Special Forest Products

This analysis examines changes to the distribution, abundance, and quality of special forest products relative to their demand that would result from the alternatives.

Key Points

- All alternatives, including the No Action and PRMP, would maintain similar levels of availability and abundance of special forest products.
- Under all alternatives, the BLM would provide reasonable opportunities for collection and harvest of special forest products over the long term.

All action alternatives would provide reasonable opportunities for collection and harvest of special forest products on BLM-administered lands, similar to the No Action Alternative. Some harvest locations of specific types of special forest products would change over time as forest management activities occur in different locations. Collectors focus harvest efforts in locations where special forest products of commercial or personal value are abundant, easy, and economical to harvest. In general, it is expected that, similar to past activity, special forest products would be harvested from common and abundant plant or fungus species. Special forest products would be generally abundant in the planning areas under all action alternatives, similar to the No Action Alternative. See the *Special Forest Products* section in *Chapter 3*.

Most special forest products are collected in small quantities for personal or commercial use and would not be affected by changes in levels of management activities. Under all of the alternatives, the management activity that varies the most and affects special forest products is timber harvest. Timber harvest would be distributed across the harvest land base over time and would result in an increase in abundance and quality for some special forest products and a decrease for others at the site scale, but not at larger landscape scales. Regeneration and thinning harvests modify the condition of conifer forest stands and stand components (such as substrates and species that support mats of mosses), disturb the forest ground floor, and remove conifer trees that are host species and support mushrooms. The harvest of firewood, fungi, floral, and greenery would shift either into, or away from, regeneration timber harvest areas. The relative availability of Christmas trees would increase as the amount of regeneration harvest and stand establishment acres increase. The relative availability and quantity of firewood would increase as timber harvest increases. Many floral products, mushrooms, and mosses would decline in availability and quality in regeneration timber harvest areas in the short term.

The amount of habitat abundance of special forest products affected by forest management activities relative to their overall extent and abundance is unknown. Extent and abundance of special forest products inventories are generally lacking. Special forest products are harvested and collected from common species distributed throughout the planning area within the forest products' specific ranges and habitat type restrictions.

Although the habitat abundance of specific forest products increases or decreases at the harvest unit scale, these effects diminish at watershed and regional scales. The increase in harvest of timber under all alternatives (by 43,500; 59,600; 128,800; and 136,900 acres under Alternatives 1, 2, 3, and the PRMP, respectively; as shown in *Table 4-39* below) from the No Action Alternative would change the habitat of forest products. The amount of habitat change relative to the total amount of special forest product areas within the range of specific special forest products is unknown. The remaining forest stands would continue to develop and support habitat for special forest products.

Commercial thinning would disturb the forest stand, forest floor, and micro-environment (amount of sunlight, temperature, and humidity change) less than regeneration harvest. Most special forest products would respond positively shortly after the initial disturbance and increase in abundance and quality

within a few years. Older conifer trees would be retained and act as host species for mushrooms, allowing mushrooms to recover and fruit within approximately 5 to 10 years (Pilz et al. 2006). Floral and greenery products would generally respond quickly to increased light and lower competition levels.

Silvicultural treatments (e.g., stand maintenance and precommercial thinning) would retard the development of some special forest products (such as mushrooms and floral and greenery), but would improve the quality and quantity of others (such as Christmas trees and boughs). The development of most mushroom products would be delayed because silviculture treatments target host species and lengthen abnormal micro-environment conditions. Also, the slash debris left by silviculture treatments would prevent access to special forest products. The amount of precommercial thinning would be similar under all action alternatives.

Timber harvest, new road construction, and silvicultural treatments under all action alternatives would not alter the overall availability, abundance, and sustainability of special forest products from the No Action Alternative at the landscape scale and within each forest product's specific range. Nearly all special forest products occur, and are also available for harvest, on neighboring public lands managed by the Forest Service and the state of Oregon. Other opportunities, although more limited, occur on other federal, state, and private lands. Although overall availability and abundance would be maintained, the availability, abundance and quality at smaller spatial scales such as harvest units or watersheds would vary in the short term as a result of timber harvest activities. See *Table 4-33 (Estimated annual acres by harvest type over the first decade)* in the *Timber* section of this chapter.

Non-harvest related vegetation treatments, livestock grazing, recreation, watershed restoration, and wildfire suppression activities would be similar under all action alternatives. These activities would not change the availability, quantity, and abundance of special forest products from the No Action Alternative. Non-harvest related vegetation treatments would amount to approximately 310,000 acres over 10 years. These treatments would normally target small diameter wood products and either chip or cut unwanted fuels, but would not affect the overall availability and quantity of special forest wood products.

Under all action alternatives, the overall amount of stands in the mature and structurally complex structural stage would not change. The relative availability and abundance of mushrooms, mosses, and floral and greenery associated with these stand types would not change. See *Table 4-39* (*Response Of Special Forest Products And Acres Of Forest Management Activity And Mature & Structurally Complex Forest By Alternative In The Year 2016*).

Under all action alternatives, the availability and abundance of five special forest product categories (transplants, seeds and seed cones, edibles and medicinals, burls and miscellaneous, and coniferous boughs) would be similar to past levels. The specific distribution and abundance of most special forest products, as well as the actual amount harvested, is relatively unknown. The response of some special forest products to increased activity levels would be either an increase or decrease in their availability and abundance, or no change. However, these changes are expected to be relatively slight compared to the No Action Alternative. Similar levels of abundant and readily available quality products would be maintained under all alternatives.

There are five special forest product categories (Christmas trees, floral and greenery, mosses, mushrooms, and wood products) that would increase or decrease as the amount of activity acres increase and as older forest types develop at the site scale. At larger landscape scales, the responses may not represent every individual product within the categories. Differing levels of timber harvest and silviculture activities, based on the amount of acres treated, would not increase or decrease the overall abundance or availability of forest products at regional scales from the current level. These forest products are generally abundant throughout the region or within the vegetative community where they occur. In general, the distribution of these special forest products over the planning area is extensive, the amount of acres of forest habitat that exists is large, and ample opportunities to harvest and collect are available.

Table 4-39. Response Of Special Forest Products And Acres Of Forest Management Activity And Mature & Structurally Complex Forest By Alternative In The Year 2016

Forest Management Activity and Forest Type	**Special Forest Product Response**	**Response** (as acres increase)	**No Action**	**Alt.1**	**Alt. 2**	**Alt. 3**	**PRMP**
			(acres)				
Regeneration Harvest	Floral/Greenery	Decrease	60,500	90,600	143,400	128,500[a]	76,600
	Mosses	Decrease					
	Mushrooms	Decrease					
	Wood Products	Increase					
	Christmas Trees	Increase					
Thinning Harvest (includes both harvest land base and nonharvest land base)	Floral/Greenery	Increase	100,000	113,400	76,700	160,300[b]	220,300
	Mosses	Decrease					
	Mushrooms	Decrease					
	Wood Products	Increase					
Silvicultural Treatments (thinning, stand maintenance and/or protection)	Floral/Greenery	Decrease	167,100	216,000	314,500	189,000	210,900
	Mushrooms	Decrease					
	Christmas Trees	Increase					
Mature & Structurally Complex Forest	Floral/Greenery	Increase	1,120,000	1,089,000	1,037,000	1,052,000	1,103,000
	Mosses	Increase					
	Mushrooms	Increase					

[a]This acreage excludes partial harvesting.
[b]This acreage includes partial harvesting.

Natural disturbances, such as wildfires and wind storms, that shape the types and availability of special forest products are unpredictable in time and location, but are expected to occur across the landscape similar to levels experienced in the past. Natural disturbances change local conditions for special forest products. In general, most special forest products would be lost in wildfires, although the availability of firewood and some mushrooms that respond to fire would increase. Windstorms that blow down large amounts of trees would reduce the quality of special forest products and would limit access for harvest. Natural disturbances would reduce the availability and abundance of special forest products only at the local level. Availability and abundance of special forest products would not be substantially affected at larger landscape scales.

Botany

This analysis examines the effects on species listed under the Endangered Species Act and BLM sensitive plants and fungi from timber management, fuels treatments, road construction, salvage, grazing, wildfire, invasive plants, off-highway vehicle use, mining, and designation of areas of critical environmental concern.

Key Points

- Under all alternatives, the occurrences and habitats of species listed under the Endangered Species Act would be maintained or increased and recovery activities would be implemented.
- Under the PRMP, risks to BLM sensitive species would be low, but slightly higher than the No Action Alternative due to increased risks from invasive plants, loss of interior habitat, and increased edge effect. Application of conservation measures to all species consistent with the BLM Special Status Species Policy on all BLM-administered lands in the planning area would result in low risk of local extirpation of occurrences for all habitat groups.
- Under Alternatives 1, 2, and 3, risks to species in eight of nine habitat groups would be low, but slightly higher than the No Action Alternative because of increased risks from invasive plants, loss of interior habitat, and increased edge effect. Conservation measures would be applied consistent with the BLM Special Status Species Policy since habitat for these groups largely falls outside the harvest land base.
- Under Alternatives 1, 2, and 3, risks to species would increase for the conifer habitat group. Some occurrences of BLM sensitive species in the conifer habitat group on O&C lands in the harvest land base would be extirpated. There would be low to moderate risk of local extirpation for some species in the conifer forest habitat group, but a low risk of extirpation or extinction from the planning area because species with 20 or fewer occurrences would receive conservation protection measures.

Federally Listed Plant Species

Under all alternatives, conservation and recovery measures would be applied to federally listed, proposed, and candidate species. Habitat and occurrences would be managed for the conservation and recovery of the species on BLM-administered lands. These measures are required by recovery plans, biological opinions, or conservation agreements and would contribute to the recovery of species.

The species shown in *Table 4-40* (*Federally listed and candidate plant species in the planning areas*) that may be found in the planning area are listed as threatened or endangered, or are candidates for listing under the Endangered Species Act.

There are seven federally listed species and one federal candidate species found on BLM-administered lands. The listed species that are not found on BLM-administered land would not be affected by BLM actions under the alternatives. The number of occurrences and amount of occupied area are two primary demographic metrics that characterize relative rarity and partially characterizes the species condition. Modifying management activities on BLM-administered lands when occurrences exist within activity areas would protect or improve the condition of the population. The general trend in the total number of occurrence and amount of occupied habitat since the species were federally listed is characterized below:

- *Remained constant*: Rough popcorn flower, Bradshaw's desert parsley, Western lily, and Siskiyou mariposa-lily
- *Increased slightly*: Cook's lomatium, Willamette Valley daisy, and Kincaid's lupine
- *Increased substantially*: Gentner's fritillary

The number of discovered sites where these plants occur has generally increased as surveys over the past several years have proceeded. The number of occurrences by species that have been found on BLM-administered lands ranges from more than 100 occurrences of Gentner's fritillary, to only one known

Table 4-40. Federally Listed And Candidate Plant Species In The Planning Area

Federal Status	Federally Listed and Candidate Plant Species		
	Scientific Name	Common Name	BLM Districts
FTO	*Castilleja levisecta*	Golden paintbrush	Salem, Eugene
FTO	*Howellia aquatilis*	Water howellia	Salem, Eugene, Roseburg, Medford
FTO	*Lupinus sulphureus* ssp. *kincaidii*	Kincaid's lupine	Eugene, Roseburg
FTO	*Sidalcea nelsoniana*	Nelson's checker-mallow	Salem
FEO	*Arabis mcdonaldiana*	McDonald's rock-cress	Medford, Coos Bay
FEO	*Astragalus applegate*	Applegate's milk-vetch	Klamath Resource Area
FEO	*Erigeron decumbens* var. *decumbens*	Willamette valley daisy	Eugene, Salem
FEO	*Fritillaria gentneri*	Gentner's fritillary	Medford
FEO	*Lilium occidentale*	Western lily	Coos Bay
FEO	*Limnanthes floccosa* ssp. *grandiflora*	Large-flowered wooly meadowfoam	Medford
FEO	*Lomatium bradshawii*	Bradshaw's desert parsley	Salem, Eugene
FEO	*Lomatium cookii*	Cook's lomatium	Medford
FEO	*Plagiobothrys hirtus*	Rough popcorn flower	Roseburg
FCO	*Calochortus persistens*	Siskiyou mariposa-lily	Medford

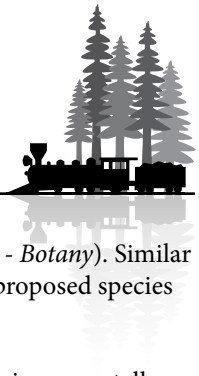
FTO (federally threatened Oregon) FEO (federally endangered Oregon) FCO (federal candidate Oregon)

occurrence of Western lily. A complete list of federally listed species and the number of extant (currently existing) occurrences are found on *Table 3-20* in *Chapter 3* and in *Appendix F - Botany*. The number of occurrences would likely increase over the next 10 years on BLM-administered lands for Gentner's fritillary and Kincaid's lupine as additional suitable habitat is surveyed and new populations are established to meet recovery objectives. Few new occurrences would be expected to be found for Cook's lomatium, Willamette valley daisy, Rough popcorn flower, Bradshaw's desert parsley, Western lily, and Siskiyou mariposa-lily because most suitable habitat for these species has already been surveyed.

Occurrences of federally listed species also are found on private lands. It is assumed that these occurrences are unprotected, not secure, and would not contribute to recovery of the species (USDI USFWS 1993, 2003b, and 2006b). This is because no protection for federally listed plant species is provided by state or federal laws on private lands.

Under all alternatives, the application of conservation measures recommended under recovery plans for all management activities would maintain or improve habitat where known occurrences and occupied habitat of federally listed and candidate species are found on BLM-administered lands. Conservation and recovery activities would be implemented consistent with recovery plans and conservation agreements for each federally listed plant species. Generally, the conservation measures recommended under recovery plans that would occur on BLM-administered lands include:

- habitat assessments
- field surveys prior to activities in suitable habitat
- conservation protection measures of existing occurrences and habitat
- habitat restoration
- augmentation of existing occurrences
- establishment of new occurrences



Recovery activities are described in recovery plans individually by species (see *Appendix F - Botany*). Similar types of conservation measures would be applied for federally listed species and federally proposed species without recovery plans, and for candidate species.

Under all alternatives, the introduction and spread of invasive plant species would increase incrementally over 10 years relative to the increase in the amount of management activities in suitable habitat for each species. (See *Chapter 4 - Invasive Species.)* Invasive plants are found in all habitat types where federally listed plants are found and compete for light, moisture, and other resources.

