
Rare Plants and Fungi

Key Points

- Only two ESA-listed plant species potentially occur within the Harvest Land Base under all alternatives and the Proposed RMP: Kincaid's lupine and Gentner's fritillary. The BLM would conduct pre-disturbance surveys and apply conservation measures for these two species under all alternatives and the Proposed RMP.
- The six ESA-listed plant species within the decision area are shade-intolerant.
- The BLM would manage Bureau Sensitive plant and fungi species under the Bureau's Special Status Species program under all alternatives and the Proposed RMP. However, under Alternative D, the BLM would manage these species on O&C lands only in such a way that would not conflict with sustained-yield timber production.
- None of the action alternatives or the Proposed RMP would include the Survey and Manage Measures; therefore, species that are Survey and Manage and not included on the Bureau Sensitive species list would receive no specific protections.
- All action alternatives and the Proposed RMP allocate more acres to the Late-Successional Reserve than the No Action alternative, which would benefit rare plants and fungi associated with Mature and Structurally-complex forest.

Summary of Notable Changes from Draft RMP/EIS

In this Proposed RMP/Final EIS, the BLM has made the following major changes from the Draft RMP/EIS:

- Updated information to reflect that the Siskiyou mariposa lily is no longer a candidate for ESA-listing
- Updated and revised numbers of Bureau Special Status and Survey and Manage species based upon the most recent lists
- Corrected the table on Survey and Manage species sites to reflect only current rather than historic sites
- Expanded the analysis of Survey and Manage species to address specifically the species that a prior analysis determined would have insufficient habitat or for which there was insufficient data to make a determination of outcomes if the Survey and Manage mitigation measure were removed under the Northwest Forest Plan.
- Added specific analysis of effects of designation of reserves on Bureau Special Status vascular plant sites
- Expanded analysis of effects of livestock grazing on Bureau Sensitive plant and fungi species within active livestock grazing allotments
- Expanded the discussion of the effect of management activities on oak communities as a separate issue

Issue 1

How would management activities (such as timber harvest, livestock grazing, and mineral development) affect Bureau Special Status plant and fungi species and Survey and Manage species?

Summary of Analytical Methods

Bureau Special Status Species include ESA-listed, proposed, candidate species, and Bureau Sensitive species. There are 258 Bureau Special Status plant and fungi species within the planning area: 163 vascular plants, 40 bryophytes (mosses and liverworts), 17 lichens, and 26 fungi. BLM State Directors can designate rare and threatened species known or suspected to occur on BLM-administered lands within their respective states as Bureau Sensitive. The BLM State Director of Oregon and Washington can also designate species as Bureau Strategic, a tracking or ‘watch list’ category that is not part of the Bureau Special Status Species program. These are species that botanists currently know little about and are known or suspected to occur on BLM-administered lands.

Of the 258 plant and fungi Bureau Special Status Species within the planning area, there are 169 documented species on BLM-administered lands. The remaining 89 species are suspected or likely to occur on BLM-administered lands. These suspected species are included on the Bureau Special Status Species list because known sites occur nearby, their range coincides with the decision area, or suitable habitat exists on BLM-administered lands.

Separate from the Bureau Special Status Species program, little-known species thought to be associated with late-successional or old-growth forests currently receive special management attention under the Survey and Manage measures (USDA FS and USDI BLM 1994). Some of the Survey and Manage species qualify for inclusion on the Bureau Sensitive species list. Of the 247 Survey and Manage plant and fungi species within the planning area, 39 are also on the Bureau Sensitive list and 59 are on the Bureau Strategic list.

Rare plant and fungi species are not evenly distributed across the landscape. Many rare plant and fungi species are difficult to detect through surveys. Distribution data is incomplete for rare plant and fungi species and special habitats within the decision area. Additionally, the BLM cannot accurately identify at this planning scale the location and timing of future management activities that might affect these species and their habitats. These compounding uncertainties complicate the analysis of effects on rare plant and fungi species.

The BLM used species occurrence data where it was available to evaluate the effects of management actions on rare plants and fungi. Botanists have surveyed only a portion the decision area, generally as a pre-disturbance survey for an individual project (e.g., timber harvest). For vascular species, site data in the BLM regional database (GeoBOB) is likely to overstate the actual number of sites and individuals per population due to the historical age of the data and lack of revisits to the sites. Conversely, this database may under-represent sites of non-vascular and fungi species, because these organisms are difficult to count and map. Despite these limitations, the BLM used this incomplete survey data to describe the relative differences among the alternatives and the Proposed RMP.

Because there is generally little existing information about the habitat needs and distribution of most of the rare plants and fungi to assess effects at the site level, this analysis assumed that the BLM will survey for rare plants and fungi prior to habitat-disturbing activities except within the Harvest Land Base under Alternative D. Surveys are considered ‘likely,’ as BLM botanists currently conduct surveys for habitat-disturbing projects, the surveys are considered practical to conduct, and yield good results to use in assessing project effects to rare botanical species. However, in some cases, other tools may be utilized to determine the effect of a project, particularly if the projects is small in size or timing is critical. Those tools may include the following:

- Evaluation of species-habitat associations and presence of suitable or potential habitat
- Application of conservation strategies, plans, and other formalized conservation mechanisms
- Review of existing survey records, inventories, and spatial data

- Utilization of professional research, literature, and other technology transfer sources
- Use of expertise, both internal and external, that is based on documented, substantiated professional rationale

For the analytical methods used in the assessment of impacts to rare plants and fungi, the BLM assumes project surveys to be the likely method used to assess project effects, but other tools may be utilized, as appropriate. As discussed in the background section, fungi are especially difficult to detect even with repeated visits. The BLM assumed that the surveys for rare fungi would be incidental to surveys for rare plants and that botanists would record all Bureau Special Status plant and fungi species encountered during surveys. However, targeted and repeated surveys for fungi would only occur under the No Action alternative where equivalent-effort fungi surveys are required for Survey and Manage fungi for projects in old-growth forests.

A variety of management actions can affect rare plants and fungi directly through the potential removal of sites or habitat and indirectly through increased risk of spread of non-native competing vegetation or risk of soil erosion. Some management actions may have both positive and negative impacts upon rare plants and fungi. Some individual management actions may favor one rare species over another. Because there are many rare plant and fungi species, survey and species data is incomplete, and effects from management actions are often variable, it is not feasible to quantify effects from each management activity and even less feasible to combine the effects of different actions on rare plants and fungi. For this analysis, the BLM analyzed the effects of management actions by alternative and the Proposed RMP on rare plants and fungi, but did not attempt to summarize quantitatively the overall effect on rare plants and fungi. Instead, the BLM provides a qualitative and comparative summary of the cumulative effect of different actions on rare plants and fungi.

Timber Harvest and other Vegetation Management

The BLM evaluated the effect of timber harvest and fertilization on rare plants and fungi. Other vegetation management treatments have the potential to affect rare plants and fungi, but it is not possible to identify differences in effects among the alternatives and the Proposed RMP at this scale of analysis with the data available.

Timber harvest methods (clearcuts, regeneration harvest with retention, selection harvest, and thinning) influence the magnitude of the effect of timber harvest on rare plants and fungi and the extent to which habitat and sites are within the Harvest Land Base. At this planning scale, it is not possible to identify accurately the location and timing of specific future timber harvests that would affect plant and fungi habitat. However, in this analysis the BLM evaluated the relative magnitude of the effect of timber harvest on rare plants and fungi based on some broad analytical assumptions.

In this analysis, the BLM evaluated effects of timber harvest on rare plant and fungi habitat based on the difference in the acreage of timber harvest among alternatives and the Proposed RMP. The BLM assumed that clearcut harvest would have a greater magnitude of effects on rare plant and fungi habitat than other harvest methods, because it would not retain any structural legacies within the harvested area. Although there would be differences in intensity of harvest among the other harvest methods, it is not possible at this scale of analysis with the data available to distinguish the potential differences in effects on rare plant and fungi habitat among the harvest methods other than clearcuts.

While rare fungi may be found in younger stands, Mature Multi-layered Canopy, and Structurally-Complex stands provide habitat for the majority of the rare fungi on the Bureau Sensitive and the Survey and Manage lists (USDA FS and USDI BLM 2000, p. 8; USDA FS and USDI BLM 2004, p. 30). The BLM specifically evaluated effects on rare fungi based on the acreage of Mature Multi-layered Canopy,

and Structurally-Complex stands within the Harvest Land Base under each alternative and the Proposed RMP.

The BLM evaluated how the Harvest Land Base overlaps with rare plant and fungi habitat and known sites under each alternative and the Proposed RMP. The BLM assumed that timber harvest activities would not affect Survey and Manage plant and fungi sites directly in the No Action alternative because of Survey and Manage program requirements for pre-disturbance surveys and site protection. The BLM assumed that Bureau Sensitive plant sites and known Bureau Sensitive fungi sites would not be directly affected by timber harvest activities except under Alternative D, because of pre-disturbance surveys for plant species and site protection for all Bureau Sensitive plant and fungi species. Under Alternative D, some sites within the Harvest Land Base would be directly affected by timber harvest, because the BLM would only protect known sites on O&C lands where protection would not conflict with sustained-yield timber production. The BLM assumed that under Alternative D, there would be no additional pre-disturbance surveys for timber harvest and the BLM would rely on existing information and habitat evaluations to assess the site-specific effects of timber management activities on Bureau Sensitive species. For the purposes of this analysis, the BLM assumed that sites within the Harvest Land Base of Survey and Manage plant and fungi species that are not Bureau Sensitive would eventually be lost because of timber harvest under the action alternatives and the Proposed RMP. The BLM assumed that loss of host trees from timber harvest could directly affect rare plants and fungi. The BLM assumed that changes to their habitat from timber harvest under all alternatives and the Proposed RMP could indirectly affect rare plant and fungi species, such as through the introduction or spread of invasive species.

In this analysis, the BLM assumed that fertilization would reduce habitat quality for rare plants and fungi. Although fertilization would promote growth of all vascular species, many rare plant species are adapted to low nitrogen soils and cannot utilize added nitrogen as readily as conifer species. Non-native species also benefit from added nitrogen, giving them a competitive advantage over many rare plant species. Nitrogen fertilization reduces ectomycorrhizal fungi species richness, the higher the rate of added nitrogen, the greater the decrease in ectomycorrhizal fungi (Ryden *et al.* 1997, Berch *et al.* 2006).

Site preparation and fuel reduction treatments, including prescribed burning and biomass treatments, would reduce slash from timber harvest and silviculture activities would remove hazard fuels in the Wildland Urban Interface (see the Fire and Fuels and Forest Management sections of this chapter). These treatments would affect rare plant and fungi species in the conifer and mixed evergreen forests, shrub communities, serpentine areas, and oak and hardwood woodlands habitat groups. Site preparation and fuel reduction treatments associated with timber harvest would primarily affect the conifer forest habitat group and oak and hardwood woodlands habitat groups. These treatments could adversely affect rare species by removing the substrate, host species, or modifying the microenvironment upon which the rare plant and fungi species depend. The effects of prescribed fire vary due to many factors including method (e.g., pile burning, under burning, and broadcast burning), type of fuels present, and topography. Effects range from low, where the litter and duff are charred or partially consumed, and there is little change to the vegetative cover, to high, where litter and duff are completely consumed and there is considerable vegetation mortality. An indirect effect of prescribed burning is the potential increase in non-native species due to removal of competing vegetation, soil disturbance, increased sunlight, and nitrogen availability. Site preparation and fuel reduction treatments may provide beneficial effects on some rare plants and fungi, such as by reducing competition and shade. Vascular plant species not in the conifer habitat group are generally shade-intolerant and respond to increased light and reduction in plant competition with increased growth, flowering, and fruiting (USDA USDI 2003, USDI FWS 2006 and 2010, Giles-Johnson *et al.* 2010). However, any such potential effects, either adverse or beneficial, are highly dependent on site-specific and project-specific factors that cannot be identified at this scale of analysis.

Designation of Late-Successional Reserve and Riparian Reserve

In the Late-Successional Reserve, management objectives include maintaining and promoting habitat for the northern spotted owl and marbled murrelet. In the Riparian Reserve, management objectives include providing for the conservation of Bureau Special Status fish and protecting water quality. Habitat conditions favorable for northern spotted owls, marbled murrelets, and Special Status fish species are also favorable for many of the Bureau Special Status plants and fungi, particularly for the bryophytes, lichens, and fungi. Most of the Bureau Special Status vascular plants, however, are sun loving and require open canopy conditions. The BLM assumed in this analysis that vascular plant sites that require full or partial sun for growth and reproduction would eventually disappear in the reserve allocations without management to reduce canopy cover.

Livestock Grazing

In this analysis, the BLM assumed that livestock grazing would have both positive and negative effects on rare plants and the plant communities in which they occur.

On the positive side, some rare plant species benefit directly from periodic livestock grazing through increased vigor and growth. In areas with a large component of non-native annual grasses, livestock grazing may reduce the biomass of these grasses, allowing native species, especially annual species, to persist (Rilla and Bush 2009). Livestock grazing may also reduce fire fuels and help maintain grasslands that are at risk from shrub or tree invasion.

