank in the Project Area holds bull thistle seeds that germinate and grow when areas are disturbed.
- St. John's wort (*Hypericum perforatum*) is scattered in many areas along roads, especially where timber stands have been opened up within the Project Area. Private lands outside the project areas are more infested with this species due to the greater amount of disturbance that has occurred on these lands.

- Yellow toadflax (*Linaria vulgaris*) infestations are known to occur in several units of previously logged timber sales in the southeast of the Project Area. Most of these sites have been treated with herbicides for several years except for some of the more recently located sites that have been treated once or twice. Sites that have been treated for several years are decreasing in numbers but sites with fewer treatments remain dense infestations. A new infestation was located in 2008 on the edge of Road 3700585, a very short road from Road 3700 to a spring. This site was treated by covering with plastic since it is near a spring.

Direct Effects of the Action Alternatives

Direct effects include introducing plants/seeds to areas impacted by project activities or spreading existing infestations of noxious weeds.

All Alternatives provide a risk of introducing or spreading non-native species through current on-going activities in the Project Area. Humans and machinery are vectors and any disturbance is an opportunity for establishment of these species.

Alternative One has more ground/vegetation impacting activity than Alternative Two and Three and carries an increased risk of introduction and spread of non-native species through project activities. Mitigation measures to prevent and control the spread of invasive non-native plants would help but not eliminate this risk. Compared to Alternative One and Alternative Three, Alternative Two provides the least risk of introducing and spreading non-native species from project activities since less ground would be disturbed.

With the implementation of mitigation measures, it is expected that there is less potential for the action alternatives to introduce noxious weeds to other parts of the Project Area than there would be without the mitigation measures.

Chemical control methods have been used at most of the yellow toadflax sites for several years resulting in many fewer plants over the years. They will continue to be treated chemically as needed in the future.

Indirect Effects of the Action Alternatives

All Alternatives increase the risk of introducing or spreading non-native species by opening up and disturbing habitat that may facilitate nearby infestations to spread into the Project Area. Mitigation measures to prevent and control the spread of noxious weeds would aid but not eliminate this risk.

Cumulative Effects of the Action Alternatives

Other projects within or near the Project Area that may introduce or spread noxious weeds include projects for Big Butte Springs, cattle grazing, road maintenance, and meadow restoration. Surrounding private lands include areas of intense logging from the past and more are expected to occur. It is presumed that projects on private lands will facilitate the increased spread or introduction of noxious weeds.

On National Forest lands, mitigation measures are proposed for projects and risk of spread or introduction of invasive species is less due to these measures. It is unknown if any of the projects on private lands led to increased spread or introduction of invasive species but it is likely that this has occurred without mitigation measures in place.

Aquatic Habitat and Fish

How will activities associated with the Proposed Action affect the downstream habitat for resident and anadromous fish populations?

Existing Condition

Anadromous fish do not occur within the Rustler Project Area. Lost Creek Dam is a barrier to up-stream movement for anadromous fish in the South Fork Rogue River 5th field watershed. Within the Big Butte Springs Watershed, Butte Falls blocks all but a few coho salmon and steelhead from migrating up the South Fork above this feature at river mile 14 from the Rogue River. A diversion dam at the Butte Falls Fish Hatchery approximately 1 mile upstream from Butte Falls is the upper extent recorded for anadromous fish (J. Doino, pers. comm.). Critical Habitat for coho salmon, historic and occupied, may extend two to five miles above the falls. In North Fork Big Butte Creek, anadromous fish are not known to occur above Jackass Creek at river mile 8.3 (J. Doino, pers. comm). Coho salmon and steelhead (Oncorhynchus mykiss) juveniles and adults have not been observed on National Forest in South Fork or North Fork Big Butte subwatersheds on National Forest lands. Chinook salmon (Oncorhynchus tshawytscha) occur in South Fork Big Butte Creek below Butte Falls.

The U.S. Forest Service conducted stream surveys on Titanic, Rancheria, Twincheria, and Misfit Creeks in 1999. All of these streams contained resident cutthroat trout (Oncorhynchus clarki). Not all streams in the Project Area have been surveyed. There is potential for cutthroat trout to be present in other streams throughout the Project Area. However, there are no R-6 Sensitive fish species within the Project Area boundary.

In compliance with Section 7 of the Endangered Species Act (ESA) and the Forest Service Biological Evaluation process for TES fish species, the list of species potentially occurring within the Rustler Project Area was reviewed. Lists for the Rogue River-Siskiyou National Forest (RRS-NF) and the Pacific Northwest Region (R-6) were reviewed in regard to potential effects on any of these species by actions associated with the Rustler project. Pre-field and reconnaissance results are summarized in the table below.