There are 44 occurrences of Gentner's fritillary found in grazing allotments on the Medford District. The National Landscape Conservation System includes 22 of these occurrences. Grazing has been allowed where occurrences of Gentner's fritillary are found. Yearly monitoring has not detected any damage to plants or habitat as a result of utilization by cattle. These populations are generally small, ranging from a few individuals to 30 or more in a population and generally occupy 0.5 acres or less. Application of conservation protections measures (fence exclusion, release date adjustments etc.) would prevent grazing utilization, damage to plants, or extirpation of occurrences.

Occasionally, immediate response to emergency operations such as wildfire suppression would result in the damage or loss of occupied habitat or occurrences. When these occasional situations occur, the application of conservation measures would minimize damage or loss of occurrences or habitat to the extent the wildfire emergency conditions allow the measures to be applied.

BLM Sensitive Species

Most plant and fungi species are considered common and are of no conservation concern. This analysis focuses on the BLM's sensitive species, which include state-listed species. Species are grouped according to habitat associations to facilitate analysis of a large number of species (see the *Botany* section of *Chapter 3*).

The analysis examines the risks to these species given the type and amount of expected management activities and the conservation measures to be applied under each of the alternatives. Under the No Action Alternative and the PRMP, where conservation measures would be applied to all species consistent with the BLM Special Status Species Policy on all BLM-administered lands in the planning area, the known occurrences would likely survive. Occurrences and habitat characteristics would be managed for the specific biological requirements of each species. Application of conservation measures would provide protection from management activities that would modify site conditions and occupied habitat. Typically, conservation measures are designed for management activities and implemented as seasonal or operational restrictions and changes in treatment methods, or habitat protection buffers. Management activities may affect these species by altering vegetative and environmental conditions, compacting or displacing soil, altering hydrologic conditions, introducing and spreading invasive plants, or trampling or damaging individual plants or occurrences. Species conservation protection measures would alter the area, extent, or timing of the activity, the type of operation, and the degree of disturbance to counter these effects.

Under Alternatives 1, 2, and 3, conservation measures consistent with the BLM Special Status Species Policy would be applied to species occurrences and habitat on Public Domain lands and O&C lands that are not in the harvest land base. With the exception of the conifer habitat group, all other habitat groups occur primarily on lands outside of the harvest land base.

Under Alternatives 1, 2, and 3, occurrences of Bureau sensitive species would be extirpated and occupied habitat lost in the harvest land base if and when management activities intersect with species occurrences. Conservation measures would not be applied to species occurrences or habitat in the conifer habitat group that occur within the O&C harvest land base unless 20 or fewer occurrences of a species are known to exist. See *Appendix F - Botany* for a list of species on BLM-administered land with 20 or fewer occurrences.

Under the No Action Alternative and the PRMP, which provide for applying conservation measures consistent with BLM Special Status Species Policy to all species occurrences on all land use allocations, the Bureau sensitive species occurrences would likely survive.

Under all action alternatives, the amount of timber harvest (including subsequent silviculture treatments, hazardous fuels treatments, and road construction) would increase compared to the No Action Alternative (see *Table 4-41*). This would affect Bureau sensitive species occurrences primarily in the conifer habitat group. Under all action alternatives, these management activities would result in the potential introduction and spread of invasive plant species, loss of forest biological legacy (i.e., large trees, snags, and down wood) in regeneration harvest areas, and decreases in the amount of interior habitat in the harvest land base.

The level of forest management activities that would occur under the alternatives is shown in *Table 4-41* (*Forest management activities that potentially affect special status species plant occurrences over the next 10 years).*

Effects of Land Management Activities

Timber Harvest

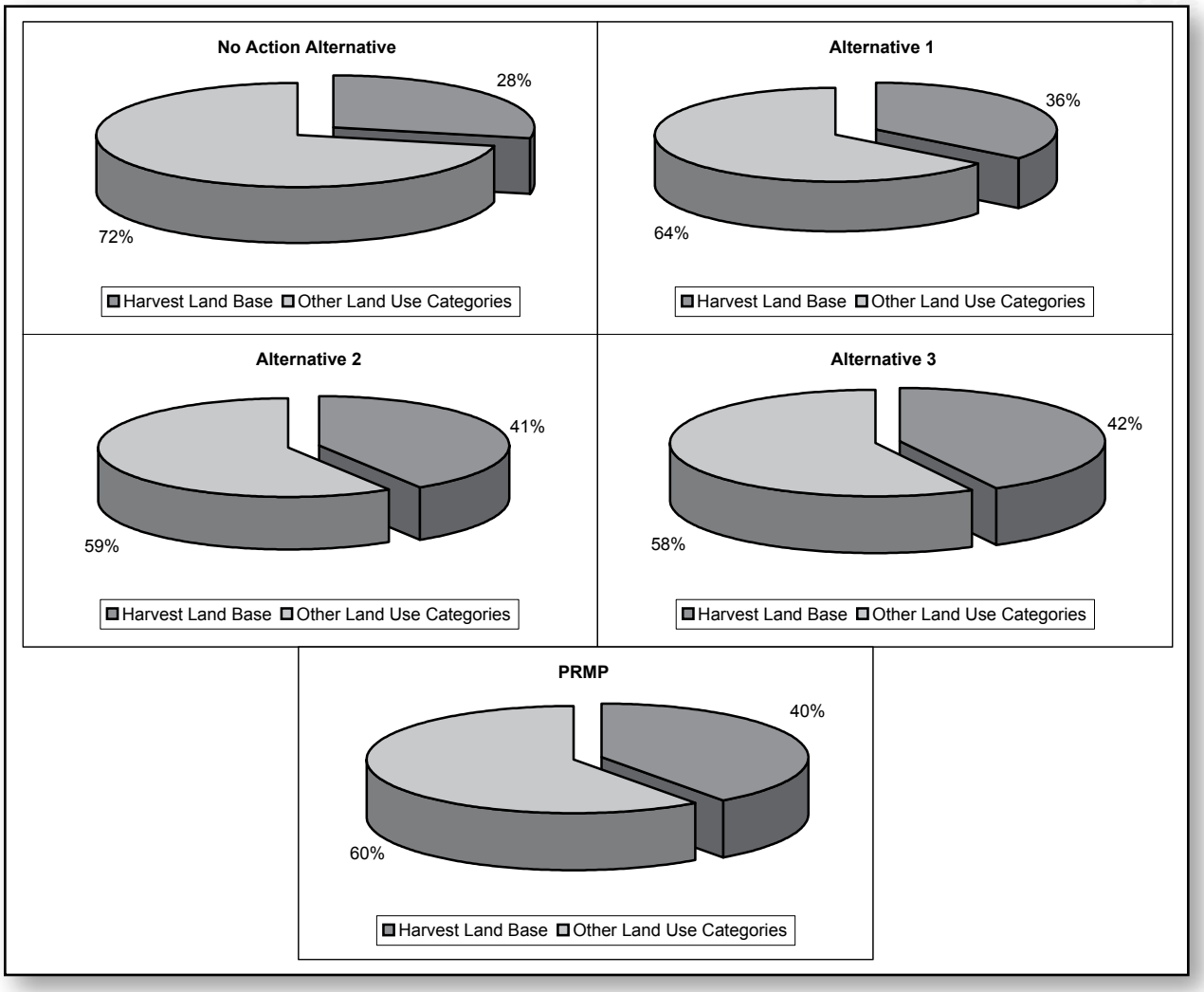
Timber harvesting modifies forest vegetation including species composition, stand age, density, canopy, and legacy components such as snags and large down wood that serve as substrate and hosts for some species associated with the conifer habitat group. Timber harvesting also alters environmental conditions. The amount of physical disturbance of the site from timber harvest activities varies widely, depending on factors such as terrain, access, type of equipment, and skills of the operator. These factors contribute to the total area disturbed and the survival of any species occurrence in the area. For some species and occurrences, the effects of the physical disturbance of the harvest method would have more consequence than modification of the habitat without application of conservation measures.

Under Alternatives 1, 2, 3, and the PRMP, the acres with known occurrences of BLM sensitive species in the conifer forest habitat group that would be subject to timber harvest would increase compared to the No Action Alternative. *Figure 4-70* (*Distribution of occurrences of BLM sensitive botany species subject to timber harvest)* shows that when all known BLM sensitive species occurrences are aggregated and compared between alternatives, the most notable pattern is the increase in the number of occurrences in the harvest land base under the action alternatives compared to the No Action Alternative.

Table 4-41. Forest Management Activities Over The Next 10 Years That Affect Special Status Species Plant Occurrences

Activity	No Action	Alt. 1	Alt. 1	Alt. 3	PRMP
Regeneration Harvest (acres)	60,500	90,600	143,400	3,900	76,000
Partial Harvest (acres)	0	0	0	124,600	0
Thinning (Harvest Land Base and Non-Harvest Land Base) (acres)	100,000	113,400	76,700	160,300	221,100
Timber Slash and Non-Timber Vegetation Treatments (acres)	110,000	110,000	110,000	110,000	291,000
Road Construction (miles)	820	830	1,010	1,060	1,280

Figure 4-70. Distribution Of Known Occurrences Of BLM Plant And Fungi Species Subject To Timber Harvest



Approximately 3,700 total known occurrences of BLM sensitive species have been recorded on BLM-administered lands. The percentage of known species occurrences in the conifer habitat group that are within the harvest land base would be 28%, 36%, 41%, 42% and 40% under the No Action Alternative and Alternatives 1, 2, 3 and the PRMP, respectively. A disproportionate number of known occurrences is likely to be within the land use categories that are more available for projects. Therefore, known occurrences should not be cited to establish actual distribution or use patterns for these species. Known occurrences of species in the conifer habitat group that are within the harvest land base would be subject to greater risk of occurrence extirpation and habitat losses through management actions under Alternatives 1, 2, and 3 compared to the No Action Alternative. Under the PRMP, timber harvesting activities would not directly affect occurrences and occupied habitat within the timber harvest land base, because conservation measures would be applied to all BLM sensitive species and occurrences and the species would likely survive.

Four general timber harvest types would occur under the various alternatives: regeneration, partial, uneven-aged, and thinning. Under the alternatives, the amount of regeneration harvest acres as a portion of total harvest acres would be least under the PRMP (26%) and the most under Alternative 2 (65%), compared to 38% for the No Action Alternative, and 44% for Alternatives 1 and 3. There are approximately 2.2 million acres of BLM-administered lands in the planning area that contain conifer forests. Regeneration harvest under the No Action Alternative, Alternatives 1 and 2, and the PRMP (and regeneration and partial harvest under Alternative 3) would remove forest stands and biological legacy (large trees, snags, and down wood) components, as follows:

Alternative	Acres of Regeneration Harvest in 10 Years	Percent of all BLM Conifer Forest Regeneration Harvest in 10 Years
No Action	60,500	2.75
Alternative 1	90,600	4.12
Alternative 2	143,400	6.52
Alternative 3	128,500	5.84
PRMP	76,000	3.45

The No Action Alternative, in addition to applying conservation measures for known species occurrences, would retain biological legacies (green trees, coarse wood, and large diameter snags) in regeneration harvest areas and provide future substrate for a sub-group of species (lichen, bryophytes and fungi) in the conifer forest habitat group.

Under all action alternatives, regeneration harvest would remove commercial trees and forest biological legacy (green trees, commercial coarse wood, and commercial snags). Biological legacy and small undisturbed patches provide refugia for species to persist over time (Franklin et al. 2002), including a sub-group of species in the conifer forest habitat group. Future forest stands on the timber base under the PRMP (except where uneven-aged management is applied) and Alternatives 1 and 2 would develop into even-aged, homogenous conifer stands with reduced biodiversity compared to existing natural stands with biological legacy components. These habitat components (large trees, snags, and down wood) would be removed, reducing the amount of future habitat available for recruitment of populations for many decades.

A sub-group of more than 25 lichen, bryophyte, and fungi species in the conifer forest habitat group is associated with habitat conditions and forest biological legacy (green trees, coarse wood, and snags) of mature and old conifer forests. Important habitat components include coarse wood, snags, and specific host species (see *Appendix F - Botany*). The risk to these species would increase as the level of timber harvest activities increases, biological legacies are lost, and interior habitat conditions are reduced in the harvest land base over time. Development of large dead wood in forest stands does not begin for about 100 years after harvest removal and does not culminate for more than 400 years (Spies et al. 1988). Although each species has a unique distribution, biology, and ecology and the amount of information relative to these life requirement features is limited, the biological legacy components appear to be one of many components essential to persistence of these species. Biological legacies play important roles in perpetuating species during ecosystem reorganization and recovery following disturbance (Franklin et al. 2000, Franklin and MacMahon 2000, and Lindenmayer and Franklin 2002). Some species (B*ryoria pseudocapillaris* and *Hypogymnia duplicata*) are only known to occur on the bark of old coastal spruce trees and other conifer forests (coastal maritime). Other species (*Calicium adspersum* and *Tetraphis geniculata)* are associated with coarse wood in interior habitat conditions of old conifer forests.

Under Alternatives 1, 2, 3, and the PRMP, regeneration harvests of forest stands would not develop replacement biological legacies (large trees, snags, and down wood) suitable for a sub-group of conifer-associated species before the next timber harvest is scheduled. Under all action alternatives, these forest stands would permanently lose host and substrate habitat for these species in regeneration harvest units in the harvest land base. However, a substantial amount of forest stands with biological legacy would

remain on BLM-administered lands in the non-harvest land base (e.g., Congressional reserves, National Conservation System lands, Late-Successional Management Areas, and Riparian Management Areas), and in the Uneven-age Timber Management Area under the PRMP, as well as on Forest Service lands. Of the 2.2 million acres of BLM-administered land in the conifer forest lands, the portion in the non-harvest land base by alternative is:

- 73 percent in the No Action Alternative
- 60 percent in Alternative 1
- 46 percent in Alternative 2
- 36 percent in Alternative 3
- 55 percent in the PRMP

Forests in the non-harvest land base would provide suitable habitat conditions for future recruitment of populations, depending on the unique range, distribution, biology, and ecology of the species.

Under Alternatives 1, 2, 3, and the PRMP, forest stands under age 30 would not be suitable habitat for this sub-group of species in the conifer forest group. This is true even when biological legacy components persist because only a few relic occurrences of all species have been discovered in these stands. Stands between 30 and 80 years of age provide mixed but improving habitat conditions for these species. Currently, more than 1.0 million of the 2.2 million acres of BLM-administered conifer forest lands are under 80 years of age. Of these, nearly 450,000 acres are under 30 years (see the *Timber* section in *Chapter 3*).