On the negative side, livestock may directly eat rare plants, reducing the plant's ability to recover and reproduce. Livestock also trample vegetation and may introduce and spread noxious and invasive weed species. Trampling impacts, however, are typically concentrated. In summer, the presence of water is much more important than in the winter, and livestock do not stray far from water. Heavy trampling disturbance occurs around holding pens, water sources, salt blocks, and trails between favored livestock grazing areas; livestock may completely denude these areas. Away from these resources, effects from trampling are usually dispersed.

The BLM evaluated the effects of livestock grazing on rare plants by comparing the acreage open to livestock grazing in each alternative and the Proposed RMP. Additionally, the BLM considered the presence of ESA-listed threatened and endangered plant species in active allotments.

ACEC Designation

The BLM designates ACECs where special management attention is required to maintain and protect relevant and important values. In this analysis, the BLM assumed that management for these relevant and important values would also be protective of rare plants and fungi. The BLM compared the acreage of ACECs to evaluate the protection for rare plants and fungi under each alternative and the Proposed RMP. Although rare plant and fungi species are not evenly distributed across the landscape, the BLM assumed in this analysis that all acres designated as ACECs would provide equivalent protection for rare plants and fungi. At this scale of analysis, the BLM does not have sufficient information to identify specific effects of specific ACEC designations on rare plant and fungi species.

Road Construction

In this analysis, the BLM evaluated the effects of road construction on rare plants and fungi based on the miles of new road construction during the first decade under each alternative and the Proposed RMP. The BLM assumed that new road construction would adversely affect rare plants and fungi because of direct disturbance and removal plants and fungi and from disturbance and removal of habitat. Road construction

directly removes all vegetation in the construction zone, increases water runoff on the compacted or hardened surface (which can result in increased soil erosion immediately adjacent to the road), fragments habitat, creates a conduit for the introduction of noxious and non-native invasive plants, and increases access routes for public motorized vehicle use and camping. In this analysis, the BLM assumed that road construction would cause habitat disturbance and removal across a 45-foot width (see the Soil Resources section of this chapter).

Public Motorized Access Designations

In this analysis, the BLM assumed that areas designated as *open* for public motorized access would experience habitat removal and disturbance for rare plants and fungi. Where cross-country travel would occur, vehicles would crush vegetation, displace soils, and create trails that could potentially degrade occupied habitat and damage sites of rare plant and fungi species that may be scattered throughout the area. These conditions would allow for the introduction and dispersal of noxious and non-native weed species.

Although the BLM has some site-specific and anecdotal information about illegal public motorized travel activities, the BLM does not have a basis for predicting the location or effects of any widespread or systematic illegal public motorized travel activities. In addition, much of the decision area has physical limitations to potential illegal public motorized travel activities, including dense vegetation, steep slopes, and locked gates. Terrain, vegetation, and a greater amount of open spaces in most of the interior/south can lead to degradation and erosion in a greater proportion than the coastal/north where vegetation is denser and terrain is steeper. However, the BLM lacks a basis for characterizing current illegal public motorized travel activities or forecasting potential illegal public motorized travel activities in the future under any of the alternatives and the Proposed RMP at this scale of analysis. In this analysis, the BLM assumed that members of the public participating in motorized travel recreation would operate vehicles consistent with BLM decisions about public motorized travel opportunities (see the Trails and Travel Management section of this chapter).

Areas designated as *closed* for public motorized access would not experience habitat disturbance for rare plants and fungi, because the BLM would not permit public motorized vehicle activities. Areas designated as *limited* would not experience measurable additional habitat disturbance for rare plants and fungi, because the BLM would limit public motorized vehicle use to existing or designated roads and trails, which have already experienced disturbance through the original construction of the roads or trails. Until the BLM completes route designations through implementation-level travel management planning, the BLM cannot identify which routes the BLM would designate under a particular alternative or the Proposed RMP. Therefore, the BLM cannot quantify more site-specific effects in this analysis, and would address effects in implementation-level analysis.

Mineral Development

Within the decision area, the BLM's primary salable mineral material is quarry rock. The majority of this quarry rock is crushed aggregate used by the BLM, private companies, and local governments for road surfacing (see the Minerals section of this chapter). Quarry activities could have a detrimental effect on a small amount of habitat associated with rare plants and fungi in the rocky areas/outcrops, scree, serpentine, and conifer groups. The BLM also considered the effects of quarry activities on rare plants and fungi based on the acreage closed to salable mineral material disposal under each alternative and the Proposed RMP.

In this analysis, the BLM assumed that leasable mineral development would have no foreseeable effect on rare plants and fungi, because the BLM can impose site-specific stipulations, such as no surface occupancy, on each lease as needed to protect rare plant and fungi sites and habitat.

The BLM assumed that locatable mineral entry would adversely affect rare plants and fungi because of habitat removal and disturbance. The BLM evaluated this habitat removal and disturbance based on the acres that the BLM would recommend for withdrawal from locatable mineral development by alternative and the Proposed RMP. The BLM assumed in this analysis that areas recommended for withdrawal would protect rare plant and fungi sites and habitats from effects from locatable mineral entry. Locatable mining operations occur primarily in areas occupied by species in the rocky areas/outcrops/scree, serpentine, conifer, and riparian and aquatic habitat groups. While the number of sites of rare plants and fungi that intersect with mining operations would be few, where they do occur, the BLM assumed that these sites would be lost. The mining laws (see the Minerals section of this chapter) explicitly allow for consideration of ESA-listed or proposed species, but not for other BLM Special Status Species; therefore, the BLM assumed that sites of Special Status Species other than ESA-listed or proposed species would likely be extirpated and occupied habitat would be destroyed because of equipment operations and ground disturbance.

Background

The planning area is vegetatively diverse due to the physical geography of the area. The planning area falls within five of the Level III ecoregions⁸² mapped by the Environmental Protection Agency: Willamette Valley, Coast Range, Cascades, Klamath Mountains, and Eastern Cascades Slopes and Foothills (Omernik and Griffith 2012).

Within Oregon, there are more than 4,677 recognized taxa of vascular plants (Oregon Flora Project 2013). There is a substantial diversity of non-vascular plants (bryophytes and lichens) and fungi within the planning area; however, there is not a single comprehensive list of these organisms, because scientists have not studied and catalogued these species as well as vascular plants. The majority of the plants and fungi found in Oregon are common, and the current threat of extinction is slight. Some species are naturally rare or uncommon due to many biological and physical factors. For example, some rare plant species are strictly associated with serpentine soils that occur in the planning area within the Klamath Mountains ecoregion (e.g., crinite mariposa lily (*Calochortus coxii*); Oregon Biodiversity Information Center 2014). Rare species may occur in very small numbers or may be abundant within a narrow distribution. Other rare species may have a broad distribution, but occur in small numbers where found (e.g., clustered lady's-slipper (*Cypripedium fasciculatum*); Oregon Flora Project 2014). Some species are rare because of changes to their habitat (e.g., farming, urban and rural development, mining, and road construction).

The distribution of rare plant species is not even across the landscape. Mapping of species sites provides distribution and density patterns. 'Hot spots' are areas of high Bureau Special Status Species richness and density. Hot spots can occur at fine spatial scales, such as special habitat features (meadows, wetlands, rock outcrops, and other non-forested areas), and at larger geographic scales, where high levels of endemism occurs on the broader landscape level (**Appendix N**). The figure in **Appendix N** is based upon data in the BLM's Geographic Biologic Observations (GeoBOB) database. Because the BLM does not have complete botanical surveys, that figure shows the relative density of Bureau Special Status Species sites based upon current data. Both **Table 3-107** and **Table 3-108** indicate that the largest abundance and density of Bureau Sensitive/Strategic plant sites within the planning area is within the Medford District.

⁸² Ecoregions are areas within which ecosystems are generally similar based upon geology, vegetation, climate, and hydrology. These are different from the physiographic provinces described in **Figure 3-187**.

This is because the Medford District lies primarily within the Klamath Province, which has the highest total species richness of any province within the planning area. The complex geology of the Klamath Province supports diverse plant communities.

Table 3-107. Bureau Sensitive and Strategic plant and fungi sites by status and taxonomic group

District/ Field Office	Bureau Sensitive				Bureau Strategic				Totals (Number of Sites)
	Bryophytes (Sites)	Lichens (Sites)	Vascular Plants (Sites)	Fungi (Sites)	Bryophytes (Sites)	Lichens (Sites)	Vascular Plants (Sites)	Fungi (Sites)	
Coos Bay	14	128	195	19	57	10	11	57	491
Eugene	8	23	92	8	7	19	1	24	182
Klamath Falls	-	-	53	6	-	-	2	4	65
Medford	9	-	2,918	11	35	165	48	38	3,224
Roseburg	1	40	103	9	5	18	-	18	194
Salem	16	171	29	102	3	14	-	73	408
Totals	48	362	3,390	155	107	226	62	214	4,564

Table 3-108. Bureau Special Status, Strategic, and Survey and Manage plant and fungi sites documented between January 2009 and July 2013 in the decision area

District/ Field Office	Special Status (Number of Sites)	Strategic (Number of Sites)	Survey and Manage (Number of Sites)	Surveyed (Acres)
Coos Bay	9	2	15	8,217
Eugene	8	5	16	36,197
Klamath Falls	-	-	-	234
Medford	207	74	94	47,917
Roseburg	7	6	45	19,117
Salem	3	1	10	9,615
Totals	226	88	180	121,297

Field surveys are the best method to confirm presence or absence of rare species and to increase knowledge of range, distribution, and habitat characteristics. Based upon data available in the GeoBOB database as of November 2014, the BLM surveyed approximately 121,297 acres within the decision area from January 2009 to July 2013 and found a total of 226 new Bureau Special Status Species sites, 88 new Bureau Strategic species sites, and 180 new Survey and Manage species sites. These were typical pre-project surveys, not the Survey and Manage ‘equivalent-effort’ surveys. Thus, the BLM found 1 new Bureau Special Status, Bureau Strategic, or Survey and Manage plant or fungi site for every 246 acres surveyed on average over this time period. However, BLM found the majority of the new sites within the Medford District, which has 92 percent of the Special Status sites, 84 percent of the Bureau Strategic sites, and 52 percent of the Survey and Manage sites. The detection rate for the Medford District was 1 new site for every 128 acres surveyed, while the detection rate for the Eugene District was much less, with 1 new site found for every 1,248 acres surveyed. During this period, surveyors did not document any new sites of Bureau Special Status, Bureau Strategic, or Survey and Manage plant or fungi species within the Klamath Falls Field Office while conducting typical pre-project surveys.⁸³

⁸³ ‘Equivalent-effort’ surveys conducted between 2011 and 2013 in the Klamath Falls Field Office did yield numerous sites of Survey and Manage fungi.

Certain species, especially fungi, are difficult to detect during much of the year (USDA FS and USDI BLM 2004, pp. 148–149). Many fungi grow below the soil surface or within down woody debris and surveyors can only detect them when their fruiting bodies are present. Most of the structure (mycelium) of fungi species is not visible, because it is within whatever substrate the fungus lives (e.g., logs, tree stumps, duff, and soil). Generally, botanists consider fungi impractical to survey for, because they do not produce sporocarps (fruiting bodies) every year, or do not produce sporocarps everywhere that they may occur, and the sporocarps are usually present for a short time. Most of the Bureau Special Status and Survey and Manage fungi are mycorrhizal and associated with conifer trees. Other species are decomposers or are parasites on other fungi. Even when sporocarps are present, they are an unreliable indicator of location and activity of mycelia (Dahlberg and Stenlid 1995). The presence of sporocarps demonstrates that the species is present, but visual observation cannot determine the extent of a fungi population. The plant community composition gives an indication of the fungi community under the surface. The plant community influences the development of mycorrhizal populations (i.e., when the aboveground vegetation changes, the fungi community also changes).

Likewise, many vascular plant species may germinate only when growing conditions are favorable for the species, and the presence of flowers may be required for positive identification. To optimize detection, botanists must conduct surveys during the appropriate season and when local field conditions are favorable for the species. The numbers of Special Status Species sites listed in **Table 3-108** represent a snapshot in time and give an indication of relative abundance and diversity of rare plant and fungi species among the BLM administrative units in the planning area. The BLM conducted the majority of the surveys for pre-disturbance surveys for individual projects (e.g., timber sales, culvert replacements, and noxious weed treatments). Survey efforts for these species have been biased in their location based on proposed land management projects.

Many rare plants are associated with distinct and narrow habitat types within larger vegetative communities shaped by geologic features and substrate, climate, and hydrologic influences. These habitats range from rock substrates and outcrops of different origins with variable soil types and conditions (including sand dunes) to seasonal and permanent wetlands, vernal pools, fens, bogs, and marshes. Because they have persisted over time, these habitats have become refugia for unusual plant communities and rare species adapted to specialized environments. However, even within these habitats, rare species occur very infrequently.

