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Grasshopper Restoration Project

Wildlife Report

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1.0 Introduction

This report addresses the wildlife species that may be found in the Grasshopper project area. Seven species of wildlife, including critical habitat, are classified as threatened, endangered or proposed and may be found on or adjacent to the Barlow Ranger District. There are eighteen U.S. Forest Service Region 6 Sensitive species, seven Survey and Manage species, and five Management Indicator species that may also be found on the District. The status of each species in the project area is listed in Table 1. Species that are not present or do not have habitat within the project area will not be discussed further in this report.

Table 1. Status of Species in the Project Area.

Federally Threatened, Endangered or Proposed Species	Habitat	Presence
Northern spotted owl (*Strix occidentalis caurina*)	yes	yes
Northern spotted owl critical habitat	yes	n/a
North American wolverine (*Gulo gulo luscus*)	no	-
Gray wolf (*Canis lupis*)	yes	unknown
Canada lynx (*Lynx canadensis*)	no	-
Oregon spotted frog (*Rana pretiosa*)	no	-
Oregon spotted frog critical habitat	no	-
R6 Sensitive Species		
Bald eagle (*Haliatus leucocephalus*)	no	-
Bufflehead (*Bucephala albeola*)	no	-
Harlequin duck (*Histrionicus histrionicus*)	no	-
White-headed woodpecker (*Picoides albolarvatus*)	yes	unknown
Lewis' woodpecker (*Melanerpes lewis*)	no	-
Cope's giant salamander (*Dicomptodon copei*)	no	-
Townsend's big-eared bat (*Corynorhinus townsendii*)	no	-
Fringed myotis (*Myotis thysanodes*)	yes	unknown
Western bumblebee (*Bombus occidentalis*)	yes	unknown
Suckley's cuckoo bumblebee (Bombus suckleyi)	yes	unknown
Johnson's hairstreak (Callophyrs johnsoni)	yes	unknown
Mardon skipper (Polites mardon)	no	-
Columbia sideband (*Monadenia fidelis Columbiana*)	no	-
Crowned tightcoil (*Pristiloma pilsbryi*)	no	-
Shiny tightcoil (*Pristiloma wascoense*)	no	-
Sierra Nevada red fox (*Vulpes vulpes nectator*)	no	-
Survey and Manage Species		
Great gray owl (*Strix nebulosa*)	no	-
Oregon red tree vole (Arborimus longicaudus)	no	-
Larch Mountain salamander (Plethodon larselii)*	no	-
Dalles sideband (*Monadenia fidelis minor*)*	yes	no**
Crater Lake tightcoil (*Pristiloma arcticum crateris*)*	yes	no
Evening fieldslug (*Deroceras hesperium*)	no	-
Puget Oregonian (*Cryptomastix devia*)*	yes	no
Columbia Oregonian (*Cryptomastix hendersoni*)	yes	no
Management Indicator Species		
Mule Deer (*Odocoileus hemionus*) and Elk (*Cervus elaphus nelsoni*)	yes	yes

Pileated Woodpecker (*Dryocopus pileatus*)	yes	yes
American Marten (*Martes americana*)	yes	unknown
Wild Turkey (*Meleagris gallopavo*)	yes	yes
Western Gray Squirrel (*Sciurus griseus griseus*)	yes	yes
Other Required Analysis		
Snags and Down Wood	yes	yes
Neotropical Migratory Birds	yes	yes

*These species are now also considered a Region 6 Sensitive Species in addition to Survey and Manage.

**The Dalles sideband was found in some units during surveys and those units have subsequently been dropped.

2.0 Northern Spotted Owl

Both action alternatives are likely to adversely affect spotted owl by habitat impacts, although Alternative 2 would further reduce canopy cover and delay the attainment of suitable habitat by as much as 75 to 100-years compared to Alternative 1.

This section describes effects to the Northern Spotted Owl and certain habitat components. Section 3.0 describes effects specifically for Critical Habitat for the Northern Spotted Owl.

2.1 Analysis Assumptions and Methodology

2.1.1 Disturbance

The U.S. Fish and Wildlife Service (FWS) has concluded that noise, smoke, and human presence can result in a disruption of breeding, feeding or sheltering behavior of the northern spotted owl (spotted owl) such that it creates the potential for injury to individuals (i.e., incidental take in the form of harassment). For a significant disruption of spotted owl behavior to occur as a result of disturbance caused by the Action Alternatives, the disturbance and spotted owl(s) must be in close proximity to one another. Human presence on-the-ground is not expected to cause a significant disruption of behavior because spotted owls do not seem to be startled in those situations.

A spotted owl that may be disturbed at a roost site is presumably capable of moving away from the disturbance without a substantial disruption of its behavior. Since spotted owls forage primarily at night, projects that occur during the day are not likely to disrupt its foraging behavior. The potential for effects is mainly associated with breeding behavior at active nest sites.

In the late breeding period, potential effects from disturbance decline because juvenile spotted owls are increasingly more capable of moving as the nesting season progresses. The critical breeding period is March 1 through July 15. After July 15, it is estimated that most fledgling spotted owls are capable of sustained flight and can move away from most harmful disturbances.

The FWS has based disruption distances on interpretation of the best available science. The Proposed Action for this project that generates noise above ambient levels would be the use of heavy equipment and chainsaws. The disruption distance is 35 yards for heavy equipment and 65 yards for chainsaws. Surveys were started in 2018 and are ongoing until implementation.

2.1.2 Home Range and Core Area

For the Willamette Province, the home range is a 1.2-mile radius circle (2,894 acres) centered on a nest site. A core area has been defined as the area within a home range that receives disproportionately high use (502-acres or 0.5-mile radius circle from the historic nest). There are seven historic home ranges that overlap analysis area for the Grasshopper analysis area. Of these 7, only 5 overlap with units identified for proposed treatments.

Habitat modification within the home range can directly and indirectly influence the likelihood of spotted owls occupying, breeding, and persisting at known and potential sites. When suitable habitat is reduced to below 40 percent of a home range, spotted owl occupation and breeding success is likely to be diminished, including a potential for incidental take to spotted owls due to habitat loss. Breeding behavior, including rearing of young, is more affected by habitat conditions in the core area compared to the home range. When suitable habitat is removed to below 50 percent within the core area, spotted owl occupation and breeding success is likely to decline.

While it is usually the alteration or removal of suitable habitat (nesting, roosting, and foraging) that may result in adverse impacts to a territorial pair of spotted owls, the loss or degradation of dispersal habitat may also result in short-term impacts. The FWS has guidelines for how much removal of suitable habitat would result in take, but there are no such guidelines for dispersal habitat.

2.2 - Analysis of Alternatives for Northern Spotted Owl

2.2.1 - Existing Condition

2.2.1.1 – Habitat

Spotted owls generally rely on older forested habitats that contain the structures and characteristics required for nesting, roosting, foraging, and dispersal. These characteristics of older forests include a multi-layered, multi-species canopy dominated by large overstory trees; moderate to high canopy closure; a high incidence of trees with large cavities and other types of deformities; numerous large snags; an abundance of large, dead wood on the ground; and open space within and below the upper canopy for spotted owls to fly (Thomas et al. 1990). Forested stands with high canopy closure also provide thermal cover, as well as protection from predation.

Dispersal habitat for spotted owls usually consists of mid-seral stage stands between 40 and 80 years of age of age with a canopy closure of 40 percent or greater and an average diameter of 11-inches. Spotted owls use dispersal habitat to move between blocks of suitable habitat and juveniles use it to disperse from natal territories. Dispersal habitat may have roosting and foraging components, enabling spotted owls to survive, but lack structure suitable for nesting.

Recent landscape-level analyses suggest that a mosaic of late-successional habitat interspersed with other vegetation types may benefit spotted owls more than large, homogeneous expanses of older forests (Zabel et al. 2003). A recent study by Davis et al (2022) found 3-percent net increase of nesting/roosting habitat on federal lands between 1993 and 2017. They also identified that 7.9-percent of nesting/roosting habitat was lost due to wildfire compared to 2.9-percent loss due to timber harvest on federal lands.

There are ~3,035-acres of dispersal habitat and ~12,882-acres of suitable habitat in the ~28,786-acre analysis area for spotted owls. There are seven historic home ranges that overlap with the analysis area. Project design criteria, including seasonal timing restrictions, are in place minimize impacts in these areas. Surveys started in 2018 have consistently detected a pair of Northern spotted owls in the Boulder Creek drainage. No treatments are planned for this area.

2.2.1.2 - Prey

The composition of prey in the spotted owl's diet varies regionally, seasonally, annually, and locally, which is likely in response to prey availability (Forsman et al. 2001). Northern flying squirrels and woodrats are usually the predominant prey species. Other prey species include red tree vole, red backed voles, mice, rabbits and hares, birds, and insects.

Studies have found that northern flying squirrels have generally responded negatively to thinning, although results have varied across studies. Several studies have suggested that forest thinning can temporarily (up to 20 years) reduce the availability of truffles, which are a key food resource for northern flying squirrels and other small mammals on which spotted owls depend (Waters et al. 1995).

Sollmann et.al (2016) found that flying squirrel densities were reduced on the scale of a thinning treatment unit, and that these animals shifted their distribution into adjacent un-thinned areas without decline in overall density. While density-dependent effects didn't manifest in the untreated stands during the life of the study, it is possible that there may be delayed effects on flying squirrel populations as the untreated stands move toward the pre-treatment densities. For the short-term at least, prey for spotted owls may still be available at pre-treatment densities within the owl's home range but it is expected that in the long-term, until habitat returns to pre-treatment conditions, prey for spotted owl may be reduced under the proposed action.

Mixed results have been reported in studies that examined effects of thinning on woodrats. Dusky-footed woodrats occur in a variety of conditions, including both old forests and younger seral stages, and are often associated with streams (Carey et al. 1992, 1999, Anthony et al. 2003). Research has suggested that thinning or associated practices (*e.g.*, burning slash piles) could be detrimental to dusky-footed woodrats if it reduces hardwoods, shrubs or downed wood, yet treatments could ultimately benefit woodrats if they result in growth of shrubs or hardwoods. The proposed treatments would not reduce the amount of hardwoods and would result in the growth of shrubs which could benefit woodrats.

Species such as brush rabbits and other rodents are primarily associated with early-and mid-seral forest habitats (stands < 80 years of age) and could benefit from increased understory and shrub development (Carey 2001, Carey and Wilson 2001).

2.2.1.3 Barred Owl Competition

The Revised Recovery Plan for the Northern Spotted Owl (USDI 2011) identifies three major threats to NSO: past habitat loss, competition from barred owls and future habitat loss, in particular habitat loss due to fire. The arrival of barred owls in this region has becoming another compounding threat to NSO as they compete for habitat and prey resources. Barred owls have been detected throughout the project area with the majority of detections being East of the Boulder Creek drainage. Weins et al (2014) states that mounting evidence indicates that barred owls are displacing, hybridizing with and even killing northern spotted owls. Franklin et al. (2021) found that barred owl presence was the primary factor negatively affecting apparent survival, recruitment, and rates of population change.

Dugger et al. (2011) modeled extinction and colonization rates for spotted owl pairs in the South Cascade Demographic Study area where barred owls were detected on some home ranges. They found that extinction rates for spotted owls increased with decreasing amounts of old forest in the core area, and that the effect was 2-3 times greater when barred owls were detected. They also found that colonization rates for spotted owls decreased as the distance between patches of old-growth forest increased (i.e. increased habitat loss and fragmentation) and that barred owl presence similarly decreased the rate of colonization of spotted owl pairs. Holm et al (2016) that interspecific competition with barred owls may contribute to regional extinction of northern spotted owls in some areas.

Across the regional landscape, within the Oregon demographic study areas, there has been a steady increase in the number of barred owls as measured by the proportion of spotted owl sites with barred owls detected, with as many as 60-percent of the spotted owl sites having barred owls detected (Forsman et al. 2011). Dugger et al (2011) found that as many as 53-percent of their study sites had barred owl detections, however, they also found that some Northern spotted owls retain their territories and successfully reproduce in areas where barred owls were detected.

Across their range, barred owls are known to use a wide variety of forest types and it has been suggested they are habitat generalists that may benefit from timber harvest activities such as clearcutting and thinning (Hamer et al. 1989, Iverson 1993). A detailed review for the spotted owl recovery plan found much evidence that barred owls prefer old-growth and older forest habitat in the Pacific Northwest (USFWS 2011). Weins et al (2014), in a study based in Oregon, found that northern spotted owls spent a dipropionate amount of time foraging on steep ravine slopes dominated by old (>120-yr) conifers trees while barred owls used forest types more evenly. However, the two species didn’t appear to differ their use in young, mature or riparian-hardwood forest types.

While a suggestion has been made that timber harvest activities may favor barred owls, an alternative hypothesis is that barred owls have a wider range of habitat use in the northern part of the spotted owl's range, and the spotted owl has a narrower one. But in the more southerly part of the spotted owl's range, the spotted owl seems to have a broader range of habitat use than does the barred owl (Courtney et al 2004). Therefore, timber harvest may have the effect of leading to a competitive advantage for barred owls in some areas, but not in others (Courtney et al 2004, Dugger et al. 2011).

The Grasshopper planning area is in the middle of the range for Northern spotted owl so the above studies may indicate a balance between an advantage for barred owls and an advantage for spotted owls. Maximizing critical habitat may allow for coexistence of northern spotted owls and barred owls (Dugger et al 2011 and Forsman et al 2011). Studies have found that while abundant habitat helps mitigate displacement of northern spotted owls due to barred owls, it does not reverse it (Franklin et al. 2021, Davis et al. 2022). Efforts to reduce potential fire severity and to prioritize the highest quality suitable habitat and occupied sites will provide the best habitat advantage to northern spotted owls when dealing with barred owl occupancy pressures.

Historically, northern spotted owls and barred owls were allopatric species, as barred owls move into historic northern spotted owl habitat there is the potential for significant impact on prey populations (Holm et al 2016). Little is known about the immediate and long-term effects this may have on species composition or ecosystem processes. Because barred owls can prey on a wider range of species than spotted owls, there has been speculation that thinning may increase prey favored by barred owls (McComb et al 2013).

Wiens et al (2014) found that while both species' diets were dominated by nocturnal mammals, the diet of barred owls also included many terrestrial, aquatic and diurnal prey species that were rare or absent in the northern spotted owl diet. The Young Stand Study on the Willamette National Forest found that commercial thinning of mid-seral stands will increase the abundance of deer mice and Townsends chipmunks (McComb et al 2013). Wiens (2012) found that these two species comprised about 5 percent of the prey biomass for spotted owls compared to 3 percent for barred owls in an area of western Oregon. Therefore, the small mammal species that would increase most after thinning under the Proposed Action are not ones that are selectively favored by barred owls more than spotted.

2.2.1.4 Management and Population Trends

Given the continued decline of the species, the apparent increase in severity of the threat from barred owls, and information indicating a recent loss of genetic diversity for the species, the Revised Recovery Plan recommends retaining more occupied spotted owl sites and unoccupied, high value spotted owl habitat on all lands.

The Revised Recovery Plan identifies competition from the barred owl as an important threat to the spotted owl. Since barred owls are more aggressive and use the same habitats and prey as spotted owls, they are believed to be out competing spotted owls for habitat and food (USFWS

2011, Wiens 2012). Within the Oregon demographic study areas, there has been a steady increase in the number of barred owls as measured by the proportion of spotted owl sites with barred owls detected, with as many as 60 percent of the spotted owl sites having barred owls detected. Studies indicate that when barred owls are present, Northern spotted owl demographic performance is better in areas where high-quality habitat is available (Dugger et al 2011, Wiens 2012).

2.2.1.5 Fire

Wildfire is an important ecological process in the Pacific Northwest and can have lasting effects on vegetation composition and structure (Walsh 2015). Disturbance regimes have changed due to past management, including fire suppression as well as changes in climate (Jones et al. 2021). Large-scale drought and 'megafires' threaten the persistence of forest habitat. Although high-severity fires have been a part of the historical ecological processes for this region, wildfire frequency has been steadily increasing over the last 400-years (Walsh et al. 2015). The historic landscape could incur wildfires and maintain function across the larger landscape, but current NSO suitable habitat (old growth habitat) is less resilient to megafires (Lesmeister et al. 2021, Jones et al. 2021).

The predicted enhanced threat of future large-scale high severity fires within the range of Northern spotted owls compounds this threat further. Forest dependent taxa can experience a rapid habitat loss following stand-replacing fires (Jones et al. 2021). The threat of wildfire is now a greater threat to NSO habitat than timber harvest on federal lands (Lesmeister et al. 2021). Jones et al. (2021) posits that rapidly changing fire regimes could result in a threat to some forest-dependent species as ecosystems cross a 'tipping point' and experience type conversion. However, not all fires are high severity fires, and it is worth noting that early-seral areas, particularly those generated by mixed-severity fires, can provide areas for foraging, including by species that rely on older forests for nesting habitat, such as northern spotted owls (Halofksy et al *in press*). Davis et al. (2022) states that nesting/roosting habitat can serve as important fire refugia, but that additional research is needed to identify areas within old growth that could be persistent fire refugia, spatially and temporally through multiple fires. Jones et al (2016) found that reducing the frequency of large severity fires could benefit northern spotted owls and that forest restoration and old-forest species conservation objectives may be more compatible than previously believed.

2.2.1.6 Climate

Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations. Potential changes in temperature and precipitation have important implications for spotted owl reproduction and survival (USDI 2019). Glenn et al. (2010) found that northern spotted owl population growth was negatively associated with hot summer temperatures at their southernmost study area in the southern Oregon Cascades, indicating that warm temperatures may still have an effect on the species. Drought or hot temperatures during the summer have also been linked to reduced spotted owl recruitment (Glenn et al. 2010, USDI 2019). Changing climates may also cause drought-related mortality of large trees that support nesting/roosting for northern spotted owls (Davis et al. 2022).

The relationship between climate and northern spotted owls is complex and variable. Dugger et al (2016) suggested that range-wide survival increased when winters were warmer and drier. This may become a factor in population numbers in the future; given climate change predictions for the Pacific Northwest include warmer, wetter winters (USDI 2019). Effects of climate change, including fire and pest incidence, will not only affect currently suitable habitat for the northern spotted owl, but they will also likely alter or interrupt forest growth and development processes.

Climate change is predicted to increase the extent and frequency of large fires, with the largest changes occurring along the western Cascades of Oregon and Washington (Davis et al. 2022). A more detailed look at potential climate change impacts for NSO habitat within this region and its subsequent tie to NSO can be found in Halofsky et al. *in press*. In addition, see the Climate Change Report which is incorporated by reference and summarized in the EA section 3.14.

2.3 - Environmental Consequences Spotted Owl

2.3.1. – Analysis Area

The analysis area for spotted owl includes the project boundary plus a 1.2-mile buffer in order to include impacts to any unknown territory that may overlap treatment units. This area is 28,786 acres in total. This analysis area is defined by USFWS to address ESA cumulative effects in compliance with Section 7 of the Endangered Species Act. ESA cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area and considered in this biological opinion. Past federal actions are considered in the baseline condition. Future federal actions are not included in the analysis because future projects require separate consultation pursuant to section 7 of the Act. NEPA cumulative effects are conducted at a different analysis scale and can be found in section 2.4.

2.3.2 – No Action

If no action were taken, then no acres would be treated and there would be no direct effects to spotted owls. The existing condition would be maintained with little change in the short-term. In the long-term, in the absence of major disturbance events, the stand densities and canopy cover would increase. Many of the stands currently providing dispersal habitat would grow into low quality suitable habitat in the next 75 to 100 years. After 200 or more years, these stands would function similar to a thinned stand but may have a greater number of snags and down wood. The potential impacts to habitat from wildfire, insects, or disease are greater under the No Action Alternative. If a fire were to move through the area without reducing fuels, it would likely be more severe without treatments.

2.3.3 - Direct and Indirect Effects of Alternative 1

2.3.3.1 - Effects from Disturbance

The proposed project is expected to have disturbance from vegetative treatments, road maintenance, road reconstruction, temporary road construction, and fuels treatments. Specifically, the disruption will be from chainsaws and other heavy equipment, smoke, and helicopter use. Protocol surveys have been conducted throughout the project area and one spotted owl pair has been found

The project design criteria for treatments under the Proposed Action includes timing restrictions within the disturbance distance of a known spotted owl nest patch. All activities that require the use of heavy equipment or chainsaws that are between 65 yards and 0.25 miles from an owl nest patch between March 1 and July 15 ***may affect but are not likely to adversely affect*** spotted owl from disturbance. The project design criteria for helicopter use under the Proposed Action includes a timing restriction for no small helicopter use within 0.25 miles of a spotted owl nest patch, and no large helicopter use within 0.5 miles of a nest patch between March 1 and September 30, therefore, the use of helicopters ***may affect, but is not likely to adversely affect*** spotted owls due to disturbance.