Table 3.12: Threatened and Sensitive Fish Species in the Project Area

Wildlife Species (Common name)	Scientific Name	Pre-field Review	Field Surveys
		Existing Sighting or Potential Habitat	Habitat or Species Present
Threatened Species			
Coho salmon	*Oncorhynchus kisutch*	No	No
Sensitive Species			
Chinook salmon	*Oncorhynchus tshawytscha*	No	No
Inland redband trout	*Oncorhynchus mykiss*	No	No
Pit sculpin	*Cottus pitensis*	No	No

Coho Salmon

The proposed Rustler project does not fall within a Critical Habitat Unit for coho salmon. While a strong body of evidence exists documenting adverse effects to salmonids and their habitat from timber harvest and its associated activities such as road construction (Meehan 1991), most of this research has been directed at clear-cutting, particularly clear-cutting along streams or using no-cut buffers of varying widths in combination with upland clear-cutting.

There is a general paucity of literature documenting effects to fish and their habitat from commercial thinning activities. In Washington, Rashin et al. (2006) evaluated the effectiveness of riparian buffers in preventing sedimentation and degradation of aquatic habitat and found 81 percent of 21 sites with riparian buffers (about 10 meters wide) were effective at preventing sediment related water quality impacts. The four sites that were only partially effective in preventing sediment related water quality impacts used upslope clearcut logging practices, in contrast to thinning used in the effective sites (Rashin et al. 2006). The authors found most of the observed sediment was associated with skid trails and yarding corridors; very little was associated with tree falling or subsequent windthrow associated with logging.

Direct effects can occur directly by harming (killing or injuring) or harassing an animal. Harassing is defined as an intentional or negligent act that creates the likelihood of injuring wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns such as breeding, feeding, or sheltering (50 CFR §17.3). No activities are proposed in this project that could cause direct effects to fish, because no in stream work is proposed.

Harm may also include habitat modification or degradation that actually kills or injures a listed species by significantly impairing essential behavior patterns such as breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 217.12).

Suspended and deposited sediment and associated increased turbidity at high enough levels could impair essential behavior patterns (e.g. feeding) and influence egg to fry survival and smolt growth (Suttle et al. 2004). Suspended and deposited sediment and associated increased turbidity could potentially be generated from skyline yarding, temporary road construction, tractor skidding, landing construction, log hauling, road maintenance, and slash burning, but project design criteria specified for this project will be effective at preventing significant sedimentation at the site scale. Further, the amount of sediment entering fish-bearing streams is expected to be very slight and insignificant in terms of altering behavior or habitat. Because these sediments are small and mobile, the probability they would settle out in preferred fish spawning areas (higher velocity pool tail-outs and low-gradient riffles) is relatively low unless associated with a streamside landslide. Therefore, the amount of sediment reaching fish-bearing reaches in the Project Area is anticipated to be discountable. Disturbed areas should re-vegetate within the first 2-3 years following treatment, and any erosion is expected to be short term.

Losses of streamside wood and hence future in-stream wood could potentially be caused by these project actions: timber cutting, temporary road construction, temporary road re-construction, landing construction. Landings and temporary roads would be constructed outside of Riparian Reserves, so these actions should not have an effect on in-stream wood. Some short term (40-80 years) losses to wood input may occur from timber cutting (riparian thinning) adjacent to small channels (Beechie et al. 2000), such as many of the non-fish-bearing perennial streams in the Project Area. However, these temporary losses could be offset by more rapid growth from thinning and hence maturation, death, and delivery in remaining streamside conifers. Further, the use of no-cut primary shade zones would ensure wood recruitment in the area closest to the stream channels that have been determined to be the most important to wood recruitment (Meleason et al. 2003). No other impacts to other fish habitat elements such as stream temperature, food availability, dissolved oxygen, pool formation, side channel availability, or bank stability are expected from this project because of reasons described above. Stream temperature will not be measurably changed by this project because shade-producing trees will not be removed.

Effects of Action Alternatives

The Rustler Vegetation Management Project would result in a **"no effect"** determination for coho salmon for all alternatives because; 1) coho salmon do not occupy streams within the Project Area, 2) no new temporary roads or landings, are proposed nor allowed within Riparian Reserves, 3) no density management treatment would reduce the existing overstory canopy within Riparian Reserve to less than 50% (on average at the stand level), 4) no density management (pre-commercial thinning) would occur within 25 feet of the stream channel, and 5) no timber harvest would occur within 100 feet of any perennial stream.

The determination of effects for all federally listed species is "**no effect**" therefore; the Rogue River-Siskiyou National Forest is not required to consult with the U.S. Fish and Wildlife Service.