Rare vascular plant species occur in a broad range of plant communities, habitat types, and substrates. Since vascular plants are generally large and botanists have studied them extensively, botanists have a good understanding of the habitats associated with each of the rare vascular plants. Bryophytes and lichens also occur in a variety of habitats. Many of these species are closely associated with a particular substrate (e.g., conifer tree boles), habitat condition (e.g., moist forest), and environment (e.g., near the coast); however, because they are smaller and often more difficult to identify than vascular species, botanists do not know as much about their habitats and range than they do about vascular species. Fungi occur in a number of forms. Most are mycorrhizal and usually associated with host species in conifer and hardwood forest communities. Because the fruiting body (e.g., mushroom) of a fungus is often the only part of the fungus visible, biologists often know little about the distribution, range, and habitat needs of rare fungi species.

Mycorrhizal fungi grow in a symbiotic relationship with vascular plant species. One or both organisms are dependent upon the other for food or resources. Mycorrhizal fungi depend upon actively growing root tips of the vascular plant with which it is associated. Mycorrhizal fungi populations change when the vascular plant community changes. Tree removal results in a decline in fine root activity and a similar reduction in the diversity of mycorrhizal fungi (Hagerman *et al.* 1999). Clear-cutting results in the loss of

fungi species richness, (i.e., the larger the clearcut, the greater the impact to the mycorrhizal fungi community; Dural *et al.* 1999, Hagerman *et al.* 1999, Kranabetter and Kroeger 2001). Green tree retention and smaller clearcuts allow fungi to continue to persist in the harvested area and allow for early recolonization of mycorrhizal species post-harvest (Miller *et al.* 1998, Wiensczyk *et al.* 2002, Kranabetter and Kroeger 2001, Luoma and Eberhart 2005).

Biological factors play important roles in determining the distribution and abundance of a species. These factors include reproductive strategies, inbreeding depression, pollinators and pollination, consumption by herbivores, weed invasion, habitat connectivity, disease, predation, habitat change, and global climate change. Often the biological factors that affect a species' rarity are difficult to isolate or are interrelated, creating uncertainty as to the real cause of rarity. Some rare Oregon species appear to be remnant populations from historic plant communities that have shifted since the last ice age. Other rare species in Oregon are narrow endemics adapted over long periods to specific habitats or substrates, such as the serpentine endemic group. Some rare species may have evolved as isolated populations that are diverging morphologically from the greater population, or may be the result of hybridization (e.g., Gentner's fritillary). Certain rare species of lichens and bryophytes, while geographically widespread, appear to be locally adapted to narrow environmental conditions along the Pacific Northwest coast. A number of species in Oregon are rare due to loss of habitat and the introduction and spread of invasive plants.

Natural disturbances, such as wildfires, windstorms, and floods, change plant communities and habitat conditions for rare plants and fungi. Many factors determine whether a population will survive a disturbance, including the following:

- Type, extent, duration, and intensity of the disturbance
- Frequency and season of the disturbance
- Habitat and life cycle requirements of a species
- Adaptability of a species to a changed environment

Some rare plant species are adapted to frequent, low-intensity fires and respond positively in most cases (e.g., Bradshaw's desert-parsley; Kaye *et al.* 2001). Species such as Gentner's fritillary and Kincaid's lupine can respond positively to the increased light and moisture from the loss of overtopping and competing vegetation and the increase in nutrients available after a fire. Although certain species respond positively to disturbance, they remain rare because of infrequent disturbances, loss of habitat, and rapid invasion by annual weeds. Alternatively, fire consumes many rare lichen, bryophytes, and fungi, along with some vascular plants without fire-adaptive mechanisms. These sites, as well as their habitat and hosts, would be lost unless protected in a niche or island where the fire was absent or less severe.

Floods and debris flows alter riparian and aquatic plant communities and can alter the rare plant populations that occur in disturbed areas. These types of events are very dynamic, with some rare plant sites benefiting whereas others are lost. Although floods may appear to destroy the existing riparian and aquatic vegetation initially, they also deposit sediment, distribute seed, and reduce native and invasive vegetation. This facilitates vigorous re-sprouting and reseedling of riparian-associated shrubs, perennial and annual grasses, and forbs. For example, many rare rush and sedge species associated with streams and wetlands are adapted to periodic floods by prolific seed production.

ESA-listed Species

Twelve ESA-listed plant species occur or have occurred historically within the planning area. The BLM has documented six of these species within the decision area: Gentner's fritillary, western lily, Cook's lomatium, rough popcorn flower, Kincaid's lupine, and Nelson's checker-mallow. The U.S. Fish and Wildlife Service has designated critical habitat for four of the ESA-listed plants: Willamette Valley daisy,

large-flowered woolly meadow-foam, Cook's lomatium, and Kincaid's lupine. The U.S. Fish and Wildlife has completed recovery plans for all of the ESA-listed plants within the planning area.

Gentner's fritillary is a member of the lily family (*Liliaceae*) and has showy deep red to maroon flowers on a single erect flowering stem arising from an underground bulb. The bulbs produce small bulblets that are loosely attached to the parent individual. These asexually produced bulblets are the primary means of reproduction for the species (Amsberry and Meinke 2007). Many Gentner's fritillary plants do not flower or flower only in some years, making positive identification of newly discovered sites difficult, because leaves are indistinguishable from other co-occurring fritillary species. Gentner's fritillary occurs in scattered locations throughout the Rogue and Illinois River watersheds within the Medford District. Habitat is diverse, ranging from Oregon white oak woodlands, moist riparian areas, Douglas-fir forests, and serpentine areas. The Medford District has surveyed an average of 40,000 acres per year for the years 2008–2013. On average, the surveyors found 1 new Gentner's fritillary site for every 4,400 acres surveyed in suitable habitat. Most sites are very small (i.e., less than 12 individuals). However, a few sites contain several hundred flowering plants with many more bulbs producing only vegetative leaves. There are currently 162 sites within the decision area. There are an additional 36 sites on BLM-administered lands within the Cascade-Siskiyou National Monument, which is outside of the decision area. Gentner's fritillary occurs within eight active livestock grazing allotments. The Medford District has surveyed all suitable habitats within livestock grazing allotments, and populations generally occur on steeper slopes outside of riparian areas, where livestock use is light. Botanists monitor the effects of livestock grazing on Gentner's fritillary, and there is little evidence of direct livestock grazing or trampling by livestock (M. Wineteer, BLM, personal communication, 2014). The Medford District has worked to augment sites by outplanting bulblets since 2002.

Western lily is a perennial in the lily family (*Liliaceae*) and occurs in a narrow strip along the immediate Pacific coast between Coos Bay, Oregon, and Eureka, California, in a variety of early successional habitats: freshwater wetlands, coastal prairie and scrub, and the edges of Sitka spruce forest. The single natural BLM site occurs within the New River ACEC in the Coos Bay District. An experimental introduction of Western lily within the New River ACEC in 1996 produced its first flowering plant in 2011, but the researcher has not noted any natural reproduction as of 2014 (Guerrant 2015). Suitable habitat for additional introductions within the New River ACEC is limited (T. Rodenkirk, BLM Botanist, personal communication, 2014).

Cook's lomatium is a perennial forb in the carrot family (*Apiaceae*). The species occurs in the Medford District in the Agate Desert of Jackson County on the edge of vernal pools and in the Illinois Valley in seasonally wet grassy meadows, oak woodlands, and serpentine meadow and shrub habitats. The largest populations on BLM-administered lands are in and adjacent to the French Flat ACEC. Rural development and recreational use threaten Cook's lomatium habitat in the Illinois Valley as illegal uses such as public motorized vehicle trespass and refuse dumping occasionally damage sites on BLM-administered lands, although the use of barricades and law enforcement efforts have successfully reduced effects in recent years (R. Showalter, BLM, personal communication, 2014). The BLM does not authorize livestock grazing of any habitats containing Cook's lomatium.

Rough popcorn flower is an annual to perennial herb in the borage family (*Boraginaceae*) that occurs in seasonally wet meadows or Oregon ash-swale openings in northern Douglas County in the Roseburg District. There are no naturally occurring populations of rough popcorn flower on BLM-administered lands. The Oregon Department of Agriculture, in cooperation with the BLM, planted three sites within the North Bank Habitat Management Area ACEC starting in 1998. One of these populations is thriving and has expanded to fill the potential habitat within the area. The second site is still extant; however, the number of plants has declined drastically over the years, likely due to a change in the site's hydrology. The BLM planted additional suitable habitat adjacent to the original planted location in 2006. The third

population occurs in marginal habitat that is too dry for the species, and it is unlikely that the species still occurs there.

Kincaid's lupine is a long-lived herbaceous perennial species in the pea family (*Fabaceae*). It ranges from Lewis County, Washington, to Douglas County, Oregon. Botanists first described the species from the Willamette Valley, where most of the known and historic populations occur. The habitat for Kincaid's lupine in the Willamette Valley consists primarily of upland prairie remnants. Within the decision area, the primary habitat is open woodland and meadow edges, often near roadsides, associated with Pacific madrone, incense cedar, and Douglas-fir trees with a relatively open canopy cover. There are currently ten Kincaid's lupine sites known to occur in the decision area. In addition, there are five sites on BLM-administered lands within the West Eugene Wetlands, which is outside of the decision area. In 2006, the U.S. Fish and Wildlife Service designated critical habitat for Kincaid's lupine in the Willamette Valley and Washington State, but not in the southern portion of its range in Douglas County. The only designated critical habitat for Kincaid's lupine on BLM-administered lands is within the West Eugene Wetlands. In April 2006, the Roseburg District, U.S. Fish and Wildlife Service, and the Umpqua National Forest completed a programmatic conservation agreement for Kincaid's lupine in Douglas County (USDI BLM, USDI FWS, and USDA FS 2006). The three cooperating agencies completed the "Management Plan for Kincaid's Lupine in Douglas County, Oregon" in March 2008 (USDI BLM, USDI FWS, and USDA FS 2008). The management actions specified in the management plan tier to the management goals and objectives for the recovery of Kincaid's lupine (USDI FWS 2010). The primary threats to Kincaid's lupine in the planning area are forest succession and resulting canopy shading, noxious weed invasions, and road maintenance. In addition, the populations in the decision area are generally small and isolated from each other. This isolation limits the likelihood of cross-pollination between populations, which could result in inbreeding depression.

Nelson's checker-mallow is a long-lived perennial in the mallow family (*Malvaceae*) that occurs in the Willamette Valley from Benton County, Oregon, and north into Cowlitz and Lewis Counties, Washington. In the Willamette Valley, Nelson's checker-mallow occurs in wet prairies, stream sides, and occasionally in Oregon ash woodlands or among woody shrubs. On BLM-administered lands, the species occurs at one site in the Walker Flat ACEC on the Salem District. Most of the plants in this population occur on adjacent City of McMinnville property. Nelson's checker-mallow requires open habitats; succession and canopy closure is a threat to the species (USDI FWS 2012).

Siskiyou mariposa lily, a former candidate for ESA-listing, also occurs within the planning area. The U.S. Fish and Wildlife Service determined that the species did not warrant listing at this time (80 FR 60834), and this analysis addresses the species as a Bureau Sensitive species. Siskiyou mariposa lily is a perennial in the lily family (*Liliaceae*). It is endemic to three disjunct ridge tops in the Klamath-Siskiyou Range on the California-Oregon border. The habitat for the species is rocky openings within a montane shrub plant community. The one site on BLM-administered lands consists of 1–5 plants within a 54-square-foot area (USDI BLM, USDI FWS, and USDA FS 2013).

The following six species occur or occurred historically within the planning area, but are unlikely to occur in the decision area: Applegate's milk-vetch, Willamette Valley daisy, large-flowered woolly meadow-foam, Bradshaw's desert parsley, golden paintbrush, and water howellia.

Applegate's milk-vetch in the pea family (*Fabaceae*) is a narrowly distributed endemic, known to occur only in southern Klamath County, Oregon. It occurs within interior alkali grassland with rabbitbrush and greasewood in areas with periodic flooding and drying. Very little of this habitat is present on BLM-administered and is unlikely to occur in the Klamath Falls Field Office (R. Currin, U.S. Fish and Wildlife Service, personal communication, 2014, and J. Blanchard, personal communication, 2014).

Willamette Valley daisy in the sunflower family (*Asteraceae*) occurs in both wet and dry prairie grasslands within the Willamette Valley where woody cover is nearly absent and where herbaceous vegetation is low in stature. Five sites occur on BLM-administered lands within the West Eugene Wetlands, which is outside of the decision area. The only designated critical habitat on BLM-administered lands within the planning area is also within the West Eugene Wetlands.

Large-flowered wooly meadowfoam in the meadowfoam family (*Limnanthaceae*) is associated exclusively with the margins around shallow vernal pools in the Agate Desert of the Rogue Valley in Jackson County, Oregon. There are 18 extant sites within the Agate Desert on private, State, and Federal land managed by the Bureau of Reclamation (USDI FWS 2012b). There is no designated critical habitat on BLM-administered lands.

Bradshaw's desert parsley in the carrot family (*Apiaceae*) is restricted to wet prairie habitats with heavy clay soils. The majority of the known sites occur between Salem and Creswell, Oregon; however, two sites are known in Clark County, Washington (USDI FWS 2010). Seven sites occur on BLM-administered lands within the West Eugene Wetlands, which is outside of the decision area.