2.3.3.2 - Effects from Habitat Modification

Vegetative treatments that impact suitable and dispersal habitat could impede or shift spotted owl movements during dispersal. Dispersal can be described as having two phases: transience and colonization (Courtney et al 2004, p. 5-13). Fragmented forest landscapes are more likely to be used by owls in the transience phase as a means to move rapidly between denser forest areas (Courtney et al 2004, USFWS 2012). Movements through mature and old growth forests occur during the colonization phase when birds are looking to become established in an area (Miller et al 1997, Courtney et al 2004). Transient dispersers use a wider variety of forest conditions for movements than colonizing dispersers, who require nesting/roosting/foraging habitats used by breeding birds (USFWS 2012). A reduction in the amount of suitable habitat reduces spotted owl abundance and nesting success (Bart 1995). The removal of suitable and dispersal habitat could reduce the ability of owls to move across the landscape as dispersal success is likely highest in mature and old growth forest stands where there is more adequate cover and food supply.

The proposed thinning would remove 610 acres of dispersal habitat and downgrade 1,234 acres of suitable habitat to dispersal (Table). Treatments that reduce the canopy cover to 40 percent will delay the attainment of late seral habitat compared to the no action alternative by as much as 75 to 100 years, depending on site conditions.

Table 2. Acres of Habitat Removed, Downgraded, or Maintained in Analysis Area for Alternative 1.

	Acres of Suitable	Acres of Dispersal	Acres of Capable
Total	12,882	3,035	4,273
Maintained	1,773	0	1,743
Downgraded	1,234	N/A	N/A
Removed	0	610	N/A

Some habitat would be treated but the function of that habitat would be maintained after treatments. Treatments that maintain suitable habitat on 1,773 acres impact these stands by reducing the canopy cover, and by reducing shrubs and other components that provide habitat for prey species. Although habitat within these units would be reduced in quality, it would still function as suitable habitat.

Treatments on 1,743 acres of habitat-capable (currently not habitat) are within plantations where tree growth has slowed. Thinning these stands would increase the rate at which larger trees would be recruited, and in turn, increasing the rate that dispersal and nesting habitat would be attained.

There are approximately 272 acres of treatments of the project area that are within Inventoried Roadless Areas and most of these are near the northern project boundary. These treatments are a subset of the total acres treated. Of these acres, 124 are currently suitable habitat and 33 are dispersal habitat. The remaining acres are not currently providing habitat for spotted owls. Treatments would downgrade 57 acres of suitable, maintain 67 acres of suitable, and remove 33 acres of dispersal habitat within Inventoried Roadless Areas.

There is currently enough suitable habitat in the planning area to support 7 potential owl territories. The effects of habitat changes to these territories are evaluated at three scales: a) nest patch within 300 meters of the nest site; b) core area, within 0.5 miles of the nest; and c) home range, within 1.2 miles of the nest. All the potential territories are currently above the home range threshold of 40 percent and above the core area threshold of 50 percent suitable habitat (Table 3).

Table 3. Suitable Habitat Before and After Treatment (Alternative 1)

	Core Area				Home Range			
Owl Site #	% Suitable Habitat Pre-treatment	Total Acres Pre-Treatment	% Suitable Habitat Post-treatment	Total Acres Post-treatment	% Suitable Habitat in Pre-treatment	Total Acres Pre-Treatment	% Suitable Habitat Post-treatment	Total Acres Post-Treatment
1	63	314	55	273	53	1536	50	1441
2	56	281	56	281	42	1208	41	1202
3	65	325	51	257	58	1687	40	1159
4	91	458	91	458	72	2096	66	1927
5	54	270	50	245	54	1575	41	1196
6	79	393	79	393	58	1687	54	1577
7	64	321	64	321	41	1182	40	1174

Treatment activities that downgrade suitable habitat on 1,234 acres ***may affect and are likely to adversely affect*** spotted owl. **Because treatments would not reduce habitat below threshold levels**, the removal of habitat within potential spotted owl territories is not expected to prevent owls from occupying these sites or from being able to successfully produce young. Proposed treatments are intended to reduce severity of future fires and promote long-term retention of the untreated suitable habitat.

Treatment activities that remove dispersal habitat on 610 acres are ***not likely to adversely affect*** spotted owl. The analysis area currently has approximately 3,035 acres of dispersal only habitat. When combined with the amount of suitable that will also provide for dispersal (12,882 acres), 55 percent of the analysis area is currently providing dispersal habitat. This amount will be reduced by 2 percent to 53 percent. Treatments would not prevent owls from being able to disperse between blocks of suitable habitat within the analysis area and to adjacent suitable habitat outside the analysis area. The location of treatment units and the prescriptions were designed to leave dispersal corridors between areas of suitable habitat.

2.3.3.3 – Effects from Fuels Treatments

Fuels reduction is expected to have both negative and beneficial effects to spotted owl prey species. Some small mammals may be directly impacted due to smoke or the inability to escape fire. Other small mammals may not be affected if they are mobile, protected within large downed coarse wood, or able to move away from the fire or mastication activities. However, there may be long-term benefits from a low intensity burn or mastication that is expected to increase plant vigor and prey species forage production.

Burning could also facilitate cavity creation. Another expected benefit of fuels treatment is the decrease in potential for a stand replacing event in the drier forests within the eastern portion of the action area. All fuels treatments would be within vegetation treatment units. Although fire may be allowed to back into untreated stands, the intent is to contain fuels treatments within previously treated areas and any habitat impacted by fire backing into adjacent stands would not change the function of the habitat. Because fuel treatment activities have the potential to temporarily impact prey species, these activities ***may affect and are likely to adversely affect*** spotted owl. While underburning and mastication may temporarily impact prey species, these treatments will not change the overall function of the habitat after treatment.

2.3.3.4 Effects of Temporary Road Construction

The proposed project would create new temporary roads. While some components of habitat would be impacted by the creation of these roads, the function of the habitat at the stand scale would remain the same. The width of temporary roads would be approximately 16 feet, and when multiplied by the length of the proposed roads equals 4.0 acres of roads in suitable habitat and 0.8 acres in dispersal. While these acres represent the footprint of impacts, the actual number of acres of habitat impacts would likely be much less since roads would be placed in areas requiring the least amount of tree removal which would be more cost effective. Therefore, the above numbers represent the maximum amount. Given that up to 4.0 acres of non-contiguous suitable habitat could be removed, temporary road construction ***may affect, and is likely to adversely affect spotted owl****. The removal of dispersal habitat for road construction ***may affect and is not likely to adversely affect spotted owl.***

*__NOTE:__ *Between project initiation and publication of the Final EA, project design criteria were added to mitigate potential impacts of temporary road construction in suitable habitat thus resulting in reduced potential impacts and a revised finding of* ***may affect and is not likely to adversely affect spotted owl.***

2.3.4 – Direct and Indirect Effects of Alternative 2

The direct and indirect effects of Alternative 2 are the same as those described in Alternative 1 with an exception to the amount of suitable habitat removed. Alternative 2 would remove 278 acres of suitable habitat. The removal of suitable habitat, rather than downgrading it to dispersal, would increase the time in which late successional characteristics would be attained on these acres by as much as 75 to 100 years compared to Alternative 1. All core areas and home range percentages would be the same as those analyzed under Alternative 1. All effects determinations for Alternative 2 are the same as Alternative 1.

2.4 – Cumulative Effects of Action Alternatives

The NEPA cumulative effects analysis area for northern spotted owl was completed within the White River Watershed. Some portions of the watershed extend beyond Forest Service lands are not managed for northern spotted owls and therefore are not considered habitat for this analysis. Past timber harvest and modification of habitat by forest fires on the eastside of the Mt. Hood National Forest and adjacent lands under other ownership were considered in this cumulative effects' analysis for projects in the past, present, and foreseeable future that overlap the analysis area in time and space. Analysis at the watershed scale allows for a biologically meaningful analysis and supports management of migratory or dispersal corridors for northern spotted owls.

Previous federal actions for this analysis included past and ongoing timber harvests activities (see silviculture report for additional details) . Typical past regeneration timber harvesting activities on federal land has reduced the amount of suitable habitat on the landscape and this habitat loss will remain on the landscape into the future until these stands grow over time and become suitable again which could be 100 or more years. Therefore, past timber harvests on federal lands that overlap with the Grasshopper analysis area would result in a cumulative impact to suitable habitat for both action alternatives. This cumulative impact specifically includes the direct loss of suitable habitat. However, the project would not be harvesting more acres of suitable then will be growing back into habitat. Thus, this impact is expected to be minor when compared to the overall amount of suitable habitat available to the northern spotted owl. Additionally, private lands are not expected to provide suitable habitat in the long-term as they are not managed for spotted owl.

Also included in the analysis was the effects of the 2020 White River Fire. This fire was a mixed-severity mosaic fire, occurred on the east side of the Mount Hood National Forest burning approximately 8,715-acres of National Forest Service (NFS) land. Within the NFS fire boundary, most of the suitable northern spotted owl nesting, roosting, foraging habitat survived with a loss of ~490-acres (2,708 pre-fire to 2,218 post fire). As a result of this fire, there will be a salvage project to treat ~250-acres of the impacted area in areas of moderate-to-high burn severity (>50%). The treated acres are covered under the existing 2017 NLAA Salvage Programmatic; no green trees that survived are expected to be removed. Reforestation efforts are planned to occur within portions of the burned area within the next 4-years. In addition, burned trees may be removed along roads within the fire boundary area. The Forest would also continue to manage the road and trail system for public safety which includes the felling of hazard trees. Even with accounting for these projects, the snag and down wood levels would remain relatively unchanged when considered at the watershed scale post-fire. Therefore, these activities (salvage and danger/hazard tree management) when combined with the anticipated impacts from this project are not expected to cumulatively impact nesting, roosting, or foraging habitat for the northern spotted owl. For more information about snags and down wood, see section 14.0.

Regarding dispersal habitat for the northern spotted owl, there could be some cumulative effects when combined with past timber harvest. The cumulative effects to dispersal habitat, however, would be minor and not prevent northern spotted owls from dispersing throughout the analysis area. Owls would continue to be able to disperse north and west across the Forest in alignment with the best quality habitat. Forest Service land to the southeast of the project is all within the Rocky burn area and not providing dispersal habitat. Private lands beyond the forest boundary are not managed for northern spotted owls. Thus, there would be no cumulative impacts to dispersal habitat in these locations.

2.5 - Consistency with Management Direction

2.5.1 - Recovery Actions 10 and 32

The proposed project is consistent with the Northwest Forest Plan and with the Revised Northern Spotted Owl Recovery Plan (USFWS 2011).

- *Recovery Action 10*: Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl populations.
  - The proposed project maintains spotted owl sites and the highest quality habitat within the planning area.
- *Recovery Action 32*: Because spotted owl recovery requires well distributed, older and more structurally complex multi-layered conifer forests on Federal and non-federal lands across its range, land managers should work with the Service to maintain and restore such habitat while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees.
  - High quality, Recovery Action 32 stands would be maintained with suitable and dispersal between these stands for habitat connectivity.

2.5.2 – Forest Plan Standards and Guidelines

The Proposed Action is consistent with the following Standards and Guidelines:

FW -170, 171: The Forest shall cooperate with implementation of interagency species recovery efforts for threatened and endangered species.

FW – 174: Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act.

FW – 175: Habitat for threatened, endangered and sensitive plants and animals shall be protected and/or improved.

FW – 176: Biological Evaluations shall be prepared for all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened or sensitive species.

2.6 - Other Agencies and Individuals Consulted

The proposed action was consulted on under the formal programmatic: Biological Opinion on Mt. Hood National Forest Timber Harvest and Routine Activities (USFWS 20, Ref # 01EOFW00-2020-F-0169).

3.0 – Northern Spotted Owl Critical Habitat

Both action alternatives are likely to adversely affect critical habitat by impacts to nesting, roosting and foraging habitat.

3.1 Analysis Assumptions and Methodology

The Final Critical Habitat (CH) Rule has a section entitled "Determining Whether an Action is Likely to Adversely Affect CH" (77 FR 71939). For this analysis the stand scale was utilized to assess effects for all four physical and biological features, or PBFs, that characterize critical habitat for the spotted owl. This scale of analysis is consistent with the current method recommended by the Willamette Province Level 1 Team for addressing effects to CH for consultation.

PBF 1 is the forest types that support spotted owls. This criterion was used to identify CH affected by the Proposed Action. PBFs 2, 3, and 4 (nesting/roosting, foraging, and dispersal habitat) were specifically considered with respect to each action alternative to determine if they were removed, reduced, maintained or enhanced at a stand level. The analysis of impacts has both a temporal scale (would the actions delay or accelerate the development of the PBFs in the stand following treatment) and a qualitative scale (would the life history needs of the spotted owl be better or worse with respect to the PBFs as a result of the treatment).

In addition to the above scales, the effects to the PBFs are evaluated at the scales of the CH subunit, CH unit, and the range of the spotted owl. However, if proposed activities do not have significant effects at a smaller scale, they would not have significant effects at increasingly larger scales and would therefore not be analyzed at the larger scale. For example, if proposed activities maintain the PBFs in a manner that meets the life history needs of the spotted owl at the stand scale, then it would not have significant adverse impacts at the subunit scale.

3.2 - Analysis of Alternatives for Spotted Owl Critical Habitat

3.2.1 - Existing Condition

3.2.1.1 - Legal Status

On December 4, 2012, the revised final rule for spotted owl critical habitat (CH) was published (USFWS 2012) and became effective on January 3rd, 2013. The revised CH currently includes approximately 9,577,969 acres in 11 units and 60 subunits in California, Oregon, and Washington.

3.2.1.2 - Conservation Role of Critical Habitat

The role of spotted owl critical habitat is:

- To ensure sufficient habitat to support stable, healthy populations of spotted owls across the range and within each of the 11 recovery units,

- To ensure distribution of northern spotted owl habitat across the range of habitat conditions used by the species, and
- Incorporate uncertainty, including potential effects of barred owls, climate change and wildfire-disturbance risk.

Critical habitat protections are also meant to work in concert with other recovery actions such as barred owl management (USFWS 2012, p. 71879). Recovery actions include:

1. Conserve the older growth, high quality and occupied forest habitat as necessary to meet recovery goals. This includes conserving old growth trees and forests on Federal lands and undertake appropriate restoration treatment in the threatened forest types.
2. Implement science-based, active vegetation management to restore forest health, especially in drier forests in the eastern and southern portions of the spotted owl's range. This includes managing Northwest Forest Plan (NWFP) forests as dynamic ecosystems that conserve all stages of forest development (e.g., old growth and early seral), and where tradeoffs between short-term and long-term risks are better balanced. The NWFP should be recognized as an integrated conservation strategy that contributes to all components of sustainability across Federal lands.
3. Encourage landscape-level planning and vegetation management that allow historical ecological processes, such as characteristic fire regimes and natural forest succession, to occur on these landscapes throughout the range of the spotted owl. This approach has the best chance of resulting in forests that are resilient to future changes that may arise due to climate change (USFWS 2012, p. 71881).

3.2.1.3 - Physical and Biological Features

Past designations of critical habitat have used the terms "primary constituent elements" (PCEs), "physical and biological features" (PBFs) or "essential features" to characterize the key components of critical habitat that provide for the conservation of the listed species. The new critical habitat regulations (USFWS and NMFS 2016) discontinue use of the terms "PCEs" or "essential features" and rely exclusively on use of the term PBFs for that purpose because that term is contained in the statute. To be consistent with that shift in terminology and in recognition that the terms PBFs, PCEs, and essential habit features are synonymous in meaning, we are only referring to PBFs herein. Although the spotted owl critical habitat designation defined PCEs, they will be referred to as PBFs in this document.

PBFs are described in the CH rule as the specific elements that comprise the physical or biological features needed for the conservation of the spotted owl. These features are the forested areas that are used or likely to be used by the spotted owl for nesting, roosting, foraging, or dispersing (USFWS 2012, p. 71904). The PBFs are the specific characteristics that make habitat areas suitable for nesting, roosting, foraging, and dispersal (USFWS 2012, pp. 71906-71908). The PBFs include:

1. Forest types that support the spotted owl across its geographic range. This PBF is essential to the conservation of the species because it provides the biotic communities that are known to be necessary for the spotted owl.

    a. Includes - Sitka spruce, western hemlock, mixed conifer, mixed evergreen, grand fir, Pacific silver fir, Douglas-fir, white fir, Shasta red fir, redwood/Douglas-fir, and the moist end of ponderosa pine.
    b. Coniferous zones at elevations up to 6000'.
    c. This PBF must be in concert with at least one other PBF to be critical habitat.
2. Habitat for nesting and roosting. Nesting habitat is essential to provide structural features for nesting, protection from adverse weather conditions, and cover to reduce predation risks. Roosting habitat is essential to provide for thermoregulation, shelter, and cover to reduce predation risk while resting or foraging.
    a. These habitats must provide:
        i. Sufficient foraging habitat to meet home range needs of territorial pairs throughout the year.
        ii. Nesting and roosting habitat (see definition above)
3. Foraging habitat essential to provide a food supply for survival and reproduction.
    a. Varies widely across the range in accordance with ecological conditions and disturbance regimes that influence vegetation structure and prey species distributions
    b. East Cascades foraging habitat
        i. Stands of nesting or roosting habitat
        ii. Stands of Douglas-fir or white fir/Douglas-fir mix
        iii. Mean tree size >16.5" dbh
        iv. Increased density of large trees (>26" dbh) and increased basal area
        v. Large accumulations of fallen trees and other woody debris
        vi. Sufficient space below canopy to fly
4. Habitat to support the transience and colonization phases of dispersal.
    a. Would optimally be composed of nesting, roosting or foraging habitat but may also be composed of other forest types that occur between larger blocks of nesting, roosting, and foraging habitat
        i. Where nesting, roosting, and foraging habitat is insufficient to support dispersal, dispersal habitat may be provided by:
            1. Habitat supporting the transience phase of dispersal
                a. Stands with adequate tree size and canopy cover to provide protection from avian predators and minimal foraging opportunities
                b. May include but is not limited to trees at least 11" dbh and a minimum of 40% canopy cover AND
                c. Younger and less diverse forest stands than foraging habitat like even-aged, pole-sized stands if they contain some roosting structures and foraging habitat to allow for temporary resting and feeding during the transience phase
            2. Habitat supporting the colonization phase of dispersal
                a. Equivalent to nesting, roosting, and foraging habitat but may be smaller in area than that needed to support nesting pairs

3.2.1.4 - Critical Habitat in the Action Area

Of the 20,024 acres of critical habitat in the analysis area, approximately 2,428 acres are providing only dispersal habitat (PBF 4) and 10,037 acres are providing suitable habitat for spotted owls (PBF 2, 3 and 4). The remaining 4,273 acres are considered non-habitat and are mostly providing PBF 1. These PBFs in the action area are functioning at a landscape scale and could support up to 7 territories.

3.2.1.5 - Subunit ECN 7

The Proposed Action is within the in East Cascades North, subunit ECN 7. Of the 139,983 acres in this subunit, approximately 139,865 are located on the Mt Hood NF. This subunit is located in Wasco and Hood River Counties on the east side of the Cascades with a small portion in Clackamas County on the west side of the Cascades. There are approximately 4,428 acres of critical habitat in treatment units.

There are approximately 58,397 acres of suitable habitat within ENC 7. Based on the amount of habitat and the average home range size for this Province, this subunit could potentially support up to 48 territories. Of these territories, 7 rely on habitat within the analysis area.

Special management considerations or protections are required in this subunit to address threats from current and past timber harvest, removal or modification of habitat by forest fires and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south and east-west connectivity between other subunits and critical habitat units.