Under Alternatives 1, 2, 3, and the PRMP, forest fragmentation of stands 80 years and older would increase and interior habitat conditions would decrease on BLM-administered lands within the harvest land base over the next 10 years. Suitable habitat would be reduced by between 30,000 to 64,000 acres under the alternatives for a sub-group of plant and fungi species in the conifer forest habitat group. A growing body of literature demonstrates that micro-climate changes from multiple interactions across a gradient between edge and interior habitat conditions affect species diversity, abundance, and vigor (Chen et al. 1995, Jules 1998, and Stewart et al. 2006). Depending on the edge characteristics and surrounding stand age, interior habitat conditions would require a forest stand patch size of approximately 50 acres for any interior habitat and 100 acres or more for any substantial amounts. See *Chapter 4 (Structural Stages and Spatial Pattern* section*)* for a discussion of the forest patch sizes that would occur under the alternatives.

Under Alternatives 1, 2, 3, and the PRMP, risks for this sub-group of species in the conifer forest habitat group associated with mature and older conifer forest would increase slightly over the next 10 years from the No Action Alternative. Biological legacy (large trees, snags, and down wood) would be lost from stands during regeneration harvests. This loss would reduce the amount of future suitable habitat for dispersal and survival of populations of species. Under the PRMP, regeneration harvests would not occur in the Uneven-age Timber Management Area. Under the PRMP, which would apply conservation measures to all known occurrences of species consistent with the BLM Special Status Species Policy, all known occurrences would likely survive. Under the PRMP, the harvest of older and more structurally-complex multi-layered conifer forest stands within the harvest land base would be deferred through 2023. Risks to this sub-group of species would increase slightly under the PRMP and moderately under Alternatives 1, 2, and 3. Risks to the other sub-groups of species would be similar to the No Action Alternative.

Partial harvest under Alternative 3 would be a type of regeneration harvest that would create even-aged stands in the understory, but retain portions of the existing overstory stand, aggregated or distributed within the harvest area. Partial harvests would occur only under Alternative 3 and create approximately 125,000 acres of stands with biological legacy and 4,000 acres of stand establishment forests similar to regeneration harvest without biological legacy.

Uneven-age management would occur under the PRMP on 41,300 acres in the southern Cascades and Klamath Provinces. Uneven-age and partial harvests would retain biological legacy and host species in forest stands, although at a lower amount, at smaller diameter sizes, and at different distributions than natural stands.

Thinning would occur under all alternatives. Thinning is an intermediate stand harvest that retains larger diameter trees distributed evenly over the harvest area. Generally, thinning forest stands modifies stand characteristics, structure, and vegetation less than other harvest types. Also, with thinning, forest stands recover quicker from disturbance and would have minimized risks to occurrences and species in the conifer forest habitat group.

Salvage Harvest

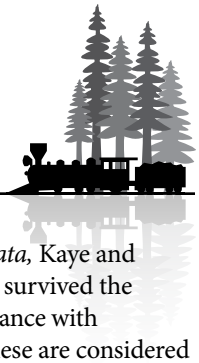
Under Alternatives 1, 2, 3, and the PRMP, salvage timber harvest would occur following disturbance both inside and outside of the timber harvest land base. Salvage harvest would primarily affect plant and fungi species in the conifer and mixed evergreen forests, riparian and aquatic, serpentine areas, and oak and hardwood woodlands habitat groups. It is not possible to predict the locations and amount of salvage harvest that would occur over the next 10 years (see the *Introduction* in *Chapter 4*). The Eastern Cascades, the southern West Cascades, and the Klamath Provinces have high fire frequency, with low severity return intervals where salvage harvest would occur (see the *Fire and Fuels section* of *Chapter 3*). Where high severity wildfires occur, they would consume most occurrences and suitable habitat of rare plant and fungi species, although some would likely survive below ground as propugules or in unburned areas or islands of low intensity burns (Kaye et al. 2005; *Botany* section of *Chapter 3*).

Under Alternatives 1, 2, and 3, no conservation protection measures would be applied to species and occurrences within the salvage areas. Risks to species and occurrences would increase moderately from the No Action Alternative. Although not all occurrences would be extirpated as a result of wildfires, subsequent ground disturbance from salvage activities could contribute to additional occurrence extirpations. Under the PRMP, with the application of conservation measures to species occurrences on all BLM-administered lands, the species would likely survive, with risks to species and occurrences similar to the No Action Alternative.

Silviculture Treatments

Under Alternatives 1, 2, 3, and the PRMP, the amount and location of silviculture treatments would be associated primarily with the amount and location of regeneration, partial, and uneven-age harvest acres within the harvest land base as shown in *Table 4-41* (*Forest management activities that affect plant occurrences over the next 10 years*). Silvicultural treatments associated with regeneration harvest would modify newly established, young forest stands through cutting and scalping vegetation, conifer thinning, converting hardwood stands to conifers, and fertilization. Treatments associated with regeneration harvests would result in young stands that are generally even-aged with reduced stand structure and species diversity, and lacking small micro-habitat patches. Structural components and small undisturbed patches remaining in the unit from previous treatments would allow some species occurrences in the conifer habitat group to persist within the harvest units. Silviculture treatments would occur over a 20-year period of time on the forest stands where regeneration harvests occurred.

Occasionally, occurrences of rare plant species have survived the combination of harvest, fuels reduction, and silviculture treatments in the past when no conservation measures were applied. Forests in the stand establishment and young forest structural stage classification are suitable habitat for a sub-group of species in the conifer habitat group. As long as populations were not completely extirpated during timber harvest activities, this sub-group of species would benefit from more frequent habitat disturbances when conservation measures are integrated with activities. Species such as Tall bugbane and Wayside aster respond positively



by increasing growth, flowering, and fruiting from more open conditions (e.g., *Cimicifuga elata,* Kaye and Kirkland 1999; *Eucephalus vialis,* Thorpe and Kaye 2006*).* Other occurrences of species have survived the combination of treatments in the past, but do not appear to benefit biologically to the disturbance with increased growth and reproduction *(Cypripedium fasciculatum,* Knorr and Martin 2003). These are considered relic occurrences that survived the activity and habitat disturbance in micro-habitat patches but are neither tolerant nor adapted to harvest disturbances.

Under Alternatives 1, 2, and 3, few rare plant and fungi occurrences that survived the initial timber harvest would survive subsequent silviculture treatments without the application of conservation measures. Under either of these three alternatives, risks to species and occurrences would increase slightly compared to the No Action Alternative because most populations would have been extirpated as a result of habitat loss and activity disturbance during timber harvest. Species with 20 or fewer occurrences would receive conservation protection measures. Under the PRMP, risks to species and occurrences would be similar to the No Action Alternative. Under both the PRMP and No Action Alternative, species would likely survive due to application of conservation measures to occurrences and species on all BLM-administered lands consistent with Bureau Special Status Species Policy.

Site Preparation and Non-Timber Related Vegetation Treatments

Under all action alternatives, hazardous fuel reduction treatments and biomass treatments would reduce slash from timber harvest and silviculture activities, remove hazard fuels in the Wild Urban Interface, and harvest fuels for biomass. Non-timber related vegetation treatment activities would occur on approximately 219,000 acres, and site preparation after timber harvest would occur on 71,000 acres over the next 10 years. More than 270,000 acres would occur in the Klamath, Eastern Cascades, and the southern portion of the West Cascades Provinces. These treatments would affect plant and fungi species in the conifer and mixed evergreen forests, shrub communities, serpentine areas, and oak and hardwood woodlands habitat groups. Fuel reduction treatments associated with timber harvest (approximately 50% of total acres) would primarily affect the conifer forest habitat group and oak and hardwood woodlands habitat groups. More rare plant and fungi species and occurrences are found in the Klamath Province than any other province; the fewest number of occurrences are found in the Eastern Cascades Province. Species would no longer occur in these treatment units if the substrate, host species, or micro-environment upon which the species depends is removed by the treatments.

The prescribed fire and fuel treatments to reduce fire hazard are done under spring-like conditions and designed not to consume soil duff, large logs, or snags. Under all of the alternatives, substrate consisting of large down logs or snags would generally be retained in hazardous fuel treatments. A projection of the number of acres or intensity of biomass removal that would take place under the alternatives is speculative (see the *Energy and Minerals* section of *Chapter 4*). 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 (Kaye and Thorpe 2006, USDA USDI 2004b, USDA and USDI BLM and NPS 2004, USDI USFWS 2005 and 2006b).

Under Alternatives 1, 2, and 3, conservation protection measures would not be applied to fuels reduction treatments associated with timber harvest on O&C lands in the timber harvest land base. Consequently, under these three alternatives, few rare plant and fungi occurrences would survive in timber harvest units that receive fuels reduction treatments. Risks to species and occurrences would increase slightly to moderately compared to the No Action Alternative because most occurrences would be extirpated as a result of timber harvest. Species with 20 or fewer occurrences would receive conservation protection measures. Since species and occurrences on lands not in the O&C harvest land base would receive conservation measures, most occurrences there would likely survive. Under the PRMP, where conservation protection measures would be applied to all species and occurrences on all BLM-administered lands, the species would likely survive. Risks to species and occurrences under the PRMP would be similar to the No Action Alternative.

Road Construction

Under all action alternatives, road construction associated with forest management activities would increase compared to the No Action Alternative and occur predominantly in the conifer habitat group. Road construction would occur to a lesser amount in areas where all the other habitat groups are found. The increase in new roads would disproportionately affect the Klamath Province on the Medford District because of the higher density of such plant occurrences relative to other provinces. Roads there would be more likely to cross habitat types such as meadows or serpentine areas with rare plant occurrences. The total miles of new permanent and temporary roads and the percent that occurs in the Klamath Province (Medford District) are as follows:

	Road Miles	Medford District %
• No Action Alternative:	820	19%
• Alternative 1	830	34%
• Alternative 2	1,010	27%
• Alternative 3	1,060	31%
• PRMP	1,280	29%

Conservation measures would be applied under all alternatives to species occurrences and occupied habitat in the path of road construction for all nine habitat groups in areas outside of the harvest land base. Under Alternative 1, 2, and 3, most occurrences of species in the conifer habitat group that occur in the path of road construction would likely be extirpated in areas within the timber harvest land base since conservation measures would not be applied. Since conservation measures would be applied to species with 20 or fewer occurrences, these species occurrences would likely survive. Under the PRMP, the risks to species and occurrences would be similar to the No Action Alternative where all occurrences would likely survive since conservation protection measures would be applied to all species and occurrences on all BLM-administered lands consistent with Bureau Special Status Species Policy.

Invasive Plants

Under all action alternatives, the risk of introducing and spreading invasive plants would increase as a result of the combination of activities that include timber harvest activities, salvage harvest, fuels treatments, silviculture activities, road construction, and grazing, but would decrease as a result of limiting off-highway vehicle activity to designated roads and trails (see *Table 4-41*). The level of risk would increase the risk of introducing invasive species relative to the amount of activity proposed by alternative, with the highest risks under Alternatives 2 and the PRMP. These activities disturb vegetation and expose soils for invasive species introduction and spread (see the *Invasive Plants* sections in *Chapters 3* and *4)*. Invasive plants occur throughout the planning area, but are less prominent on serpentine soils in the Klamath Province. Invasive plants are found on habitat occupied by all nine habitat groups. Invasive plants would primarily affect the vascular plant group of species. There is very little information about the adverse effects of invasive plant species (e.g., false brome and knotweeds) to fungi and terrestrial lichens and bryophytes (Kaye, pers. com. 2008). The interactions between the type, amount, and location of activities with invasive plants are key factors in determining the magnitude of effects to species occurrences.

Invasive plants alter the existing native plant community and reduce rare plant growth and vigor, flowering, and fruiting. They also limit the expansion and migration of occurrences (Kaye et al. 2006, USDA USDI 2005). Under all action alternatives, the risk of invasive plant introductions and spread would increase moderately compared to the No Action Alternative (see the *Invasive Plants* section of *Chapter 4*). Impacts to rare plant occurrences would vary depending on many factors, but primarily the invasive species and its biology, site characteristics, and the rare plant species and its biology. There is not a reliable way to predict actual location of invasive species introductions relative to occurrences of rare species as a result of activities. Actions to control invasive plant species that eradicate or reduce competition would benefit

rare plant occurrences. Generally, larger rare plant occurrences would be more resilient to invasive species invasion and persist longer than small occurrences that are less robust.

Under all action alternatives, measures to prevent and control new invasive plant infestations would be applied on all BLM-administered land. Although these measures would reduce the likelihood of the introduction of invasive plants and treat their spread, it is assumed these actions would not be completely successful. Under all action alternatives, the risk to rare vascular plant species occurrences and habitat in all habitat groups would increase moderately compared to the No Action Alternative.

Wildfire Suppression

All habitat groups would be subject to wildfire suppression activities, but primarily activities would occur in the southern half of the West Cascades, Eastern Cascades, and Klamath Provinces. Under all action alternatives, risks to species occurrences from wildfire suppression activities would be similar to the No Action Alternative. Rare plant and fungi species in the planning area evolved in ecosystems that included periodic natural fires, but not wildfire suppression activities. Immediate response wildfire suppression activities that involve bull-dozing (such as fireline access and construction, safety zone construction, and staging centers) often make more fundamental and longer-lasting changes to habitat than the wildfire itself, although on a much smaller area. On the recent Timber Rock wildfire, only 27 of 27,100 acres (0.1%) were disturbed by fire lines (USDI BLM 2004). The acres of wildfire suppression activity are low relative to other management activities, but where suppression activities occur on the sites of BLM sensitive species occurrences, the species would likely be extirpated from those sites. Suppression efforts that prevent or reduce habitat loss of habitat from uncharacteristic wildfire would preserve occurrences that would otherwise be lost.

Locatable Mining Activities

The existing laws in regard to mining activities on the public lands are equally applicable to all the alternatives; therefore, the level of mining operations would also be the same under all alternatives. Whatever effects on botanical species occur from mining activities would be part of the existing condition and projected effects of the No Action Alternative. This discussion, therefore, does not compare alternatives regarding mining activities, but rather for consideration for cumulative effects. Mining operations occur throughout the planning area, but would occur primarily in areas occupied by species in the rocky areas/outcrops/scree, serpentine, conifer, and riparian and aquatic habitat groups.

The majority of claims, notices, and plans occur on Medford District (Klamath Province) where more rare plant occurrences are located. There are approximately 2,500 mining claims of active record in the planning area. Mining notices allow ground disturbance for exploration of locatable minerals. Plans of operation are required for commodity extraction operations or explorations greater than 5 acres. The number of occurrences that intersect with mining operations would be few, although some would be consequential. Mining claims, notices, and plans exist on areas where there are known rare plant occurrences such as French Flat (Medford District) and Hunter Bog (Coos Bay District), which also are areas of critical environmental concern. Seven BLM's sensitive species and numerous occurrences are found on these two areas alone. Because conservation measures for Bureau sensitive species would not be applied to mining notices and plans of operations, some species occurrences would likely be extirpated and occupied habitat destroyed as a result of equipment operations and ground disturbance.