Golden paintbrush in the broomrape family (*Orobanchaceae*) historically occurred in the grasslands and prairies of the Willamette Valley, but agricultural, residential, and commercial development has extirpated all sites in Oregon. The species is currently known from 11 populations in Washington and British Columbia (USDI FWS 2010). Golden paintbrush was last seen growing wild in Oregon in 1938 in Linn County. Researchers began planting small numbers of golden paintbrush within the Finley and Basket Butte Wildlife Refuges in 2005 from seed collected in Washington to test restoration methods for the species (USDI FWS 2010).

Water howellia in the bellflower family (*Campanulaceae*) no longer exists in Oregon, but there are herbarium records showing that the species used to occur in at least four locations within the Willamette Valley and Columbia River floodplain. The species currently occurs in a few sites in Washington, Idaho, Montana, and California. The species appears to be restricted to small, vernal, freshwater wetlands, glacial pothole ponds, or former river oxbows that have an annual cycle of filling with water over the fall, winter, and early spring, followed by drying during the summer months (USDI FWS 1994).

Bureau Sensitive and Strategic Species

Based on BLM Manual 6840 – Special Status Species Management, the BLM would address Bureau Sensitive species and their habitats in land use plans and would implement measures to conserve these species and their habitats, to promote their conservation, and reduce the likelihood and need for these species to be listed under the Endangered Species Act. While the Special Status Species policy applies to all lands managed by the BLM: “The application of the Special Status Species policy to provide specific protection to species that are listed by the BLM as sensitive on lands governed by the O&C Act must be consistent with timber production as the dominant use of those lands” (BLM Manual 6840 – Special Status Species Management; USDI BLM 2008).

Bureau Strategic species are not Bureau Special Status for management purposes (IM-OR-2015-028). The only requirement for this group of species is that information for species sites located during any survey efforts would be entered into the BLM corporate database (GeoBOB). This analysis includes discussion of Bureau Strategic species to provide a more comprehensive analysis of rare plants and fungi in the decision area; effects to these species are typically not analyzed in project-level analyses.

In Oregon, the Sensitive and Strategic lists are tied to the Oregon Biodiversity Information Center (ORBIC) rankings. ORBIC is part of the Institute for Natural Resources that was created by the Oregon

Legislature with the Oregon Sustainability Act of 2001 (ORS 184.421). The ranks that ORBIC produces are shared through a network of natural heritage programs and conservation centers, allowing information sharing among several countries in the western hemisphere. The BLM updates the Sensitive and Strategic Species lists approximately every three years.

In 2004, the BLM and Forest Service established an interagency program for the conservation and management of rare species in Oregon and Washington known as the Interagency Special Status/Sensitive Species Program (ISSSSP). The ISSSSP has funded a number of inventories, monitoring projects, and the development of species fact sheets and conservation assessments that aid in the management of Bureau Special Status Species. The Affected Environment section contains a summary of the results of these surveys.

Survey and Manage

The Northwest Forest Plan and the 1995 RMPs include the Survey and Manage measures, which require special management attention for little known species thought to be associated with late-successional or old-growth forests. Some species require pre-project surveys and have prescribed management actions if found.

The 2000 Final Supplemental EIS for Amendment to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines and the 2004 Final Supplemental EIS to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines discussed the origin and implementation of the Survey and Manage measures and the need for changes to the measures (USDA FS and USDI BLM 2000, pp. 3–10, 16–24; USDA FS and USDI BLM 2004, pp. 3–9, 15–21), and those discussions are incorporated here by reference.

Those two Supplemental EISs and the 2007 Final Supplement to the 2004 Supplemental EIS also described the Survey and Manage species and their habitat, distribution, and occurrence (USDA FS and USDI BLM 2000, pp. 213–319; USDA FS and USDI BLM 2004, pp. 141–183; USDA FS and USDI BLM 2007, pp. 181–244), and those descriptions are incorporated here by reference.

The 2012 Resource Management Plan Evaluation Report (USDI BLM 2012, pp. 12–13) summarized the history of proposed changes to the Survey and Manage measures and that summary is incorporated here by reference. The Wildlife section of this chapter contains additional information on the history of proposed changes to the Survey and Manage measures.

There are six categories of Survey and Manage species that are found in the planning area (**Table 3-109**). The categories consider species relative rarity, their level of association with late-successional/old-growth forests, and if pre-disturbance surveys are practical (**Table 3-110**). Strategic surveys are landscape-scale surveys designed to collect information about a species, including its presence and habitat, and are required for all Survey and Manage species. For Category A and C species, pre-disturbance surveys are required. The Survey and Manage measures specified that if strategic surveys were not completed for Category B species in fiscal year 2006 (fiscal year 2011 for fungi), then surveys equivalent to pre-disturbance surveys would be required prior to management disturbance in old-growth habitat. Twelve years of strategic surveys for fungi have increased the total known sites of Survey and Manage fungi from approximately 3,500 to 14,400 sites within the decision area. Over the course of the program, surveyors found enough sites of 39 fungi species that these fungi are no longer considered rare (Molina 2008).

“Equivalent effort” surveys are required for two lichens, four bryophytes,⁸⁴ and all Category B fungi species prior to disturbance in old-growth forest, defined by the Northwest Forest Plan as a forest stand, usually at least 180 to 220 years old, with moderate-to-high canopy closure, a multi-layered, multi-species canopy dominated by large overstory trees, a high incidence of large trees, some with broken tops and other indications of old and decaying wood, numerous large snags, and heavy accumulations of wood, including large logs on the ground (USDA FS and USDI BLM 1994a). The Survey and Manage Category B Fungi Equivalent-Effort Survey Protocol generally requires two years of surveys with visits scheduled in the autumn and spring when sporocarps are more likely present (USDA FS and USDI BLM 2011).

Table 3-109. Number of Survey and Manage plant and fungi species by taxonomic group and category found within the planning area using the current (2003) Survey and Manage species list

Taxa Group	Survey and Manage Categories						Total Species (Number)
	A (Number)	C (Number)	B (Number)	D (Number)	E (Number)	F (Number)	
Bryophytes	2	-	8	-	3	-	13
Fungi	1	-	163	13	4	3	184
Lichens	10	2	6	-	20	2	40
Vascular Plants	7	3	-	-	-	-	10
Totals	20	5	177	13	27	5	247

Source: USDI BLM 2014

Table 3-110. Survey and Manage categories and associated survey status by rarity

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Survey Status Undetermined
Rare	Category A	Category B	Category E
Uncommon	Category C	Category D	Category F

Affected Environment

There are 213 known sites of ESA-listed plants on the decision area (**Table 3-111**). Most occupied sites of the ESA-listed species are very small: approximately 74 percent of all sites occupy 0.10 acre or less or comprise less than 10 individuals. All but two of these species occur in habitats uncommon in the planning area: wetlands, meadows, oak woodlands, or rocky areas. The two remaining species—Gentner’s fritillary and Kincaid’s lupine—occur in mixed woodlands and hardwood/conifer habitat. While the U.S. Fish and Wildlife Service has designated critical habitat for the large-flowered woolly meadow-foam, Cook’s lomatium, and Kincaid’s lupine, only 3,125 acres of Cook’s lomatium critical habitat occurs within the decision area.

⁸⁴ BLM Instruction Memorandum No. OR-2006-038. Lichens: *Bryoria subcana* and *Thorlurna dissimilis*; Bryophytes: *Kurzia makinoana*, *Marsupella emarginata* var. *aquatica*, *Orthodontium gracile*, and *Tritomaria exsectiformis*.

Table 3-111. ESA-listed plants within the decision area

Common Name	Scientific Name	Known Sites	District/Field Office within Range of Species	Notes
Endangered				
Gentner's fritillary	<i>Fritillaria gentneri</i>	162	Klamath Falls, Medford	All BLM sites are on Medford District with an additional 36 sites within Cascade-Siskiyou National Monument; potential habitat in Klamath Falls Field Office
Western lily	<i>Lillium occidentale</i>	1	Coos Bay	An additional introduced site is not yet established
Large-flowered woolly meadow-foam	<i>Limnanthes pumila</i> ssp. <i>grandiflora</i>	-	Medford	Potential habitat in Medford District
Bradshaw's desert parsley	<i>Lomatium bradshawii</i>	-	Eugene, Salem	No potential habitat on BLM within decision area; there are 7 sites within the West Eugene Wetlands.
Cook's lomatium	<i>Lomatium cookii</i>	35	Medford	Largest BLM populations in and adjacent to French Flat ACEC
Rough popcorn flower	<i>Plagiobothrys hirtus</i>	3	Roseburg	BLM populations are introduced within the North Bank Habitat Management Area
Threatened				
Golden paintbrush	<i>Castilleja levisecta</i>	-	Eugene, Salem	No potential habitat on BLM
Water howellia	<i>Howellia aquatilis</i>	-	Eugene, Salem	No potential habitat on BLM
Kincaid's lupine	<i>Lupinus oreganus</i>	10	Eugene, Roseburg	5 additional sites within West Eugene Wetlands
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	1	Salem	Within the Walker Flat ACEC
Total		212		

There are 4,564 known sites of Bureau Sensitive and Strategic plant and fungi species within the decision area (**Table 3-107**). Sites range in size from just one or a few individuals that occupy much less than 0.10 of an acre to thousands of individuals that comprise several acres. Nearly 90 percent of the known Sensitive and Strategic plant and fungi sites are less than 1 acre.

The BLM has conducted Survey and Manage fungi equivalent-effort surveys on 5,356 acres in the Medford District and 686 acres in the Klamath Falls Field Office from 2011 to 2013. Surveyors found 619 sites during this period, an average of 1 new site for every 9.8 acres surveyed within potential habitat. The Salem District conducted equivalent-effort fungi surveys on 2 acres and did not find any fungi.

There are currently 862,408 acres of Mature Multi-layered Canopy or Structurally-complex stands, which provides potential habitat for rare plants and fungi that are associated with late-successional and old growth habitat.

Environmental Consequences

Under all alternatives and the Proposed RMP, the BLM would—

- Manage ESA-listed species consistent with recovery plans and designated critical habitat, including: the protection and restoration of habitat; altering the type, timing, and intensity of actions; and other strategies designed to recover populations of species;
- Conduct surveys for ESA-listed and candidate plant species on BLM-administered lands with suitable habitat;
- Maintain or restore natural processes, native species composition, and vegetation structure in natural communities outside of the Harvest Land Base through conducting prescribed fires, thinning, removal of encroaching vegetation, retention of legacy components (e.g., large trees, snags, and down logs), and planting or seeding native species;
- Use only species native to the plant community when re-vegetating degraded or disturbed areas; and
- Retain or reconnect the hydrologic flows to wetlands (see **Appendix B**).

The alternatives and the Proposed RMP vary in the approach to pre-disturbance surveys for and management of known sites of Bureau Sensitive and Survey and Manage species. The BLM would conduct pre-disturbance surveys for Bureau Sensitive species under the No Action alternative and Alternatives A, B, and C, and the Proposed RMP and would manage the species and their habitat so that BLM actions would not contribute to the need to list these species. Alternative D does not include any requirement for pre-disturbance surveys for Bureau Sensitive species, and the BLM would protect known Bureau Sensitive species sites in the Harvest Land Base on O&C lands only where protection would not conflict with sustained-yield timber production. The No Action alternative would also require pre-disturbance surveys for Survey and Manage species where appropriate and would manage known Survey and Manage sites through implementation of the Survey and Manage measures. None of the action alternatives or the Proposed RMP would require pre-disturbance surveys or site management for Survey and Manage species that are not included on the Bureau Sensitive species list.

Under Alternatives A and C, and the Proposed RMP, the BLM would take actions to contribute toward the recovery of ESA-listed and Special Status plants. This would involve active management to augment existing populations and create new populations within suitable habitat to meet recovery plan goals for ESA-listed species and to increase the overall resiliency of other Special Status Species to reduce the risk of extirpation. Under the action alternatives and the PRMP, the BLM would allocate all 3,125 acres of Cook's lomatium critical habitat in the action area to District-Designated Reserves and manage those reserves for the species and its critical habitat. Under the No Action alternative, Cook's lomatium critical habitat would occur within the Riparian Reserve and other allocations with no timber harvest. Since the BLM would manage Cook's lomatium critical habitat for the primary constituent elements under the alternatives and the Proposed RMP, there would be no management impacts to critical habitat.

Under the action alternatives and the Proposed RMP, within the dry forests outside of the Harvest Land Base, the BLM would apply management treatments to maintain or promote desired species composition within oak woodland, meadows, grasslands, and shrublands. In addition, within the Uneven-aged Timber Area, the BLM would retain oaks established prior to 1850. Under Alternative B, the BLM would manage mixed hardwood/conifer communities outside of the Harvest Land Base to maintain and enhance oak persistence and structure. Since oak species may be a minor component of mixed hardwood/conifer

communities, they are likely to die off over time without management to prevent conifers from shading them out. Under Alternative B, the BLM would actively manage forest stands for the persistence of these species. Under the Proposed RMP across all land use allocations, the BLM would manage mixed hardwood/conifer communities to maintain and enhance oak consistent with other management direction for the land use allocation. The BLM would also retain oaks greater than 24" DBH, except for safety or operational reasons in the dry Late-Successional Reserve and the Uneven-aged Timber Area sub-allocation of the Harvest Land Base.