3.2.1.6 - Special Management Considerations

Special management considerations for primary constituent elements are from the Final Critical Habitat Rule (USFWS 2012, p. 71909-71910). The following is a summary of the special management considerations for ECN 7. These management considerations will be addressed in the effects section of this document:

1. Conserve older stands that contain the conditions to support northern spotted owl occupancy or high value northern spotted owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp.III43, III-67). On Federal lands this recommendation applies to all land use allocations;
2. Emphasize vegetation management treatments outside of northern spotted owl territories or highly suitable habitat;
3. Design and implement restoration treatments at the landscape level;
4. Retain and restore key structural components, including large and old trees, large snags, and downed logs;
5. Retain and restore heterogeneity within stands;
6. Retain and restore heterogeneity among stands;
7. Manage roads to address fire risk; and

8. Consider vegetation management objectives when managing wildfires, where appropriate.

3.3 - Environmental Consequences Spotted Owl Critical Habitat

3.3.1 – Analysis Area

The analysis area for spotted owl critical habitat includes the Grasshopper project boundary and a 1.2-mile buffer which would include any territories that may overlap with treatments.

3.3.2– No Action

There would be no short-term effects to spotted owl critical habitat under this alternative. In the short-term, the units that are providing dispersal habitat (PBF 4) would continue to function as dispersal habitat and snag levels would remain essentially unchanged. In 20 to 30 years, the stands could start to differentiate to varying degrees and show an increase in the levels of small snags and small down wood. The quality of dispersal habitat would improve only slightly in some stands while improving more in others depending on site conditions. Stands that are functioning as suitable habitat (PBF 2) would continue to function as suitable habitat.

In the long-term, the stands that are currently considered non-habitat for spotted owls would likely become dispersal habitat (PBF 4). Some of the stands may eventually develop nesting habitat characteristics and become suitable spotted owl habitat (PBF 2). However, with no action, it could take as much as 60 to 150 years for these stands to develop into suitable habitat. The potential impacts to critical habitat from wildfire, insects, or disease are greater under the No Action Alternative. If a fire were to move through the area without reducing fuels, it would likely be more severe without treatments.

3.3.3 - Direct and Indirect Effects of Action Alternatives

Effects are the same for both action alternatives because there are no shelterwood treatments proposed in Critical Habitat for the Northern Spotted Owl. The Final CH Rule has a section entitled “Determining Whether an Action is Likely to Adversely Affect CH” (77 FR 71939). For this analysis the stand scale was utilized to assess effects for all four PBFs. This scale of analysis is consistent with the current method recommended by the Willamette Province Level 1 Team for addressing effects to CH for consultation.

PBF 1 is the forest types that support spotted owls. This criterion was used to identify CH affected by the Proposed Action. PBFs 2, 3, and 4 (nesting/roosting, foraging, and dispersal habitat) were specifically considered with respect to the Proposed Action to determine if they were removed, reduced, maintained or enhanced at a stand level. The analysis of impacts has both a temporal scale (would the actions delay or accelerate the development of the PBFs in the stand following treatment) and a qualitative scale (would the life history needs of the spotted owl be better or worse with respect to the PBFs as a result of the treatment).

In addition to the above scales, the effects to the PBFs are evaluated at the scales of the CH subunit, CH unit, and the range of the spotted owl. However, if proposed activities do not have significant effects at a smaller scale they would not have significant effects at increasingly larger scales and would therefore not be analyzed at the larger scale. For example, if the Proposed Action maintains the PBFs in a manner that meets the life history needs of the spotted owl at the stand scale, then it would not have significant adverse impacts at the subunit scale.

3.3.3.1 - Effects from Vegetation Treatments

Because there are no shelterwood treatments in spotted owl critical habitat, the effects from both Alternatives would be the same. The proposed thinning treatments would impact the PBFs at the stand scale. 610 acres of dispersal only habitat (PBF 4) would be removed in treatment units. These treatments would delay the development of PBFs on these acres in the stands following treatment and the life history needs would no longer be met in these units until the stands develop PBFs again in 25 to 75 years. Habitat for PBF 2 (nesting, roosting) and PBF 3 (foraging) would be downgraded to dispersal on 828 acres. These treatments would reduce the PBFs at the stand level and delay the development of these PBFs. The life history needs for dispersing owls would still be met in these units (Table 4).

Table 4. Acres of Critical Habitat Removed, Downgraded, or Maintained in Analysis Area for Alternative 1.

	Acres of Suitable	Acres of Dispersal	Acres of Capable
Total	10,037	2,428	4,273
Maintained	1,181	0	1,743
Downgraded	839	N/A	N/A
Removed	N/A	610	N/A

Some habitat would be treated but the function of that habitat would be maintained. This includes 1,181 acres of PBF 2 and PBF 3. Although the habitat within these units would be temporarily reduced in quality, these treatments would accelerate the development of the PBFs in these stands by reduced competition and an increase in the growth of trees and shrubs.

Treatments on 1,743 acres of non-habitat are within plantations where tree growth has slowed. Thinning these stands would increase the rate at which larger trees would be recruited, and in turn, increasing the rate that PBFs 2 through 4 would be attained.

Removal of 610 acres of PBF 4 on 610 acres ***may affect, and is not likely to adversely affect spotted owl critical habitat***. Because PBFs 2 and 3 would be downgraded on 1,181 acres, these treatment units would no longer provide or would reduce the quality of PBFs for dispersal, reproduction and survival of the spotted owl within these units, both Alternative 1 and Alternative 2 ***may affect, and is likely to adversely affect spotted owl critical habitat***.

3.3.3.2 - Effects of Fuels Treatments

Fuels reduction is expected to have both negative and beneficial effects to spotted owl foraging habitat (PBF 3). Treatments may impact vegetation structure and prey species distributions by reducing prey hiding cover in treatment units and/or moving prey into adjacent stands where the density may be higher than normal. However, there may be long-term benefits from a low intensity burn or mastication that is expected to increase plant vigor and prey species forage production.

Burning could also facilitate cavity creation and increase prey denning opportunities. Another expected benefit of fuels treatments is the decrease in potential for a stand replacement event in the drier forests within the eastern portion of the action area. While underburning and mastication may temporarily impact prey habitat, these treatments will not change the overall function of the habitat after treatment. Because fuel treatment activities have the potential to remove some components of PBF 3 in the short-term, these activities ***may affect and are likely to adversely affect spotted owl critical habitat***.

3.3.3.3 - Effects from Temporary Road Construction

The proposed project would create new temporary roads. While some components of habitat would be impacted by the creation of these roads, the function of the habitat at the stand scale would remain the same. The width of temporary roads would be approximately 16 feet, and when multiplied by the length of the proposed roads equals 3.3 acres of roads in suitable habitat and 0.8 acres in dispersal. While these acres represent the footprint of impacts, the actual number of acres of habitat impacts would likely be much less since roads would be placed in areas requiring the least amount of tree removal which would be more cost effective. Therefore, the above numbers represent the maximum amount. Given that up to 3.3 acres of PBF 2 could be removed, temporary road construction ***may affect, and is likely to adversely affect spotted owl critical habitat****. The removal of dispersal habitat for road construction ***may affect and is not likely to adversely affect spotted owl critical habitat.***

NOTE:** *Between project initiation and publication of the Final EA, project design criteria were added to mitigate potential impacts of temporary road construction in suitable habitat thus resulting in reduced potential impacts and a revised finding of* ***may affect and is not likely to adversely affect spotted owl critical habitat.

3.3.3.4 - Special Management Considerations for ECN-7

Eight special management considerations or protections were identified for the East Cascades Critical Habitat Unit ECN-7 in the Final Critical Habitat Rule.

1. Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp. III-43, III-67). On Federal lands, this recommendation applies to all land-use allocations.

- The proposed project maintains the highest quality habitat within spotted owl territories as described in Recovery Actions 10 and 32. Treatments will be located between patches of this habitat which will reduce the likelihood of losing the remaining habitat from wildfire, insects, or disease.

2. Emphasize vegetation management treatments outside of northern spotted owl territories or highly suitable habitat;

- The proposed project maintains the highest quality habitat within spotted owl territories as described above under management consideration #1. Treatments will be located between patches of this habitat which will reduce the likelihood of losing habitat from wildfire, insects, or disease.

3. Design and implement restoration treatments at the landscape level;

- The proposed project was designed adjacent to and in conjunction with other treatment areas such as the Rocky Restoration Project in order to achieve landscape-level treatments.

4. Retain and restore key structural components, including large and old trees, large snags, and downed logs;

- The proposed project will help to maintain key structural components by reducing fuels and preventing the loss of these components due to fire, insects, and disease. Additionally, the project design includes areas of "no treatment" to maintain these elements. Within treatment areas, the project would not remove the largest and oldest trees, would not remove downed logs, and would not cut snags unless required for safety.

5. Retain and restore heterogeneity within stands;

- The proposed project would retain and restore heterogeneity within stands through variable density thinning including skips and gaps. The gaps would open the canopy and allow for the growth of young trees which would create multiple age classes within the stand.

6. Retain and restore heterogeneity among stands;

- The proposed project would retain and restore heterogeneity among stands by having a mosaic of treated units adjacent to untreated areas.

7. Manage roads to address fire risk;

- The proposed project will maintain a road system that will accommodate fire suppression activities and will also close temporary roads to eliminate access and reduce human caused fires.

8. Consider vegetation management objectives when managing wildfires, where appropriate.

- The proposed project is specifically designed in order to be able to better manage a wildfire in the event one should start in or near the planning area.

3.4 – Cumulative Effects of Action Alternatives

Cumulative effects for Northern Spotted Owl critical habitat were analyzed at the Forest's East Zone, East Cascades North, Subunit-7 (ECN-7) scale. Management objectives for ECN-7 critical habitat are outlined within the Northern spotted owl critical habitat rule (USFWS 2012) and both include objectives for fuels management. The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effect's analysis: past timber harvest on federal land, upcoming or ongoing projects that remove or downgrade suitable habitat, modification of habitat by forest fires, and OHV trail construction and maintenance. Private lands are not CH and were therefore not considered in the cumulative effect's analysis.

Timber harvest on federal land and utility corridor maintenance have reduced the amount of suitable habitat (PBF 2) on the landscape and will continue to do so into the future. Utility corridors are not expected to provide suitable habitat as they are not managed for spotted owl CH. Timber harvest on federal land have reduced the amount of all 4 PBF's until these stands grow over time and become suitable habitat again.

In 2020 the White River Fire, a mixed-severity mosaic fire, occurred on the east side of the Mount Hood National Forest burning approximately 8,715-acres of National Forest Service (NFS) land. Within the NFS fire boundary, most of the suitable NSO nesting, roosting, foraging habitat survived with a loss of ~490-acres (2,708 pre-fire to 2,218 post fire). This acreage represents 1.4% of the total ECN-7 subunit (White River Fire BAER Report, 2020). As a result of this fire, there will be a salvage project to treat ~250-acres of the impacted area in areas of moderate-to-high burn severity (>50%). The treated acres are covered under the existing 2017 NLAA Salvage Programmatic; no green trees that survived are expected to be removed. Reforestation efforts are planned to occur within portions of the burned area within the next 4-years. In addition, burned trees may be removed along roads within the fire boundary area. The Forest would also continue to manage the road and trail system for public safety which includes the felling of hazard trees. Even with accounting for these projects, the snag and down wood levels would remain relatively unchanged when considered at the watershed scale post-fire. For more information about snags and down wood, see section 14.0.

In 2021 the Barlow Ranger district signed the South Five Mile Insect and Disease Project that includes downgrading 166 acres of PBF 3 (foraging habitat). Acres of suitable habitat treated were predominately in pine-oak and exist because of fire exclusion. These acres were covered under the existing LAA programmatic (USDI 2019). Similarly, the Polallie Cooper Hazardous Fuels Reduction project (2016) required a standalone consultation (Biological Opinion O1EOFWOO-2016-I-0385) and removed 2 acres of PBF 2 habitat and 29 acres of PBF 3 and downgraded 119 acres of PBF 2 habitat and 126 acres of PBF3 habitat. For both projects, district staff prioritized maintaining key suitable habitat by concentrating treatments outside of historic and current nest patches (RA-10 habitat), surveyed projects ahead of implementation, and maintained connectivity between RA-10 habitat therefore cumulative effects from these projects would be minimal.

The cumulative effects to dispersal habitat (PBF 4) would not prevent spotted owls from continuing to forage or disperse throughout the analysis area. The private land to the east is not providing for dispersal of spotted owl and is at the far eastern portion of the species range. Owls would be able to disperse north and west across the Forest. The Forest Service land directly South-East of the planning area is within the Rocky burn and is not currently providing dispersal habitat.

3.5 - Consistency with Management Direction

3.5.1 - Special Management Considerations for ECN-7

Eight special management considerations or protections were identified for the East Cascades Critical Habitat Unit ECN-7 in the Final Critical Habitat Rule. See 3.3.3.4 for how project elements are consistent with these.

3.6 - Other Agencies and Individuals Consulted

The proposed action was consulted on under the formal programmatic: Biological Opinion on Mt. Hood National Forest Timber Harvest and Routine Activities (USFWS 20, Ref # 01EOFW00-2020-F-0169).

4.0 – Gray Wolf

Both action alternatives would have the same effects on gray wolves and may affect but are not likely to adversely affect the species.

4.1 Analysis Assumptions and Methodology

A review of scientific literature, relevant to Forest Service managed lands, was conducted in order to make sound decisions about the potential impacts to wolves from management activities. Recommendations to reduce impacts to wolves were made based on meetings and communications with subject matter experts from partnering agencies (WDFW, ODFW, and FWS) who have experience with monitoring and managing wolf populations in northeast Oregon (USFS 2015).

The authors of this draft paper examined the best available information to evaluate the impacts of forest management on gray wolf range and population expansion on the Umatilla Forest. (USFS 2015) Because the management activities on both Forests are similar, it is assumed that this information would also apply to wolves that may occur on the Mt. Hood National Forest. This evaluation concluded that activities that took place outside of 1-mile from a den or rendezvous site would have no effect on gray wolf from disturbance.

4.2 - Analysis of Alternatives for Gray Wolf

4.2.1 - Existing Condition

Gray wolves (*Canis lupus*) were reintroduced in the mid-1990s in central Idaho and Yellowstone National Park and then dispersed naturally into Oregon. In 2008 the first wolf pack was confirmed in Oregon on the Umatilla National Forest by Oregon Department of Fish and Wildlife

(ODFW) biologists. In May 2001, the FWS delisted wolves in Idaho, Montana, parts of Oregon, Washington, and Utah. In December 2015 the ODFW removed the gray wolf from its endangered species list because the wolf had met the state's population criteria for delisting. On January 4, 2021, all gray wolves were removed from the federal threatened and endangered list, including the Oregon population west of Hwy 395. Following federal delisting, the gray wolf was moved to the Forest Service R6 Sensitive Species list. Then in February 2022, the gray wolf population west of Hwy 395 was restored to the endangered species list. The FWS is the lead management agency for wolves west of Hwy 395, including those that may be on the Forest. Since establishment was documented in 2008, Oregon's wolves expanded rapidly and in 2018 resident wolves occur within almost 19,000 square kilometers of the state. Most wolves occur in northeastern Oregon, and four areas of know wolf activity now occur in the western part of the state.

Gray wolves are considered habitat generalists. Wolves in Oregon primarily use forested habitat with seasonal shifts to more open habitats that reflect seasonal distributions of prey (ODFW 2019).

4.3 - Environmental Consequences Gray Wolf

4.3.1 – Analysis Area

The analysis area for gray wolves includes the planning area boundary and a one-mile buffer that would account for any territories that may overlap with project activities.

4.3.2 – No Action

There would be no increase in human activities in the area. Thinning activities that would increase forage for deer and elk would not take place, and therefore there would be no benefit to wolves.

4.3.3 - Direct and Indirect Effects of Action Alternatives

Both action alternatives would have the same effects on gray wolves. No dens or rendezvous sites have been detected within the project area. Project related activities would increase human presence during implementation and this may cause wolves to temporarily avoid the area.

Thinning activities would increase forage for deer and elk which are the primary prey species of gray wolves. While the proposed action may cause wolves to temporarily avoid the area during project implementation, project design criteria would limit disturbance within one mile of a den or rendezvous site. In addition, the proposed action could indirectly benefit the gray wolf by increasing the availability of prey within in the planning area, therefore, activities may affect but are not likely to adversely affect the species.

4.4 – Cumulative Effects of Action Alternatives

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effect's analysis: timber harvest on federal lands, road decommissioning and road closures, pre-commercial thinning, and recreational use.

The cumulative effects are similar to the effects of the Proposed Action and would have a combination of positive and negative impacts to gray wolf. Open habitat that would be created from timber harvest, pre-commercial thinning, and plantation thinning would increase the availability of prey within the analysis area. Road closures and decommissioning would benefit wolves by decreasing the amount of human disturbance. The increased human presence from human activities may cause wolves to temporarily avoid the area during implementation of projects and heavy recreational use may cause wolves to avoid areas altogether.

4.5 - Consistency with Management Direction

The Proposed Action is consistent with the following Land and Resource Management Plan Standards and Guidelines:

FW -170, 171: The Forest shall cooperate with implementation of interagency species recovery efforts for threatened and endangered species.

FW –174: Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act.

FW –175:Habitat for threatened, endangered and sensitive plants and animals shall be protected and/or improved.

FW –176: Biological Evaluations shall be prepared for all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened or sensitive species.

5.0 – White-headed Woodpecker

Both action alternatives would have the same effects on the white-headed woodpecker. Activities may impact individuals but would not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species.

5.1 Analysis Assumptions and Methodology

All Region 6 sensitive species within the project area must be analyzed in a Biological Evaluation, as required by the Forest Plan. Sensitive species with suitable habitat within the project area include white-headed woodpecker, fringed myotis, western bumblebee, and Johnson's hairstreak. Information on these species from the Interagency Special Status / Sensitive Species

Program as well as other research was reviewed and summarized to determine how these species use the project area and the impacts that this project would have on these species.

5.2 - Analysis of Alternatives for White-headed Woodpecker

5.2.1 - Existing Condition

White-headed woodpeckers are cavity nesting birds strongly associated with coniferous forests dominated by pines. They are residents from south-central British Columbia, north-central Washington and northern and western Idaho south through eastern and southwest Oregon to southern California and west-central Nevada (Garrett et al. 1996). White-headed woodpeckers range from very rare in British Columbia to common further south in their range in California.

In Oregon and Washington, white-headed woodpeckers occur primarily in open ponderosa pine (*Pinus ponderosa*) or dry mixed-conifer forests dominated by ponderosa pine (Bull et al. 1986, Dixon 1995, Frenzel 2004, Buchanan et al. 2003). They have also been found in moderate densities in dry mixed conifer forests which were dominated by firs but contained both ponderosa pine and sugar pine.

Nesting usually occurs in open ponderosa pine forests with higher numbers of large trees and snags than the surrounding forest (Buchanan et al. 2003, Frenzel 2004) and they typically excavate nest cavities in large, moderately decayed, ponderosa pine snags (Buchanan et al. 2003, Dixon 1995, Frenzel 2004). White-headed woodpeckers forage in ponderosa pine trees in stands with higher canopy closure than nest stands (Dixon 1995, Fredrick and Moore 1991).

Landscapes with a mosaic of open habitat for nesting in close proximity to closed-canopy forests which provide foraging habitat seem to be important for white-headed woodpeckers (Wightman et al. 2010, Latif et al. 2012). Closed-canopied forests with cone-producing pine trees and insects may be important for year-round foraging, particularly outside the breeding season (Garrett et al. 1996).

Nest trees of White-headed woodpeckers are typically large, moderately decayed, ponderosa pine snags. In Oregon and Washington, 6 separate studies indicate average nest tree dbh of 15 to 40 inches dbh. Wightman et al. (2010) found nest survival rates were higher in burned areas than nest success reported for unburned forests in central Oregon. Wightman et al. (2010) also found white-headed woodpeckers selected for nest snags >20 inches dbh from unburned or low severity burned areas that contained live trees.

A tolerance level indicates the percentage of individuals that use a particular habitat component. For white-headed woodpeckers, 80 percent of this species uses habitat with 3.8 large snags per acre and 4.3 small snags per acre. In the planning area, 50 percent of the white-headed woodpeckers would use the available small snags (2.0 per acre) and 30 percent would use the available large snags (< 1 per acre). The current snags per acre are shown in Table 8 under the DecAID analysis.

Table 5 displays summarized data in the 30, 50, and 80 percent tolerance levels for the white-headed woodpecker in eastside mixed conifer. The planning area currently averages small snags at the 50 percent tolerance level and 30 percent tolerance level for large snags.