Rock Quarries

Under all action alternatives, the level of rock quarry operations would increase slightly compared to the No Action Alternative. The amount of quarry operation activity would be associated with the level of road construction and maintenance under each alternative. Quarry operations occur in areas occupied by species

in the rocky areas/ outcrops/scree, serpentine, and conifer groups. There are approximately 370 existing quarries located on 700 acres. Existing quarries would be expanded, and a few new rock quarries would be developed to meet new road construction and maintenance rock needs. The location of new quarries is uncertain and would depend on the location of the activities and suitable rock sources. This would affect a relatively small percentage of the planning area and would possibly intersect with only a small number of plant occurrences. The overall risk of occurrence extirpation to species in these four habitat groups from quarry activities would be low under all alternatives. Conservation measures would be applied to all species and occurrences on all BLM-administered lands consistent with Bureau Special Status Species Policy since quarry sites are outside of the harvest land base.

Grazing

Under all alternatives, livestock grazing would occur in the southern half of the West Cascades, the Eastern Cascades, and the Klamath Provinces. Risks to occurrences and species would be similar to the No Action Alternative. Grazing would occur in areas occupied by upland meadows/grasslands, oak and hardwood woodlands, conifer, seasonal wetlands fens/vernal pools, and riparian and aquatic habitat groups. Under the No Action Alternative, approximately 560,000 acres would be authorized for grazing. Under all action alternatives, the number of grazing allotment acres would be reduced by 141,000 acres to 420,000 acres. Since these 141,000 acres of allotments are currently vacant (no cattle grazing occurring), there would be no change in the effects to the known occurrences of the BLM's sensitive species in this area.

Under all alternatives, there are 9 species in the Klamath Falls Resource Area and 46 species in the Medford District that include over 700 occurrences on 1,080 acres within allotments authorized for grazing.

Livestock graze and trample vegetation, including BLM sensitive species. Species assessments and monitoring of rangeland conditions and trends indicate that relatively few occurrences are extirpated due to grazing within the planning area. (ODA 2005, Meinke 2007, Menke et al. 2007, Kaye 2002).

Not all areas within grazing allotments are grazed and not all occurrences in grazing allotments are affected by grazing or trampling. Some occur in inaccessible locations, areas of low forage and use, or where grazing and trampling is seasonal, transient, and low. A few annual species such as Bellinger's meadow-foam, disappearing monkeyflower, and sculptured allocarya can tolerate light-to-moderate levels of trampling and grazing, as long as they can produce seed and maintain stable germination and occupancy levels (Whiteaker, pers. com. 2007).

Generally, the areas of higher grazing utilization occur in close proximity to abundant forage, grassland meadows, water sources, and flat ground. Areas of higher disturbance from trampling occur around holding pens, watering areas, and salt blocks. These high disturbance areas allow invasive plants to establish, increase occupancy, and spread. Occurrences of BLM sensitive species occur in areas of high utilization and high disturbance as well as low utilization. Although occurrences would normally withstand low-to-moderate amounts of grazing and trampling damage, high levels of disturbance (especially when repeated over multiple years) would reduce plant vigor, prevent reproduction, damage individual plants and occurrences, and increase the introduction and spread of invasive plants. Where high levels of disturbance occur in proximity to rare species, the risk to occurrences increases and may result in the extirpation of populations (Menke and Kaye 2007).

Under all alternatives, occurrences and occupied habitat of BLM's sensitive species that occur in the five habitat groups (upland meadows/grasslands, oak and hardwood woodlands, conifer, seasonal wetlands fens/vernal pools, and riparian and aquatic) would be protected from grazing and trampling through conservation measures associated with the application of the BLM's Special Status Species Policy. Since expected grazing usage is the same under all alternatives, including the No Action Alternative, and conservation measures would be equally applied under all alternatives, the effects regarding grazing activities on botanical species is not relevant to the choice to be made among the alternatives.

Off-Highway Vehicle Use

Under the No Action Alternative, approximately 330,000 acres of BLM-administered lands would be designated as open to off-highway vehicle use in the Salem, Eugene, and Medford Districts, and the Klamath Falls Resource Area. Approximately 85,000 acres would be designated as closed. Species in all nine habitat groups are found in these areas. A majority of these open areas are located on steep, densely-forested terrain, which is not conducive to cross-country motor vehicle travel. However, where cross-country travel occurs, vehicles would crush vegetation, displace soils, and create trails that could potentially degrade occupied habitat and damage occurrences of rare plant species that may be scattered throughout the area.

High concentrations of off-highway vehicle activities occur around campgrounds, recreation areas, existing trails, and adjacent to private lands and fan outwards for hundreds of acres. Off-highway vehicle activities occur across a wide area, including 140,000 acres in the Klamath Province where the highest density of species occurrences are found.

Under Alternatives 1, 2, and 3, off-highway vehicle activity would be closed on an additional 14,000 acres and designated as "limited to designated roads and trails" on an additional 1.3 million acres. Only 77 acres would remain open to off-highway vehicles. Risks to occurrences and species would be reduced moderately compared to the No Action Alternative. A designation of "limited to designated roads and trails" would result in a reduction to the amount of potential damage to occupied habitat and occurrences for all habitat groups compared to the No Action Alternative. Populations would likely still experience some reductions and extirpations, but at lower rates. The 77 acres that would remain open include coastal sand dune areas in the Coos Bay District. An abundance of rare plant occurrences (mostly lichens in forested areas) are found in surrounding habitat, but off-highway vehicle activities would not result in loss or damage to occurrences or degrade habitat. The 77 acres which would be designated as open under Alternatives 1, 2, and 3 would be designated as limited to designated roads and trails under the PRMP.

National Landscape Conservation System and Areas of Critical Environmental Concerns

Under all action alternatives, risks to occurrences and species in the National Landscape Conservation System would be similar to the No Action Alternative. A small portion of these lands have been surveyed, but approximately 300 occurrences and 307 acres of occupied habitat of special status plant and fungi species are known from the National Landscape Conservation System.

Areas of critical environmental concern are designated where special management attention is required to maintain and protect relevant and important values. Under the No Action Alternative, 131 existing and potential areas of critical environmental concern would be managed to maintain and protect relevant and important values. This would result in the conservation of approximately 560 known occurrences of BLM's sensitive plant species. These species occur in a wide range of habitats throughout the planning area, with over 400 occurrences in the Klamath Province. More occurrences are likely to exist in areas of critical environmental concern because of the unique nature of the habitat.

Under Alternatives 1, 2, and 3, there are 40 Areas of Critical Environmental Concern that contain special status species as a relevant and important value; these areas would not be designated under one or more of these three alternatives. These areas contain approximately 60 known occurrences. There are 28 additional Areas of Critical Environmental Concern with the BLM's sensitive species that would be reduced in size under one or more of these alternatives. Occurrences of species in the conifer habitat group would be subject to forest management activities. Some occurrences of these species would likely be extirpated as a result of future forest management activities because they would not receive special management attention or conservation protection measures (except for those species with 20 or fewer occurrences). An example

of these species (*Cupressus bakeri)* is one of eight populations in Oregon; this species is found in the Baker Cypress Area of Critical Environmental Concern (Medford District). It is the only occurrence on BLM-administered lands and is the northern most population of cypress in North America.

Under the PRMP, there are six areas of critical environmental concern that contain special status species as a relevant and important value that would not be designated, and 22 others that would be reduced in size. Conservation measures would be applied to species occurrences on all BLM-administered lands consistent with Bureau Special Status Species Policy. There would be a low risk of extirpation of occurrences and species, similar to the No Action Alternative.

Biological Factors and Risk to Species from Management

For many species, there is insufficient information at the level of plan decision-making to determine the significance of the loss of one or more occurrences to a BLM sensitive plant or fungi species. The Bureau special status plant and fungi species have diverse life histories and respond differently to habitat change and disturbances. The unique biological requirements, ecology, and threats of each species shape the number of individuals, patch size, and distribution. Biological factors interact with environmental factors to determine population and species rarity and trends (Gurevitch et al. 2006, Kaye et al. 1997).

Various studies discuss specific factors that influence population trends relative to plant life-form and life history, breeding systems and effective breeding occurrences, seed dormancy, recruitment, colonal growth, colonization, genetic factors, and models of extinction risks and disturbance (Ellestrand and Elam 1993, Lennartsson 2002, Menges 2000, Schemske et al. 1994). Although each species requires individual biological, ecological, and risk assessments and the threshold of many species is higher, at a minimum any occurrence losses from management activities to species with 20 or fewer occurrences would contribute to the trend toward local extirpation or extinction of the species within the planning area (Ellstrand and Elam 1993, Freidman 2007, Kaye 2007, and USDI USFWS 2003). For some species, this threshold is higher. However, the threshold is consistent with general biological, environmental, and risk factors for species rankings in Oregon Natural Heritage Plan (2007) and Nature Serve (2008).

Under Alternatives 1, 2 and 3, there would be little risk of the extirpation of occurrences to BLM's sensitive species in the nine habitat groups in areas outside of the harvest land base on BLM-administered O&C lands and on Public Domain lands. This is because conservation measures associated with the BLM Special Status Species Policy would be applied and occurrences would likely survive. The BLM Special Status Species Policy would be applied in all land use allocations under the No Action Alternative and the PRMP.

Under all alternatives, 90 of the BLM's sensitive species with 20 or fewer known occurrences and containing at least one occurrence would occur on BLM-administered lands (excluding species in the Cascade Siskiyou National Monument and West Eugene Wetlands). Of these species, 41 occur entirely on BLM-administered lands.[8] Specifically:

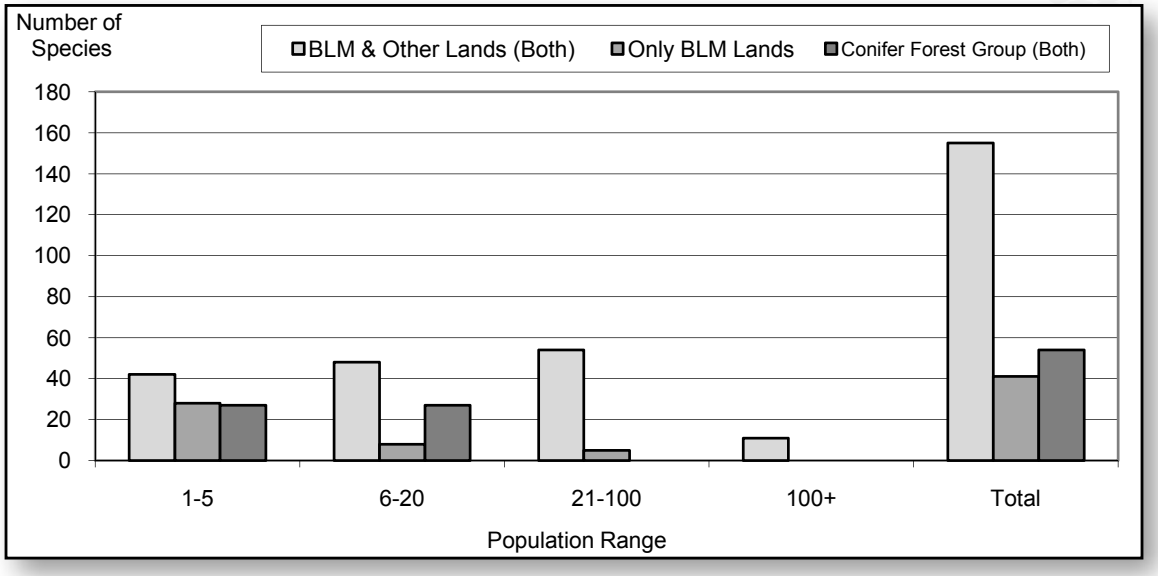
- 42 of the 90 species have 1 to 5 known occurrences.
- 48 of the 90 species have 6 to 20 known occurrences.

The conifer habitat group, where forest management activities would occur, includes 54 of the 90 species as shown in *Figure 4-71* (*Distribution of known populations of Bureau special status species by land ownership and habitat group)*. Of these 54 species:

- 27 species have 1 to 5 known occurrences.
- 27 species have 6 to 20 known occurrences.

[8]There is some uncertainty when combining records from two data sets related to double counting and undercounting. Geobob was the primary data source for BLM lands. Heritage data was the source for state, private, and other federal lands.

Figure 4-71. Distribution Of Known Populations of Bureau Special Status Species By Land Ownership And Habitat Group



Any occurrence losses from management activities would be critical for species with fewer than 20 occurrences (Ellstrand and Elam 1993, USDI USFWS 2003c, Kaye pers. com., 2007). Conservation measures would be applied to species with 20 or fewer occurrences to prevent extirpation in the planning area under all alternatives.

There are another 65 sensitive species that are known from more than 21 occurrences. Although five of these species occur entirely on BLM-administered lands, none occur in the conifer habitat group.

Under Alternatives 1, 2, and 3, species with 21 to 100 known occurrences in the conifer habitat group would have an increased risk of extirpation of occurrences. Any occurrence losses would contribute to a trend toward extirpation within the planning area. However, conservation measures would be applied to prevent extirpation and extinction if occurrences drop to 20 or fewer known occurrences.

Under Alternatives 1, 2, and 3, occurrences of species on private lands would not be considered when determining the total number of species occurrences for applying conservation measures. It is assumed that no protection of the BLM's sensitive species would occur on private lands; however, if BLM sensitive species occur on private lands, the circumstances that have permitted its continued existence on the private lands may or may not continue. It would be speculative to predict the change in those circumstances and likewise the outcome of such occurrences. Therefore, the assumption is made in this analysis that no change would occur to any species occurrences on private lands. Occurrences of these species, as well as federally listed plants, have been damaged and extirpated on private lands (USDI USFWS 2003b and 2006b, Brock and Callagan 2006). The loss of habitat is documented in various monitoring reports and recovery plans for federally listed plant species (USDI USFWS 1998c, 2000, 2003a, and 2003b).

Under the No Action Alternative and the PRMP, due to application of conservation measures to occurrences and species on all BLM-administered lands consistent with Bureau Special Status Species Policy, there would be a low risk of extirpation to occurrences and species similar to the No Action Alternative.

Projected Occurrences and Occupied Habitat

A quantitative analysis was conducted to calculate the number of occurrences and occupied habitat of BLM's special status plant and fungi species that would be expected to occur on BLM-administered lands. This information is useful in estimating the number of occurrences and occupied habitat expected to occur and the potential intersect of occurrences and management activities. The analysis derives estimated occurrences and occupied habitat on all BLM-administered lands using a single linear projection based on existing survey and occurrence data. A ratio of the total number of known occurrences and occupied habitat to the total number of acres surveyed was calculated and applied across all BLM-administered lands.