Timber Harvest and other Vegetation Management

The two ESA-listed species that occur within forest and woodland habitat, Kincaid's lupine and Gentner's fritillary, have known sites within the Harvest Land Base under the alternatives and the Proposed RMP. More sites of these species occur within the Harvest Land Base under all of the action alternatives and the Proposed RMP than under the No Action alternative. However, the BLM would conduct pre-disturbance surveys and apply the same conservation measures for these ESA-listed species under all alternatives and the Proposed RMP, regardless of land use allocation. Therefore, the species-specific protections for these species would avoid adverse effects from timber harvest.

Under the No Action alternative and Alternatives A, B, and C, and the Proposed RMP, timber harvest would not directly affect sites of Bureau Sensitive plants, including lichens and bryophytes, and their occupied habitat within the Harvest Land Base, because the BLM would conduct pre-disturbance surveys and apply conservation measures. These conservation measures would be sufficient to protect sites based on past implementation of these measures. The known Bureau Special Status and Bureau Strategic plant and fungi sites that would occur within the Harvest Land Base under each alternative and the Proposed RMP are listed in **Table 3-112**. The BLM and U.S. Forest Service have not reviewed the status of any species under the adaptive management process of the Survey and Manage measure since 2003. Some of the Survey and Manage species have had a very large increase in the number of known sites, as reflected in this table, and would likely be removed from Survey and Manage list under a current review.

Since fungi are difficult to detect even with multiple visits and the BLM cannot delineate their occupied habitat, it is possible that timber activities could affect some Bureau Sensitive fungi sites under all alternatives and the Proposed RMP. However, there is no basis for predicting a difference in effects between the No Action alternative and Alternatives A, B, and C, and the Proposed RMP. Under Alternative D, Bureau Sensitive plant and fungi known sites would receive protection within the Harvest Land Base on O&C lands only when protection measures do not conflict with sustained-yield timber production. In addition, since there is no provision for pre-disturbance surveys within the Harvest Land Base under Alternative D, potential habitat would be disturbed and previously unknown sites would be affected and potentially lost, contributing to the loss of genetic diversity. However, the majority of the decision area is allocated to reserves under Alternative D, which would limit this potential effect to the population as a whole.

Table 3-112. Bureau Special Status and Bureau Strategic plant and fungi sites within the Harvest Land Base

Alternative /Proposed RMP	Taxa Group	ESA Endangered	ESA Threatened	Bureau Sensitive	Bureau Strategic	Total Species
No Action	Bryophytes	-	-	10	22	32
	Lichens	-	-	110	300	410
	Vascular Plants	15	1	1,287	9	1,312
	Fungi	-	-	99	219	318
	No Action Totals	15	1	1,506	550	2,072
Alt. A	Bryophytes	-	-	8	6	14
	Lichens	-	-	95	80	175
	Vascular Plants	25	7	490	6	528
	Fungi	-	-	92	44	136
	Alt. A Totals	25	7	687	136	853
Alt. B	Bryophytes	-	-	4	16	20
	Lichens	-	-	75	184	259
	Vascular Plants	54	7	904	6	971
	Fungi	-	-	112	166	278
	Alt. B Totals	54	7	1,095	372	1,528
Alt. C	Bryophytes	-	-	8	20	28
	Lichens	-	-	115	201	316
	Vascular Plants	57	8	893	8	966
	Fungi	-	-	117	172	289
	Alt. C Totals	57	8	1,133	401	1,599
Alt. D	Bryophytes	-	-	10	25	35
	Lichens	-	-	122	224	346
	Vascular Plants	46	8	1,066	7	1,127
	Fungi	-	-	101	102	203
	Alt. D Totals	46	8	1,299	358	1,711
PRMP	Bryophytes	-	-	6	9	15
	Lichens	-	-	85	15	100
	Vascular Plants	50	12	824	18	904
	Fungi	-	-	98	219	317
	PRMP Totals	50	12	1,013	261	1,336

There are 2,719 known Bureau Sensitive, Bureau Strategic, and Survey and Manage fungi sites within the decision area. Under all alternatives and the Proposed RMP, the majority of known sites of rare fungi would be within reserve land use allocations.

Under the No Action alternative, the BLM would continue to implement the Survey and Manage measures to conduct pre-disturbance surveys and protect known sites for the Survey and Manage species. Most Survey and Manage plant and fungi species would have sufficient habitat to maintain stable populations under the No Action alternative (USDA FS and USDI BLM 2000). In addition, Mature and Structurally-complex forest habitats for Survey and Manage plant and fungi species would increase under the No Action alternative in the decision area.

Under all action alternatives and the Proposed RMP, species that are Survey and Manage and not included on the Bureau Sensitive species list would receive no specific protections. The number of unprotected sites would vary: Alternative A would have the fewest sites within the Harvest Land Base, and Alternative C would have the most (**Table 3-113**). Unless these sites co-occur with Bureau Sensitive species, timber harvest would affect these sites.

Table 3-113. Survey and Manage plant and fungi species sites within the Harvest Land Base that are not also Bureau Sensitive/Bureau Strategic

Alternative/ Proposed RMP	Taxa Group	Survey and Manage Species That Are Not Also Sensitive or Strategic (Number of Sites)	Known BLM Sites Within HLB (Percent)
No Action	Bryophytes	3	3%
	Lichens	1,133	40%
	Vascular Plants	277	39%
	Fungi	2,006	47%
	No Action Totals	3,419	43%
Alt. A	Bryophytes	1	1%
	Lichens	401	14%
	Vascular Plants	60	9%
	Fungi	596	14%
	Alt. A Totals	1,058	13%
Alt. B	Bryophytes	3	3%
	Lichens	709	25%
	Vascular Plants	249	35%
	Fungi	1,079	25%
	Alt. B Totals	2,040	26%
Alt. C	Bryophytes	9	8%
	Lichens	1,026	37%
	Vascular Plants	220	31%
	Fungi	1,434	34%
	Alt. C Totals	2,689	34%
Alt. D	Bryophytes	6	5%
	Lichens	826	30%
	Vascular Plants	228	32%
	Fungi	929	22%
	Alt. D Totals	1,989	25%
PRMP	Bryophytes	3	3%
	Lichens	717	26%
	Vascular Plants	203	29%
	Fungi	1,228	29%
	PRMP Totals	2,151	27%

There is incomplete and unavailable information relevant to the effects of the action alternatives and the Proposed RMP on Survey and Manage species. With complete and species-specific survey information on the location of habitat and species sites for all Survey and Manage species, the BLM would be able to analyze the effects of all alternatives and the Proposed RMP on Survey and Manage species and compare

those effects to the No Action alternative, which would continue to implement the Survey and Manage measure. However, the BLM lacks complete and species-specific survey information for most Survey and Manage species (USDA FS and USDI BLM 2004, pp. 108–109). It would be exorbitantly expensive and time-consuming to conduct random surveys across the decision area for all Survey and Manage species. Consistent with Council on Environmental NEPA regulations at 43 CFR 1502.22, this analysis summarizes the information that is currently available on the effects of the alternatives and the Proposed RMP on Survey and Manage species. The 2004 Final SEIS to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines (USDA FS and USDI BLM 2004, pp. 141–183) and the 2007 Final Supplement to the 2004 SEIS (USDA FS and USDI BLM 2007, pp. 162–244) analyzed the removal of Survey and Manage measures for known site management and pre-disturbance surveys. The species descriptions and discussions of known site management and pre-disturbance surveys from those analyses are incorporated here by reference. The U.S. District Court in *Conservation Northwest et al. v. Rey et al.* (Case No. C08-1067-JCC) found that the analysis of effects to species in the 2004 Final SEIS and the 2007 Final SEIS was insufficient to support the conclusion that the Survey and Manage measure was no longer necessary to meet the goals of the Northwest Forest Plan. The discussions of the 2004 SEIS and 2007 SEIS are incorporated by reference here only to the extent those portions of the analyses were not found invalid by the court. Nevertheless, the information in the 2004 SEIS and 2007 SEIS does present analysis based on the incomplete survey information available that concludes that most Survey and Manage species would have sufficient habitat to support stable populations under the No Action alternative without the Survey and Manage measure.

Even in the absence of the Survey and Manage measure, habitat and sites of species that fall within the reserve system would receive some protection. Not all sites within reserve land use allocations would necessarily be protected by buffers comparable to the No Action alternative. However, management actions in reserves could occur within these sites, but there would be a minimal effect to the species based on the type and intensity of allowable treatments. Under all action alternatives and the Proposed RMP, management direction in reserves would largely limit stand treatments to thinning to improve habitat conditions and fuels treatments to reduce the risk of uncharacteristic wildfire, and would generally preclude stand treatments that would remove or degrade Mature and Structurally-complex habitat (**Appendix B**). Compared to the No Action alternative, all action alternatives and the Proposed RMP allocate more acres to the Late-Successional Reserve, which the Northwest Forest Plan expected to contribute to meeting the needs of late-successional and old-growth related species (USDA Forest Service and USDI BLM 2000, pp. 201–202). To the extent that the No Action alternative without the Survey and Manage measure would provide sufficient habitat for Survey and Manage species, as analyzed in the 2004 SEIS, the action alternatives and the Proposed RMP would provide more habitat within the Late-Successional Reserve.

The Survey and Manage species are species associated with “late-successional and old-growth forests” (USDA FS and USDI BLM 2000, p. 8; USDA FS and USDI BLM 2004, p. 30). To the extent that older and more structurally-complex multi-layered conifer forests as defined in the action alternatives and the Proposed RMP encompass the ‘late-successional and old-growth forests’ that provide habitat for Survey and Manage species, all action alternatives and the Proposed RMP reserve such forests from timber harvest within the Late-Successional Reserve. Under all action alternatives and the Proposed RMP, there would be no timber harvest of older and more structurally-complex multi-layered conifer forests, although each alternative and the Proposed RMP use a different definition to identify older and more structurally-complex multi-layered conifer stands. Therefore, all of the action alternatives and the Proposed RMP, in contrast to the No Action alternative, would protect from timber harvest the forest conditions with which the Survey and Manage species are most closely associated.

In addition to reserving existing older and more structurally-complex multi-layered conifer forests, the acreage of Mature and Structurally-Complex forest (which is a broader category) in the decision area

would increase under all alternatives and the Proposed RMP. Therefore, the amount of habitat for Survey and Manage plant and fungi species would increase under all alternatives and the Proposed RMP.

The current Survey and Manage list (USDI BLM 2014) includes 247 plant and fungi species. However, only 143 of these species have documented occurrences in the decision area. Many of the remaining 104 species are unlikely to occur on BLM-administered lands because suitable habitat is not present. **Table N-3** in **Appendix N** includes all 247 Survey and Manage plant and fungi species, whether they are documented on BLM-administered lands, and whether they are also on the Bureau Sensitive or Bureau Strategic lists.

In the 2007 SEIS, the BLM evaluated whether there would be sufficient habitat available for each Survey and Manage species to maintain the species if the Survey and Manage mitigation measure was removed from the existing Resource Management Plans (USDA Forest Service and USDI BLM, 2007). **Table N-3** in **Appendix N** indicates the plant and fungi species that the BLM determined in the 2007 analysis would have either insufficient habitat due to management or there was insufficient information to determine an outcome. These include 46 species – 28 fungi, 6 bryophytes, and 12 lichens. Only 35 of these species occur in the decision area, of which 5 are Bureau Sensitive and 30 are Bureau Strategic. For the 35 species that occur on the decision area, the BLM evaluated the percentage of known sites that would occur within a reserve allocation under each alternative and the Proposed RMP. Except for *Sowerbyella rhenana* in Alternative C and *Stenocybe clavata* in Alternative D, all of the 35 species would have an equal number or more known sites in a reserve allocation than under the No Action alternative (**Table 3-114**). As described above, habitat and sites of species that fall within the reserve system under the action alternatives and Proposed RMP would generally be protected. Overall, 45 percent of known sites of these 35 species would fall within reserve allocations under the No Action alternative, the fewest of any alternative and the Proposed RMP.⁸⁵ Under the Proposed RMP, 88 percent of known sites of these species would fall within reserve allocations, more than any alternative. One species, *Tholurna dissimilis*, is known from only two sites on BLM-administered lands, both of which would occur within the Harvest Land Base under all alternatives and the Proposed RMP. Given the difficulties of comparing directly the effects of the alternatives and the Proposed RMP to the outcomes described in the 2007 SEIS and the very few sites of *Tholurna dissimilis* in the decision area, it is not possible to make any conclusion about effect of allocating two known sites on BLM-administered lands to the Harvest Land Base. More generally, as with all Survey and Manage species, all action alternatives and the Proposed RMP, would protect from timber harvest the forest conditions with which the Survey and Manage species are most closely associated.

⁸⁵ Under the No Action alternative, sites not in reserve allocations would be protected consistent with the Survey and Manage measure. To the extent that the percentage of sites in reserve allocations indicates the extent of habitat for these species in reserve allocations, the No Action alternative would provide less habitat within reserve allocations than the action alternatives or the Proposed RMP.