Table 5. Tolerance Levels for Snags in Eastside Mixed Conifer for White-headed Woodpecker*

Wildlife Habitat Type Eastside Mixed Conifer	30% Tolerance Snags per Acre	50% Tolerance Snags per Acre	80% Tolerance Snags per Acre
Small Trees ≥ 10”	0.3	1.9	4.3
Large Trees ≥ 20”	0.0	1.5	3.8

*From DecAID Table EMC_S/L.sp-22

Caution should be exercised when using the white-headed woodpecker data from DecAID, which are from a population where adult mortality is outpacing recruitment (Frenzel 2004). The density of snags may or may not be part of the issue with this species since white-headed-woodpeckers do not rely on snags for foraging and thus may be able to use areas with lower snag densities than other woodpecker species that do forage extensively on snags.

The golden-mantled ground squirrel and yellow pine chipmunk are known nest predators. Golden-mantled ground squirrels are positively associated with down wood volume and yellow pine chipmunks are positively associated with shrub cover (Wightman et al. 2010).

Hollenbeck et al. (2011) developed a habitat suitability index model for unburned forests of central and southeastern Oregon. Based on this model, there are 2,887 acres of highly suitable habitat, 5,357 acres of marginally suitable habitat, and 1,010,461 acres of non-habitat for white-headed woodpecker on the Forest. Based on the average home range size of 793 acres in fragmented habitat, the eastern portion of the project area is currently in marginal habitat and may provide enough habitat for 8 to 9 pairs of white-headed woodpeckers.

5.2.1.1 - Threats

Habitat loss is the primary threat to White-headed woodpeckers. Logging practices that target large ponderosa pine, snag removal, and fragment forests contribute to declines in habitat, especially in the northern half of the species range (Garrett et al. 1996). Fire suppression has led to changes in forest tree species composition and structure primarily due to the development of true fir (*Abies spp.*) in the understory. These changes have altered fire regimes, and as a result ponderosa pine forests are no longer maintained by frequent natural fire, which leaves the forests susceptible to stand-replacing fires.

Wightman et al. (2010) and Frenzel (2004) found that predation by small mammals was the most common cause of nest failure of White-headed woodpeckers. Increasing shrub cover may lead to increasing populations of small mammals. Nest success of White-headed woodpeckers is higher at nest sites with lower shrub cover (Frenzel 2004, Kozma and Kroll 2012).

5.2.1.2 - Landbird Conservation Strategy

Oregon-Washington Partners in Flight have developed conservation strategies for the east-slope of the Cascades and the northern Rocky Mountains of Oregon and Washington (Altman 2000).

The White-headed woodpecker is a focal species for ponderosa pine or dry habitats in both ecoregions. Strategy objectives include no net loss of this habitat type, retention of all ponderosa pine trees and snags >20 inches dbh, use of natural disturbance regimes such as fire, and restoration of at least 30 percent of the potential late-successional forest by 2025.

Management considerations should focus on white-headed woodpecker habitats on public lands which are primarily, low-elevation, dry forests with a component of large ponderosa pine (Altman 2000). In Oregon and Washington, the vast majority of habitat for this species is on National Forest System lands. Private, State, and City lands are not managed for woodpecker habitat, therefore, it is assumed that any habitat currently present in those areas, would not be maintained for the long term. Management considerations should include spatial heterogeneity at the landscape scale that mimics historical conditions.

5.3 - Environmental Consequences White-headed Woodpecker

5.3.1 – Analysis Area

The analysis area for white-headed woodpeckers includes the eastern portion of the planning area.

5.3.2 – No Action

Under the No Action alternative, open large ponderosa pine habitat would remain limited, which is important nesting habitat for this species. In the short-term, the analysis area would continue to provide snags at the 30 and 50 percent tolerance levels for large and small snags for white-headed woodpeckers. Snags would be recruited more quickly under this alternative as shown in Tables 8, 9, and 10. The 80 percent tolerance level for large snags (3.5 snags per acre) would be achieved within 80 years under this alternative and within 10 years for small snag (4.3 snags per acre).

High densities of trees and shrubs in the understories would continue to alter what once provided open habitats when fire was more prevalent on the landscape. White-headed woodpeckers prefer to nest lower on large diameter trees and favor open conditions to be able to escape predators and defend their young, and this habitat would not be provided under current conditions. The number of white-headed woodpeckers in the analysis area would continue to be lower than historic levels.

5.3.3 - Direct and Indirect Effects of Action Alternatives

Vegetative and fuel treatments on 1,770 acres in the eastern portion of the planning area in ponderosa pine and oak habitat would benefit white-headed woodpeckers by opening the stand and reducing the amount of understory and shrubs on the forest floor. Areas of no treatment adjacent to treated stands would provide a mosaic of open habitat for nesting in close proximity to closed-canopy forests which provide foraging habitat for this species. Fuels treatments that reduce the number of shrubs would also reduce habitat for golden-mantled ground squirrels and yellow pine chipmunk, which are known nest predators of white-headed woodpeckers. The reduction of predator habitat would increase the survival rate for white-headed woodpecker young.

In the short-term, the analysis area would continue to provide snags at the 30 and 50 percent tolerance levels for large and small snags for white-headed woodpeckers. Over the long-term, snags would be recruited more slowly when compared to the No Action alternative as shown in tables 8, 9, and 10. The 80 percent tolerance level for large snags (3.8 snags per acre) would not be achieved within 100 years under this alternative but would be achieved for small snags (4.3 snags per acre) within 50 years.

The number of white-headed woodpeckers in the analysis area would be expected to increase over time under the Proposed Action as habitat conditions for this species improve. The analysis area currently provides marginal habitat for 8 to 9 pairs of white-headed woodpeckers. Under the Proposed Action, some treatment areas in ponderosa pine would go from marginally suitable to highly suitable and the number of nesting pairs that could be supported would increase to 11 to 12 nesting pairs. Because habitat would be improved for white-headed woodpeckers, proposed activities may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Large snags and large down wood would not be impacted by the Proposed Action. While snags within this habitat type are below historic levels at the watershed scale (see DecAID analysis), white-headed woodpeckers do not appear to rely on these high-density patches and may rely more on the presence of large ponderosa pine.

5.4 – Cumulative Effects of Action Alternatives

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effect's analysis: timber harvest on federal land, pre-commercial thinning, and fire suppression. Thinning projects that treated overstocked stands have benefited the white-headed woodpecker by increasing the potential for larger trees on the landscape which provide large snags for nesting habitat. Past timber harvest on federal land that targeted large ponderosa pine has contributed to declines in habitat. Fire suppression has led to changes in forest tree species composition and structure with the development of true fir in the understory and an increase in shrubs which has changed the habitat from highly suitable to marginally suitable or non-habitat for white-headed woodpeckers.

5.5 - Consistency with Management Direction

The Landbird Conservation Strategy objectives include no net loss of suitable habitat and retention of all ponderosa pine trees and snags greater than 20 inches DBH. While some ponderosa pines larger than 20 inches DBH may be cut, they would be removed in areas where there are larger pines and habitat would be improved. No snags would be cut unless they pose a safety risk. For details about effects to snags and down wood see section 14.0 in this report.

6.0 – Fringed Myotis

Both action alternatives would have the same effects on the fringed myotis. Activities may impact individuals but would not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species.

6.1 Analysis Assumptions and Methodology

All Region 6 sensitive species within the project area must be analyzed in a Biological Evaluation, as required by the Forest Plan. Sensitive species with suitable habitat within the project area includes white-headed woodpecker, fringed myotis, western bumblebee, and Johnson's hair-streak. Information on these species from the Interagency Special Status / Sensitive Species Program as well as other research was reviewed and summarized to determine how these species use the project area and the impacts that this project would have on these species.

6.2 - Analysis of Alternatives for Fringed Myotis

6.2.1 - Existing Condition

6.2.1.1 – Distribution and Habitat

The fringed myotis is predominantly found in western North America, occurring from southern British Columbia, Canada, south through southern Mexico (O'Farrell and Studier 1980, Hall 1981, Rasheed et al. 1995). It occurs west to the Pacific coast and east to the Rocky Mountains.

Fringed myotis appear to use a fairly broad range of habitats (Cryan 1997). The most common habitats in which this species has been found are oak, pinyon, and juniper woodlands or ponderosa pine and Douglas fir forest at middle elevations (O'Farrell and Studier 1980, Cockrum et al. 1996, Ellison et al. 2004). This species is mostly found in dry habitats where open areas are interspersed with mature forests, creating complex mosaics with ample edges and abundant snags. This can take a variety of forms, where open areas are likely represented by short and mixed-grass prairie, sagebrush and other xeric shrublands and forests, including a variety of low and mid-elevation pine and mixed-conifer types. Ideal habitat includes nearby water sources and suitable cliff or snag roost habitat.

6.2.1.2 – Roost Sites

Suitable roosting sites are an important habitat component, the availability of which can determine population sizes and distributions (Humphrey 1975, Kunz 1982). Throughout their range, fringed myotis use caves, mines, and buildings as maternity colonies, solitary day and night roosts, and hibernacula (O'Farrell and Studier 1980, Perkins et al. 1990, Ellison et al. 2004). They also use bridges and rock crevices as solitary day and night roosts (Brown and Berry 1998, Herder 1998), and they may hibernate in crevices (Christy and West 1993). They regularly roost underneath bark and inside hollows of tree snags, particularly ponderosa pine and

Douglas-fir in medium stages of decay. This may represent the primary daytime roosting structure in some areas.

Studies suggest that the best habitat model for predicting bat presence in an area contain only these variables: the number of snags ≥ 30 cm DBH combined and percent canopy cover, where increasing numbers of snags and decreasing canopy cover increased the probability of bat occurrence (Weller 2000). Abundance of large snags and low canopy cover allows more thermal heating of roosts, easier flight access to roosts, and the ability to readily switch roosts, for predator avoidance, or to find more suitable microclimates (Lewis 1995, Weller 2000). In such circumstances, fringed myotis have been known to switch roosts several times a week (e.g., every 1.72 ± 0.23 days; Weller and Zabel 1999). Roost snags also tended to be taller relative to the surrounding canopy than random snags, had a higher diameter at breast height than random snags, and were nearer to stream channels than randomly selected points. Since *M. thysanodes* tended to roost under loose bark, most roost snags were in decay classes 2 to 4 (Thomas et al. 1979). Roost snags were Douglas-fir, ponderosa pine, and sugar pine used in approximate proportion to their availability, and the largest snags in the study area were predominantly Douglas-fir.

6.2.1.3 – Foraging

Some studies have suggested that fringed myotis consume mostly beetles (Rainey and Pierson 1996), but others in the Pacific Northwest have suggested mainly moths (Whitaker et al. 1977). Anecdotal information supports a diet largely of beetles and moths (Turner and Jones 1968, Arizona Game and Fish Department 1997). Early studies (Black 1974, Banfield 1975) speculate that fringed myotis hunt insects on the wing, usually over vegetative canopy from sunset until midnight. However, their wing morphology is indicative of dexterous, low-speed flight suggesting that these bats may glean insects from vegetation (O'Farrell and Studier 1980), probably near the top of the forest canopy (Miner et al. 1996). Given their wing morphology, echolocation patterns, and purported gleaning mode of foraging, it is likely that they forage in interior forest and/or along forest edges.

6.3 – Environmental Consequences Fringed Myotis

6.3.1 – Analysis Area

The analysis area for the fringed myotis includes the eastern half of the planning area.

6.3.2 – No Action

Under the No Action alternative, fringed myotis roosting and foraging habitat would not be impacted. There are no hibernacula or mines in the analysis area. Canopy closures would remain unchanged. Since fringed myotis utilize open canopies for foraging, this alternative would provide less foraging habitat for the species in the short-term than the action alternatives. The No Action alternative would have slightly more snags for roosting since none would be cut for safety concerns.

6.3.3 - Direct and Indirect Effects of the Action Alternatives

Proposed activities would have no impact on hibernacula or mines since these habitats are not in the project area. Some roost trees would be removed; however, large snags would not be cut in the project area unless they pose a health and safety risk. Vegetative and fuel treatments on 1,770 acres in the eastern portion of the planning area would benefit fringed myotis by opening the stand and reducing the amount of understory which would improve foraging habitat. Areas of no treatment adjacent to treated stands would create a mosaic of open habitat that would also improve foraging habitat for this species. Thinning would reduce the number of large snags in the analysis area over the long-term from 5 snags over 25 inches DBH in 100 years to 3 snags over 25 inches DBH in the same time frame (see DecAID analysis). Large snags in the adjacent untreated stands would continue to be provided for roosting. For details about effects to snags and down wood see section 14.0 in this report. Because roosting snags would only be removed for safety concerns and foraging habitat would be improved, proposed activities may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

6.3.5 – Cumulative Effects

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effect's analysis: timber harvest on federal land, pre-commercial thinning, hazard tree removal, and campsite operations and maintenance. There are no known mines or caves that would provide for hibernacula, therefore there are no cumulative effects to these structures. Thinning projects that treated overstocked stands have benefited the fringed myotis by increasing the potential for larger trees on the landscape and opening the canopy which provides foraging. Past timber harvest on federal land that targeted large ponderosa pine has reduced large ponderosa pine which would have become the large snags needed for roosting habitat. Hazard tree removal and campsite operations and maintenance have removed and will continue to remove large snags that provide important roosting habitat.

7.0 – Western Bumblebee and Suckley Cuckoo Bumblebee

Both action alternatives would have the same effects on western bumblebees and the associated parasitic bee species, the Suckley cuckoo bumblebee. Activities may impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species

7.1 Analysis Assumptions and Methodology

All Region 6 sensitive species within the project area must be analyzed, as required by the Forest Plan. Sensitive species with suitable habitat within the project area include the white-headed woodpecker, fringed myotis, western bumblebee, and Johnson's hair-streak. Information on these species from the Interagency Special Status / Sensitive Species Program as well as other research was reviewed and summarized to determine how these species use the project area and the impacts that this project would have on these species.

7.2 - Analysis of the Alternatives for the Western Bumblebee and Suckley's Cuckoo Bumblebee

7.2.1 - Existing Condition

7.2.1.1 Life History

The western bumblebee was widespread and common throughout the western United States and western Canada before 1998 (Xerces Society 2009). Since 1998, populations of this bumblebee have declined drastically throughout parts of its former range. In Alaska, east of the Cascades and in the Canadian and U.S. Rocky Mountains, viable populations still exist. Populations of the western bumblebee in central California, Oregon, Washington and southern British Columbia have mostly disappeared. It is difficult to accurately assess the magnitude of these declines since most of this bee's historic range has not been sampled systematically.

Cuckoo bumblebees do not live in social groups, but instead use the nests and their tending workers of social western bumblebee species to successfully reproduce. Suckley's Cuckoo Bumblebee are dependent upon the presence of the western bumblebee.

According to Goulsen (2003a), bumblebee colonies are annual. In the late winter or early spring, the queen emerges from hibernation and then selects a nest site, which is often a pre-existing hole, such as an abandoned rodent hole. She then supplies the nest with pollen as well as nectar.

Bumblebees visit a range of different plant species and are important generalist pollinators of a wide variety of flowering plants and crops (Goulsen 2003a;). Although bumblebees do not depend on a single type of flower, some plants rely solely on bumblebees for pollination. In addition, native bees, such as bumblebees are adapted to local conditions (Goulsen 2003b).

7.2.1.2 – Threats

There are several threats which face bumblebees and are leading to their decline. The following threats and conservation considerations are from a status review, co-authored by Robbin Thorp, Elaine Evans, and Scott Hoffman (Thorp et al. 2008). Agriculture and urban development alter landscapes and habitat required by bumblebees while grazing livestock poses a threat since the animals remove flowering food sources, disturb nest sites and alter the vegetation community. Foraging bumble bees are directly threatened by insecticide applications when used in agricultural settings. Massive bumble bee kills have occurred as a result of insecticide application on Forest Service managed public lands intended for the control of spruce budworm. Bumble bees can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides. When exotic plants invade and dominate native grasslands, they may threaten bumble bees by competing with the native nectar and pollen plants relied upon by bumble bees.

7.2.1.3 Surveys on the Forest

Surveys for Western bumblebees were conducted by the Xerces Society on the Forest in 2013 and by Forest Service biologists in 2015. A total of 34 locations were surveyed in 2013 and Western bumble bees were located at 8 of these locations. In 2015, 24 locations were surveyed, and bumble bees were detected at 8 locations, 6 of which were previously unreported locations for this species. In 2016, 23 locations were surveyed, and Western bumblebees were documented at 6 of these sites. Five of the six sites were new locations for this species. None of the detections were in the Grasshopper planning area but suitable habitat does exist in the higher elevations.

7.3 - Environmental Consequences Western Bumblebee and Suckley's Cuckoo Bumblebee

7.3.1 – Analysis Area

The analysis area for Western bumblebee and Suckley Cuckoo Bumblebee includes the Grasshopper planning area.

7.3.2 – No Action

Under the No Action alternative, there would be no direct impacts to bumble bee nesting, foraging, and over-wintering habitat. There would be fewer flowering plants for foraging under this alternative in the long-term since canopies would remain closed and less sunlight would reach the forest floor which is required for the growth of most nectar plants.

7.3.3 - Direct and Indirect Effects of Action Alternatives

Proposed activities may temporarily impact flowering plants during road maintenance, road reconstruction, and timber harvest activities. Reducing this food source would reduce the ability of foraging bees to find nectar at these sites which is a required food source for young bees. It is expected that these shrubs would regenerate within a few years and that the bumblebees would have other nectar plants available within the untreated open portions of the project area.

Activities may temporarily impact nest sites if these nests are located within abandoned bird nests or other structures above ground. Tree harvest and road maintenance and reconstruction activities could reduce the number of nests available in the short-term and therefore reduce the number of bumblebees that this area could support. Nest sites would increase within a few years after treatment. The temporary reduction in flowering shrubs and nesting sites may impact individuals but will not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species.

Because bumblebees can forage for nectar on a variety of flowering plants, the untreated portions of the planning area would continue to provide a food source. These untreated portions of the watershed would also continue to provide for nesting and hibernating habitat. The adjacent untreated areas would allow for bumblebees to recolonize the impacted acres within the treatment area as foraging and nesting habitat return.

While the number of bees in the project area may be slightly reduced, this reduction would be temporary as flowering shrubs and nest sites increase within a few years after treatments. In the long-term, the proposed action would benefit bumblebees since the increase of nectar plants would provide additional foraging for this species.

7.3.5 – Cumulative Effects

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: road decommissioning, road closures, pre-commercial thinning, noxious weed treatments, and livestock grazing.

The projects listed above may increase or improve foraging habitat in the long-term. While weed treatments may benefit bumblebees by improving habitat for native flowering plants, bees can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides.

While the projects analyzed under cumulative effects may have impacts to individual bumble bees, the main threats to this species are agriculture and urban development, livestock grazing, and broad scale insecticide application (Thorp et al. 2008). These kinds of activities are not included in the proposed action, but livestock grazing is considered a cumulative impact. Because some of the proposed activities increase or improve habitat while others may decrease it, the impacts would likely be beneficial and detrimental at the same time, the overall impacts would be neutral and populations of this species would persist in the analysis area.

7.4 - Consistency with Management Direction

The proposed action is consistent with the following Standards and Guidelines for sensitive species: FW-174: Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670; and, FW-175: habitat for threatened, endangered and sensitive plants and animals shall be protected or improved.

8.0 – Johnson's Hairstreak

Both action alternatives would have the same effects on Johnson's Hairstreak. Activities may impact individuals but would not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species.

8.1 Analysis Assumptions and Methodology

All Region 6 sensitive species within the project area must be analyzed, as required by the Forest Plan. Sensitive species with suitable habitat within the project area includes the white-headed woodpecker, fringed myotis, western bumblebee, and Johnson's hair-streak. Information on these species from the Interagency Special Status / Sensitive Species Program as well as other research was reviewed and summarized to determine how these species use the project area and the impacts that this project would have on these species.

8.2 - Analysis of Alternatives for Johnson's Hairstreak

8.2.1 - Existing Condition

8.2.1.1 – Habitat

Johnson's hairstreak occurs within coniferous forests which contain the mistletoes of the genus *Arceuthobium*, commonly referred to as dwarf mistletoe. These plants are highly specialized and are known to occur on a number of different conifers (Schmitt and Spiegel 2008). Larsen et al. (1995) states that old-growth and late successional second growth forests provide the best habitat for this butterfly, although younger forests where dwarf mistletoe is present also supports *C. johnsoni* populations. All sightings in both Washington and Oregon have been in coniferous forests. Ecoregions where this species occurs in Oregon, as determined by the Oregon Biodiversity Information Center include the Ochoco, Blue and Wallowa Mountains, Coast Range, East Cascades, Klamath Mountains, West Cascades and the Willamette Valley.