There are no R-6 Sensitive fish species within the Planning Area, therefore the Rustler Vegetation Management Project would result in a **"no impact"** determination for Sensitive fishes. Native cutthroat trout occur in some of the streams within the Project Area. For the reasons stated above, it is not predicted that there would be any measurable effects to native trout species within the Rustler Project Area.

Scenic Quality

Will the resulting visual character (evidence of management) affect attainment of visual quality objectives for scenic quality, as a result of activities associated with the Proposed Action?

Existing Condition

Under the Rogue River National Forest LRMP, each Management Strategy has an assigned Visual Quality Objectives (VQO) in order to maintain a sense of a natural system and meet the public's scenic expectations in the National Forest.

The Big Game Winter Range Management Strategy area has an assigned VQO of Modification, while the Minimum Management and the Timber Suitable Management Strategy areas in the Rustler Vegetation Management Project Analysis area have been assigned a VQO of Maximum Modification. A Modification VQO is defined as an area where "human activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in the foreground or middleground" (Visual Quality Objectives in Douglas-fir Forests, Pg. 3).

The terms Modification and Maximum modification were coined when timber harvest prescriptions were almost exclusively clearcuts and shelterwoods. Silvicultural prescriptions that maintain forest canopy closure and diverse structure exceed scenic the requirements for both Modification and Maximum Modification. Openings that borrow from the natural landscape in character, size, and shape and blend the regeneration openings with the natural terrain to the extent possible (Rogue River LRMP, Ch. 4, Pg. 236) also meet both Modification and Maximum Modification.

In theses areas timber management is the primary goal and it is expected to be evident from foreground (up to 1/2 mile) and middleground (up to 5 miles) view points in the form of roads, log landings, tree stumps, slash and silvicultural treatments.

Direct/Indirect and Cumulative Impacts of the Action Alternatives

In the Rustler Vegetation Management Project Area, the thinning treatments are designed to retain a functional mature or late-seral forest following treatment, and the openings are scaled to sizes consistent with natural opening in the area. These meet the requirements for both Modification and Maximum Modification. As such, scenic quality objectives and guidelines associated with Modification and Maximum Modification Visual Quality Objectives would be met with the Action Alternatives in Timber Suitable Management Strategy areas.

No other short- term, long- term, direct, indirect, or cumulative impacts to scenic quality are anticipated.

Cumulatively, past timber harvest actions have created an unnatural appearance (scattered large openings) across the landscape. Additionally, long-term fire exclusion in unlogged stands has created an unnaturally dense forest with a loss of large ponderosa pine (a visually attractive and desirable species) from moisture competition and stress. The Rustler project does not contribute to the unnatural appearance of past logging practices, and it takes action to remove moisture stress from old growth Ponderosa Pine, with the goal of retaining them for the long term. It is returning the landscape to a more historic and natural appearance than was left by past management actions.

Recreation and Public Safety

Will activities associated with the Proposed Action affect or change public use of recreation facilities, special uses, and features, and affect the safety of the recreating public?

Existing Condition

There are no developed recreation opportunities (campgrounds, trails, trailheads, resorts, Sno-parks, or recreation rentals) in the Rustler Vegetation Management Project Area.

The primary dispersed recreation activities within the area include vehicle camping, viewing scenery, hunting, berry picking, mushroom picking, Christmas tree cutting, off-highway vehicle use, snowmobiling and Nordic skiing. There are no monitored dispersed camping sites in the project area, however, there are numerous dispersed campsites in the area. Berry picking and hunting are the most desired day-use activities in the project area and primarily occur during the months of September and October.

There are no Congressionally Designated areas within the Rustler Vegetation Management Project Area, but the southeast boundary of the Project Area borders the Sky Lakes Wilderness. There are no eligible or suitable Wild and Scenic Rivers or Inventoried Roadless Areas within the Project Area.

Direct/Indirect Effects of the Action Alternatives

Since there are no developed recreation sites within the Rustler Vegetation Management Project Area, there would be no impacts to developed recreation sites. However, there are several developed recreation sites in the vicinity of the Project Area: Parker Meadows Campground, South Fork Campground, Lodgepole Guard Station, Middle South Fork Trailhead and the Blue Canyon Trailhead. The access roads to these sites (Road 37, Road 32, Road 34 and Road 3770) are also identified as haul routes for commercial timber removal.

Combining commercial vehicle traffic and public vehicle traffic increases the risk of accidents. As discussed in Chapter 2, this risk will be mitigated and/or reduced by including in the timber sale contracts requirements for notifying the public. Temporary road closures to public traffic may also be considered.

After interdisciplinary review, no other potential for short-term, long-term, direct, indirect, or cumulative impact to developed recreation sites or dispersed recreation activities were identified.