Table 3-114. Percent of known BLM sites within reserve allocations under the alternatives and the Proposed RMP for Survey and Manage species found to have uncertain outcomes in the 2004 FSEIS

Species	No Action (Percent)	Alt. A (Percent)	Alt. B (Percent)	Alt. C (Percent)	Alt. D (Percent)	PRMP (Percent)
<i>Albatrellus ellisii</i>	38%	100%	48%	50%	86%	49%
<i>Calicium adaequatum</i>	100%	100%	100%	100%	100%	100%
<i>Calicium adspersum</i>	100%	100%	100%	100%	100%	100%
<i>Clavariadelphus ligula</i>	16%	65%	38%	41%	48%	43%
<i>Clavariadelphus sachalinensis</i>	26%	94%	78%	88%	92%	82%
<i>Collema nigrescens</i>	75%	96%	86%	84%	82%	90%
<i>Cudonia monticola</i>	50%	77%	98%	98%	77%	98%
<i>Gomphus kauffmanii</i>	59%	100%	67%	63%	82%	80%
<i>Gyromitra californica</i>	18%	45%	27%	18%	36%	27%
<i>Kurzia makinoana</i>	100%	100%	100%	100%	100%	100%
<i>Microcalicium arenarium</i>	33%	67%	100%	100%	100%	100%
<i>Nephroma occultum</i>	37%	100%	98%	98%	98%	98%
<i>Phaeocollybia californica</i>	50%	82%	74%	66%	72%	77%
<i>Phaeocollybia dissiliens</i>	38%	81%	86%	48%	76%	90%
<i>Phaeocollybia fallax</i>	48%	79%	86%	70%	73%	86%
<i>Phaeocollybia piceae</i>	41%	79%	84%	65%	69%	89%
<i>Phaeocollybia pseudofestiva</i>	36%	89%	88%	66%	83%	91%
<i>Phaeocollybia scatesiae</i>	68%	81%	81%	65%	84%	83%
<i>Phaeocollybia sipei</i>	50%	82%	89%	52%	72%	91%
<i>Phaeocollybia spadicea</i>	50%	80%	81%	62%	67%	84%
<i>Polyozellus multiplex</i>	100%	100%	100%	100%	100%	100%
<i>Pseudocyphellaria rainierensis</i>	90%	100%	100%	98%	100%	100%
<i>Ramaria amyloidea</i>	100%	100%	100%	100%	100%	100%
<i>Ramaria araiospora</i>	42%	80%	76%	60%	83%	84%
<i>Ramaria aurantiisiccescens</i>	31%	74%	68%	57%	86%	84%
<i>Ramaria cyaneigranosa</i>	34%	72%	65%	55%	80%	80%
<i>Ramaria largentii</i>	50%	100%	100%	100%	100%	100%
<i>Ramaria rubrievanescens</i>	36%	78%	76%	71%	84%	87%
<i>Ramaria stuntzii</i>	40%	76%	71%	53%	75%	79%
<i>Sarcodon fuscoindicus</i>	33%	67%	43%	43%	71%	43%
<i>Sowerbyella rhenana</i>	48%	63%	48%	36%	58%	54%
<i>Sparassis crispa</i>	47%	84%	98%	84%	79%	99%
<i>Stenocybe clavata</i>	96%	97%	98%	98%	78%	98%
<i>Tholurna dissimilis</i>	-	-	-	-	-	-
Overall	45%	82%	83%	69%	78%	88%

In summary, all action alternatives and the Proposed RMP would remove the Survey and Manage measure that requires pre-disturbance surveys and protection of known sites. There is incomplete and unavailable information relevant to the effects of the action alternatives and the Proposed RMP on Survey

and Manage species. The 2007 SEIS provides an incomplete analysis, in that survey and species data for Survey and Manage species was (and remains) incomplete, and in that the 2007 SEIS did not include information on species and sites that has since been identified over the past decade. Nevertheless, the analysis in the 2007 SEIS supports the conclusion that most Survey and Manage species would have sufficient habitat to support stable populations under the No Action alternative without the Survey and Manage measure.

It is not possible to compare directly the effects of the alternatives and the Proposed RMP to the outcomes described in the 2007 SEIS. The determinations about species outcomes in the 2007 SEIS were based on the evaluation of experts and were more qualitative than quantitative in nature. These qualitative expert opinions were based on assumptions of continuing application of the land use allocations of the Northwest Forest Plan, and are therefore only directly applicable to the No Action alternative. Finally, the conclusion in the 2007 SEIS of “insufficient habitat to support stable populations in a portion of the Northwest Forest Plan area” did not specify the areas of “insufficient habitat” beyond broad geographic areas. Thus, these general and qualitative conclusions are difficult to re-evaluate in light of these alternatives and the Proposed RMP, which would alter only management on BLM-administered lands in Oregon (USDA FS and USDI BLM 2007, pp. 118–119).

Furthermore, the threshold determination of whether there is sufficient habitat to support stable populations of the Survey and Manage species is not necessary to provide a “hard look” in this Proposed RMP/Final EIS at the environmental effects of the alternatives and the Proposed RMP. The determination related to stable populations is tied to the species viability goal of the Northwest Forest Plan, which is not part of the purpose for this RMP revision. The Survey and Manage measures were identified in the Final Supplemental EIS for the Northwest Forest Plan as a potential mitigation measure to increase the likelihood of achieving “viable populations, well-distributed across their current range, of species known (or reasonably expected) to be associated with old-growth forest conditions” (USDA FS and USDI BLM, 1994, p. 3&4-129) – a goal which was founded on a U.S. Forest Service planning regulation which, as explained above, did not and does not apply to the BLM. Finally, to the extent that the Survey and Manage measures were intended to prevent disruptions to sustained-yield timber production that would result from future listing of species under the ESA, the Survey and Manage measures are unnecessary under the action alternatives and the Proposed RMP (see the Relationship of the RMPs to Other Plans and Programs section of Chapter 1).

Although it is not possible to compare directly the effects of the alternatives and the Proposed RMP on Survey and Manage species to the outcomes described in the 2007 SEIS, it is possible to evaluate where known sites occur and how habitat would change over time under the alternatives and the Proposed RMP. For the 35 species that occur within the decision area and that the 2007 SEIS concluded would have either insufficient habitat due to management or there was insufficient information to determine an outcome, 88 percent of known sites would fall within the reserve land use allocations under the Proposed RMP, and all action alternatives would have a higher percentage of known sites in the reserve land use allocations than the No Action alternative. All action alternatives and the Proposed RMP allocate more acres to the Late-Successional Reserve than the No Action alternative, protect older and more structurally-complex multi-layered conifer forests, and result in an increase in Mature and Structurally-complex forest. As a result (as can best be determined given the incomplete information available to the BLM), all action alternatives and the Proposed RMP would protect most existing habitat for Survey and Manage species, would protect most known sites within the reserve allocations, and would result in an increase in the amount of habitat for Survey and Manage species.

A sub-group of more than 25 lichen, bryophyte, and fungi species (including Bureau Special Status Species and Survey and Manage species that are not Bureau Special Status Species) is associated with habitat conditions and biological legacies (e.g., green trees, coarse wood, and snags) of mature and

structurally-complex forests. Important habitat components include coarse wood, snags, and specific host species. In general, the risk to these species would increase as the level of timber harvest activities would increase, biological legacies would be lost during harvest, and timber harvest would reduce interior habitat conditions in the Harvest Land Base over time.

The overall acreage of timber harvest during the first decade would be largest under Alternative C, with 178,429 acres of total timber harvest, and only slightly lower under Alternative B, with 173,633 acres of timber harvest (**Table 3-115**). Alternative D, the No Action alternative, and the Proposed RMP would have substantially lower acreage of total timber harvest, with 139,557 acres, 157,041 acres, and 155,635 acres, respectively. Alternative A would have the lowest acreage of total timber harvest, with 98,113 acres in the first decade. Included in the totals for Alternative A and the Proposed RMP are acres of thinning without timber removal, which would be much less likely to have adverse effects on rare plant and fungi habitat than other timber harvest methods, although it is not possible to quantify that difference in this analysis. Thinning without timber removal would include 12,957 acres under Alternative A and 2,215 acres under the Proposed RMP.

Table 3-115. Total acres of timber harvest in the first decade (2013–2023).

Harvest Type	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)	PRMP (Acres)
Clearcut	-	42,200	-	83,691	-	-
Salvage	2,539	884	2,642	3,587	1,640	2,258
Selection	-	26,757	68,580	45,403	103,059	58,641
Thinning	110,570	15,315	71,700	45,748	14,901	61,406
Thinning without Timber Removal	-	12,957	-	-	-	2,215
Variable Retention Harvest	43,932	-	30,711	-	19,957	31,115
Timber Harvest Totals	157,041	98,113	173,633	178,429	139,557	155,635

Under Alternatives A and C, forest management would include clearcuts (i.e., regeneration harvest with no retention) in the High Intensity Timber Area, and comprise 1.7 percent and 3.4 percent, respectively, of the decision area. Within the first decade, almost twice as many acres would be clearcut in Alternative C than in Alternative A (**Table 3-115**). Early successional Bureau Special Status species (e.g., wayside aster and tall bugbane) would benefit from the disturbance if they occur within colonization distance of the clearcut. However, the BLM would reforest these clearcuts after harvest, typically within five years of harvest, limiting the duration of any habitat benefit to early successional species on each harvest unit.

The impacts from salvage harvest would generally be the same as harvest of live trees. However, since the BLM would likely not be able to conduct pre-disturbance surveys for salvage harvest following disturbances such as wildfire, undiscovered sites would likely be affected, making the effects of salvage similar among all alternatives and the Proposed RMP. Salvage harvest could remove or damage live trees that are a refuge for rare plant and fungi species. Salvage harvest would primarily affect plant and fungi species in conifer and mixed evergreen forests, riparian and aquatic, serpentine areas, and oak and hardwood habitats. In all alternatives and the Proposed RMP, salvage would take place in the Harvest Land Base after a high- or moderate-severity wildfire event. In Alternatives A, B, and D, and the Proposed RMP, salvage would not take place in the Late-Successional Reserve, except for resource protection and safety objectives. Only in Alternative C would timber salvage occur in the Late-Successional Reserve for economic objectives. While it is not possible to predict the locations and amount of salvage harvest that would occur over the next 10 years, the BLM forecasts that salvage harvest would

occur on a relatively small acreage under all alternatives and the Proposed RMP, approximately 1–2 percent of the total acres of timber harvest.

The No Action alternative and Alternative C would reduce habitat quality for rare plants and fungi because of fertilization. The No Action alternative would include almost twice the acreage of fertilization as Alternative C. The No Action alternative would reduce habitat quality for rare plants and fungi on 12,052 acres in the first decade, and Alternative C would reduce habitat quality on 6,854 acres. Most of the fertilization acres would occur within very young stands that are within Early Successional or Stand Establishment structural stages. However, the No Action alternative would include a small acreage of fertilization within Mature and Structurally-complex stands in the first decade, increasing the likelihood of reducing habitat quality for rare plants and fungi associated with that habitat. Alternatives A, B, and D would not include any fertilization and thus would not reduce habitat quality for rare plants and fungi. The Proposed RMP would allow for the manual application of fertilizers where necessary to enhance vigor and growth of desired vegetation within the Harvest Land Base; however, any fertilization would have to be compatible with management direction in the Proposed RMP to manage Bureau Special Status Species to maintain and enhance their persistence and to maintain natural species composition. As a result, it is unlikely that fertilization would reduce habitat quality for rare plants and fungi under the Proposed RMP, especially since manual application would limit the acreage involved.

Under all alternatives and the Proposed RMP, a majority of the BLM-administered lands would be allocated to reserves, where Mature and Structurally-complex stands would be retained and additional habitat would develop. All action alternatives and the Proposed RMP allocate more acres to Late-Successional Reserve than the No Action alternative, which would benefit rare plants and fungi associated with Mature and Structurally-complex stands. The acreage of Structurally-complex stands would increase under all alternatives and the Proposed RMP, as would the acreage of stands older than 120 years. Within the Harvest Land Base, the abundance of Structurally-complex stands would increase substantially under the No Action alternative, Alternatives B and D, and the Proposed RMP, with the largest proportional increase in Alternative D. Additionally, a substantial amount of forest stands with biological legacies would remain on BLM-administered lands in the Harvest Land Base, except for the High Intensity Timber Areas under Alternatives A and C. The abundance of Structurally-complex stands would not increase within the Harvest Land Base under Alternatives A and C.

The acreage of potential fungi habitat (i.e., Mature Multi-layered Canopy and Structurally-complex stands) within the Harvest Land Base would vary (**Table 3-116**). Alternative A would have the fewest potential fungi habitat acres within the Harvest Land Base because most of this habitat would be allocated to reserves. The Proposed RMP would have the second lowest acreage of potential fungi habitat within the Harvest Land Base. The No Action alternative would have the largest acreage of potential fungi habitat within the Harvest Land Base; however, most of this habitat would be subject to the Survey and Manage equivalent-effort survey requirement, and the BLM would protect new sites. All of the Sensitive and Strategic fungi sites within the Harvest Land Base are also Survey and Manage species. Of the action alternatives and the Proposed RMP, Alternative C would have the largest number of potential fungi habitat acres within the Harvest Land Base, followed by Alternatives D and B. The BLM would conduct pre-disturbance surveys under Alternatives A, B, and C, and the Proposed RMP for Special Status Species, and the BLM would provide conservation measures for new sites found. As noted above, the effectiveness of fungi surveys is limited, because fungi are difficult to detect even with multiple visits. The BLM would not conduct surveys under Alternative D, and undetected sites would be affected by timber harvest.