8.2.1.2 – Life History

Larvae can be found feeding on dwarf mistletoe (Opler and Wright 1999). Caterpillars feed on all exposed plant parts and secrete a sugary solution which is used by ants that in turn protect the caterpillar from predators. Caterpillars can be found on host leaves April-October (Allen et al. 2005). Nectar of flowers in several families from numerous genera including *Actostophylos, Ceanothus, Cornus,* dandelion, *Fragaria, Rorippa* and *Spraguea* is consumed by adult butterflies who obtain additional moisture by visiting mud puddles (Shields 1965). In California, males have been observed awaiting females by perching atop treetops or hilltops (Scott 1986). Adults fly from mid-May to early September with peaks occurring in May and August (Pyle 2002). In the northern part of the range, and at high altitudes, one flight occurs from late May- mid July (Scott 1986). The Johnson's hairstreak is considered to be the only butterfly that relies older forests (Pyle 2002). Due to their habitat associations and tendency to reside in the forest canopy, these butterflies are not often encountered.

8.2.1.3 – Threats

The main threats to this species are the reduction of old-growth, insecticide use, and application of herbicides to flowering plants that are nectar sources. The application of BTK

(*Bacillus thuringiensis* Berliner var. *kurstaki*), used for spruce budworm suppression, is also hazardous to populations of the Johnson's hairstreak.

8.3 - Environmental Consequences Johnson's Hairstreak

8.3.1 – Analysis Area

The analysis area for Johnson's hairstreak includes the Grasshopper planning area.

8.3.2 – No Action

Under the No Action Alternative, Johnson's hairstreak mistletoe habitat and flowering food source would not be impacted and, therefore, there would be no impact to the butterfly

8.3.3 - Direct and Indirect Effects of Action Alternatives

Activities could impact the larval stage of Johnson's hairstreak by removing large trees with mistletoe. Trees with mistletoe would not be directly targeted by this project and would continue to be present throughout the planning area. Mature forest structure would also remain within treated and adjacent untreated stands.

The proposed project may temporarily impact flowering plants during road maintenance, road reconstruction, and timber harvest activities. Reducing this food source would reduce the ability of foraging butterflies to find nectar at these sites. These flowers and shrubs would regenerate within a few years and the butterflies would have other nectar plants available within the project area.

While the number of Johnson's hairstreak in the project area may be slightly reduced, this reduction would be temporary as flowering shrubs increase within a few years after treatments. Because these butterflies can forage for nectar on a variety of flowering plants, the untreated portions of the planning area would continue to provide a food source. These untreated portions of the planning area and many of the treated stands would continue to provide mistletoe for caterpillar habitat. The proposed action may impact individuals or habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

8.4 – Cumulative Effects of Action Alternatives

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effect's analysis: road decommissioning, road closures, pre-commercial thinning, and noxious weed treatments.

The projects listed above may increase or improve foraging habitat in the long-term. While weed treatments may benefit butterflies by improving habitat for native flowering plants, butterflies can be indirectly harmed when the flowers that they normally use for foraging are removement by the application of herbicides. The beneficial impact of habitat improved for

Johnson's hairstreak under this cumulative effects analysis would outweigh the negative impacts from herbicide application.

8.5 - Consistency with Management Direction

Through project design and the use of design criteria, the proposed action is consistent with the following Standards and Guidelines for sensitive species: FW-174: Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670; and, FW-175: habitat for threatened, endangered and sensitive plants and animals shall be protected or improved.

9.0 – Mule Deer and Elk

Both action alternatives would have the same effects on deer and elk. Forage would be improved, disturbance would take place only during treatment activities, and road densities would meet Forest Plan Standards. The treatments under the action alternatives ***would not contribute to a negative trend in viability on the Forest for deer and elk.***

9.1 Analysis Assumptions and Methodology

The National Forest Management Act requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area." The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. The primary assumption of this process is that indicator species represent the habitat needs of other species because they have similar habitat requirements. Spotted owls, for example, indicate the needs of a variety of animals that use old growth forest. This analysis focuses on certain key species and does not specifically address common species except to the extent that they are represented by these management indicator species. Management Indicator Species for this portion of the Forest within the project area include northern spotted owl, mule deer (deer) and elk, pileated woodpecker, American marten, wild turkey, and Western gray squirrel (Table 1). A Forest wide analysis was completed and is incorporated by reference.

9.2 - Analysis of Alternatives for Deer and Elk

9.2.1 - Existing Condition

The project area supports elk and deer for most of the year. Elk cows and calves are in the western portion and higher elevations of the watershed from early spring though late fall. Black-tailed deer are common and relatively abundant in the spring, summer, and fall within the planning area. The eastern portion of the analysis area is identified in the Mt. Hood LRMP as inventoried winter range. Deer and elk spend the winter there depending on snow accumulation. Deer are less likely to be there during periods of heavy snowfall as they are less able to move through deep snow. Forage is available in the planning area but is generally of low quality due to the lack of un-forested areas. The Rocky Burn, adjacent to the planning area, provides higher quality forage for deer and elk.

Elk herds within the project area likely exhibit a close association with riparian habitat in areas of gentle terrain and low open road density. Research on elk in this kind of habitat generally shows that elk spend most of their time in close proximity to a stream or wetland. Low quality forage, lack of wetlands and permanent low-gradient streams are considered one of the limiting factors for elk and possibly deer in the planning area.

Thermal cover for elk is defined as a stand of coniferous trees at least 40-feet tall with an average crown closure of 70 percent or more. Optimal cover is found mainly in multi-storied mature and old-growth stands. The stands in the planning area provide both thermal and optimal cover.

During the 1980s and 1990s, wildlife managers considered thermal cover to be important to deer and elk survival and production. Over time, wildlife managers have questioned if elk required thermal cover. Telemetry data presented at the Elk Modeling Workshop (April 2010) indicated that elk were negatively associated with cover and that openings are far more valuable for elk than cover.

With the reduction in regeneration timber harvest, the Forest now has abundant optimal and thermal cover, but openings for forage are becoming scarce. There are approximately 69,226 acres of early-seral habitat on the Forest. This level is declining over time at mid and lower elevations since plantations have grown dense with trees that shade out forage.

High road densities lead to harassment of elk herds. Harassed elk move more often than elk left alone and use of habitat decreases as road density increases (Witmer 1985). It is also recognized that elk within or moving through areas of high open-road densities move longer distances; often several miles per day. The current open road density in the planning area for summer range is 2.4 miles per square mile and is 2.99 miles of open roads per square mile in winter range. The adjacent Rocky Planning area will close approximately 5-miles of roads that lead to the Grasshopper Planning area and would then reduce the open road densities in winter range to 1.2 miles of open roads per square mile. The Rocky road closures would be implemented before this project is completed and therefore, the road densities for winter range for this analysis would be 1.2.

9.3 - Environmental Consequences Deer and Elk

9.3.1 – Analysis Area

The analysis area for deer and elk includes the White River Watershed. Treatment units are located within inventoried winter range in the eastern portion of the planning area and summer range in the western portion.

9.3.2 – No Action

Disturbance from human presence and activities within the planning area would remain the same as the current levels. Stand structural development would remain unchanged over the short-term; no forage habitat would be created; and thermal and hiding cover for deer and elk would remain the same. In the long-term, forage habitat would be reduced within the watershed as open areas are overgrown with tree species. Road densities would remain unchanged at 2.4 miles of open roads per square mile in summer range and 1.2 in inventoried winter range.

9.3.3 - Direct and Indirect Effects of Alternative Actions

9.3.3.1 – Thermal Cover and Forage

The proposed treatments would remove thermal cover in stands when canopy cover is reduced to below 50%. While there would be a loss of thermal cover in treated stands, there would be an increase in forage within these same stands. Because thermal cover is no longer considered a vital component of deer and elk habitat, and because cover would still be provided in untreated stands, deer and elk would benefit from treatments because of the increase in forage. Alternative 2 would open stands to a greater degree on approximately 284-acres compared to Alternative 1. These acres would provide better forage for approximately 25-years compared to Alternative 1.

9.3.3.2 - Disturbance

Timber removal, road maintenance, and sale area preparation activities could potentially disturb animals in the area at the time of implementation. Disturbance could temporarily displace animals and may potentially affect the health of individuals if the disturbance occurs near active calving or wintering sites. Project activities would not all be occurring at the same time, but in a few places at any one time. The potential disturbance would be small in scale, temporary in nature and only impact a few individuals at any given time. The project is not expected to cause a measurable reduction or increase in the current local population size for either deer or elk.

New temporary road construction and old existing temporary roads would be reopened and reconstructed to access units. These roads would not be open to the public and the only disturbance would be from activities required to open the road and to accomplish proposed treatments in the project area. The roads that would need to be opened would be closed after treatments. There would be no increase in the long-term harassment of deer and elk with this alternative. While there is some B10 Land Use Allocation in the analysis area, no activities are proposed in this area.

9.3.3.3 – Road Densities

The current open road density in summer range is 2.4, which is below the 2.5 miles per square mile for the Forest Plan Standard in inventoried summer range. The open road density within inventoried deer and elk winter range, including the Rocky road closures, is currently 1.2 miles of road per square mile, which is below the 2.0 miles per square mile standard for inventoried winter range under the Forest Plan.

The proposed action would reduce the open road density for the project area by closing or decommissioning 2 miles of roads. The reduction in open road densities would benefit deer and elk by reducing the disturbance from human presence.

9.4 – Cumulative Effects of Action Alternatives

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effect's analysis: road decommissioning, road closures, recreational use, pre-commercial thinning, and timber harvest on Forest and private lands.

It is assumed that at least 50-percent of the private land would not provide thermal cover at any given time. However, cover is not considered a limiting factor for deer and elk in the analysis area because much of the Forest's lands are providing cover and very little forage opportunities. The optimum cover forage ratio is 60-percent forage and 40-percent cover (Thomas, 1979). Forage availability is more of a limiting factor on the Forest but is more available off-Forest as a result of regeneration harvest on private lands. Cumulatively, there would be a small increase in forage and a small decrease in cover which would move the forage to cover ratio towards the optimum ratio and therefore the cumulative effects of treatments would be neutral.

Human presence from recreation may cause both deer and elk to avoid more heavily used areas. Deer are expected to be more tolerant of recreation, while elk are less tolerant, and may move out of areas at certain times of the year. Cumulatively, recreational activities would impact deer and elk by reducing the amount of security habitat available, which could in turn, reduce the number of deer and elk that the analysis area could support.

9.5 - Consistency with Management Direction

This project is is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area."

Forage would be improved, disturbance would take place only during treatment activities, and road densities would meet Forest Plan Standards. The treatments under the action alternatives ***would not contribute to a negative trend in viability on the Forest for deer and elk.***

Open road densities under the proposed action would be reduced. The Forest Plan Standard of 2.5 miles per square mile of open roads for inventoried summer range (FW-208) would be met.

The Forest Plan Standard for open road densities in inventoried winter range of 2.0 miles per square mile.

10.0 – Pileated Woodpecker

The proposed alternatives would improve habitat in the sapling thin units and would not treat the best suitable habitat for this species. The proposed project ***would not contribute to a negative trend in viability on the Forest for pileated woodpecker.***

10.1 Analysis Assumptions and Methodology

See section 9.1 Analysis Assumptions and Methodology

10.2 - Analysis of Alternatives for Pileated Woodpecker

10.2.1 - Existing Condition

The pileated woodpecker was chosen as a management indicator species because of its need for large snags, large amounts of down woody material, and large defective trees for nesting, roosting and foraging. Pileated woodpeckers use mature and older, closed canopy stands (>60% canopy cover) for nesting and roosting but may use younger (40 to 70-years), closed canopy stands for foraging if large snags are available. Large snags and decadent trees are important habitat components for pileated woodpeckers (Hartwig et al. 2004, Mellen et al. 1992). Within the United States, the pileated woodpecker population has steadily increased from 1966 to 2015, according to the North American Breeding Bird Survey (Sauer 2017).

The Mt. Hood National Forest monitors the amount of pileated woodpecker habitat on the Forest using the metric: acres that contain 10 or more trees per acre that are >20" in diameter. In 2016, this metric registered 596,780 acres across the Forest. Overall, this metric has been steadily increasing since the 1990 Forest Plan was written (543,240 acres in 1990).

The association with late seral stages comes from the need for large-diameter snags or living trees with decay for nest and roost sites, large-diameter trees and logs for foraging on ants and other arthropods, and a dense canopy to provide cover from predators. Nest cavities average 8-inches in diameter and 22-inches in depth and are excavated at an average height of 50-feet above the ground, therefore nest trees must have a large diameter in order to contain nest cavities. Because ants are the main diet for pileated woodpeckers, large diameter snags and logs with some decay are selected for foraging because carpenter ants inhabit these sites. Nest excavation occurs from late March to early May, incubation from May to early June, and fledging in early July. Both birds excavate, incubate, and rear young.

A tolerance level indicates the percentage of individuals that use a particular habitat component. For pileated woodpeckers, 30 percent of this species uses habitat with 3.5 large snags per acre and 14.9 small snags per acre. Less than 30 percent of the pileated woodpeckers would use the available small and large snags in the planning area. The current snags per acre are shown in Table 8 under the DecAID analysis. Table 6 displays summarized data in the 30, 50, and 80 percent tolerance levels for pileated woodpecker in eastside mixed conifer.

Table 6. Tolerance Levels for Snags in Eastside Mixed Conifer for Pileated Woodpecker*

Wildlife Habitat Type Eastside Mixed Conifer	30% Tolerance Snags per Acre	50% Tolerance Snags per Acre	80% Tolerance Snags per Acre
Small Trees ≥ 10”	14.9	30.1	49.3
Large Trees ≥ 20”	3.5	7.8	18.4

*From DecAID Table EMC_S/L.sp-22

The mean home range for pileated woodpeckers is 1,181 acres with approximately a 9-30 percent overlap (about 200 acres) between territories. Therefore, an average home range with overlap for pileated woodpeckers would be approximately 970 acres (Mellen et al. 1992).

From 2014 to 2016, forest stands that meet the snags per acre metric have increased steadily from 592,470 acres to 596,780 acres. Overall, this metric has been steadily increasing since the 1990 Forest Plan was written (543,240 acres in 1990). Range-wide within Canada and the United States, the pileated woodpecker population has steadily increased from 1966 to 2015, according to the North American Breeding Bird Survey (Sauer et al., 2017). The trend for the pileated woodpecker is increasing at the forest and range-wide scale.

By dividing the acres of pileated woodpecker habitat by the average home range with overlap (970 acres) there are 615 potential home ranges on the Mt Hood National Forest. With an average of four eggs laid by each pair (Marshall, D.B. et al. 2003), this would indicate that the summer population of pileated woodpeckers could be as high as 2,500 birds including adults and fledglings. Given the amount of habitat available, there may be up to 5 home ranges in the project area when considering unmanaged stands as habitat.

The Northwest Forest Plan directs the B5 pileated woodpecker/American marten areas to return to their underlying land allocation in Matrix lands except where needed to assure habitat and dispersal for the guilds of species represented by the pileated woodpecker and marten. The Forest assessed the relative importance of individual B5 areas in contributing to late seral forest conditions at the watershed landscape level. Based on that assessment, the Forest recommended that certain B5 areas be returned to the underlying land allocation and that individual watershed analysis take a closer look at the remaining B5 areas.

The White River Watershed Analysis looked at all individual B5 areas again to validate the results of the Forest level analysis and to make a recommendation on which areas to retain. The Forest did not find a need to retain any B5 areas set aside for pileated woodpeckers within the project boundary.

10.3 - Environmental Consequences Pileated Woodpecker

10.3.1 – Analysis Area

The analysis area for the pileated woodpecker includes the western portion of the Grasshopper planning area.

10.3.2 – No Action

There would be no short-term effects to pileated woodpecker under this alternative. In the short-term, habitat and snag levels would remain essentially unchanged. In 20 to 30 years, the plantation and sapling stands would start to differentiate to varying degrees and show an increase in the levels of small snags and small down wood. Some of the young stands may eventually become suitable habitat. However, with no action, it could take as long as 60 to 150 years for these stands to develop into suitable pileated woodpecker habitat.

10.3.2 - Direct and Indirect Effects of Alternative 1

Sapling stands do not provide habitat for this species, therefore there would be no direct impacts from sapling treatments. In the long-term, habitat for pileated woodpecker would be improved in these stands because larger trees would be recruited onto the landscape more quickly in thinned stands.

Timber harvest has the most notable effect on habitat for the pileated woodpecker. Removal of large diameter trees and canopy reductions limits nest and roost sites, foraging habitat, and protective cover. Forest fragmentation likely reduces population density and makes birds more vulnerable to predation as they fly between forest fragments. Treatments that reduce the canopy cover may reduce the ability of an area to support, roosting, and foraging for this species (Marshall, D.B. et al. 2003). The best suitable habitat for pileated woodpecker in the western portion of the planning area is being maintained and is not within treatment units.

The number of large diameter snags and down logs that are currently in treatment units would not be impacted since snags and down logs would be maintained according to Forest Plan Standards and Guidelines. Snags would only be felled for safety reasons. For details about effects to snags and down wood see section 14.0 in this report. Fuels treatments that target small diameter down wood are not anticipated to remove a substantial amount of large down wood.

10.3.3 – Direct and Indirect Effects of Alternative 2

The direct and indirect effects of Alternative 2 are the same as those described in Alternative 1 except for the shelterwood treatments. Alternative 2 would reduce canopy covers to between 20 and 30 percent on approximately 289 acres. The canopy cover reduction would increase the time in which late successional characteristics would be attained on these acres by as much as 75 to 100 years compared to Alternative 1. Large snag levels (≥ 24") would be the same as Alternative 1, but there would be fewer small snags between 12 and 24 inches recruited over the next 100 years (Tables 7 and 9).

10.4 – Cumulative Effects of Action Alternatives

Past timber harvest on the Mt. Hood National Forest and adjacent lands under other ownership was considered in this cumulative effects analysis for projects in the past, present, and foreseeable future that overlap the analysis area in time and space.

Past timber harvest on federal lands has reduced the amount of habitat in the analysis area. Habitat for this species has continued to increase over time across the Forest but the analysis area would provide less habitat than other areas of the Forest. The current trend for pileated woodpeckers is increasing at the Forest and range-wide scale, therefore the cumulative impacts would be minimal.

10.5 - Consistency with Management Direction

The proposed action is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area."

The proposed project would not treat the best suitable habitat for this species and would improve habitat in the sapling thin units and habitat for this species has been steadily increasing over the last 25 years. Therefore, the proposed project ***would not contribute to a negative trend in viability on the Forest for pileated woodpecker.***

11.0 – American Marten

The proposed alternatives would improve habitat in the sapling thin units and would not treat the best suitable habitat for this species. The proposed project ***would not contribute to a negative trend in viability on the Forest for American marten.***

11.1 Analysis Assumptions and Methodology

See section 9.1 Analysis Assumptions and Methodology.

11.2 - Analysis of Alternatives for American Marten

11.2.1 - Existing Condition

This species was selected as a Management Indicator Species because of its association with mature and over-mature habitat, and their need for large snags and large amounts of down wood (USDA 1990).

American marten are typically associated with late-seral coniferous forests with closed canopies, large trees, and abundant snags and down woody (Zielinski 2001). Coarse woody debris is an important component of marten habitat. Large logs and other structures provide protection from predators, access to the subnivean (i.e., beneath the snow) space where most winter prey are captured, and protective thermal conditions, especially during winter (Buskirk 1994). A variety of structures are used for dens, with trees, snags, logs, and rocks accounting for 70 percent of reported den structures (Buskirk 1994). On the Mt. Hood National Forest, the species is generally found above 3500' in elevation.

Martens prey on vertebrates smaller and larger than themselves, eat carrion, and forage for bird eggs, insects, and fruits (Martin 1994). Their diets in summer include a wide range of food types, while berries are important in the fall. As snow cover increases, martens utilize mostly mammalian prey, the most important of which are ground squirrels, mice, and rabbits. Martens forage by walking along the ground or snow surface, with forays up trees, investigating possible feeding sites by sight and smell.

The Mt. Hood National Forest monitors the amount of American marten habitat on the Forest using the metric: acres of forest at >3500' elevation currently in mature or late-successional stage, with >50% canopy cover.