The following information was used for the analysis:

- Approximately 509,600 acres (20% of the total 2.6 million acres) have been surveyed on BLM-administered lands in the planning area over the past 7 years. Surveyed acres occur in areas and habitat types where future activities on BLM-administered lands would occur.
- About 3,700 total known occurrences and 4,250 acres of occupied habitat of the BLM's special status species occur on BLM-administered lands in the planning area.[9] (Although the Bureau special status species list changed in 2007, nearly all of the species except the fungi were included in previous survey lists.)
- Acres of timber harvest and fuels reduction treatments were projected for each action alternative.
- Data sets of surveyed acres, known occurrences, and occupied habitat were projected for all unsurveyed BLM-administered lands and each BLM district.

The following statements apply to the projection of occurrences and occupied habitat:

- The BLM special status species are not homogenously distributed throughout the planning area and tend to have a clumpy or patchy distribution. They are often associated with poorly understood biotic, edaphic (soil), and climatic patterns.
- The pattern of distribution is based on the survey information and provides only a broad approximation of the number of occurrences and the pattern of occupied habitat at the planning area scale.
- There is incomplete information on the distribution of the BLM's special status plant and fungi species in the planning area, as well as the specific location of future management actions that could affect these occurrences.
- The pattern that results from the acres surveyed, occurrences found, and acres of occupied habitat cannot be used to predict the location of BLM special status species. The analysis is limited to broad-scale estimates of the aggregate of all occurrences and occupied habitat and is not applicable to any specific species.
- The analysis assumes a similar level of discovery in the future as the past.

The results of the analysis, including the number and percentage of projected occurrences that would be affected by forest management activities under the alternatives, are shown in *Table 4-42* (*Projected occurrences that would be affected by forest management over the next 10 years)*.

Under Alternatives 1, 2, and 3, the percentage of projected species occurrences that would be affected by management activities would range from 8 to 11 percent over 10 years. The projected occurrences in the harvest land base would intersect with forest management activities over decades, and most occurrences would be extirpated unless the species is known from 20 or fewer occurrences. In this case, occurrences would be protected by conservation measures under the BLM Special Status Species policy. The relationship between occurrences affected does not necessarily equate to the percentage of risk to a specific species. Under the No Action Alternative and the PRMP, species occurrences would not be affected due to the application of conservation measures under the BLM Special Status Species policy.

[9]These species and occurrences are based on the 2008 BLM special status species list and the records in GeoBob on October 22, 2007. They do not include occurrences in the West Eugene Wetlands nor lands in the National Landscape and Conservation System.

A similar calculation of projected occurrences and occupied habitat was estimated for each BLM district using local data for survey acres, species occurrence, and occupied habitat. The results of the analysis show that 0.8% of all BLM-administered lands in the planning area would be occupied habitat. See *Table 4-43 (Projected BLM sensitive plant and fungi species occurrences and occupied habitat by district*). The ratio of known occupied habitat and known occurrences as a fraction of surveyed acres, when calculated for each BLM district and projected over each district's entire land base, provides a comparison of projected occupied habitat and occurrences between districts. The total number of projected occurrences is approximately 18,395. The amount varies across districts and ranges from approximately 1,000 projected occurrences in Coos Bay District, to nearly 9,500 in the Medford District.

The average occupied habitat size per occurrence, or patch size, of BLM special status species varies broadly among districts, from 0.21 acres in the Salem District to 12.89 acres in the Klamath Falls Resource Area. Differences in patch size among BLM districts largely depend on the types of species, species life-form, biology, ecology, and habitat.

The percent of projected occupied habitat as a percent of each BLM district's total land base also varies widely, from 0.1 percent in the Salem District and Klamath Falls Resource Area, to 4.1% in the Coos Bay District. The differences are due to the number and patch size of occurrences, and also the size of each BLM district (refer to *Figure 3-48* in *Chapter 3*). In areas where few occurrences are found, the likelihood of activities affecting these occurrences is lower. Where occurrence densities are higher, the likelihood of activities affecting occurrences is higher. Where the patch size per occurrence is smaller, such as in the Medford and Salem Districts, the likelihood of population loss would increase as activity levels increase because smaller size occurrences would be more susceptible to disturbances such as invasive species invasion or changes to interior habitat conditions.

Table 4-42. Projected Occurrences That Would Be Affected By Forest Management Over The Next 10 Years

Alternative	Planning Area (BLM Acres)	Number of Projected Occurrences	Acres of Timber Harvest Treatments	Number of Projected Occurrences Affected	Percent of Projected Occurrences Affected
No Action	2,557,800	18,395	160,500	1,154	6%
Alt. 1	2,557,800	18,395	204,000	1,467	8%
Alt. 2	2,557,800	18,395	220,100	1,583	9%
Alt. 3	2,557,800	18,395	288,800	2,077	11%
PRMP	2,557,800	18,395	296,900	2,135	12%

Table 4-43. Projected BLM Sensitive Plant And Fungi Occurrences And Occupied Habitat By District

	Planning Area	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath
Total Acres	2,557,800	403,000	315,100	426,300	322,700	865,800	224,900
Projected Occupied Area (acres)	21,331	429	5,027	4,755	13,344	5,178	251
Occupied Area (%)	0.8%	0.1%	1.6%	1.1%	4.1%	0.6%	0.1%
Projected Number of Occurrences	18,395	2,085	3,276	2,705	1,051	9,473	19
Average Acres Per Number of Occurrences	1.16	0.21	1.53	1.76	12.70	0.55	13.21

Invasive Plants

This analysis examines timber harvesting, road management activities, and off-highway vehicle use for the potential to introduce and spread invasive plant species would result from the alternatives.

Key Points

- The risk of introducing and spreading invasive plant species over the next 10 years would be lowest under the No Action Alternative, and highest under Alternative 2.
- The risk of introducing and spreading invasive plant species over the long term would be lowest under the No Action Alternative, and highest under Alternative 3.

The effects of timber harvesting, road management activities, and off-highway vehicle use on the introduction and spread of invasive plant species is measured in terms of susceptibility or risk at the scale of fifth-field watersheds. Timber harvesting, road management activities, and off-highway vehicle use generally can create susceptibility for invasive plant species introduction and spread. Under any of the actions, including action alternatives and no action, infestations would be introduced and spread more readily in areas that would have greater intensity and extent of human activity (e.g., high recreational use areas).

Management activities on other land ownerships would also contribute to the amount of lands made susceptible to the introduction and spread of invasive plant species. In addition, other management actions such as grazing and recreational activities on BLM-administered lands would also contribute to the introduction and spread of invasive plant species. The analysis assumes that actions on other ownerships and actions other than timber harvesting, road management activities, and off-highway vehicle use would continue to contribute to invasive plant species introduction and spread at current levels. Any future changes in the contribution from these other activities to the risk of introduction and spread of invasive plant species would be speculative and depend largely on site-specific factors that cannot be analyzed at this scale of analysis. However, there is no basis for speculating that such changes would vary among the alternatives. Therefore, information on the contribution of these other management actions to the risk of introduction and spread of invasive plant species is not necessary for a reasoned choice among the alternatives.

Inadvertent Introduction of Invasive Plant Species

The factors that were considered in the analysis of the relative levels of risk for the inadvertent introduction of invasive plant species on the BLM-administered lands include:

- distribution and abundance of species
- types of timber harvesting and logging methods
- proximity of harvesting activity to streams
- intensity and distribution of management activities
- designations for off-highway vehicle use

Species group distributions are categorized and displayed in maps as abundant, limited, or low by fifth-field watershed (see *the Invasive Plant* section in *Chapter 3)*. For analysis purposes, species groups are combined to represent invasive plant species.

Risk of Introduction

The relative risk of invasive plant species being introduced over the next 10 years as an inadvertent result of timber harvesting activities would vary by alternative. The differences are based on the distribution of invasive plant species, the acres of the different timber harvesting types (thinning, partial harvesting, regeneration harvesting, and uneven-aged management), and the methods of logging that would be used. See *Appendix G - Invasive Plants* for methodology used in determining risk of, or susceptibility to, invasive plant introductions. Timber harvesting types and logging methods would alter the conditions that affect the introduction and spread of invasive weeds. For example:

- Regeneration harvests under all alternatives and partial harvests under Alternative 3 would create higher light levels than commercial thinning and uneven-aged management.
- Soil would be disturbed more by ground-based logging methods, less by skyline cable systems, and least by aerial logging systems.

A comparison of the relative susceptibility among the alternatives can be seen in *Figure 4-72 (Relative susceptibility of fifth-field watersheds to invasive plant species introduction as a result of timber harvesting activities over the next 10 years), Figure 4-73 and Table 4-44 (Susceptibility comparison for introduction of invasive plant species associated with timber harvesting activities over the next 10 years)*. Watersheds with no potential for timber harvesting activities in the first 10 years of implementation, or which have no BLM-administered lands do not have an assigned susceptibility category.

Figure 4-72 is based on estimates derived from the Ten-Year Scenario Quality Check (*Appendix E - Timber*) and should not be interpreted as a product of actual site-specific project planning.

Susceptibility to the introduction of invasive plant species would be greatest under Alternative 2, which would have 171 watersheds with some level of susceptibility that is associated with timber harvesting activities over the next 10 years. The No Action Alternative would have the least susceptibility to the introduction of invasive plant species, with 156 watersheds having some level of susceptibility. Alternatives 1, 3, and the PRMP would be intermediate in susceptibility, with 158, 160, and 168 watersheds, respectively, having some level of susceptibility.

Table 4-44. Susceptibility Comparison For The Introduction Of Invasive Plant Species That Are Associated With Timber Harvesting In The Fifth-Field Watersheds Across The Alternatives Over The Next 10 Years

Susceptibility Ranking	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
High	0	0	2	1	0
Moderate	2	6	13	8	9
Low	154	152	156	151	159
Total Susceptible	**156**	**158**	**171**	**160**	**168**
Total Not Susceptible	**104**	**102**	**89**	**100**	**92**
Total Watersheds	**260**	**260**	**260**	**260**	**260**

Figure 4-72. Relative Susceptibility Of Fifth-Field Watersheds To Invasive Plant Species Introduction As a Result Of Timber Harvesting Activities Over The Next 10 Years

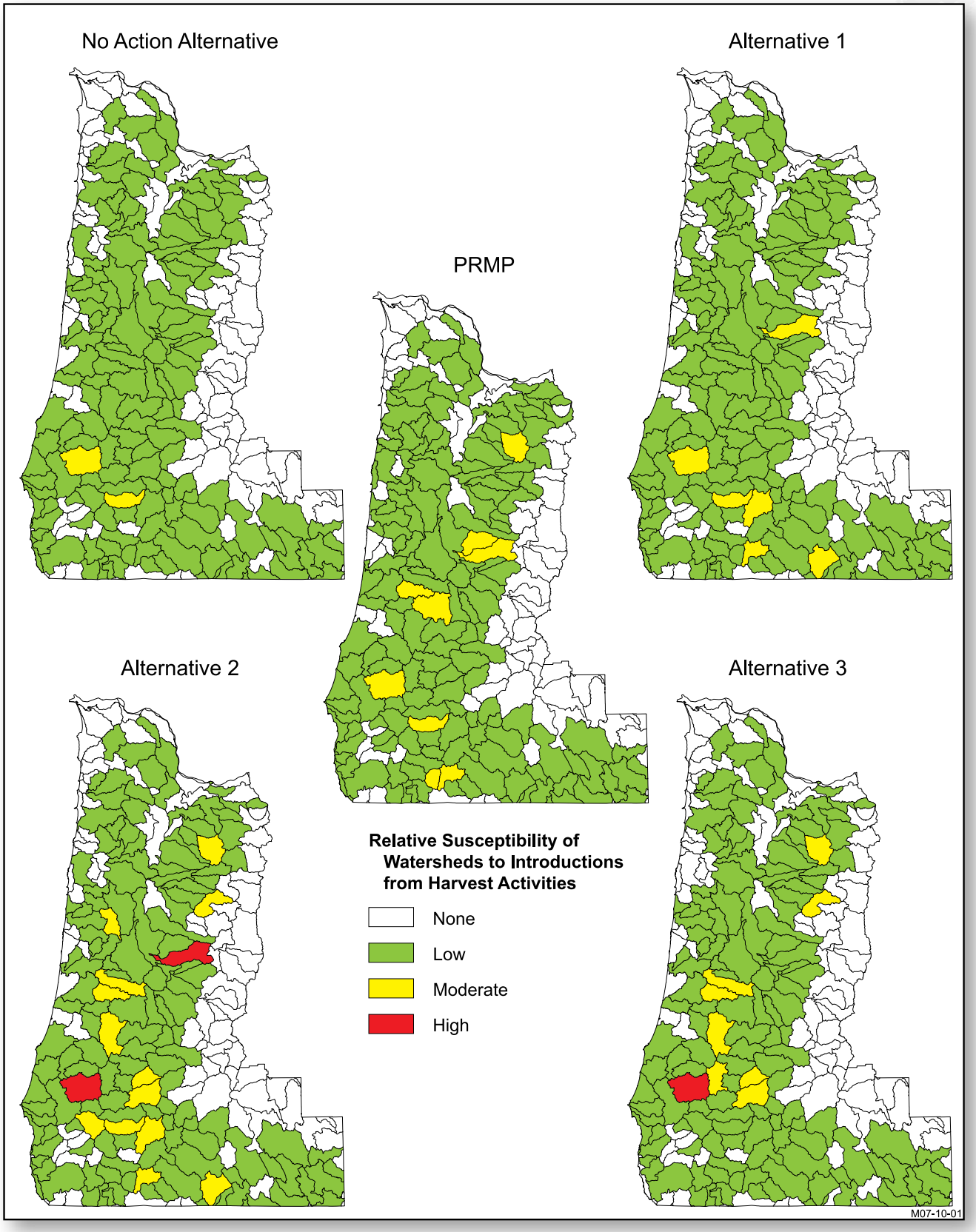
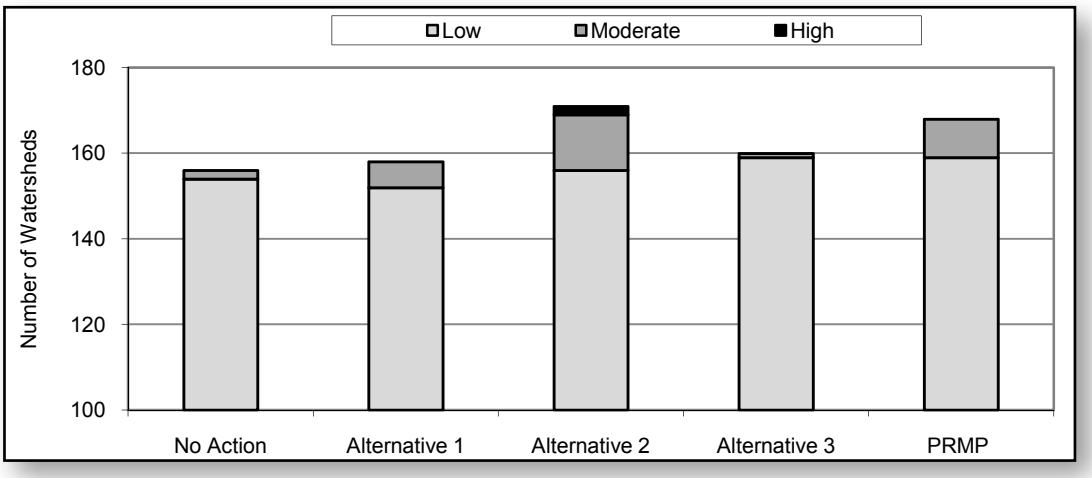


Figure 4-73. Susceptibility Comparison For Introduction Of Invasive Plant Species Associated With Timber Harvesting Activities Over The Next 10 Years



Under Alternative 2, there would be two watersheds in the highest susceptibility category. These two watersheds would be located in the Eugene, Roseburg, and Coos Bay Districts. Under Alternative 3, there would be one watershed in the highest susceptibility category. This watershed would be located in the Roseburg and Coos Bay Districts. Under the No Action Alternative, Alternative 1, and the PRMP, there would be no watersheds in the highest susceptibility category.