Table 3-116. Bureau Special Status fungi potential habitat within the Harvest Land Base

Alternative/ Proposed RMP	Fungi Habitat within the Harvest Land Base (Acres)
No Action	255,125
Alt. A	40,140
Alt. B	145,081
Alt. C	156,219
Alt. D	150,103
PRMP	91,428

Designation of Reserve Allocations

As noted earlier, all of the action alternatives and the Proposed RMP would designate more acres of land to reserve allocations (e.g., Late-Successional Reserve and Riparian Reserve). For comparison, **Table 3-117** lists the number of known Bureau Special Status vascular plant sites within the Late-Successional Reserve and Riparian Reserve. The fewest number of sites in reserves would be in the No Action alternative, and the largest number would be in Alternative A. The Proposed RMP and Alternatives C and D would have similar numbers of sites in reserves.

Where Gentner’s fritillary and Kincaid’s lupine occur within forested communities, they are generally on the edge or in openings. Alternative A would include the largest number of sites for Gentner’s fritillary and Alternatives B, C, and D, and the Proposed RMP for the largest number of sites for Kincaid’s lupine.

Table 3-117. Bureau Special Status vascular plant sites within reserve allocations

Alternative/ Proposed RMP	Bureau Special Status Vascular Plants (Known Sites in Reserves)	Gentner’s Fritillary (Known Sites in Reserves)	Kincaid’s Lupine (Known Sites in Reserves)
No Action	1,679	40	7
Alt. A	2,758	95	8
Alt. B	1960	41	10
Alt. C	2,138	50	10
Alt. D	2,108	65	10
PRMP	2,128	46	10

While the overall management objectives for reserves are consistent across action alternatives and the Proposed RMP, the management direction varies. The No Action alternative would allow for management activities within reserves to promote recovery of ESA-listed species. The Proposed RMP would conduct integrated vegetation management to restore and maintain habitat for Bureau Special Status Species. The action alternatives would not conduct integrated vegetation management to restore and maintain habitat for Bureau Special Status Species within reserve allocations. Plant species that require open growing conditions would likely decline in the reserve allocations under the action alternatives. Under the No Action alternative, the BLM would only manage habitat for ESA-listed species within reserves, and Bureau Sensitive plant species would decline in the reserve allocations. The

Proposed RMP would maintain and enhance habitat for Bureau Special Status plant species within reserve allocations.

Livestock Grazing

Under the No Action alternative, livestock grazing would be available on 495,190 acres in the Coos Bay District, the Klamath Falls Field Office, and the Medford District. However, 140,380 acres are currently vacant and have not been subject to livestock grazing for several years. The vacant allotments would remain available for livestock grazing under the No Action alternative, and livestock grazing could occur in these areas in the future.

Alternatives A, B, and C, and the Proposed RMP would close the vacant allotments to livestock grazing, but keep all active allotments open to livestock grazing. Since these vacant allotments are not currently grazed, there would be no immediate difference in effects from the No Action alternative. However, closing the vacant allotments would preclude potential future livestock grazing impacts to rare plants and fungi.

Under the No Action alternative, Alternatives A, B, and C, and the Proposed RMP, livestock grazing would continue in active allotments. There are 571 Bureau Special Status plant and fungi sites within active livestock grazing allotments, including Gentner’s fritillary, 35 Bureau Sensitive vascular plants, 2 Bureau Sensitive bryophytes, and 3 Bureau Sensitive fungi. The large majority of these sites (98 percent) are vascular plants. As described in the Background section, livestock grazing can have both positive and negative effects to vascular plants. As described in the Livestock Grazing section of this chapter, the BLM conducts periodic rangeland health assessments. The BLM has found that 12 allotments in the decision area are not meeting rangeland health standards due to livestock grazing. Of the 12 allotments, there are 5 that contain Bureau Sensitive vascular plant sites, as shown in **Table 3-118**.

Table 3-118. Bureau Sensitive plants within allotments not meeting rangeland health standards due to livestock grazing

District/ Field Office	Allotment	Sensitive Plants within Allotment
Klamath Falls	Dixie	<i>Limnanthes floccosa</i> ssp. <i>bellingermana</i>
Medford	Brownsboro Park	<i>Plagiobothrys greenii</i> , <i>Plagiobothrys austiniae</i> , <i>Ranunculus austrooreganus</i>
	Canal	<i>Ranunculus austrooreganus</i>
	Conde Creek	<i>Scirpus pendulus</i> , <i>Nemocladius capillaris</i> , <i>Hackelia bella</i>
	Cove Creek	<i>Limnanthes floccosa</i> ssp. <i>bellingermana</i> , <i>Poa rhizomata</i>

BLM botanists have observed livestock directly uprooting and trampling individuals of *Limnanthes floccosa* ssp. *Bellingermana* and wallowing in their vernal pool habitat (J. Blanchard, 2015, personal communication). Conversely, botanists have noted an increase in invasive competitive plants, such as yellow starthistle and North Africa grass, in habitat for *Limnanthes floccosa* ssp. *bellingermana* in response to the removal of livestock. Due to a wildfire in 2014, the Dixie allotment is unavailable to livestock grazing for one to two years. There are fences within the allotment to protect meadows and springs from livestock grazing. Under the No Action alternative, Alternatives A, B, and C, and the Proposed RMP, the BLM would adjust the grazing season of use to minimize direct impacts to the species from livestock.

As is true for most allotments, the livestock grazing effects on plants are highly variable across the Brownsboro Park allotment. Botanists have periodically monitored the allotment and found that, while the grasslands are dominated by nonnative grasses, particularly medusahead and yellow starthistle, the three Bureau Sensitive plant species within the allotment have not been directly impacted by livestock (M. Wineteer, 2015, personal communication). Botanists have not observed any livestock grazing impacts on the Bureau Sensitive plant species within the Canal, Conde Creek, or Cove Creek allotments (B. Wender, 2015, personal communication).

Currently, 62 sites of Gentner's fritillary, ranging in size from 1 plant to approximately 30 plants, occur in 8 active allotments. Another 55 Gentner's fritillary sites occur within 8 vacant allotments. Despite the presence of this species within active allotments in the No Action alternative, Alternatives A, B, and C, and the Proposed RMP, there would be no direct negative impacts to this species from livestock grazing because there has been no evidence that livestock eat Gentner's fritillary or cause measurable trampling impacts (M. Wineteer, BLM, personal communication, 2014). Livestock tend to concentrate in areas with water, while Gentner's fritillary generally occurs on steeper slopes outside of riparian areas.

There is little research on the effects of livestock grazing on fungi in the planning area. It is likely that livestock may trample and even consume sporophytes, but these impacts would generally be minor and would not affect the long-term viability of fungi since most of the hyphal mat is underground. Livestock may trample bryophytes that grow on the soil surface. One of the Bureau Sensitive bryophytes that occurs within an active grazing allotment, *Meesia uliginosa*, grows on the soil surface in wetland habitat. The BLM has not observed any livestock grazing impacts to this species.

Alternative D would close all current active and vacant allotments. Elimination of livestock grazing under Alternative D would have both positive and negative effects for the known Bureau Special Status plant and fungi species that occur within active allotments. Elimination of livestock grazing would reduce direct consumption of these species and trampling, but would also result in increased competition for resources from non-native plant species, including noxious weeds, and have an increased accumulation of fuels, increasing the risk of wildfire. The specific effects of the elimination of livestock grazing under Alternative D on each of the Special Status plant and fungi species would depend on species-specific and site-specific factors. For example, almost 99 percent of the currently active allotments with Gentner's fritillary locations are in the Improve management category, meaning that the current resource condition does not meet Rangeland Standards and Guidelines. While livestock do not directly affect Gentner's fritillary, removing livestock might improve adjacent habitat for the species and allow for potential expansion. Nevertheless, given the absence of evidence that livestock grazing is affecting Gentner's fritillary, there are no reasonably foreseeable differences in effects on Gentner's fritillary of eliminating livestock grazing under Alternative D.

ACEC Designation

Under the No Action alternative, the BLM would maintain the designation of 50,073 acres of ACECs. In addition, under the No Action alternative, the BLM would continue to provide interim management to protect relevant and important values on 54,310 acres of potential ACECs. As a result, the No Action alternative would effectively manage 104,383 acres to maintain relevant and important values and thereby protect rare plant and fungi species. Alternatives A and D would designate the most acres of ACECs, 94,545 and 94,376 acres, respectively. The Proposed RMP would designate 93,515 acres. Alternatives B and C would designate the fewest acres: 88,448 and 87,044 acres, respectively (see the ACEC section in this chapter).

Within the 104,383 acres of existing designated and potential ACECs, there are approximately 650 known sites of Bureau Special Status plants and fungi within these areas and 284 sites of Survey and Manage

species. However, not all acres of ACECs contain Bureau Special Status plants and fungi or botanical Survey and Manage species. Additionally, management direction for land use allocations other than the Harvest Land Base would effectively protect these existing sites whether or not the ACEC designation were applied under any alternative or the Proposed RMP. As such, potential loss of sites for Bureau Special Status plants and fungi or botanical Survey and Manage species would only occur where an ACEC designation was not applied due to conflicts with sustained-yield timber harvest on O&C lands. The action alternatives would present potential loss of sites ranging from none under Alternative D, one under Alternative A, six under Alternative B, and nine under Alternative C. Under the Proposed RMP, no sites occur within ACECs that are not designated due to conflict with sustained-yield timber production, and no sites would potentially be lost from any ACECs not being designated.

As a result, Alternative D and the Proposed RMP would have similar effects and provide the most benefit to rare plant and fungi species through ACEC designation. Alternative A would designate more acres as ACECs than the Proposed RMP, but one site would be at risk for potential loss and benefits to rare plant and fungi species would be somewhat less than Alternative D and the Proposed RMP. Alternatives B and C would have similar effects in the amount of acres not designated as ACECs and provide the least benefit to rare plant and fungi species through ACEC designation, with Alternative B providing slightly more protection than Alternative C. Even though the No Action alternative would designate the fewest acres of ACECs, it would provide the greatest benefit to rare plant and fungi species because of the protection provided by interim management of potential ACECs.

Road Construction

As described earlier, road construction directly removes vegetation, fragments habitat, increases water runoff and erosion immediately adjacent to the road, provides a conduit for noxious and invasive plants to spread, and provides increased access by humans and wildlife that may further affect habitat for rare plants and fungi. New road construction would generally avoid directly affecting rare plant and fungi sites, because the BLM would conduct surveys prior to construction and would avoid or minimize any site found if alternate routes are available. However, road construction could directly affect some sites and indirectly affect sites in proximity to roads by increased access and spread of noxious and invasive vegetation. Although it is not possible at this scale of analysis with the data available to determine whether the estimated new road construction under each alternative and the Proposed RMP would occur within potential or occupied habitat for rare plants and fungi, the acreage of estimated habitat removed or disturbed by road construction provides a relative evaluation of the effects of road construction on rare plants and fungi. Alternative C would result in the largest mileage of new road construction in the first decade (**Table 3-119**). This mileage of new road construction would result in the removal or disturbance of 3,819 acres of habitat. Alternative D would result in the least mileage of new road construction in the first decade and 1,318 acres of habitat removed or disturbed. The Proposed RMP would potentially remove or disturb more habitat acres than Alternatives D and A, but less than the No Action alternative and Alternatives B and C.

Table 3-119. Road construction miles for the first 10 years of implementation

Alternative/ Proposed RMP	Total New Road Construction (Miles)	Habitat Removed or Disturbed (Acres)
No Action	637	3,481
Alt. A	299	1,642
Alt. B	531	2,897
Alt. C	699	3,819
Alt. D	240	1,318
PRMP	437	2,391

Public Motorized Access Designations

Under the No Action alternative, approximately 85,000 acres (3.3 percent) of the decision area would remain designated as *closed* for public motorized access, and approximately 330,400 acres (12.8 percent) would remain designated as *open* for public motorized access. On the remaining 83.9 percent, public motorized vehicle use would continue to be *limited* to existing or designated roads and trails. On some portion of the 330,400 acres designated as *open* for public motorized access, habitat removal and disturbance has been occurring and would continue to occur. It is not possible for the BLM to determine at this scale of analysis with the data available how much of the 330,400 acres designated as *open* for public motorized access are actually experiencing habitat removal or disturbance or would in the future. However, within areas designated as *open* for public motorized access, such effects could occur throughout the open area without future analysis or decision-making by the BLM.

Under all action alternatives and the Proposed RMP, no areas would be designated as *open* for public motorized access. The BLM would designate the entirety of the decision area as either *closed* or *limited* for public motorized access. As such, there would be no additional habitat removal or disturbance from public motorized vehicle use measurable at this scale of analysis with the data available under any of the action alternatives or the Proposed RMP.