Overall, this metric has been increasing since the 1990 Forest Plan was written but plateaued between 2002-2005. From 2006 to 2011, mature/late-successional forests (>3500') acreage declined mainly due to multiple large fires in or adjacent to the Mt. Hood wilderness and Bull of the Woods wilderness. Post 2011, marten habitat acreage leveled out as almost all fires were at lower elevations, coupled with several years of low fire activity on-forest. From 2014 to 2016, the trend for forest stands that meet this metric stayed relatively constant.

A tolerance level indicates the percentage of individuals that use a particular habitat component. For American marten, 30 percent of this species uses habitat with 3.7 large snags per acre and 11.8 small snags per acre. Less than 30 percent of the American marten would use the available small and large snags in the planning area. The current snags per acre are shown in Table 8 under the DecAID analysis.

Table 7 displays summarized data in the 30, 50, and 80 percent tolerance levels for American marten in eastside mixed conifer. The planning area currently averages 9.1 small snags per acre and 2.3 large snags per acre which is below the 30% tolerance level for this species.

Table 7. Tolerance Levels for Snags in Eastside Mixed Conifer for American Marten*

Wildlife Habitat Type Eastside Mixed Conifer	30% Tolerance Snags per Acre	50% Tolerance Snags per Acre	80% Tolerance Snags per Acre
Small Trees ≥ 10”	11.8	12.8	14.4
Large Trees ≥ 20”	3.7	4.0	4.5

*From DecAID Table EMC_S/L.sp-22

Activities such as timber harvest and road construction that fragment, dissect, and isolate habitats are the largest threats to marten. Fragmented habitats attract habitat generalist predators like the great-horned owl, coyote, and bobcat which can all prey on marten. In addition, fragmentation eliminates the connectivity and creates isolated individuals and populations which are more susceptible to extirpation.

11.3 - Environmental Consequences American Marten

11.3.1 – Analysis Area

The analysis area for the American marten includes the area within the western portion of the planning area. The Northwest Forest Plan directs the B5 pileated woodpecker/American marten areas to return to their underlying land allocation in Matrix lands except where needed to assure habitat and dispersal for the guilds of species represented by the pileated woodpecker and marten. The Forest assessed the relative importance of individual B5 areas in contributing to late seral forest conditions at the watershed landscape level. Based on that assessment, the Forest recommended that certain B5 areas be returned to the underlying land allocation and that individual watershed analysis take a closer look at the remaining B5 areas.

The White River Watershed Analysis looked at individual B5 areas to validate the results of the Forest level analysis and to make a recommendation on which areas to retain. The Forest found the need to retain one B5 area for American marten in the Analysis Area.

11.3.2 – No Action

There would be no short-term effects to American marten under this alternative. In the short-term, habitat and snag levels would remain essentially unchanged. In 20 to 30 years, the plantation and sapling stands would start to differentiate to varying degrees and show an increase in the levels of small snags and small down wood. Some of the young stands may eventually become suitable habitat. However, with no action, it could take as long as 60 to 150 years for these stands to develop into suitable marten habitat.

11.3.3 - Direct and Indirect Effects of Alternative 1

Sapling stands do not provide habitat for this species, therefore there would be no direct impacts from sapling treatments. In the long-term, habitat for American marten would be improved in these stands because larger trees would be recruited onto the landscape more quickly in thinned stands than under the No Action Alternative.

At least 160 acres of mature or old growth forest within the 320-acre B5 management unit would be maintained and all treatments within B5 would maintain a canopy cover of 50 percent in commercial units. The best suitable habitat for American marten in the western portion of the planning area is being maintained and is not within treatment units.

The number of large diameter snags and down logs that are currently in the analysis area would not be impacted since snags and down logs would be maintained according to Forest Plan Standards and Guidelines. Snags would only be felled for safety reasons. For details about effects to snags and down wood see section 14.0 in this report. Fuels treatments that target small diameter down wood are not anticipated to remove a substantial amount of large down wood.

The proposed project would not treat the best suitable habitat for this species, would improve habitat in the sapling thin units, and habitat for this species has been steadily increasing over the last 25 years. Therefore, the proposed project ***would not contribute to a negative trend in viability on the Forest for American marten.***

11.3.4 – Direct and Indirect Effects of Alternative 2

The direct and indirect effects of Alternative 2 are the same as those described in Alternative 1 except for the shelterwood treatments. Alternative 2 would reduce canopy covers to between 20 and 30 percent on approximately 289 acres. This canopy cover reduction would increase the time in which late successional characteristics would be attained on these acres by as much as 75 to 100 years compared to Alternative 1. Large snag levels (≥ 24") would be the same as Alternative 1, but there would be fewer small snags between 12 and 24 inches recruited over the next 100 years (Tables 8 and 10).

11.4 – Cumulative Effects of Action Alternatives

Past timber harvest on the Mt. Hood National Forest and adjacent lands under other ownership was considered in this cumulative effects analysis for projects in the past, present, and foreseeable future that overlap the analysis area in time and space.

Timber harvest on federal land has reduced the amount of suitable habitat for American marten in the analysis area and will continue to do so into the future until these stands grow over time and become suitable habitat again.

11.5 - Consistency with Management Direction

The proposed action is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area."

The proposed project would not treat the best suitable habitat for this species, would improve habitat in the sapling thin units, and habitat for this species has been steadily increasing over the last 25 years. Therefore, the proposed project ***would not contribute to a negative trend in viability on the Forest for American marten.***

12.0 – Wild Turkey

Both action alternatives would have the same effects on wild turkeys and would benefit the species by improving and ***would not contribute to a negative trend in viability on the Forest for wild turkey.***

12.1- Analysis Assumptions and Methodology

See section 9.1 Analysis Assumptions and Methodology

12.2 - Analysis of the Proposed Action for Wild Turkey

12.2.1 - Existing Condition

The wild turkey is a management indicator species for the ponderosa pine-Oregon white oak vegetation association of the Forest. Two subspecies of wild turkeys (Merriam's and Rio Grande) are found on the Forest. Turkeys feed on acorns, conifer seed, insects, and grass/forbs and nest on the ground hidden by grass or shrubs. Turkeys roost on the ground and in large diameter (> 14-inch dbh) ponderosa pine and Douglas fir generally on slopes greater than 30 percent and within 0.5 miles of a food source.

Wild turkeys generally prefer dense ground vegetation (14 to 16 inches in height) next to nesting cover. Open riparian woodlands and forest openings of one to three acres provides good brood habitat. These open areas need to provide for a multitude of forage that supports insects, allows for foraging, and provides cover in order to avoid predators. Turkeys are present within the eastern portion of the planning area and this area provides nesting, roosting, foraging, and brood-rearing habitat.

The Mt. Hood National Forest monitors the amount of wild turkey habitat on the Forest using the metric: acres of the Forest that contain ≥80% ponderosa pine and/or Oregon white oak. From 2014 to 2016, forest stands that met this metric have increased slightly from 31,280 acres to 32,010 acres. Overall, this metric decline steadily from 1990 (34,760 acres) to a low in 2004 (30,090 acres) but has then steadily increased annually from 2008 to the present.

12.3 - Environmental Consequences Wild Turkey

12.3.1 – Analysis Area

The analysis area for wild turkey includes the eastern portion of the planning area.

12.3.2 – No Action

Under the No Action Alternative, there would be less forage and hiding cover available for wild turkey compared to the Proposed Action. As stands continue to grow, this habitat would further be reduced.

12.3.3 - Direct and Indirect Effects of Action Alternatives

Proposed activities would benefit wild turkey by opening ponderosa pine stands and providing suitable foraging, nesting, brood-rearing, and roosting cover. Thinning activities would open the forest canopy in places and provide a combination of open, mature, mast-producing forests and shrubs, and species of varying ages and sizes that would create a mix of habitats and would increase the number of turkeys that the planning area could support. Mast-producing trees such as oaks would not be removed during treatments. Fuels treatments including burning would promote new growth of shrub and forb species. Untreated stands would maintain patches of forested habitat that would serve as travel corridors.

12.4 – Cumulative Effects of Action Alternatives

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effect's analysis: timber harvest and cattle grazing on Forest Service lands. These projects would have a combination of beneficial and negative impacts to wild turkey.

Timber harvest and thinning have opened the forest canopy and increased forage and nesting habitat for turkeys. Depending on the intensity, grazing may permit shrub and seedling establishment and can eliminate some native forbs which would change the food available from forbs to shrubs and reduce available nesting cover.

12.5 - Consistency with Management Direction

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area."

Both action alternatives would benefit the species by improving habitat and ***would not contribute to a negative trend in viability on the Forest for wild turkey.***

13.0 – Western Gray Squirrel

Both action alternatives would have the same effects on western gray squirrels, would have both negative and beneficial impacts to the species, and ***would not contribute to a negative trend in viability on the Forest for Western gray squirrel.***

13.1 Analysis Assumptions and Methodology

See section 9.1 Analysis Assumptions and Methodology

13.2 - Analysis of the Proposed Action for Migratory Birds

13.2.1 - Existing Condition

The western gray squirrel is a management indicator species for the ponderosa pine-Oregon white oak association of the Forest. Western gray squirrels need a mix of mast-producing trees to provide food, cover, and nesting sites in their habitat. The ecological range of the western gray squirrel includes a variety of habitat types within mixed conifer and oak forests. High tree species diversity is a common component of western gray squirrel habitat and contributes to habitat quality (Linders, 2000). Gray squirrel have been documented in the planning area and there is both wintering and nesting habitat.

Gray squirrels require various age classes of oaks, including old live and dead trees, to provide both food and cover, and different age categories of conifers are important for year-round cover and seasonally important food (Patton, 1984). Generally, the squirrels require trees of a size sufficient to produce an interconnected canopy for movement between stands (Rodrick, 1986). Gray squirrels usually build winter and rearing nests in conifers and temporary or summer nests in deciduous trees, and frequently nest in trees larger than 16 inches DBH (Gregory, 2005).

Gray squirrels require a variety of food sources of which, underground fungi appear to be the most important as it makes up a major portion of the squirrels diet year round and the spread of these fungi play an important role in the health of the forests in which they live. Coniferous trees depend on the fungi for the uptake of non-mobile minerals from the soil. Pine and fir seeds are also eaten all year and almost exclusively in the late summer and early fall. Acorns are eaten from late fall through winter. Ideal foraging habitat for western gray squirrels includes a balance between open conditions that promote acorn and pine seed production, and dense stands with high canopy closure that allows canopy travel by squirrels, provides secure nesting sites, and would produce abundant underground fungi.

The Mt. Hood National Forest monitors the amount of western gray squirrel habitat on the Forest using the metric: acres of the Forest that contain ≥80% ponderosa pine and/or Oregon white oak. From 2014 to 2016, forest stands that met this metric have increased slightly from 31,280 acres to 32,010 acres. Overall, this metric decline steadily from 1990 (34,760 acres) to a low in 2004 (30,090 acres) but has then steadily increased annually from 2008 to present.

13.3 - Environmental Consequences Western Gray Squirrel

13.3.1 – Analysis Area

The analysis area for western gray squirrel includes the eastern portion of the planning area.

13.3.2 – No Action

Under the No Action Alternative, Western gray squirrel would continue to have an abundance of nesting habitat and mycorrhizal fungi for foraging. Without thinning, the more open conditions required for large pine and seed production would not increase and these would continue to be limited for gray squirrel.

13.3.3 - Direct and Indirect Effects of Action Alternatives

Proposed activities would have both negative and beneficial impacts to western gray squirrels. Reduction of canopy cover and disturbance of the litter layer during harvest may reduce soil moisture resulting in lower mychorrhizal fungi production, which is an important food source for this species. At the same time, thinning activities would provide more open conditions that would increase acorn and pine seed production which is also a food source for gray squirrels. Western gray squirrels would forage in the thinned stands that provide seasonal or an occasional abundance of food, while nesting in adjacent conifer stands with higher canopy cover. The Proposed Action would not be expected to reduce the number of Western gray squirrels that the planning area could support because thinning and fuels treatments adjacent to untreated stands would continue to provide conditions suitable for both foraging and nesting.

13.4 – Cumulative Effects of Action Alternatives

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: timber harvest and cattle grazing on Forest Service lands. These projects would have a combination of beneficial and negative impacts to western gray squirrel.

Timber harvest and thinning have reduced the canopy cover which reduces nesting habitat for western gray squirrel but may also increase pine seed production for foraging. Depending on the intensity, grazing may inhibit the growth of some mychorrhizal fungi which are a food source for gray squirrels. Because the cumulative effects are both beneficial and negative, the overall cumulative impacts would be neutral.

13.5 - Consistency with Management Direction

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area."

Both action alternatives would have the same effects on western gray squirrels, would have both negative and beneficial impacts to the species, and ***would not contribute to a negative trend in viability on the Forest for western gray squirrel.***

14.0 – Snags and Down Wood

While some snags would be cut due to safety concerns, snags and down wood would not be removed as part of the proposed action alternatives and would remain unchanged when measured at the watershed scale.

14.1 Analysis Assumptions and Methodology

The White River Watershed was analyzed for historic and current snag levels since stand level analysis does not provide a meaningful measure to snag and down wood dependent species. The analysis was further broken down by stand structures, Eastside mixed conifer and Moist mix conifer. Management for snags and down wood are compared to unharvested stands, which represent historic conditions.

14.1.1 DecAID

DecAID is a planning tool intended to help advise and guide managers as they conserve and manage snags, partially dead trees and down wood for biodiversity (Mellen-McLean 2017). It also can help managers decide on snag and down wood sizes and levels needed to help meet wildlife management objectives. The Guide to the Interpretation and Use of the DecAID Advisor outlines steps for conducting a dead wood analysis and can be found Online[1]. This tool is not a wildlife population simulator nor is it an analysis of wildlife population viability.

A critical consideration in the use and interpretation of the DecAID tool is that of scales of space and time. DecAID is best applied at scales of subwatersheds, watersheds, subbasins, physiographic provinces, or large administrative units such as Ranger Districts or National Forests. DecAID is not intended to predict occurrence of wildlife at the scale of individual forest stands or specific locations. It is intended to be a broader planning aid not a species or stand specific prediction tool. For example, previous sections discussing species such as pileated woodpecker and American marten use DecAID and tolerance level information to add context to the analysis because snags and/or down wood can be important habitat components.

DecAid was developed as the best available science to analyze snags. Therefore, DecAid was used for this project's analysis for snags to determine consistency with management direction.This advisory tool focuses on several key themes prevalent in recent literature:

- Decayed wood elements consist of more than just snags and down wood, such as live trees with dead tops or stem decay.
- Decayed wood provides habitat and resources for a wider array of organisms and their ecological functions than previously thought.
- Wood decay is an ecological process important to far more organisms than just terrestrial vertebrates.

DecAID takes advantage of the spatially-comprehensive dataset of vegetation structure developed for Oregon and Washington by a team from the Pacific Northwest Research Station and Oregon State University using the statistical imputation method Gradient Nearest Neighbor (GNN) (LEMMA 2015). DecAID includes a process ("Distribution Analysis") that allows use of GNN data to evaluate the current frequency distribution of different densities of snags and amounts of cover of down wood within geographic areas such as watersheds selected by users. By using inventory plot data from unharvested areas and information on historic disturbance regimes, the process also allows estimation of reference conditions for both snags and down wood (Mellen-McLean 2017). The version of DecAID used for this analysis is the most up-to-date and available version at this time.

Gradient Nearest Neighbor - GNN

GNN uses spectral data from satellite remote sensing as well as physical environmental data to relate inventory plots to the vast majority of forested portions of Oregon and Washington lacking field measurements (LEMMA 2015). The use of remote sensing data, which are

[1] https://apps.fs.usda.gov/r6_decaid/views/guide_interpreting_decaid.html

collected frequently, permits periodic updating of the GNN dataset to capture current conditions. A GNN dataset incorporating remote sensing data from 2017 has recently been released (2020) and incorporated into DecAID and is considered the current condition at the time of this analysis. Major disturbances since 2017 were not captured in this DecAID dataset. However, the DecAID team has developed an algorithm to exploit RAVG (Rapid Assessment of Vegetation Condition after Wildfire) data for wildfires of at least 1000 acres (USDA- Forest Service 2015) in order to estimate effects on density of snags. There have been several fires mapped by RAVG since 2017 on National Forests in northwest Oregon. One of these fires, the White River Fire in 2020, occurred within the White River Watershed in which the Grasshopper project lies. The fire burned 17,905 acres with a mixed burn severity. There are no other patches in this watershed of at least 1000 acres attributed to other mortality agents (i.e., insects or diseases) during that time period. The GNN methodology used for this analysis is the best available science at this time to describe the condition of the snag and downed wood resources by watershed.

14.2 - Analysis of the Proposed Action for Snags and Down Wood

14.2.1 - Existing Condition

Across the Mt. Hood National Forest, snags and downed wood are found at lower levels than the historic range of variability due to large stand replacing fires early in the 20th century, past timber harvest and firewood cutting. Between the years of 1870 to 1920, roughly 300,000 acres or nearly one third of the Mt. Hood National Forest was burned by stand replacement fires. There have also been approximately 350,000 acres harvested since 1900. The combination of large-scale stand replacing fires and harvest acres have contributed to the current situation where almost 60% of the forest is in a “mid stage” of stand development with relatively few large snags. However, in recent years large wildfires have burned around the Forest, including the Government Flats, 36 Pit, Gnarl Ridge, Dollar Lake, and more recently, the Riverside and White River Fires creating some concentrations of large snags.

The project area contains stands of immature plantations less than 80 years old and recently unmanaged stands over 80 years old in the wildlife habitat type (WHT) of Eastside Mixed Conifer in the eastern portion of the planning area and Montane Mixed Conifer in the western portion as defined in DecAID. Many wildlife species evolved to use large snags and logs that were historically more abundant on the landscape. The loss of large snags and logs from managed stands affects biodiversity and these large snags and down wood are often missing from managed stands across the Forest. Currently, there are roughly 2-snags per acre in the moist mix conifer and <1-snags per acre in the dry mix conifer 24-inches DBH and larger and an average of 5 snags per acre in the moist mix conifer and 4 snags per acre in the dry mix conifer 12-inch DBH and larger (Silviculture Specialist Report). The Northwest Oregon Ecology Group applied the DecAID analytical tool to assess snag densities and down wood cover for the White River Watershed post 2020 fires. Distribution analyses were performed for each of the two WHTs in the watershed (Figures 4 - 11). A distribution analysis compares the current condition to reference conditions as represented by the vegetation inventory distribution histograms in

DecAID. The histograms displayed below illustrate the estimated density of snags for two size classes and for cover for two size classes of down wood within both WHTs in the White River Watershed. The vertical axis shows the percent of the WHT in the watershed. The horizontal axis is the number of snags per acre or the percent cover of down wood. The reference condition from DecAID is on the left of the paired bars. The current condition bar is on the right of the paired bars. The paired bars compare what DecAID indicates is the reference condition with what the GNN satellite data tell us is the current condition on the ground. The current condition of the stands in the project area is below the 30 percent tolerance levels as identified in DecAID.

For the small/medium trees in the Eastside Mixed Conifer, the DecAID advisor identifies the 30 percent tolerance level for snags as 6.7 snags per acre greater than 10 inches in diameter with 2.7 of those snags greater than 20 inches in diameter. It identifies the 30 percent tolerance level for down wood as up to 6.5 percent cover of down wood (including all decay classes) with sizes of logs averaging 5 to 8 inches in diameter. For the large trees in this habitat type, the DecAID advisor identifies the 30 percent tolerance level for snags as 15 snags per acre greater than 10 inches in diameter, with 3.6 of those snags greater than 20 inches in diameter. It identifies the 30 percent tolerance level for down wood as up to 2 percent cover of down wood (including all decay classes) with sizes of logs averaging 5 to 8 inches in diameter.

For the small/medium trees in Montane Mixed Conifer, the DecAID advisor identifies the 30 percent tolerance level for snags as 10 snags per acre greater than 10 inches in diameter, with 2.7 of those snags greater than 20 inches in diameter. It identifies the 30 percent tolerance level for down wood as up to 2.5 percent cover of down wood (including all decay classes) with sizes of logs averaging greater than 5 inches in diameter. For the large trees in this habitat type, the DecAID advisor identifies the 30 percent tolerance level for snags as 11 snags per acre greater than 10 inches in diameter, with 6.5 snags per acre greater than 20 inches in diameter. It identifies the 30 percent tolerance level for down wood as up to 3.3 percent cover of down wood (including all decay classes) with sizes of logs averaging greater than 5 inches in diameter.