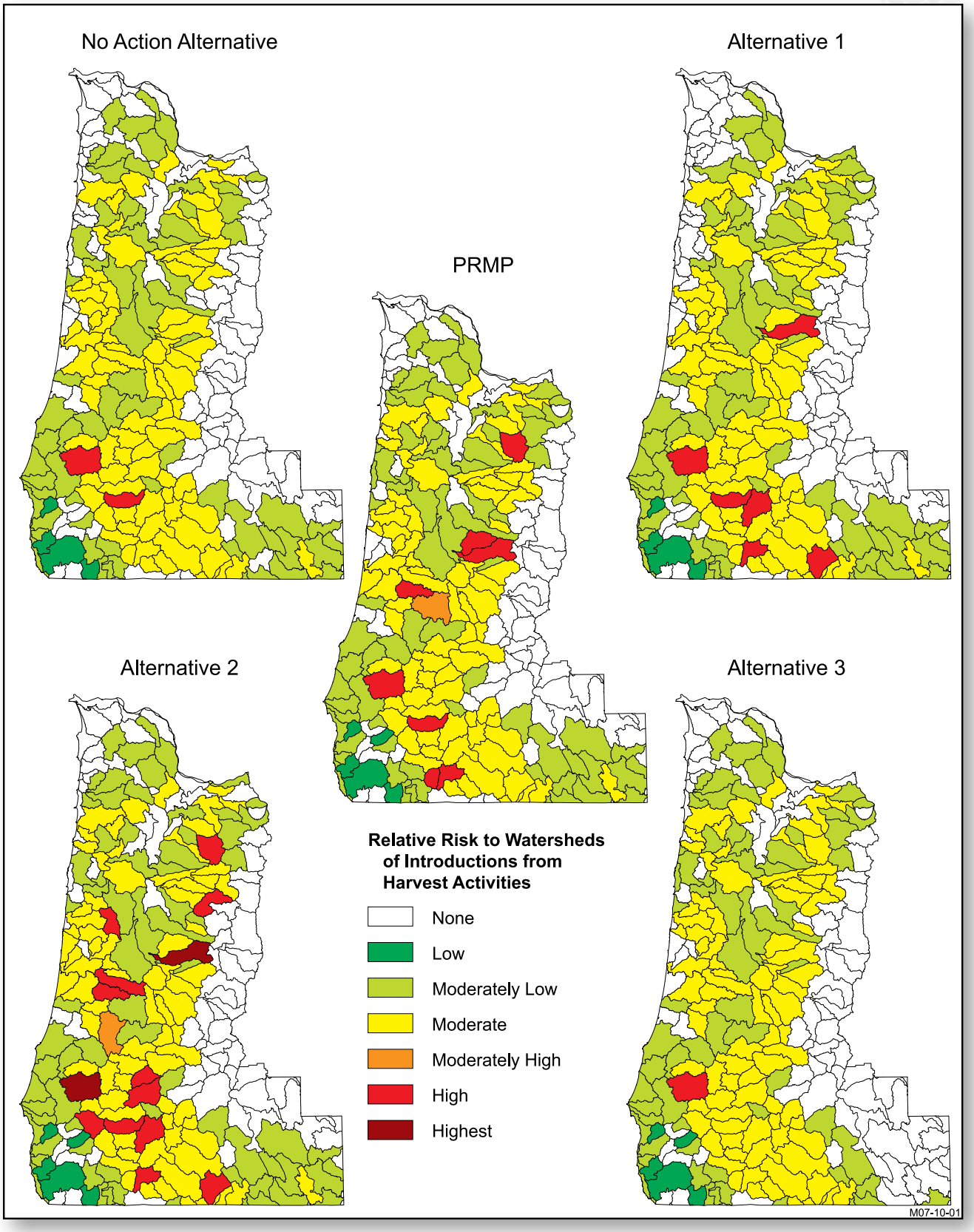
The risk of invasion is determined by both the susceptibility of a watershed to invasion from timber harvesting activities in the first 10 years of implementation and the presence of invasive plant species. See *Appendix G - Invasive Plants* for methodology used in determining risk and susceptibility.

The process used to determine the risk of invasive plant species introduction by fifth-field watershed is shown in *Table 4-45 (Matrix to determine the relative risk for introduction of invasive plant species associated with timber harvesting activities over the next 10 years)* and displayed in *Figure 4-74 (Comparison of the risk by mapped watershed for the introduction of invasive plant species that are associated with timber harvesting activities over the next 10 years)*. Within this table, categories for the distribution of invasive plant species and the categories for the susceptibility of introduction from timber harvesting activities are used to determine the relative risk categories for the inadvertent introduction of invasive plant species.

Table 4-45. Matrix To Determine The Relative Risk For The Introduction Of Invasive Plant Species That Are Associated With Timber Harvesting Activities Over The Next 10 Years

Species Distribution Categories	Susceptibility Categories for Introduction of Invasive Plant Species From Timber Harvesting Activities		
	Low	Moderate	High
Low	Low	Moderately Low	Moderate
Limited	Moderately Low	Moderately High	High
Abundant	Moderate	High	Highest

Figure 4-74. Comparison Of The Risk By Mapped Watershed For The Introduction Of Invasive Plant Species Associated With Timber Harvesting Activities Over The Next 10 Years



Watersheds with a low distribution of invasive plant species and low susceptibility for the introduction of invasive plant species would have the lowest risk of invasion. The greatest risk of invasion would be in fifth-field watersheds where both invasive plant species are abundant and susceptibility would be high. Watersheds with either no reported sites for the sample set of invasive plant species in the analysis or with no BLM-administered lands do not have an assigned risk category.

See *Figure 4-75 (Comparison of the risk by watersheds for the introduction of invasive plant species associated with timber harvesting activities over the next 10 years)* and *Table 4-46 (Risk comparison for introduction of invasive plant species associated with timber harvesting in the fifth-field watersheds across the alternatives over the next 10 years)* for the relative risk for the introduction of invasive plant species that are associated with timber harvesting activities over the next 10 years across the alternatives.

The relative levels of risk of invasive plant species introduction associated with timber harvesting activities over the next 10 years under the alternatives follow the same pattern as the relative levels of susceptibility: The highest risk would occur under Alternative 2, and the lowest risk would occur under the No Action Alternative. Under Alternative 2, there would be 2 watersheds in the highest category and 12 watersheds in the high categories for risk of invasive plant species introduction associated with timber harvest activities over the next 10 years. There would be no watersheds in the highest risk category under any of the other alternatives. There would be between four and five watersheds in the low risk category and more than half of the 260 fifth field watersheds in the moderate and moderately low categories under all alternatives.

Figure 4-75. Comparison Of The Risk By Watersheds For The Introduction Of Invasive Plant Species Associated With Timber Harvesting Activities Over The Next 10 Years

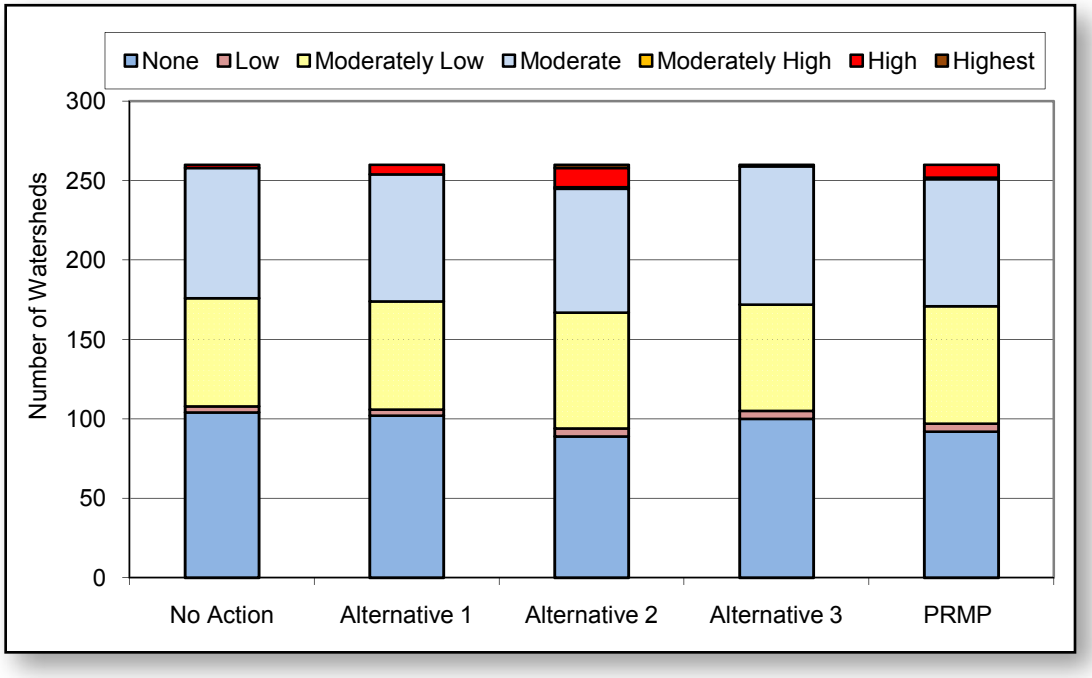


Table 4-46. Risk Comparison For The Introduction Of Invasive Plant Species Associated With Timber Harvesting In The Fifth-Field Watersheds Across The Alternatives Over The Next 10 Years

Risk Ranking	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Highest	0	0	2	0	0
High	2	6	12	1	8
Moderately high	0	0	1	0	1
Moderate – Moderately low	150	148	151	154	154
Low	4	4	5	5	5
Total At Risk	**156**	**158**	**171**	**160**	**168**
Total Not At Risk	**104**	**102**	**89**	**100**	**92**
Total Watersheds	**260**	**260**	**260**	**260**	**260**

Invasive Plant Species Introduction into Riparian Areas

The risk of invasive plant species being introduced into riparian habitats as an inadvertent result of timber harvesting activities would vary with: the widths of riparian management areas or riparian reserves; management direction within riparian areas; and levels of timber harvesting activities within riparian areas. These factors affect the light levels in riparian areas: the higher the light levels, the higher the risk for the introduction of invasive plant species (see the *Invasive Plants* section in *Chapter 3*).

Under the PRMP, the exclusion of thinning adjacent to streams would result in light levels in riparian areas that would remain at or decrease from current levels. Under the PRMP, the light levels in riparian areas would be the lowest of all alternatives because of the exclusion of thinning and silvicultural treatments adjacent to streams. Also, under the PRMP, the width of the riparian management areas would ensure that regeneration harvest would not occur within one site-potential tree-height distance of perennial and fish-bearing streams or one-half site-potential tree-height distance of intermittent, non-fish-bearing streams. The PRMP is the only alternative that would exclude these areas from thinning and silvicultural treatments.

Under the No Action Alternative and Alternative 1, the light levels in riparian areas would be higher than under the PRMP, because these two alternatives would not exclude thinning along streams. However, post-harvest light levels in riparian areas under the No Action Alternative and Alternative 1 would be lower than under Alternatives 2 and 3 because of the broader widths of the riparian reserves and riparian management areas under the No Action Alternative and Alternative 1.

Post-harvest light levels in riparian areas under Alternatives 2 and 3 would be higher than under all other alternatives, because the widths of the riparian management areas would be narrower, and Alternatives 2 and 3 would not exclude thinning along streams. The analytical assumption for the risk of introducing invasive plant species along intermittent streams under Alternatives 2 and 3 is that the light levels for riparian areas associated with these streams would mimic the levels in surrounding timber harvest units. This is due to the width of the riparian management areas along most intermittent streams under Alternatives 2 and 3, which would result in regeneration harvest (and the increase in light from such harvest) closer to streams than under the other alternatives.

The highest overall susceptibility for introduction of invasive plants into riparian habitats associated with timber management activities over the next 10 years would occur under Alternative 2 compared to the other alternatives. Under the No Action Alternative and Alternatives 1 and 3, there would be an intermediate susceptibility (lower than under Alternative 2 and higher than under the PRMP) for the introduction of invasive plants into riparian habitats associated with timber management activities over the next 10 years. Under the PRMP, there would be no measurable susceptibility for the introduction of invasive plants into

riparian habitats associated with timber management activities over the next 10 years, because the exclusion of thinning and silvicultural treatments along streams would prevent an increase in light from current conditions within riparian areas.

See *Figure 4-76 (Susceptibility comparison for the introduction of invasive plants species into riparian habitats associated with timber harvesting activities over the next 10 years)* and *Table 4-47 (Susceptibility comparison for introduction of invasive plant species into riparian habitats associated with timber harvesting activities in the fifth-field watersheds over the next 10 years)* for a comparison of the relative susceptibility among the alternatives.