Though no Congressionally Designated Areas are located within the Project Area, the southeast boundary borders the Sky Lakes Wilderness. A treatment area that is proposed adjacent to the Sky Lakes Wilderness would implement density management using ground-based logging systems. No trails pass within sight or sound of this project. Known campsites in the Wilderness are located over one mile to the east and across a ridge, well out of sight or sound of this operation. This proposal is not expected to indirectly impact visitors to the Wilderness area seeking solitude.

Rustler Peak is a communications site and contains Forest Service communications equipment and one Special Use Permit for communications use. The American Red Cross has applied to obtain a Special Use Permit for communications use in the existing facility at Rustler. No operations are proposed near this proposed facility so no short or long-term impacts under the Action Alternatives would be expected, though coordination between permittees and commercial operators may be necessary to avoid any potential access conflicts. No other short- term, long-term, direct, indirect, or cumulative impact to special uses is anticipated.

Cultural Resources

Will activities associated with the Proposed Action affect archaeological or historical sites and/or current Native American values?

Existing Condition

Protection and management of heritage resources is mandated by federal laws and regulations, most notably the National Environmental Policy Act of 1969; Antiquities Act of 1906; National Historic Preservation Act of 1966, as amended (1992); Archaeological and Historic Preservation Act of 1974; Archaeological Resources Protection Act of 1979; American Indian Religious Freedom Act of 1978; the regulations for the Advisory Council on Historic Preservation (36 CFR Part 800); Uniform Regulations for the Protection of Archaeological resources (36 CFR Part 296); and Executive Order 13007 (1996), which provides that federal lands be managed insofar as possible to accommodate access to and ceremonial use of traditional Indian sacred sites.

The human history of the area is addressed in Chapter IV of the Rogue River National Forest Cultural Resource Overview (LaLande 1980). That document is of sufficient detail to serve as the basic reference of ethnographic and historic background for this planning process.

Based on the available archaeological and ethnological evidence, native people would have used the Project Area mainly for seasonal hunting and gathering. The relatively high elevation (including the sometimes deep, long-lasting snow pack) of much of the area would have confined most uses to the warmer seasons of the year. Native people of southwestern Oregon are known to have used fire to maintain meadows and enhance berry patches, to promote retention of oaks and pines, as well as to drive deer herds into confined areas where they were more easily killed. This undoubtedly occurred to some extent in the Rustler Project Area.

Prior to the public-scoping process for the Big Rustler Environmental Assessment, in order to seek current tribal views on the proposed projects and the question of possible ongoing traditional uses or other concerns about the area, the Forest Service contacted the Confederated Tribes of the Siletz Indians of Oregon, the Confederated Tribes of the Grand Ronde Community of Oregon, and the Klamath Tribes. No interest from these Tribes was expressed.

Cultural resource surveys within the overall Project Area have also yielded some sites associated with past Euro-American uses. Most of these sites are small, have no intact structural remains, do not contain more than a diffuse scatter of pre-1950 cultural debris, and/or have been heavily affected by post-1950 activities or are otherwise badly deteriorated.

Because of various factors (e.g., recent age, lack of significant amount or kinds of cultural evidence, destroyed or deteriorated condition, extremely common kind of features with low historical importance), most of the cultural evidence found within the Planning Area has been evaluated by the Forest Service as not meeting the eligibility criteria of the National Register of Historic Places (NRHP).

Direct/Indirect Consequences Related to No Treatment

No treatment would result in no impacts to any heritage, or cultural, resources. Because there would be no ground disturbing actions, no cultural resource sites would be affected, either negatively (e.g., potential damage) or positively (possible site enhancement or public interpretation), by project or project follow-up activities.

Direct/Indirect Effects of the Action Alternatives

Under the Action Alternatives, various amounts of ground-disturbing activities of the type that can potentially affect heritage resources would occur. Alternative One, which includes the most acres of treatment and the greatest mileage of proposed new temporary road construction, hypothetically would have the greatest potential for affecting possible (i.e., as-yet *un*discovered) cultural resources, while Alternative Two, which has the fewest acres and no proposed new roads, would have the least such potential. Alternative Three would be similar to Alternative One in the nature and extent of impacts discussed here.

However, the extensive effort of cultural resource survey of the Project Area vicinity, dating from the 1970s and continuing through 2010, has provided a solid base of field-inventory data that indicates that: (a) the major kinds, locations, and approximate total number of cultural resources existing within the Project Area have already been determined by these survey efforts; (b) that most if not all potentially significant (National Register-eligible/listed) are now known and there are very few within the overall area; and (c) that none of the alternatives, provided proper project design and cultural resource management requirements are implemented, would have any direct, indirect or cumulative adverse effect to any significant cultural resources.

Climate Change

Will activities associated with the Proposed Action affect climate change (greenhouse gas emissions and carbon cycling)? Will global climate change have an effect on this project?