Mineral Development

The No Action alternative would maintain the closure of the largest acreage to salable mineral material disposal, at 319,430 acres closed. The action alternatives and the Proposed RMP would close from 232,408 acres under Alternative A to 249,241 acres under the Proposed RMP. Although there is no basis for evaluating whether closed areas would have been developed if not closed and whether such areas would have included rare plants and fungi, these acreages provide an approximate evaluation of the level of protection for rare plants from the effects of salable mineral material disposal under the alternatives and the Proposed RMP.

Under the No Action alternative, 98,400 acres would remain withdrawn from locatable mineral entry. All of the action alternatives and the Proposed RMP would recommend for withdrawal more than double the acreage of the existing withdrawals, totaling 266,472 acres under Alternative B, 306,878 acres under Alternative D, and 307,312 acres under the Proposed RMP. Although there is no basis for evaluating whether these areas recommended for withdrawal would have been developed if not withdrawn and whether such areas would have included rare plants and fungi, these acreages provide an approximate evaluation of the level of protection for rare plants from the effects of locatable mineral development under the alternatives and the Proposed RMP.

There are 1,292 active mining claims in the decision area, the majority of which occur within the Medford District, which has a disproportionate percentage of rare plant and fungi sites. There is one pending Plan of Operation in the French Flat ACEC in the Medford District that would provide protection for Cook's lomatium. The BLM does not have information on whether there are mining claims on areas that include Bureau Sensitive plant sites.

Summary

The No Action alternative would allocate the smallest Late-Successional Reserve, not reserve all Structurally-complex forest, result in the second-largest acreage of timber harvest, result in the second-largest mileage of new road construction, and designate areas as *open* for public motorized access. However, the No Action alternative would require surveys and protection of sites of Survey and Manage species. In total, the No Action alternative would provide specific species protections and would result in an increase in habitat for most rare plant and fungi species, but would provide less benefit overall than most of the action alternatives and the Proposed RMP.

Alternative A would allocate the largest Late-Successional Reserve and would result in the fewest overall acres of habitat disturbance. However, timber harvest in the moist forest would include clear-cutting, which would not provide habitat benefits for rare plant and fungi species associated with Mature and Structurally-complex stands.

Alternative B would allocate the second-largest Late-Successional Reserve and would result in the third-largest amount of habitat disturbance.

Alternative C would result in the most acres of habitat disturbance, and timber harvest in the moist forest would include clear-cutting, which would not provide habitat benefits for rare plant and fungi species associated with Mature and Structurally-complex stands. Alternative C would result in the least increase in Mature and Structurally-complex stands over time.

Alternative D would result in the second-fewest overall acres of habitat disturbance and would result in the largest increase in Mature and Structurally-complex stands over time. However, Alternative D would provide less site protection for rare plants and fungi in the Harvest Land Base than the other alternatives and the Proposed RMP.

The Proposed RMP would result in the third-fewest overall acres of habitat disturbance. The Proposed RMP would provide specifically for the maintenance and enhancement of Bureau Special Status plant species habitat within reserve allocations.

It is not possible to compare directly the cumulative effects of different actions on rare plants and fungi under the alternatives and the Proposed RMP. However, the No Action alternative and Alternative C would generally provide less benefit to rare plants and fungi. Alternatives A, B, and D, and the Proposed RMP would generally provide more benefit to rare plants and fungi.

Issue 2

How would timber harvest and other vegetation management affect oak communities?

Summary of Analytical Methods

The BLM calculated the acres of oak-dominant communities within the planning and decision areas using Gradient Nearest Neighbor (GNN) data (2012). The BLM defined oak-dominant communities as forest types where an oak species is the primary or secondary species. For example, the forest type could consist of Oregon white oak, or of ponderosa pine and California black oak.

The BLM evaluated the effect of timber harvest on oak woodlands based on the percent change in oak basal area in the Harvest Land Base and the entire decision area among the alternatives and the Proposed RMP over 50 years.

Background

Oak communities, including oak woodlands and oak savanna, represent a special habitat within the decision area. While oak species in Oregon are not Bureau Special Status species, their habitat is rare and vulnerable to destruction from development, conversion to conifer forest, and high-intensity wildfire. Oregon white oak (*Quercus garryana*) occurs from Vancouver Island through western Washington, Oregon, and northwest California and in the Sierra Nevada foothills. California black oak (*Quercus kelloggii*) ranges from southern Oregon and throughout California and occurs within the Eugene, Medford, and Roseburg Districts, and the Klamath Falls Field Office. Both Oregon white oak and California black oak may occur within forested stands as a minor component and are often examples of the legacy vegetative community. Oregon white oak is intolerant to shade and relies on the most recent two years of ring growth for water transport. Therefore, it is vulnerable to competition (Gould *et al.* 2011). Prior to European settlement, wildfire and frequent, low-intensity burning by Native Americans limited the extent of coniferous forests and sustained fire-tolerant oak savannah and woodlands (Tveten and Fonda 1999, Devine and Harrington 2006, Gould *et al.* 2011, Klamath Bird Observatory and Lomakatsi Restoration Project 2014). Lack of fire in oak communities has resulted in the encroachment of conifers that rapidly overtop, shade, and crowd out the oaks. In addition, lack of frequent fire has often resulted in the accumulation of heavy fuels, making the reintroduction of fire difficult (see the Fire and Fuels section in this chapter). Releasing Oregon white oaks from overtopping Douglas-fir increases the available soil water content, extending the growing season for the oaks and understory vegetation (Devine and Harrington 2007). Even oaks suppressed for many years respond favorably after release with increased stem diameter growth and the growth of epicormic branches (Devine and Harrington 2006). These changes are most substantial during the first five years after release.

Affected Environment

Oak woodlands and savannas are limited within the planning area. Within the decision area, Oregon white oak woodlands and savannas occur primarily in the Roseburg and Medford Districts and the Klamath Falls Field Office; however, oaks occur in all districts within the decision area. **Table 3-120** lists the acres of oak-dominant communities in the planning area and the decision area within each district.

Table 3-120. Acres of oak-dominant plant communities within the planning and decision areas

District/ Field Office	Oak – All Ownerships (Acres)	Oak – BLM-administered lands (Acres)	Oak Acres on BLM (Percent of Total)
Coos Bay	33,475	1,062	3.17%
Eugene	35,256	1,045	2.96%
Klamath Falls	11,147	3,654	32.78%
Medford	447,900	117,405	26.21%
Roseburg	135,804	12,490	9.20%
Salem	107,882	550	0.51%
Totals	771,464	136,207	17.66%

Environmental Consequences

Under the action alternatives and the Proposed RMP, within the dry forests outside of the Harvest Land Base, the BLM would apply management treatments to maintain or promote desired species composition within oak woodlands, meadows, grasslands, and shrublands. In addition, within the Uneven-aged Timber Area sub-allocation, the BLM would retain oaks established prior to 1850. Under Alternative B, the BLM would manage mixed hardwood/conifer communities outside of the Harvest Land Base to maintain and enhance oak persistence and structure. Since oak species may be a minor component of mixed hardwood/conifer communities, they are likely to die off over time without management to prevent conifers from shading them out. Under Alternative B, the BLM would actively manage forest stands for the persistence of these species. Under the Proposed RMP across all land use allocations, the BLM would manage mixed hardwood/conifer communities to maintain and enhance oak consistent with other management direction for the land use allocation. The BLM would also retain oaks greater than 24" DBH, except for safety or operational reasons in the dry Late-Successional Reserve and the Uneven-aged Timber Area sub-allocation.

Although vegetative communities where oak species currently predominate are generally outside of the Harvest Land Base in all alternatives and the Proposed RMP, oak species do occur within the Harvest Land Base. Oaks represent an immeasurable small percentage of the basal area of the stands in the Harvest Land Base in the moist forests of Salem and Eugene. However, oaks represent more than 60 percent of the basal area of some individual dry forest stands in the Klamath Falls Field Office and the Medford and Roseburg Districts. In general, all alternatives and the Proposed RMP would result in a decrease of oak basal area of 1 percent or less across the decision area over 50 years. Canopy cover of all hardwoods (e.g., oaks, madrone, maple, and chinquapin) would decrease by 3–4 percent in 50 years. It is likely that the vegetation modeling overestimates any decline in hardwood abundance in general and specifically oaks, because the tree growth model is designed primarily for fast-growing conifer species such as Douglas-fir, and the model did not account for all management directions that would help to maintain oaks within stands.

In general, oak communities would eventually decline in abundance within the Late-Successional Reserve and the Riparian Reserve as stands would continue to grow, and conifers would overtop and shade out oaks under the No Action alternative and Alternatives A, B, C, and D. Oak communities would fare best within the Late-Successional Reserve under the Proposed RMP as the BLM would utilize integrated vegetation management to increase or maintain vegetative species diversity and to create and maintain areas of hardwood dominance. Within the Harvest Land Base, the different harvest methods would have varying effects on oak species. Alternatives A and C would both include clearcuts, and all oaks present

within the stand would be removed. Forest stands with an oak component require natural or management disturbance to prevent oaks from dying out of the stand. Intermediate harvest methods, such as regeneration harvest with retention and uneven-aged management would provide more opportunities for maintaining oaks within stands.

The management direction for the action alternatives and the Proposed RMP would mitigate effects of timber harvest on oaks. Management direction common to all alternatives and the Proposed RMP designed to meet objectives for fire and fuels would maintain and promote oaks on lands outside of the Harvest Land Base. Within the Harvest Land Base, the BLM would favor patches dominated by hardwood trees and areas containing unique habitats or high diversity for retention, except in the High Intensity Timber Area under Alternatives A and C. In the dry Late-Successional Reserve under all action alternatives and the Proposed RMP, the BLM would apply vegetation management to increase species diversity and allow for hardwood persistence. Under the Proposed RMP, oaks would be maintained within forest and woodland communities across all land use allocations. The quality and quantity of existing oak habitat would improve under the Proposed RMP. The No Action alternative and the action alternatives would likely result in the decline of oaks within forest communities, as conifer species would eventually overtop and suppress oaks.

Issues Considered but not Analyzed in Detail

How would recreation management affect Special Status plant and fungi species, Survey and Manage species, and special habitats?

The BLM assumed that human use concentrated at recreation sites, such as campgrounds and trails, would adversely affect rare plants and fungi because of trampling, firewood collection, introduction and spread of noxious and non-native species, and soil disturbance. Recreation sites would not differ among the alternatives or the Proposed RMP. Changes to recreation sites in the decision area, such as the development of new sites or elimination of existing sites, would be speculative. As such, there is no basis for describing a difference in effect on rare plant and fungi species from recreation sites among the alternatives and the Proposed RMP.

While dispersed recreation could potentially affect rare plants and fungi, such recreation use would be less concentrated than at recreation sites, and effects would be speculative. It is not possible at this scale of analysis with the data available to describe any foreseeable effects on rare plants and fungi of the recreation allocations at the RMP level, such as Special Recreation Management Areas and Extensive Recreation Management Areas or issuance of special use permits.

How would invasive plant introduction and spread affect Bureau Special Status plant and fungi species, Survey and Manage species, and special habitats?

Invasive plants alter the existing native plant community and reduce rare vascular plant growth and vigor, flowering, and fruiting. There is very little information about the adverse effects of invasive plant species to fungi, terrestrial lichens, and bryophytes. Invasive species effects to rare plant and fungi sites would vary depending on many factors, but primarily the invasive species and its biology, site characteristics, and the affected rare plant species and its biology. There is not a reliable way to predict actual location of invasive species introductions relative to sites of rare species because of activities. Actions to control invasive plant species that eradicate or reduce competition would benefit rare plant sites. Generally, larger rare plant and fungi sites would be more resilient to invasive species invasion and persist longer than small sites that are less robust. The Invasive Species section of this chapter analyzed the risk of invasive

plant introduction and spread associated with management actions under each alternative and the Proposed RMP. It is not possible to describe that risk of invasive plant introduction and spread in terms of effects on rare plant and fungi species given the incomplete information on rare plant and fungi distribution, the uncertainty associated with forecasting future invasive plant introduction and spread, and the highly species-specific and site-specific interactions between rare plants and fungi and invasive plants.

How would wildfire response affect Special Status plant and fungi species, Survey and Manage species, and special habitats?

Wildfire response activities, such as bulldozing for the construction of fire lines, safety zones, and staging areas, can cause direct effects to rare plant and fungi sites from habitat disturbance. Wildfire response efforts that prevent or reduce habitat loss from uncharacteristic wildfire can preserve rare plant and fungi sites that would otherwise be lost. Because of uncertainties with regard to wildfire response activities on BLM-administered lands, such as location and extent, specific environmental effects of these actions to rare plant and fungi sites from habitat disturbance would be speculative. The full range of wildfire response tactics would be available under all alternatives and the Proposed RMP, and maintenance of fire suppression-related infrastructure would not change among alternatives or the Proposed RMP (see the Fire and Fuels section in this chapter). Because these factors would not differ among the alternatives or the Proposed RMP, there is no reasonable basis on which to identify a difference in the effects of wildfire response on rare plants and fungi.

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