Figure 4-76. Susceptibility Comparison For The Introduction Of Invasive Plant Species Into Riparian Habitats Associated With Timber Harvesting Activities Over The Next 10 Years

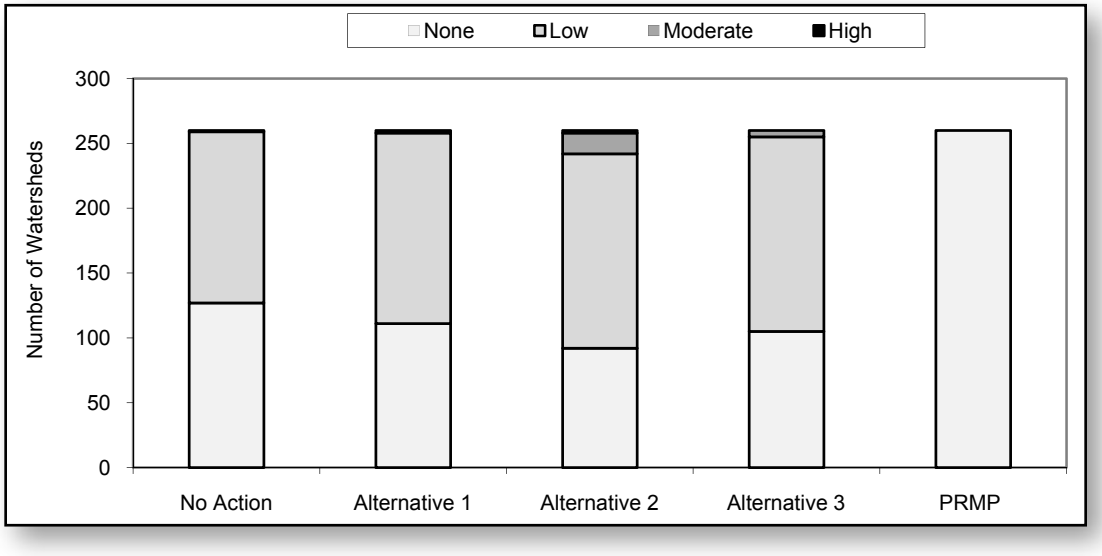


Table 4-47. Susceptibility Comparison For The Introduction Of Invasive Plant Species Into Riparian Habitats That Are Associated With Timber Harvesting In The Fifth-Field Watersheds Over The Next 10 Years

Susceptibility	No Action	Alt.1	Alt. 2	Alt. 3	PRMP
Post-thinning light levels	lower	lower	higher	higher	lowest
Widths of riparian reserves or riparian management areas	broadest	broader	narrower	narrower	broader
Thinning and silvicultural treatment exclusion areas	no	no	no	no	yes
Overall susceptibility	moderate	moderate	highest	next highest	least
High	0	0	2	0	0
Moderate	1	2	16	5	0
Low	132	147	150	150	0
Total Susceptible	**133**	**149**	**166**	**155**	**0**
Total Not Susceptible	**127**	**111**	**94**	**105**	**260**
Total Watersheds	**260**	**260**	**260**	**260**	**260**

The highest overall risk of the introduction of invasive plant species into riparian habitats that are associated with timber harvesting activities over the next 10 years would occur under Alternative 2, because there would be narrower riparian management areas under Alternative 2 than under the No Action Alternative, Alternative 1, or the PRMP. The most acres of regeneration harvest in or near riparian areas over the next 10 years would occur under Alternative 2 compared to the other alternatives See *Appendix G - Invasive Plants* for methodology used in determination of risks.

The second highest risk of introducing invasive plants into riparian areas over the next 10 years would occur under Alternative 3. This risk is based on establishment of the narrowest riparian management areas under Alternative 3 of all alternatives, and also the relatively high number of acres of thinning and partial harvests adjacent to riparian areas that would occur under Alternative 3 over the next 10 years.

The second lowest risk of introducing invasive plants into riparian areas over the next 10 years would occur under the No Action Alternative, compared to the other alternatives because the broadest riparian reserves would be established under the No Action Alternative of all alternatives and because of the relatively fewer acres of timber harvest activities within riparian areas that would occur under the No Action Alternative.

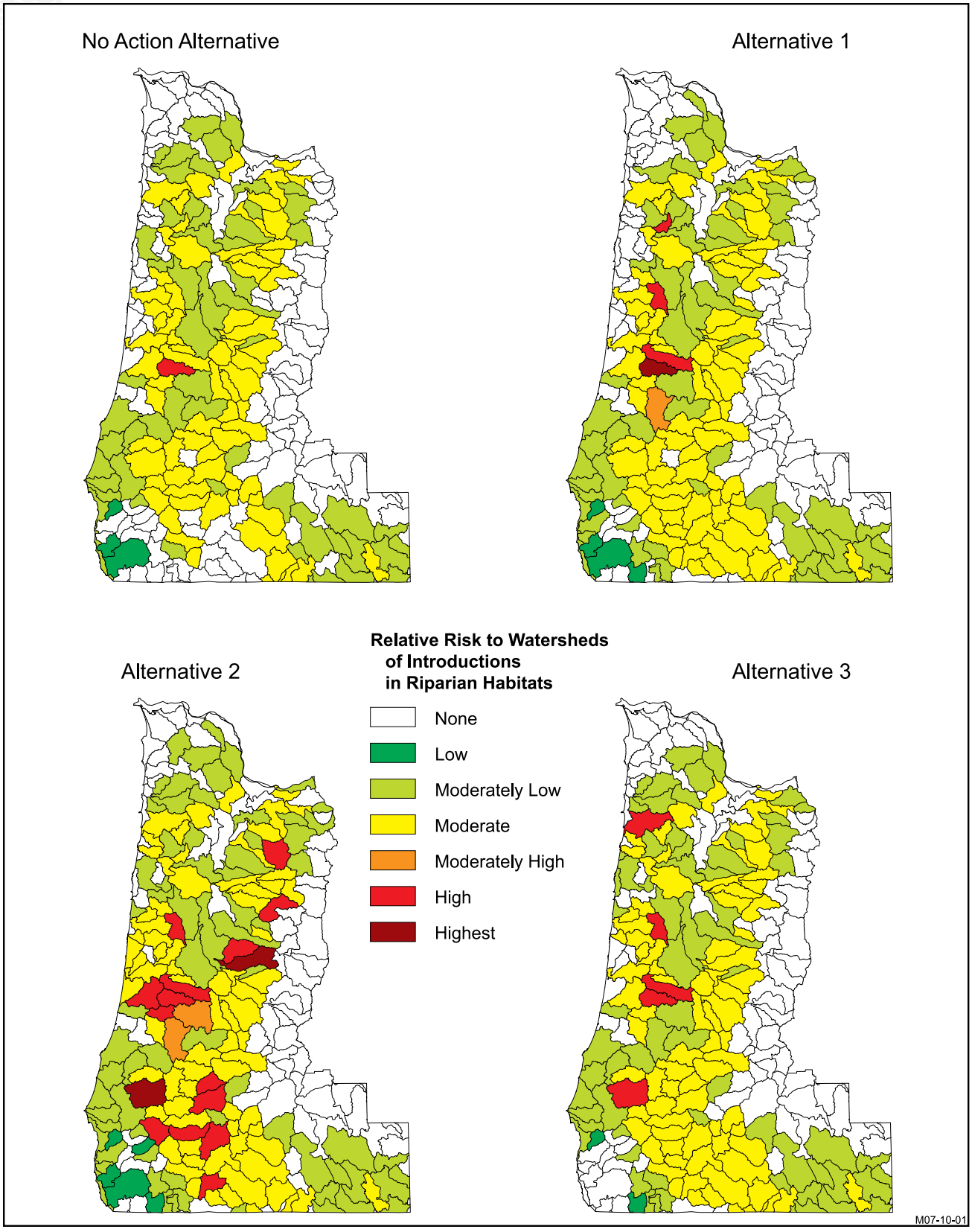
Under the PRMP, there would be no measurable risk of introducing invasive plant species into riparian areas as an inadvertent result of timber harvesting over the next 10 years, because the exclusion of thinning and silvicultural treatments along streams would prevent an increase in light within riparian areas. In addition, because there would be no thinning in the exclusion areas, there would be no harvest activities that would bring in invasive plant seed or plant parts into the riparian areas. There would be some risk of introducing invasive plant species into riparian areas as an inadvertent result of other actions related to timber harvesting, such as tree felling for safety and operational reasons. However, the resultant risk of such potential invasive plant species introductions would be highly localized and cannot be discerned at this scale of analysis.

The risk of introducing invasive plant species into riparian habitats is shown in *Figure 4-77 (Relative risk of introducing invasive plant species in riparian habitats over the next 10 years)* and based on riparian susceptibility values and invasive plant species distribution. The risk comparison for invasion into riparian habitats among the alternatives is presented in *Figure 4-78 (Riparian risk category comparison for the introduction of invasive plant species over the next 10 years)* and *Table 4-48 (Risk comparison for introduction of invasive plant species into riparian habitats associated with timber harvesting in the fifth-field watersheds over the next 10 years)*

Table 4-48. Risk Comparison For The Introduction Of Invasive Plant Species Into Riparian Habitats Associated With Timber Harvesting In The Fifth-Field Watersheds Across The Alternatives Over The Next 10 Years

Risk Ranking	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Highest to Moderately High	1	5	18	5	0
Moderate to Moderately Low	129	140	145	148	0
Low	3	4	5	2	0
Total at Risk	**133**	**149**	**168**	**155**	**0**
Total Not at Risk	**127**	**111**	**92**	**105**	**260**
Total Watersheds	**260**	**260**	**260**	**260**	**260**

Figure 4-77. Relative Risk Of Introducing Invasive Plant Species In Riparian Habitats Over The Next 10 Years



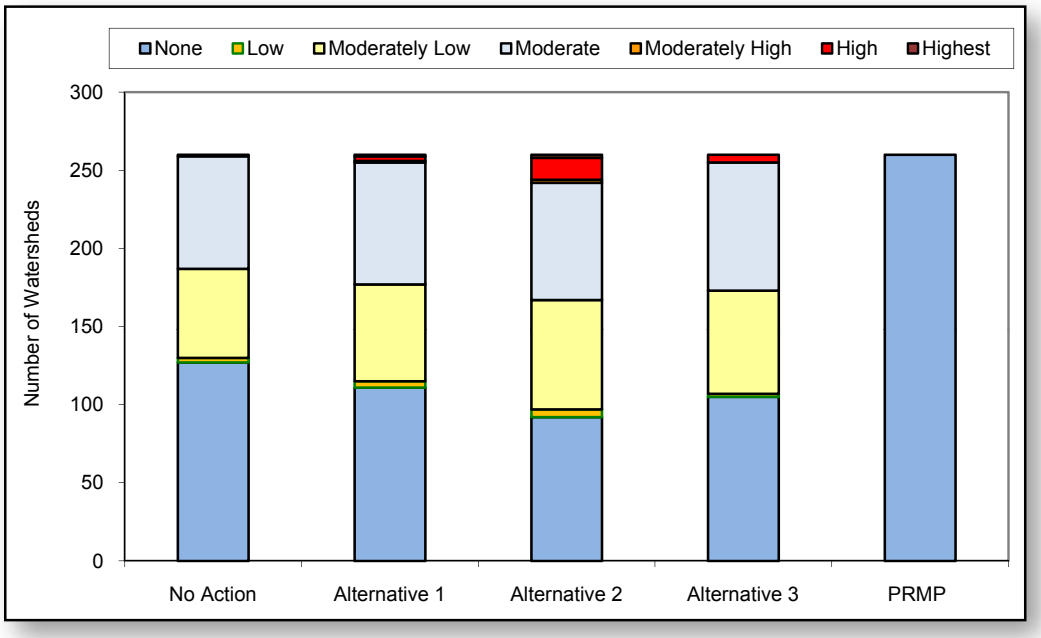


Figure 4-78. Riparian Risk Category Comparison For Introduction Of Invasive Plant Species Over the Next 10 Years

Invasive Plant Species Introduction Associated with New Road Construction

This analysis uses levels of new road construction associated with timber harvesting activities over the next 10 years to compare the relative risk of invasive plant introduction associated with road construction across the alternatives.

See *Figure 4-79 and Table 4-49 (Risk comparison for the introduction of invasive plant species associated with new road construction over the next 10 years)* for the risk comparison for the introduction of invasive plant species into fifth-field watersheds as a result of new road construction activities among the alternatives. See *Appendix G - Invasive Plants* for methodology used in determining risks. .

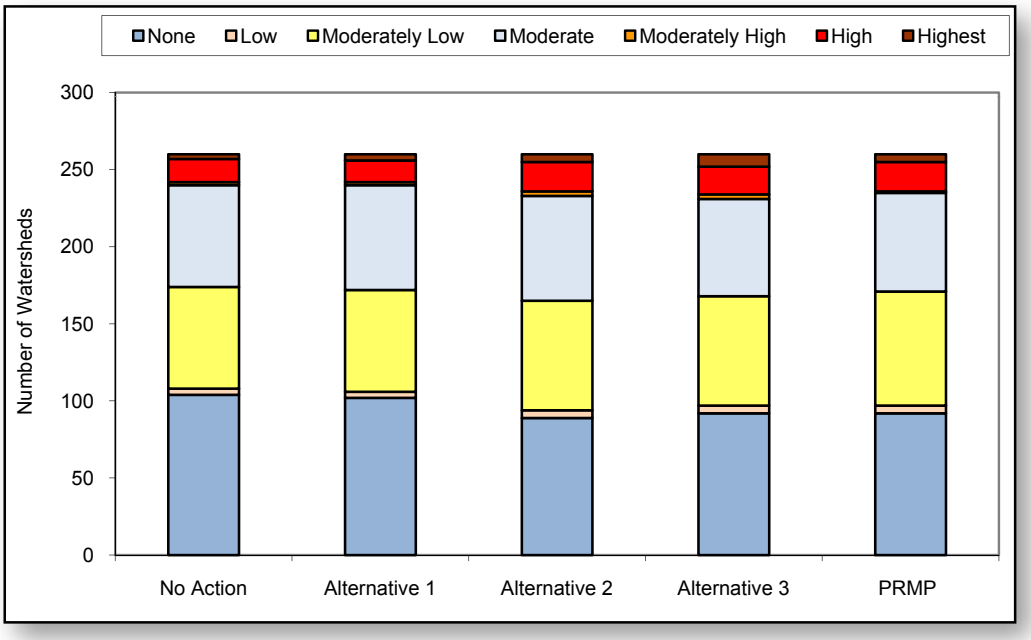


Figure 4-79. Risk Comparison For The Introduction Of Invasive Plant Species Associated With New Road Construction Over The Next 10 Years

Table 4-49. Risk Comparison For The Introduction Of Invasive Plant Species Associated With New Road Construction By Fifth-Field Watershed Over The Next 10 Years

Risk Ranking	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Highest	3	4	5	8	5
High	15	14	19	18	19
Moderately high	2	2	3	3	1
Moderate or lower	136	138	144	139	143
Total at Risk	**156**	**158**	**171**	**168**	**168**
Total Not at Risk	**104**	**102**	**89**	**92**	**92**
Total Watersheds	**260**	**260**	**260**	**260**	**260**

The greatest relative risk of inadvertent invasive plant species introduction that is associated with new road construction activities would occur under Alternative 2 compared to the other alternatives, and the lowest risk would occur under the No Action Alternative. There would be some watersheds in the highest risk category under all alternatives. Although there would be an intermediate number of watersheds with some level of risk under Alternative 3 compared to the other alternatives, the highest number of watersheds in the highest risk category would occur under Alternative 3.