Reports by the United Nations Intergovernmental Panel on Climate Change (www.ipcc.ch), US Climate Change Science Program's Science Synthesis and Assessment Products and the US Global Change Research Program have summarized the research on climate change. The Climate Impacts Group at the University of Washington has conducted climate change studies specific to the Pacific Northwest. These reports concluded that climate is already changing; that the change will accelerate in the future; and that human greenhouse gas emissions, primarily carbon dioxide emissions (CO_2), are the main source of accelerated climate change.

In the summer of 2008, the University of Oregon Climate Leadership Initiative, in partnership with The National Center for Conservation Science & Policy and the U.S. Forest Service Pacific Northwest Research Station, initiated a project to assess the likely consequences of climate change for the Rogue River Basin. The project began by downscaling three climate models (CSIRO, MIROC, and Hadley) and incorporating a global vegetation change model used by the Intergovernmental Panel on Climate Change. A panel of scientists and land managers then assessed the likely risks posed by changing climate conditions to natural systems and made recommendations for increasing the capacity of ecosystems and species to withstand and adapt to those stressors. In turn, a panel of policy experts used the information provided by the scientists to assess the likely risks to economic, built, and human systems within the Rogue Basin posed by climate change and recommended ways to increase resistance and resiliency of those systems.

The science panel made recommendations to prepare aquatic and terrestrial systems in the Rogue River Basin for climate change by increasing resilience and resistance. The recommendations applicable to the Rustler Vegetation Management project included:

Aquatic Systems

- Restoration and maintenance of stream complexity and connectivity will improve spawning habitat and allow for movement to new areas as other areas become too warm.
- Restoration and maintenance of critical landscapes such as high elevation riparian areas, floodplains, tributary junctions, north-facing streams, and stream reaches with gravels and topographic complexity.

Terrestrial Systems

- Protection and restoration of ecosystem structure, function and genetic diversity to allow organisms to withstand and adapt to climate stressors.
- Remaining intact habitats should be protected, including old growth, roadless areas and corridor connections for wildlife migration.
- Land and stream reaches that provide critical support for ecosystem services should be identified, protected and restored. Ecosystem services are benefits that people gain from functioning ecosystems, including clean water, decomposition of waste and toxins, timber harvest, recreational opportunities, etc.

As noted in the issue statement, there are two types of climate change effects for proposed projects to consider, as appropriate:

The effect of a proposed project on climate change (greenhouse gas emissions and carbon cycling): Examples include: short-term greenhouse gas emissions and alteration to the carbon cycle caused by hazardous fuels reduction projects, greenhouse gas emissions from oil and gas field development, and avoiding large greenhouse gas emissions pulses and effects to the carbon cycle by thinning overstocked stands to increase forest resilience and decrease the potential for large scale wildfire.

The effect of climate change on a proposed project: Examples include: effects of expected shifts in rainfall and temperature patterns on the seed stock selection for reforestation after timber harvest and effects of decreased snow fall on a ski area expansion proposal at a marginal geographic location, such as a southern aspect or low elevation.

Determining whether there is a cause-effect relationship is the first step in identifying a potential issue. Consideration was given as to whether some element of the proposal would result in direct, indirect, or cumulative effects on greenhouse gas emissions or the carbon cycle and the direction of effects (e.g., increase, decrease, or combination of both).

Direct/Indirect Effects of the Action Alternatives

Greenhouse Gas contributions

Many proposed projects and programs would emit greenhouse gases (direct effect) and, thus, contribute to the global concentration of greenhouse gases that could affect climate (indirect effect). Since greenhouse gases mix readily into the global pool of greenhouse gases, it is not currently possible to ascertain the effects of emissions from single or multiple sources (project).

Forest Service projects are extremely small in the global atmospheric CO_2 context. They are usually conducted using a few vehicles and chainsaws. As such, it is not presently possible to conduct quantitative analysis of actual climate change effects based on individual or multiple projects.

All alternatives considered with this proposal were identified to have minor cause-effect relationships to greenhouse gas emissions or the carbon cycle, and were determined to be of such a minor scale at the global or even regional scale, that the direct effects would be meaningless to a reasoned choice among alternatives.

Forests play a major role in the carbon cycle. The carbon stored in live biomass, dead plant material, and soil represents the balance between CO_2 absorbed from the atmosphere and its release through respiration, decomposition, and burning. Over longer time periods, indeed as long as forests exist, they will continue to absorb carbon.

The direct and indirect effects regarding these relationships are insignificant because there would be very minimal amounts of vegetation removed and disposal of brush and slash associated with trail clearing or maintenance would be minor under all alternatives.