14.2.1.1 – Snags

Currently, 42 percent of the White River Watershed contains no large snags in eastside mixed conifer compared to the historic condition of 36 percent (Figure 1). Currently, the percent of eastside mixed conifer with 0-2, 2-4, 4-6, and 6-10 large snags per acre is essentially the same as the historical reference condition. This watershed is deficient in high concentrations of large snags with 14 percent of the area with 10 or more snags per acre historically and 7 percent currently.

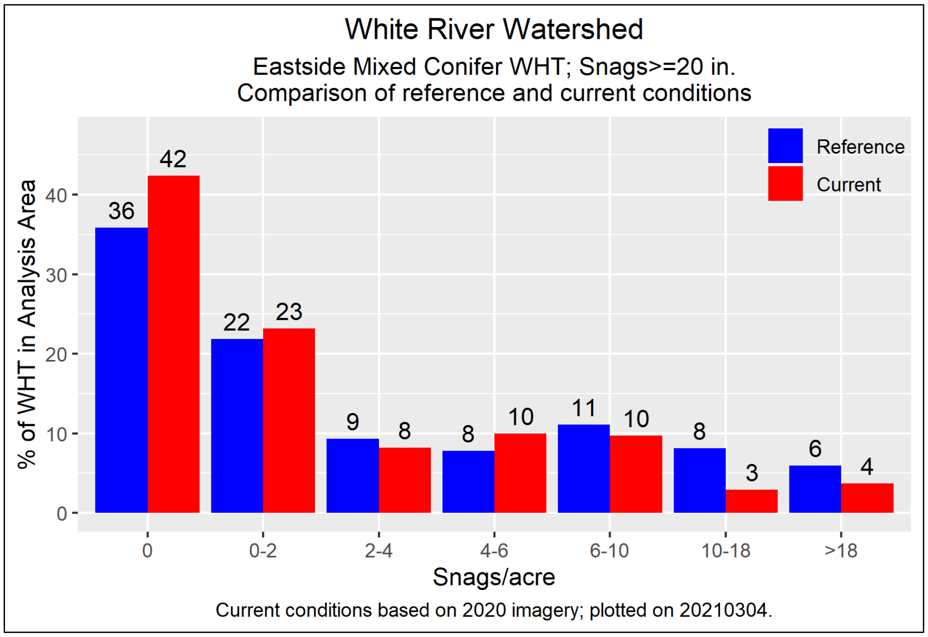

Figure 1. Comparison of Current and Reference Conditions for Large Snags in Eastside Mixed Conifer Within the White River Watershed

For small snags in eastside mixed conifer, the percent of the White River Watershed that contain no snags is about the same in the reference condition, 22 percent, compared to the historic condition of 23 percent (Figure 2). The current condition in the 0-6 snag density category is higher than the reference condition, 26 percent to 16 percent of the eastside mixed conifer habitat type and the conditions are comparable in the 6-12 snag density category. As is with the large snags, this watershed is deficient in high concentrations of small snags with 47 percent of the area with 12 or more snags per acre historically and 35 percent currently.

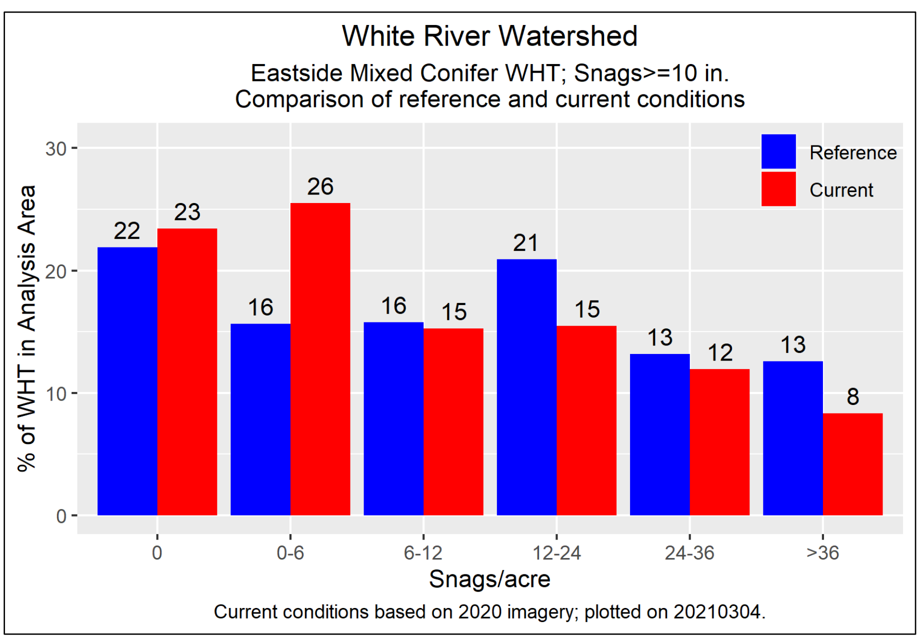

Figure 2. Comparison of Current and Reference Conditions for Small Snags in Eastside Mixed Conifer Within the White River Watershed

Currently, 42 percent of the White River watershed contains no large snags in montane mixed conifer compared to the historic condition of 34 percent (Figure 3). The watershed currently has more large snags in the 0-6 large snags per acre category with 33 percent of the montane mixed conifer in the current condition and 27 percent in the reference condition. However, this watershed is deficient in higher concentrations of large snags per acre with 39 percent of the area with 6 or more large snags per acre historically and 25 percent under current conditions.

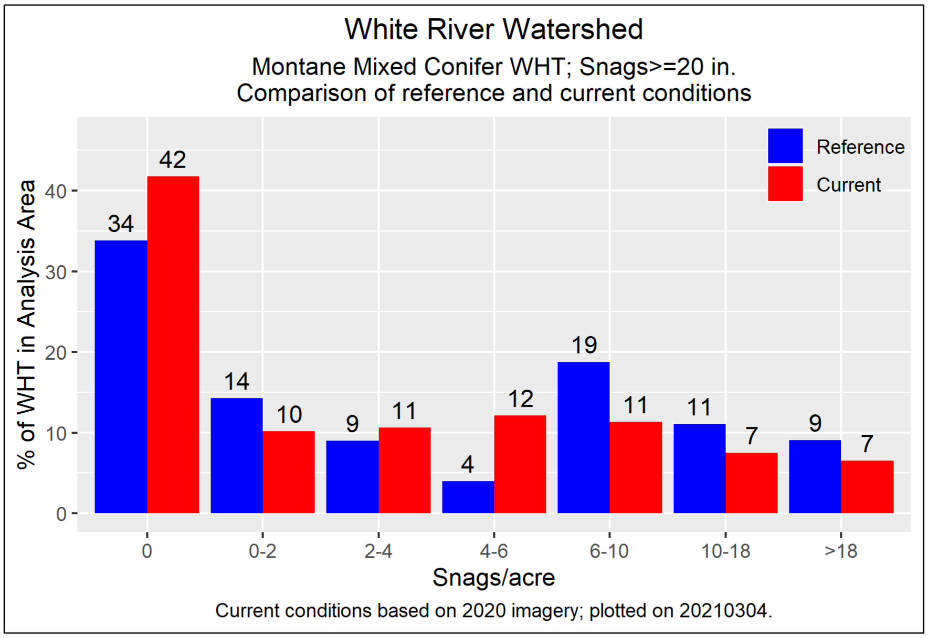

Figure 3. Comparison of Current and Reference Conditions for Large Snags in Montane Mixed Conifer Within the White River Watershed

For small snags in montane mixed conifer, 17 percent of the White River watershed contains no snags compared to the historic level of 11 percent (Figure 4). The 0-6 snag per acre category is similar at 15 percent currently compared to the historic level of 9 percent. The remainder of the categories for small snag densities are comparable to historic conditions with the exception of the 12-24 category which has 25 percent in the historic reference condition compared to 19 percent currently.

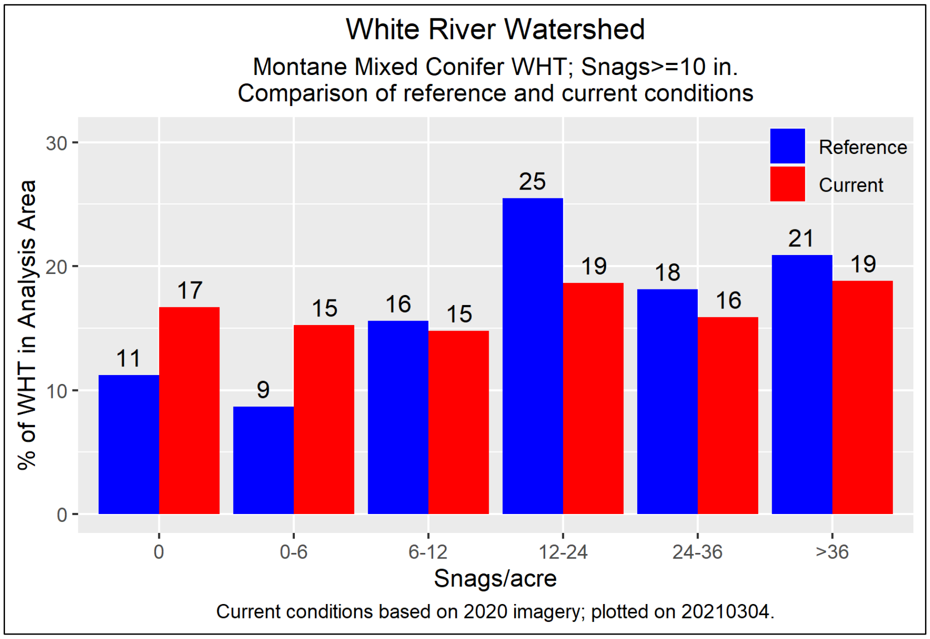

Figure 4. Comparison of Current and Reference Conditions for Small Snags in Montane Mixed Conifer Within the White River Watershed

14.2.1.2 – Down Wood

While current and reference conditions of large down logs in eastside mixed conifer are comparable, there are some differences. Historically, 79 percent of the White River Watershed had no cover of large down logs and currently, 70 percent has no large log cover. Under historic conditions, 15 percent of the watershed had up to 3 percent cover where currently 24 percent of the watershed has up to 3 percent cover (Figure 5).

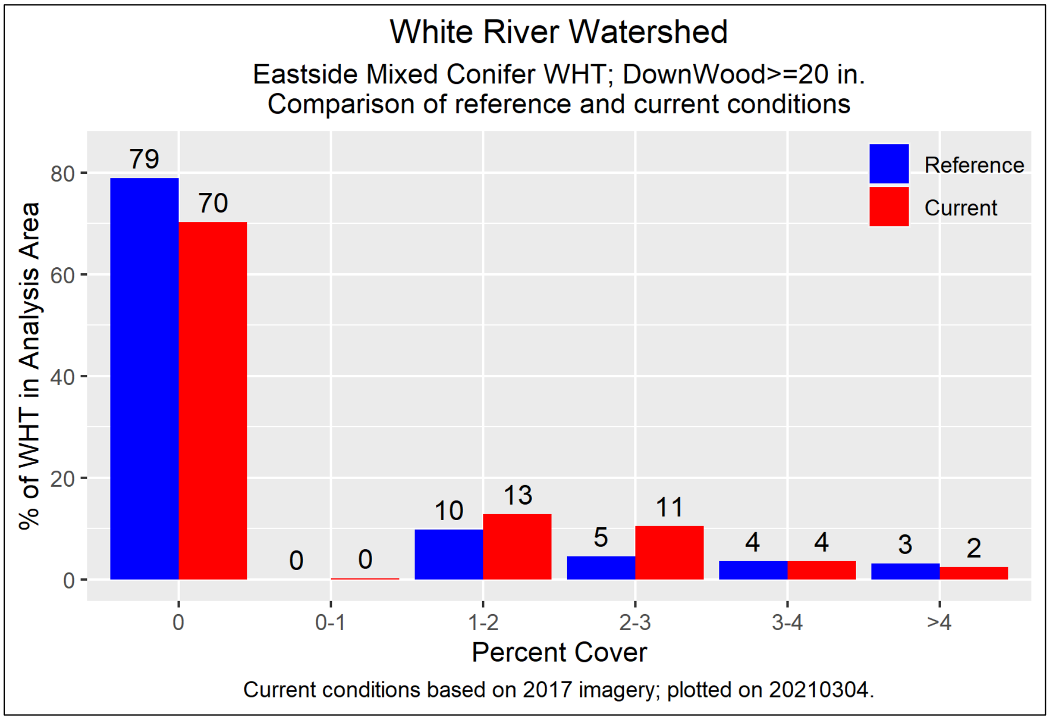

Figure 5. Comparison of Current and Reference Conditions of Percent Large Log Cover in Eastside Mixed Conifer Within the White River Watershed

For small logs in eastside mixed conifer, historically, 16 percent of the White River watershed had no cover of small down logs and currently, 9 percent has no small log cover. Under historic conditions, 48 percent of the watershed had up to 4 percent cover and currently 39 percent of the watershed has up to 4 percent cover of small logs (Figure 6). Under current conditions, 53 percent of the watershed has greater than 4 percent small log cover in eastside mixed conifer compared to 35 historically. In this wildlife habitat type, frequent low intensity fires historically would have consumed much of the down wood which may account for the differences in current vs. reference conditions.

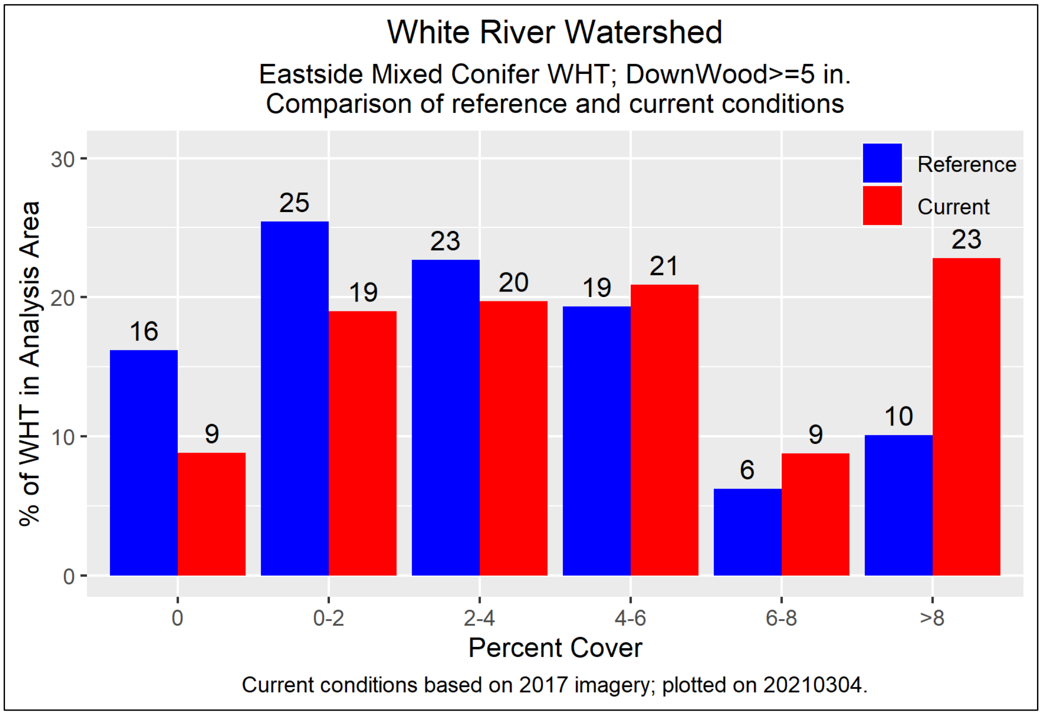

Figure 6. Comparison of Current and Reference Conditions of Percent Large Log Cover in Montane Mixed Conifer Within the White River Watershed

Historically, 72 percent of the White River watershed had no cover of large down logs in montane mixed conifer and currently, 62 percent has no large log cover. There is currently 34 percent of the watershed with up to 4 percent cover in large down logs in montane mixed conifer compared to 22 percent historically. Under historic conditions there is more large down wood, 8 percent, than occurs currently, 4 percent, in the greater than 4 percent cover category (Figure 7).

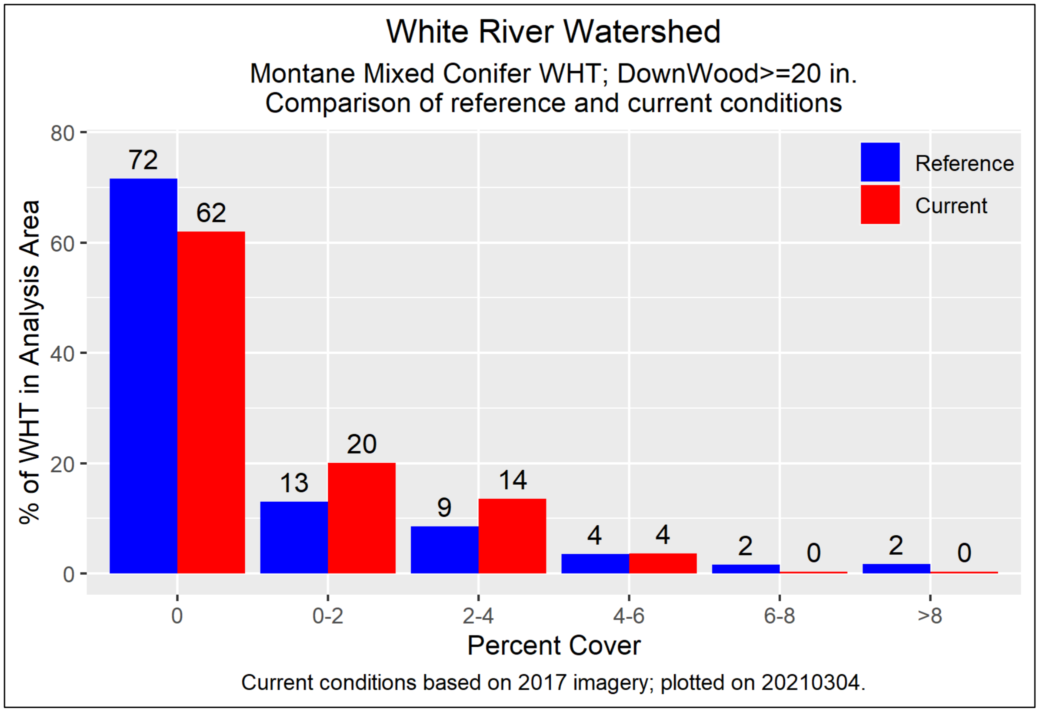

Figure 7. Comparison of Current and Reference Conditions of Percent Large Log Cover in Montane Mixed Conifer Within the White River Watershed

For small logs in the montane mixed conifer habitat type within the White River watershed, historically 39 percent of the watershed was in the 0-4 percent cover range compared to 34 percent currently. Currently, there is a higher percentage of small down wood cover in the 4-10 percent cover category at 55 percent compared to 40 percent historically (

Figure 8).

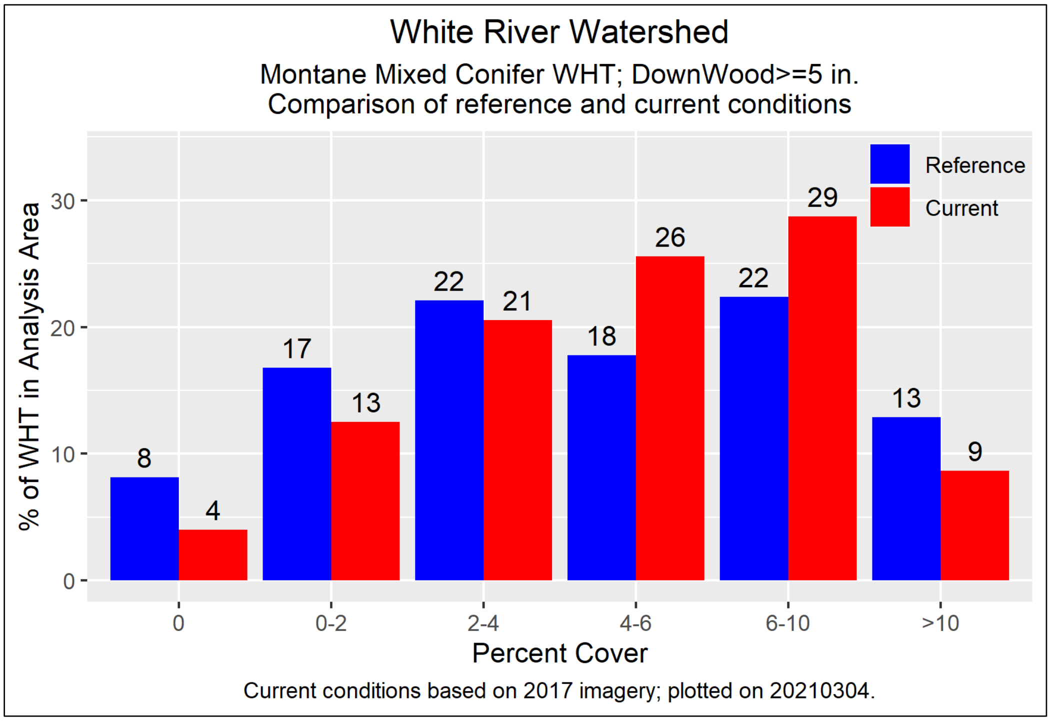

Figure 8. Comparison of Current and Reference Conditions of Percent Small Log Cover in Montane Mixed Conifer Within the White River Watershed

12.3 - Environmental Consequences Snags and Down Wood

12.3.1 – Analysis Area and Methodology

The analysis area includes the White River Watershed. While there is a portion of the Tygh Creek Watershed within the planning area, the amount of this watershed in the planning area represents less than 0.01 percent of the total respective watershed acres. Treatment units fall within the wildlife habitat types identified in DecAID as Eastside Mixed Conifer and Montane Mixed Conifer with vegetation condition types of small/medium trees and large trees.