Although the most new road construction would occur under the PRMP compared to the other alternatives, there would be an intermediate number of total watersheds at risk of invasive plant introduction among the alternatives and an intermediate number of individual fifth-field watersheds in the highest risk ranking over the next 10 years under the PRMP. These results indicate that the combination of estimated timber harvest activities and associated new road construction in fifth-field watersheds under the PRMP would result in a lower risk of introducing invasive plants into the affected fifth-field watersheds than would occur under Alternatives 2 and 3 over the next 10 years, and a greater risk than would occur under the No Action Alternative or Alternative 1.

Invasive Plant Species Introduction Associated with Off-Highway Vehicle Use

There would be little difference among the alternatives in the relative risk for introduction of invasive plant species associated with off-highway vehicle use.

Areas that are designated as *open* to off-highway vehicle use would be more susceptible to having new introductions of invasive plant species and infestation spread than areas that are designated as *limited* or *closed* to off-highway vehicle use. See *Appendix G - Invasive Plants* for methodology used in determining susceptibility. Areas that are designated *closed* to off-highway vehicle use would not be susceptible to new introductions and spread of invasive plant species associated with off-highway vehicle activity. The relative differences in susceptibility to invasive plant introductions based on off-highway vehicle designations is minor over much of the analysis area, because the topography and vegetation make most of the landscape non-conducive to cross-country vehicle travel, even by off-highway vehicles. See the *Recreation* section of *Chapter 4* for discussion of the expected levels of off-highway vehicle use based on the *open*, *limited* and *closed* designations. See *Appendix G - Invasive Species* for methodology in determining susceptibility to invasive plant introductions.

Emphasis areas for off-highway vehicle use would be more susceptible to having new introductions than other areas under the limited designation, because there would be more off-highway vehicles in the emphasis areas. The analytical assumption is that, with increased off-highway vehicle use, there would be a corresponding increase in the chance of introducing infestations.

A relative risk comparison between the alternatives for the introduction of invasive plant species into fifth-field watersheds that are associated with the off-highway vehicle designations is shown in *Figure 4-80* (R*elative risk for introduction of invasive plant species associated with off-highway vehicle designations)* and *Figure 4-81* (*Risk comparison for introduction of invasive plant species associated with off-highway vehicle use)*

Figure 4-80. Relative Risk For Introduction Of Invasive Plant Species Associated With Off- Highway Vehicle Designations

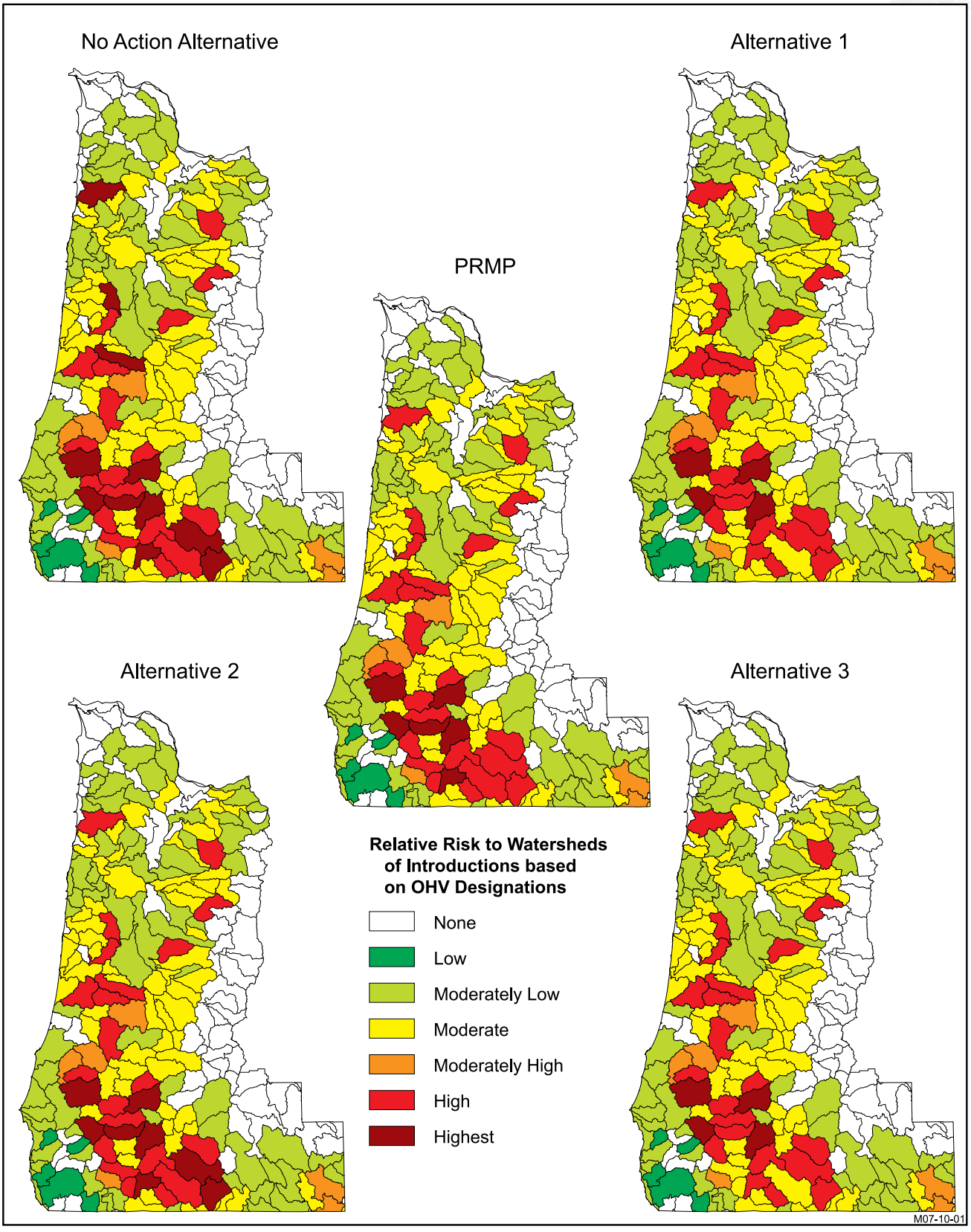
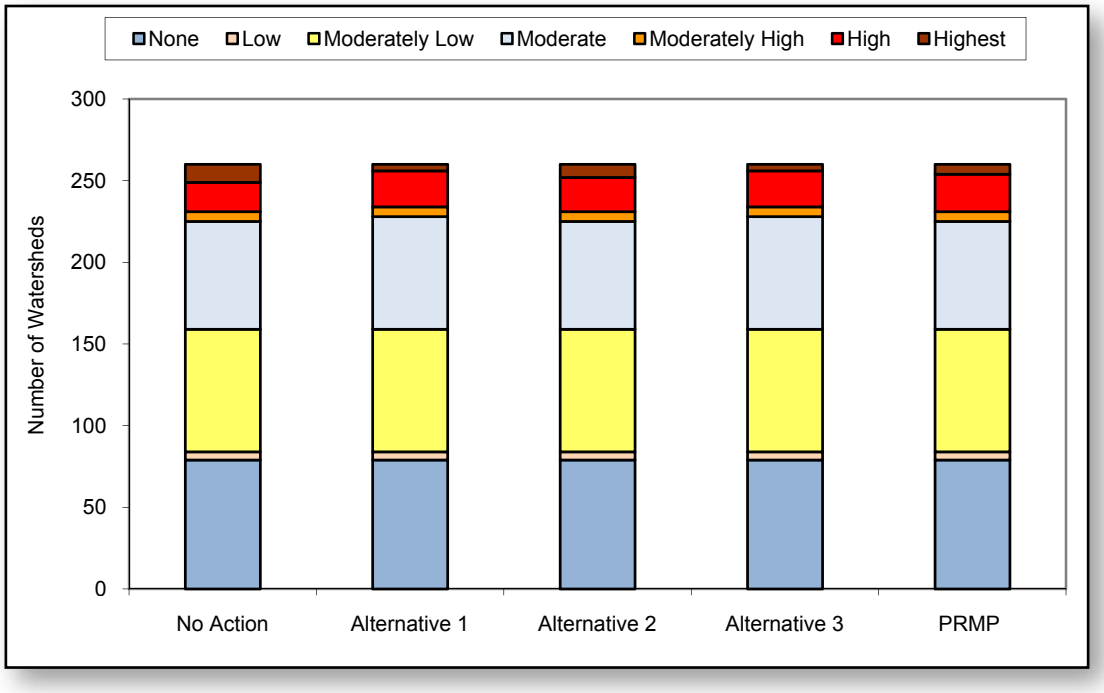


Figure 4-81. Risk Comparison For Introduction Of Invasive Plant Species Associated With Off-Highway Vehicle Use



The most fifth-field watersheds in the highest risk category for introduction of invasive plant species associated with off-highway vehicle use compared to the other alternatives would occur under the No Action Alternative, because more acres *open* and less acres *closed* would be designated under the No Action Alternative compared to any other alternative.

The variability in the results for the action alternatives can be attributed to the variability in the number and distribution of *off-highway emphasis areas*. Under Alternative 2, there would be 17 emphasis areas designated, which would be the most of any alternative. The second highest risk for introduction of invasive plant species associated with off-highway vehicle use would occur under Alternative 2 compared to other alternatives. Compared to the other alternatives, under the PRMP there would be an intermediate number of designated *off-highway emphasis areas* and an intermediate risk for introduction. The lowest risk for invasive plant introduction and the lowest number of designated *off-highway emphasis* areas would occur under Alternatives 1 and 3.

Long-Term Introduction and Spread of Invasive Plant Species and Summary

Over the long term, the potential for the introduction and spread of invasive plant species would be higher in the harvest land base than in the nonharvest land base under all alternatives. See *Chapter 2* for maps that show the relative amounts and distribution of the land use allocations under each alternative. Infestations would also be introduced and spread more readily in areas that have more human activity (such as high recreational use areas). The amount and distribution of high-use recreational use areas would not vary by alternative, except for off-highway designations.

The least risk of invasive plant species introduction and spread over the long term would occur under the No Action Alternative, because it would have the smallest harvest land base and the largest nonharvest land base compared to the action alternatives.

The highest risk of invasive plant species spread from timber harvesting and associated activities would occur under Alternative 3 compared to the other alternatives over the long term, even though under

Alternative 2 there would be a higher risk over the next 10 years. The highest risk in the long term would occur under Alternative 3, which would have the largest harvest land base, and because timber harvesting and road construction would be more dispersed across the BLM-administered lands with Alternative 3 than under the other alternatives.

The long-term risk of the spread of invasive plant species along riparian habitats would be higher under Alternatives 2 and 3 than under the No Action Alternative, the PRMP, and Alternative 1 because more infestations associated with timber harvesting would be introduced along intermittent streams under Alternatives 2 and 3 with their narrower riparian management areas widths along most of the intermittent streams. Although the timber harvesting itself under the PRMP would create no risk of invasive plant introductions into riparian areas, the associated road construction and level of road use and maintenance expected to support the timber harvesting activities would create risk for invasive plant introduction into riparian habitats over the long term.

The long-term risk of the spread of invasive plant species associated with off-highway vehicle use would be similar among all alternatives, except with regard to off-highway emphasis area designations. The No Action Alternative would have a slightly higher risk of invasive plant introductions and spread due to the more acres with *open* designations and fewer acres designated *closed* to off-highway vehicle use. The long-term risk of invasive plant species introduction and spread in the off-highway emphasis areas would be consistently higher than in the surrounding areas because of the higher level of use.

When the effects of timber harvesting activities are considered in combination with the effects of road construction and off-highway vehicle use, the overall potential for introduction and spread over the next 10 years and in the long term would be lowest under the No Action Alternative, intermediate under the PRMP, and highest under Alternative 3.

A relative risk comparison between the alternatives for the introduction of invasive plant species over both the long and short term is shown in *Table 4-50* (*Relative risk of long and short-term introduction and spread of invasive plant species by analysis factor).*

Table 4-50. Relative Risk Of Long And Short-Term Introduction And Spread Of Invasive Plant Species By Analysis Factor

Risk Analysis Factor	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Number of highest and high risk fifth-field watersheds from timber harvest activities over the next 10 years.	Low	Moderate	Highest	Lowest	High
Number of highest and high risk fifth-field watersheds for introduction into riparian habitats from timber harvest activities over the next 10 years.	Low	Moderate	Highest	Moderate	Lowest
Number of fifth-field watersheds assigned risk categories from new road construction associated with timber harvest activities over the next 10 years.	Lowest	Low Highest		High	High
Introduction into fifth-field watersheds associated with off-highway vehicle use (long and short term).	Highest	Low	High	Low	Moderate
Long-term introduction associated with timber harvest and associated activities.	Lowest	Low	High	Highest	Moderately High
Long-term introduction and spread along riparian habitats.	Lowest	Low	High	Highest	Low
Overall potential to introduce and spread invasive plant species.	Lowest	Low	High	Highest	Moderate

All alternatives include management direction to "prevent, detect, and rapidly control new invasive plant infestations." This management direction is general in nature, as is appropriate to the scope and scale of this action. More specific measures to prevent the introduction of new infestations may be incorporated in the planning and design of implementation-level actions. These specific measures may include, but are not limited to, the following:

- Use cable or aerial logging methods in fifth-field watersheds that are at high risk for the introduction of invasive plant species.
- Clean vehicles and heavy equipment that would operate off roads and in the rights-of-way. In infested areas, where the transport of invasive plant species seeds or propagules on heavy equipment is likely, clean the heavy equipment before leaving the project site, except in emergency situations.
- Use sterile material or native species weed-free straw and mulch.
- Use native plant species to promote competitive exclusion of invasive plant species.
- Consistent with project objectives, retain native vegetation in and around project locations and minimize soil disturbance.