One area of greenhouse gas production, however, warrants mention. Smoke from wildfires, is significant contributor to greenhouse gasses in the atmosphere. Such gases from high-intensity, long duration, large-scale wildfires have the greatest potential from National Forests to cumulatively affect climate change. It is this contribution that Rustler can positively reduce. Thinning these forests and constructing Fuel Management Zones will increase firefighters' likelihood of keeping such fires smaller and of lower intensity than they might otherwise be. There should likewise be a corresponding reduction in the addition of greenhouse gasses to the atmosphere from these fires.

Carbon Storage

Forests are recognized for their significant capability to store large amounts of carbon for long periods of time in the form of woody vegetation, logs, snags, and subsurface biotic and abiotic processes. Carbon storage, known as sequestration, and release is a hotly debated but poorly studied factor in forest management concerning climate change. The key agreement, however, is that carbon storage is a good thing. Carbon release is not.

Some of the mechanisms associated with the debate are as follows:

> Trees store carbon; young trees take up carbon faster than old trees; old trees store more carbon than young small trees; logging of any sort reduces the number of live trees taking up carbon; logging and wood processing burns fossil fuels, thus releasing carbon; thinning or clearcutting creates the opportunity for fewer healthier trees or more younger trees to take up more carbon per tree than the prior forest condition; post-harvest burning of slash from cut trees releases carbon; trees can store carbon for hundreds of years if they aren't cut or killed; wood products store carbon for decades, perhaps a century; wood processing creates waste that is often burned and releases carbon; wildfires release lots of carbon, and if severe, eliminate for a time a forest's ability to uptake carbon; much of the stored carbon in burned forests remains stored in large unconsumed trees, snags; and logs.

Complicating the simple cause and effect statements above are the interactions between them, such as how differing levels of tree cutting reduce carbon intake, yet reduced wildfire severity with reductions in associated carbon release, yet the burning of logging slash, etc offsets this apparent benefit somewhat (Mitchell et al, 2009). Biomass utilization provides promise of reducing the carbon release effect of slash disposal. Additionally, today's forest are overly dense with smaller trees which store less carbon overall than the fewer but larger trees in historic forests without suppressed fire regimes; and thinning today's forests can improve carbon storage by increasing the number of large trees (North et al, 2009).

The mechanisms are numerous, and the factors involved are often immeasurable, and the debate generally flows along the following lines: conservationists argue a complete halt to logging would equal in carbon savings the removal all Oregon's automobiles from roadways. Logging advocates say cut more often and use the wood, which stores carbon until it rots, and plant fast-growing young forests. Research, however, is beginning to accumulate that carbon storage can be improved by reducing harvest rates (trees harvested during each treatment); increasing rotation age (increasing the time interval between harvests) (Harmon et al, 2009 and Hudiberg et al, 2009); and thinning small trees in the understory to reduce the occurrence of uncharacteristic high-severity wildfire (North et al, 2009).

Alternative three, therefore, is an improvement over Alternatives One and Two concerning carbon storage since it retains the stands with the largest trees while focusing a larger amount of thinning on smaller understory trees than either Alternatives one or Two. This increase in carbon storage comes at the expense of increasing potential for carbon uptake by increasing the vigor of the remaining trees.

Forest Resiliency

Climate change is expected to bring temperature and moisture stress to ecosystems in the southern Cascades. Current overstocked forest conditions weaken forest vegetation through moisture competition, thereby increasing its vulnerability to the added stress of climate change. Risk of loss of these weakened forests to wildfire or pathogens (that take advantage of that weakness) in thereby increased.

A driving purpose of the Rustler Vegetation Management Project is to increase the resilience of these forests to such risk factors. Thinning the forests reduces moisture stress. Introducing low-intensity fire into the system recycles nutrients, and provides short term opportunity (bare, exposed soil) for plants to sprout or re-colonize habitats that were once choked with duff and forest debris. Some nutrients however, may be lost from the system with fire. This reduction in moisture competition and increase in biological and genetic diversity is believed to enhance these forests' resiliency to risks from fire, insects, pathogens, and the uncertainties of climate change.

Cumulative Effects of the Action Alternatives

As greenhouse gas emissions are integrated across the global atmosphere, it is not possible to determine the incremental cumulative impact on global climate from emissions associated with any number of particular projects. Nor is it expected that such disclosure would provide a practical or meaningful effects analysis for local project decisions. Uncertainty in climate change effects is expected since it is not possible to meaningfully link individual project actions to quantitative effects on climatic patterns.

It is recognized that global climate change may affect human health, that there is scientific controversy surrounding the effects of human activity on climate change, that there is uncertainty and unknown risks associated with global climate change. The ultimate effects on climate change are indeed the results of incremental cumulative effects of many actions, most of which are outside of the Agency's control.