Forest Vegetation Simulator (FVS) modeling was used to analyze snag development over time. FVS answers questions about how forest vegetation would change in response to natural succession, disturbances, and proposed management actions. The model was run with an average of the stands proposed for treatment for the No Action, Alternative 1, and Alternative 2 Actions and results are displayed below in Tables 8-10. More information on FVS can be found in the Silviculture Specialist Report and Online[2].

[2] https://www.fs.fed.us/fvs/

12.3.2 – No Action

In the short term, plantations would provide low amounts of down wood cover. Most areas would be below 6.5 percent cover of down wood and therefore be below the 30 percent tolerance level for wildlife habitat. However, some of the harvest units would likely have at least 3 percent of down wood comprised of classes 1 thru 4 and therefore would meet the 30 percent tolerance level for natural down wood conditions, as indicated by DecAID inventory data from unharvested plots.

With No Action, snags and large down wood would continue to be created by the various natural mortality agents: insects and diseases, wildfire, windthrow, snowthrow, as well as suppression mortality. Over next 70 years, these stands would continue to experience increased stand density and become increasingly more susceptible to natural mortality agents and would recruit new snags and down logs, mainly from the smaller intermediate and suppressed trees. Table 8 shows the number of snags per acre recruited over time for the No Action alternative. The No Action Alternative would have no direct, indirect, or cumulative effects on snag and down wood in the project area. For comparison purposes, taking No Action would likely provide more snags overall at maturity than the Action Alternatives.

Table 8. Recruitment of Snags Under the No Action Alternative.

Years After Treatment	QMD	# of Trees per Acre	Snags per Acre ≥12" DBH	Snags per Acre ≥24" DBH
0	10.4	361	9.1	2.3
10	11.5	303	13.2	2.1
20	12.6	255	15.0	2.0
30	6.7	717	16.2	1.9
40	7.7	505	21.8	2.4
50	8.3	450	18.7	2.1
60	6.3	791	16.5	2.1
70	7.3	556	20.5	3.0
80	6.1	817	17.2	2.8
90	6.9	614	18.6	3.5
100	7.4	549	18.8	3.1

14.3.3 - Direct and Indirect Effects of Alternative 1

14.3.3.1 - Snags

Thinning in young stands does promote the development of larger diameter *green trees* faster over time than in un-thinned stands. However, the reduction of trees during treatment would result in less available trees to naturally die and become snags. In addition, the reduced competition from the thinning reduces density-dependent mortality in the residual trees, allowing them to be healthier and live longer before succumbing to competition, insects, or disease to become a snag.

Implementation of this Alternative could also result in the loss of some snags cut for safety concerns. However, no snags are proposed to be cut as part of the proposed action and any snags that need to be cut would remain nearby as down wood. While some snags may be more prone to falling after thinning activities, the number of snags lost would not be measurable at the watershed scale. Skips and streamside protection buffers would provide short and mid-term recruitment of snags similar to the levels under the current condition.

The proposed treatments would reduce the amount of suppression mortality that would occur without treatment. Some of the snags and downed logs that might have formed in the future from the death of the intermediate and suppressed trees would be removed through the timber harvest. As a result, Alternative 1 would delay the attainment of snags through natural processes because of the reduction in density of the stands. This effect changes the trajectory for snag development compared to the No Action Alternative and reduces the number of trees available to become snags.

Snags that are left standing after thinning would be more prone to windthrow and snowthrow than they would have been without thinning. There would likely be some loss of the remaining snags within 10 years after harvest which would become down wood.

While there may be an overall reduction in the trajectory of snag creation versus taking no action, the proposed thinning would provide other ecological benefits by allowing trees to grow larger and faster, increase structural diversity, and to develop other suitable wildlife habitat characteristics (e.g., large limbs, crowns, etc.) and while Alternative 1 would have fewer snags and less down wood than taking no action, there would be sufficient quantities in units and across the landscape to provide for the needs of dependent species over time. Tables 9 shows the number of snags per acre recruited over time for Alternative 1.

Table 9. Recruitment of Snags Under Alternative 1

Years After Treatment	QMD	# of Trees per Acre	Snags per Acre ≥12" DBH	Snags per Acre ≥24" DBH
0	21.2	80	9.1	2.3
10	22.1	79	7.2	1.8
20	5.8	71	6.1	1.5
30	6.6	633	5.8	1.3
40	7.3	519	7.7	1.4
50	7.9	476	6.8	1.4
60	6.8	437	6.2	1.5
70	7.7	608	5.9	1.6
80	8.4	501	7.1	2.0
90	9.2	449	6.5	2.2
100	9.2	402	6.5	1.9

14.3.3.2 – Down Wood

Large logs (> 20 inches) existing on the forest floor would be retained. Prior to harvest, sale administrators would approve skid trail and skyline locations in areas that would avoid disturbing key concentrations of down logs or large individual down logs when possible. Snags or green trees that fall after thinning and would contribute to down wood.

An average of 6 logs per acre at least 20 inches in diameter with a volume of 40 cubic feet would be retained. In areas where logs are not large enough to meet this standard, the next smaller size logs would be maintained.

Figures 8 through 11 in the DecAid analysis show that the White River Watershed has a similar amount of area without down wood currently compared to historically but there are some pockets with higher concentrations of down wood currently than would have existed historically. Under Alternative 1, down wood levels at the watershed scale would remain unchanged. However, while some snags may be more prone to fall after thinning and then become down wood, there will be fewer trees after thinning that would contribute to future down logs. Skips and streamside protection buffers would provide short and mid-term recruitment of down wood similar to the levels under the No Action Alternative. Recruitment of down wood would not be measurable at the watershed scale.

14.3.4 – Direct and Indirect Effects of Alternative 2

14.3.4.1 – Snags

Effects for Alternative 2 are similar to Alternative 1 in that implementation of this Alternative could result in the loss of some snags cut for safety concerns. However, no snags are proposed to be cut as part of the proposed action and snags that need to be cut would remain as down wood. While some snags may be more prone to falling after thinning activities, the number of snags lost would not be measurable at the watershed scale. Skips and streamside protection buffers would provide short and mid-term recruitment of snags similar to the levels under the current condition.

The proposed treatments would reduce the amount of suppression mortality that would occur without treatment. Some of the snags and downed logs that might have formed in the future from the death of the intermediate and suppressed trees would be removed through the timber harvest. As a result, Alternative 2 would delay the attainment of snags through natural processes because of the reduction in density of the stands. This effect changes the trajectory for snag development compared to the No Action Alternative and reduces the number of trees available to become snags.

Snags that are left standing after thinning would be more prone to windthrow and snowthrow than they would have been without thinning. There would likely be some loss of the remaining snags within 10 years after harvest which would become down wood.

While there may be an overall reduction in the trajectory of snag creation versus taking no action, the proposed thinning would provide other ecological benefits by allowing trees to grow larger and faster, increase structural diversity, and to develop other suitable wildlife habitat characteristics (e.g., large limbs, crowns, etc.) and while Alternative 2 would have fewer snags and less down wood than taking no action, there would be sufficient quantities in units and across the landscape to provide for the needs of dependent species over time.

Alternative 2 would recruit slightly fewer snags per acre than Alternative 1 in the size class of 12 inches and greater (Tables 9 and 10). The shelterwood treatments under Alternative 2 would leave fewer trees in this size class to become snags in the future. At 50 years after treatments, Alternative 1 would have 6.8 trees per acre and Alternative 2 would have 6.0. At 100 years after treatments, Alternative 1 would have 6.5 snags per acre after treatments and Alternative 2 would have 5.7. While these differences can be measured at the project scale, they are not measurable at the watershed scale, which is the Analysis Area for snags and down wood.

Table 10. Recruitment of Snags Under Alternative 2

Years After Treatment	QMD	# of Trees per Acre	Snags per Acre ≥12" DBH	Snags per Acre ≥24" DBH
0	22.1	58	9.1	2.3
10	21.8	64	7.1	1.8
20	22.7	60	5.6	1.5
30	5.6	625	5.1	1.3
40	6.4	523	6.7	1.4
50	7.1	481	6.0	1.4
60	7.8	440	5.5	1.4
70	6.8	611	5.3	1.6
80	7.7	503	6.2	2.0
90	8.4	448	5.7	2.1
100	9.2	398	5.7	1.9

14.3.4.2 – Down Wood

The impacts to down wood from treatments under Alternative 2 would be the same as those for Alternative 1 except for the potential to recruit slightly fewer down logs in the shelterwood units. This impact would still not be measurable at the watershed scale and down logs would be provided to meet Forest Plan Standards.

14.4 – Cumulative Effects of Action Alternatives

Past timber harvest on the Mt. Hood National Forest and adjacent lands under other ownership was considered in this cumulative effects' analysis for projects in the past, present, and foreseeable future that overlap the analysis area in time and space.

The analysis area for snags and down wood is the White River watershed and this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. Across the Mt. Hood National Forest, snags and down wood exist at lower levels than the historic range of variability due to large stand replacing fires early in the 20th century and past timber harvest and firewood cutting which has created the current situation where almost 60% of the forest is in a "mid stage" of stand development with relatively low levels of large snags. The logging actions that occurred 50 or more years ago have still left areas with few large snags or down logs. There are still abundant small and large snags in the mature forests within the White River watershed and adjacent Wilderness as well as within the White River Fire area which burned 17,905 acres with a mixed burn severity. There is also some private land within the cumulative effects area and are included in the DecAID analyses. These private lands are not typically managed for snags or down logs and the area likely has very low levels of dead wood.

The White River Fire Salvage CE is included in this cumulative effects analysis. This project will conduct salvage activities on up to 250 acres within the within the fire boundary area. In addition, burned trees may be removed along roads within the fire boundary area. The Forest would also continue to manage the road and trail system for public safety which includes the felling of hazard trees. There are no other ongoing or foreseeable future actions that would affect snags or down wood to include in this analysis. Even with accounting for these projects, the snag and down wood levels would remain relatively unchanged when considered at the watershed scale.

The cumulative mortality from insect and disease is a cumulative effect. The cumulative mortality from insect and disease regularly creates new snags and down wood. Because snags are created in random patches of varying densities by insects and diseases it is not prudent to try to make a direct comparison of acres. However, this natural mortality creates an environment that is sustaining for snag and down wood dependent species.

The slight reduction in snag and down wood that would occur during project activities combined with the other foreseeable projects would be somewhat offset by the influx of snags and down wood from insects and disease that continues to occur. Untreated areas within the project area, watershed, and adjacent Wilderness would continue to contribute snags and down wood across the landscape. The Grasshopper project activities are therefore likely to have little cumulative effect on snag and down wood habitat throughout the analysis area. The overall effect on snags and down wood for the watershed as a result of this project is that snags and down wood would be retained and would bring the watershed closer to the range of historic variability and would result in a situation where the needs of snag dependent species are being met across the landscape now and into the future. The impacts and benefits of the activities proposed in the Action Alternatives, when added to past, current and foreseeable actions, would not result in substantive cumulative effects and while the Action Alternatives would have fewer snags and less down wood than taking no action, there would be sufficient quantities in units and, more importantly, across the landscape to provide for the needs of dependent species over time.

14.5 - Consistency with Management Direction

DecAid was used for this project's analysis for snags to determine consistency with management direction.FW-219 and FW-223 indicate that stands should have 6 logs per acre in decomposition class 1, 2, and 3 and that they should be at least 20 inches in diameter and greater than 20 feet in length. However, FW-225 and FW-226 indicate that smaller size logs may be retained if the stand is too young to have 20-inch trees. Under the proposed action, logs representing the largest tree diameter class present in the stand would be retained, therefore the proposed action is consistent with these standards.

Currently most of the trees are not large enough to produce snags of the desired size, (22 inches diameter, FW-234), but FW-235 allows the retention of smaller trees if the treated stand is too young to have trees of sufficient size. In this case, snags and green leave-trees retained would be representative of the largest size class present in the stand, therefore the proposed action is consistent with these standards.

15.0 – Migratory Birds

The effects of thinning in mid-successional stands would have a combination of positive, neutral, and negative impacts on migratory bird use within the stands depending on which species are present. There would be slightly more open habitat under Alternative 2 which would benefit species dependent on that habitat.

15.1 - Analysis Assumptions and Methodology

The Forest Service has implemented management guidelines that direct migratory birds to be addressed in the NEPA process when actions have the potential to impact migratory bird species of concern. The methodology for this analysis follows "Incorporating Migratory& Resident Bird Concerns into the National Environmental Policy Act Process Region Six Forest Service & OR/WA Bureau of Land Management" (Bresson 2016).

Conservation strategies for land birds of the east slope of the Cascade Mountains in Oregon and Washington and a conservation strategy for land birds in coniferous forests in western Oregon and Washington were prepared in June 2000 and March 1999 respectively by Bob Altman of American Bird Conservancy for the Oregon-Washington Partners in Flight. The strategies are designed to achieve functioning ecosystems for land birds by addressing the habitat requirements of "focal species." By managing for a group of species representative of important components of a functioning ecosystem, it is assumed that many other species and elements of biodiversity would be maintained.

The FWS Birds of Conservation Concern and the Oregon State list was used when developing the list of species to be considered in the planning process. This analysis was completed in order to evaluate the effects of the agency's action on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors.

15.2 - Analysis of the Proposed Action for Migratory Birds

15.2.1 - Existing Condition

Table 11 displays the focal species potentially (positively or negatively) affected by changes in habitat in the Cascade Mountains Physiographic Province, and the forest conditions and habitat attributes they represent.

Table 11. Focal Migratory Bird Species.

Forest Conditions	Habitat Attribute	Focal Species
Ponderosa Pine	Old forest, large patches	**White-headed woodpecker**
Ponderosa Pine	Large trees	**Pygmy nuthatch**
Ponderosa Pine	Open understory, regeneration	**Chipping sparrow**
Ponderosa Pine	Burned old-forest	**Lewis' woodpecker**
Mixed Conifer	Large trees	**Brown Creeper***
Mixed Conifer	Open understory, regeneration	**Williamson's sapsucker**
Mixed Conifer	Grassy openings, dense thickets	**Flammulated owl**
Mixed Conifer	Multi-layered, structuraly diverse	**Hermit thrush**
Mixed Conifer	Fire edges and openings	**Olive-sided flycatcher***
Oak-Pine Woodland	Early-seral, dense understory	**Nashville warbler**
Oak-Pine Woodland	Large oaks with cavities	**Ash-throated flycatcher**
Oak-Pine Woodland	Large pine trees/snags	**Lewis' woodpecker**
Lodgepole Pine	Mature/old-growth	**Black-backed woodpecker**
Whitebark Pine	Mature/old-growth	**Clark's nutcracker**
Montane Meadows	Wet and dry	**Sandhill crane**
Aspen	Large trees/snags, regeneration	**Red-naped sapsucker**
Subalpine fir	Patchy presence	**Blue grouse***

***Significantly declining population trends in the Cascade Mountains Physiographic Region.**

Close to 30 species of migratory birds occur on the Barlow and Hood River Districts, some of which are present within the project area during the breeding season. Some species favor habitat with late-successional characteristics, such as the hermit thrush and brown creeper, while others favor early successional habitat such as the Nashville warbler or the Williamson's sapsucker. Other species like the white-headed woodpecker and pygmy nuthatch utilize open ponderosa pine habitat.

15.3 - Environmental Consequences Migratory Birds

15.3.1 – Analysis Area

The analysis area for migratory birds includes the Grasshopper planning area.

15.3.2 – No Action

There would be no habitat alteration under this alternative. Stand conditions and the composition of migratory bird species dependent on these stands would remain unchanged in the near future. In the long-term, in the absence of major disturbance events, the stand densities and canopy cover would increase, which would change the species that would use these stands, favoring birds like the hermit thrush and brown creeper that prefer larger trees and closed canopy.

15.3.3 - Direct and Indirect Effects of Alternative 1

Research has demonstrated that thinning enhances habitat for a number of migratory species and provides habitat for some species that are rare or absent in un-thinned stands (Hagar and Friesen 2009). However, some species of migratory birds have been shown to decline following thinning. The effects of thinning in mid-successional stands would have a combination of positive, neutral, and negative impacts on migratory bird use within the stands depending on which species are present. The species that may benefit from thinning in the analysis area include the white-headed woodpecker, olive-sided flycatcher, Williamson's sapsucker, and chipping sparrow. The species that may be negatively impacted by thinning include the brown creeper, Swainson's thrush, and hermit warbler.

Treatments in the eastern portion of the planning area would improve pine/oak habitat for white-headed woodpecker, pygmy nuthatch, chipping sparrow, and Lewis' woodpecker. This habitat is now rare on the landscape because of past timber harvest and fire suppression activities which have allowed conifer encroachment into areas that would have normally burned in the past. Reducing fuels and opening the stand would reduce competition for scarce water resources and allow for the growth of healthier and larger pine and oak which these migratory bird species depend on.

15.3.4 – Direct and Indirect Effects of Alternative 2

The direct and indirect effects of Alternative 2 are the same as those described in Alternative 1 except for the shelterwood treatments. Alternative 2 would reduce canopy covers to between 20 and 30 percent on approximately 289 acres. This canopy cover reduction would increase the time in which late successional characteristics would be attained on these acres by as much as 75 to 100 years compared to Alternative 1. The shelterwood treatments on 289 acres would benefit olive-sided flycatcher and chipping sparrow and would reduce habitat for brown creeper, Swainson's thrush, and hermit warbler.

15.4 – Cumulative Effects of Action Alternatives

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effect's analysis: past timber harvest on federal lands, road decommissioning and road closures, pre-commercial thinning, and recreational use.

The cumulative effects of timber harvest activities are similar to the effects of the proposed action and would have a combination of positive, neutral, and negative impacts on migratory birds. Open habitat that would be created could be beneficial for early seral species like the olive-sided flycatcher and Williamson's sapsucker. The Swainson's thrush and brown creeper would be negatively impacted by habitat removal.

The cumulative effects of recreation could have substantial effects on migratory birds (Buckley, 2004, Jones and Nealson 2005). Recreation activities have been found to alter the physiology and immediate behavior of birds. Physiological responses include changes in temperature, heart rate or stress hormone (Thiel et al. 2008). Immediate responses include changes in foraging and evasion behaviors (Buckley 2004). Within bird populations responses can include changes in reproductive success and/or the number or density of birds (Buckley 2004). These studies have found a reduction in the number of nests built, eggs laid, and chicks hatched or fledged as a result of recreational activities.

15.5 - Consistency with Management Direction

The proposed action is consistent with Executive Order 13186 (66 Fed. Reg. 3853, January 17, 2001) "Responsibilities of Federal Agencies to Protect Migratory Birds." This Executive Order directs federal agencies to develop a Memorandum of Understanding (MOU) with the FWS to conserve birds including taking steps to restore and enhance habitat, prevent or abate pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible. The U.S. Forest Service has completed, and is currently implementing, its MOU with the FWS.

Within this MOU, the conservation of migratory birds on National Forest System lands focuses on providing a diversity of habitat conditions at multiple spatial scales. The proposed action is consistent with this direction by providing habitat that is currently limited on the Forest, which will in turn provide more diverse habitat types that will benefit multiple migratory bird species.

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