Other Effects

This section deals with those effects for which disclosure is required by National Environmental Policy Act (NEPA) regulations, Forest Service policy or regulation, various Executive Orders, or other laws and direction covering environmental analysis and documentation. In many cases, the information found here is also located elsewhere in this document. In other cases, the effects are not necessarily connected to any particular resource area.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Analysis indicates that short-term density management and commodity extraction would not adversely affect long-term productivity. Long-term productivity would be expected to increase because of vegetation management actions.

Unavoidable Adverse Effects

The implementation of any of the Action Alternatives would result in some adverse effects to both the physical and biological, and the social environment. Many of these effects can be mitigated to acceptable levels using the Mitigation Measures and Project Design Criteria specified by resource topic and alternative. The unavoidable adverse effects summarized below are those that are expected to occur after the application of mitigation measures, or that cannot be mitigated to a level approaching existing conditions.

Increased sediment delivery and water quality

Although mitigation measures (Best Management Practices) are expected to reduce the potential for accelerating sediment production to near baseline levels, there would be some minor risk for short-term indirect effects to water quality as a result of implementing any of the Action Alternatives.

Compaction/site productivity

Under the Action Alternatives, additional detrimental soil compaction would occur as a result of the use of ground-based and skyline equipment to remove trees. Mitigation measures and Project Design Criteria would limit the area compacted to comply with Forest Standards and Guidelines for soil protection. With these there would be no more than 20 percent cumulative detrimental impact from past conditions and present activities; areas currently in excess of 20 percent would not increase from current activity and would show an improving trend, due to rehabilitation through repair areas of past soil compaction (by the use of winged subsoilers which fracture the compacted subsoil without turning over the soil surface).

Air Quality

Project design and mitigation measures are expected to reduce the potential for air quality degradation from severe wildfire. The potential exists for changes in atmospheric conditions that would allow smoke and particulate matter to drift, causing minor short-term effects on air quality. All prescribed burning operations would be conducted in compliance with the Oregon Smoke Management Guidelines administered by Oregon Department of Environmental Quality.

Late-successional habitat

Under Alternatives One and Two, a decrease of late-successional habitat would occur, modifying some of the late-successional structure such as reducing some large woody material, multi-canopy layering, etc. Alternatives 1 would change the late-successional structure the most.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

Irreversible commitment of resources refers to a loss of non-renewable resources, such as mineral extraction, heritage (cultural) resources, or to those factors, which are renewable only over long time spans, such as soil productivity.

Under Alternatives One and Three, there would be temporary road construction, skid trails and landings, representing an irreversible impact to site productivity. Alternative Two has no temporary road construction, but would have some effect to soil productivity associated with additional skid trails and landings. All Action Alternatives would maintain effects at levels that would be in compliance with the Standards and Guidelines for Matrix lands.

Irretrievable commitment applies to losses that are temporary, such as loss of forage production in an area being used as a ski run, or use of renewable natural resources. The production lost would be irretrievable, but the action would not be irreversible.

Timber Production

Generally, management activities, such as thinning, improve timber production. However, opportunities to increase the net production of timber would be forgone in those areas not thinned at this time to protect other resources.

Road Activities

Generally, road activities such as road surface rock replacement and temporary road construction use (or create) different sources of rock. However, under this project, any rock would be used from established rock quarries either on or off National Forest System lands. No rock quarry pits would be developed or enlarged.

Old Growth Forest

The old growth forest that would be removed for root rot treatments under the Action Alternative would also have value as late-successional wildlife habitat, and/or human value for recreation or aesthetics, and would be irretrievably lost. However, this impact is also in accordance with the management goals and Standards and Guidelines for Matrix lands.

Cumulative Effects

As discussed in each resource section above, many of the potential effects of the Rustler Vegetation Management Project are mitigated and thus avoided. Some however, are not. In this section, a summarized overview of the cumulative effects of all the resources are brought together in a complete picture to determine if any cumulative effect is revealed that should be noted.

First, there were cumulative effects from the actions of this project that were positive: restoring past losses (down wood), mitigating past damages (subsoiling areas of soil compaction), or improving conditions for the long term (reducing stocking levels in overstocked forests, putting low-intensity fire back into the forest, big game forage values). The overall picture these present is the improvement of forest productivity, biodiversity, and resiliency.

There were also naturally recovering systems that this project does not further degrade, such as the hydrologic function of the watershed and the riparian systems.

What remains, however, is a risk to late seral forest and species dependent on them. This was noted in the discussions concerning the spotted owl, the Pacific fisher, and the American marten. It also surfaced in discussions of big game thermal cover and snag dependent species. It appears that even thinning in these stands, though intended to improve the resilience of these stands to wildfire, insects, and disease, would adversely impact in the short term (forest condition) or long term (decayed snag availability) the conditions on which dependent species rely. Alternative Three was designed to best protect these features.

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders."

The following is a summary of effects that were considered during the analysis process, not necessarily as issues, and not always totally quantifiable. All effects were determined to be consistent within the Standards and Guidelines identified in the Siskiyou National Forest Land and Resource Management Plan.

Prime Farmland and Rangeland

The watershed associated with the candidate stands does not include prime farm and rangelands. None of the Action Alternatives would produce indirect or cumulative effects adverse to prime farm or range lands.

Effects upon Wetlands and Floodplains

No floodplains, associated with Executive Order 11988, exist within the Project Area. All alternatives would constitute a "no effect" undertaking in relation to the Wetlands Executive Order 11990 because no wetlands are involved. All alternatives would be in compliance with Riparian Reserve Standards and Guidelines and would allow attainment of the Northwest Forest Plan Aquatic Conservation Strategy.

Rights-Of-Way/Lands/Minerals

No alternatives would have impacts on rights-of-way, land issues, or mineral access.

Effects on Energy Requirements

There would be no unusual energy requirements associated with implementing any alternative. Energy consumption needed to harvest timber or for recreation would not necessarily be conserved by lower levels of either activity in the Rustler Vegetation Management Project. Helicopter yarding operations are always considered due to their relative higher level of fuel consumption, but it is likely that, if these activities did not occur within this project, they would occur at similar levels elsewhere in the Forest or region, with correspondingly similar energy requirements.

Effects on the Human Environment

While the sale of National Forest timber would create or sustain jobs and provide consumer goods, no quantitative output, lack of output, or timing of output associated with implementation of any alternative is identified as affecting the civil rights, privileges, or status quo of consumers, minority groups, women or American Indians.

There would be no unmitigated adverse effects to human health or safety associated with the implementation of any alternative for this project. No health issues were identified. The only safety issues identified regarding implementation of these alternatives concern hazard trees and the mixture of recreational and industrial traffic on some forest roads. Mitigations were identified in Chapter 2 to deal with both of these potential risks.

Environmental Justice

Environmental Justice means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner, by government programs and activities affecting human health or the environment. *Pyramid Thin Project Environmental Assessment Revised June 2009 Page III - 103*

One goal of Executive Order 12898 is to provide, to the greatest extent practicable, the opportunity for minority and low-income populations to participate in planning, analysis, and decision-making that affects their health or environment, including identification of program needs and designs. The Executive Order makes clear its provisions apply full to programs involving Native Americans.

Analysis for this Proposed Action has been conducted under Departmental regulation 5600-2, December 15, 1997, including the Environmental Justice Flowchart (Appendix E), and CEQ's *Environmental Justice - Guidance Under the National Environmental Policy Act*. The Proposed Action, its purpose and need and area of potential effect have been clearly defined. Scoping under NEPA has utilized extensive and creative ways to communicate. Consultation with Native American Tribes has occurred.

This Proposed Action and alternatives do not appear to have a disproportionately high or adverse effect on minority or low-income populations, or Indian Tribes. The Proposed Action and alternatives do not have a disproportionately high and adverse human health effects, high or adverse environmental effects, substantial environmental hazard, or affects to differential patterns of consumption of natural resources. Extensive scoping did not reveal any issues or concerns associated with the principles of Environmental Justice. No mitigation measures to offset or ameliorate adverse affects to these populations have been identified. All interested and affected parties will continue to be involved with the comment and decision making process.

Relationship to Other Agencies and Jurisdictions

The **Oregon State Department of Environmental Quality** (DEQ) is responsible for enforcing the Clean Water Act of 1972. A Memorandum of Understanding prepared and agreed to by the Forest Service and DEQ states that Best Management Practices, used by the Forest Service to control or prevent non-point sources of water pollution, will meet or exceed State water quality standards.

The **Oregon State DEQ** is also responsible for enforcing the Clean Air Act of 1972. The State Smoke Implementation Plan provides guidelines for compliance which are intended to meet the requirements of the Clean Air Act. All burning plans for activities associated with this project would comply with this Plan.

The **United States Department of Interior Fish and Wildlife Service** (USFWS) is responsible for the protection and recovery of Threatened and Endangered Species. Where any such species or their habitat may be affected, the USFWS is consulted. In this project, consultation focused on the northern spotted owl.

National Oceanic and Atmospheric Administration (NOAA) is responsible for the protection and recovery of Threatened and Endangered marine fish species. Where any such species or their habitat may be affected, NOAA - fisheries is consulted.

Cultural Resource Site Reports for all cultural resources found within the Rustler Vegetation Management Project Area are filed with and approved by the **Oregon State Historic Preservation Officer**.