



Recreation

Key Points

- All action alternatives would meet overall projected recreational demand and improve the quality of visitor experiences.
- Redesignation of off-highway vehicle areas under all action alternatives would improve off-highway vehicle opportunities, public safety, and visitor experiences compared to the No Action Alternative.
- In the Medford District, management of 13 off-highway vehicle emphasis areas under Alternative 2, and 7 off-highway vehicle emphasis areas under the PRMP, would improve off-highway vehicle opportunities and would result in fewer visitor conflicts, thereby improving the quality of experiences for all visitors compared to the other alternatives.
- All action alternatives would continue to maintain a mix of recreation settings that provide a variety of opportunities and experiences for visitors.

This analysis examines the recreational demand and the quality of visitor experiences under each alternative as measured by the availability of recreational developments, recreational management areas, off-highway vehicle designations, and the variety of recreational settings.

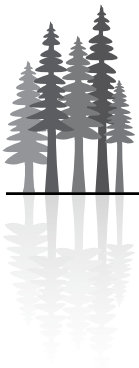
All action alternatives would carry forward 211 existing recreation developments on BLM-administered lands, except for two day-use areas in the Coos Bay District that would be discontinued due to insufficient local demand. However, two new environmental education areas would be designated in the Coos Bay District (see the *Recreation* section in *Chapter 2*).

Under all action alternatives, no new recreation developments were analyzed. Existing developments would continue to support the increasing level of recreation use on BLM-administered lands. This is because visitors are not solely dependent on recreation developments for their recreation pursuits. For example, dispersed recreation uses (e.g., hunting, fishing, and sightseeing) do not require recreation developments.

It is probable, however, that visitors would experience localized crowding at certain existing recreation developments as demand for these sites increases. Although potential recreation developments are not included in the analysis of effects (since there is no certainty of their future development), a list of potential sites, trails, and byways is included under all action alternatives (see the *Recreation* section in *Chapter 2*). Future overcrowding could be offset by developing potential recreation sites.

Under all action alternatives (within the Salem, Eugene, Roseburg, Coos Bay Districts and the Klamath Falls Resource Area), the designation of special recreation management areas would not vary by alternative. Within these four districts and one resource area, four new special recreation management areas would be designated, and two existing special recreation management areas would be consolidated. In addition, the boundaries of nine special recreation management areas would be adjusted. As a result, within these four districts and one resource area there would be 28 special recreation management areas on BLM-administered lands in the planning area, for a total of 272,438 acres under all action alternatives. This would be an increase of 150,800 acres from the No Action Alternative. A majority of this change in acreage would be a result of designating the Gerber Special Recreation Management Area (104,400 acres) in the Klamath Falls Resource Area and Tioga Special Recreation Management Area (34,000 acres) in the Coos Bay District.

Special recreation management areas would only vary by alternative on the Medford District where under the PRMP, seven new special recreation management areas (67,944 acres) focusing on off-highway vehicle recreation would be designated. Under the No Action Alternative and Alternatives 1, 2 and 3, none of



these areas would be designated as special recreation management areas. Hyatt Lake, Pacific Crest National Scenic Trail, and the Rogue National Wild and Scenic River special recreation management areas would be designated under the No Action Alternative and all of the action alternatives.

See the *Recreation* section in *Chapter 2* for information about individual recreation management areas for each BLM district by alternative.

The Row River Trail special recreation management area in the Eugene District would be 15,100 acres under the No Action Alternative. This area would be reduced from 15,100 acres to 230 acres under all action alternatives in order to focus recreation management on the trail corridor itself, rather than the entire Row River fifth-field watershed as established under the No Action Alternative. Since intensive recreation management only occurs within the trail corridor, there would be no loss of existing opportunities or experiences for visitors.

Under all action alternatives, the overall increase in the number and total acres of special recreation management areas compared to the No Action Alternative would improve the BLM's ability to provide quality visitor experiences. This is because special recreation management areas, by definition, are designed to provide specific recreation opportunities, experiences, and benefits to visitors. See *Appendix K - Recreation* for the planning frameworks that are designed to enhance the quality of visitor experiences within these special recreation management areas.

Under all action alternatives, 2.4 million acres (93%) of BLM-administered lands in the planning area would be designated as "limited to designated roads and trails" for off-highway vehicle use. This is an increase from 1.1 million acres under the No Action Alternative. For all action alternatives, this change would eliminate all off-highway vehicle open areas (330,000 acres) and areas designated as "limited to existing roads and trails" (950,000 acres). On the other hand, a 77-acre area in the Heceta Dunes would be designated as "open" under Alternatives 1, 2 and 3. Under the PRMP and the No Action Alternative, the Heceta Dunes ACEC would be managed as a closed area.

Under all action alternatives, there would also be an increase of 14,200 acres (less than 1% of the total land base) in areas that are closed to off-highway vehicle use compared to the No Action Alternative. This would bring the total amount of closed area to 98,800 acres. A majority of this increase in acreage would be the result of closing off-highway vehicle use in three elk emphasis areas (the Bull Run Watershed Management Unit and the Mt. Hood Corridor in the Salem District, and the North Bank Habitat Management Unit in the Roseburg District). Although this small increase in closed area would lose site-specific off-highway vehicle operations, it would not measurably affect off-highway vehicle opportunities when considering the overall planning area, and would improve nonmotorized recreational experiences in these areas.

An improvement in nonmotorized recreational experiences is based on the assumption that some motorized and nonmotorized activities have limited compatibility. This is especially true when high levels of both types of use are confined to the same area. For example, motorcycle riders and horseback riders using a narrow, single-track trail would likely result in visitor conflicts and safety concerns. Spatial separation of these activities reduces encounters, thereby improving the overall experience for visitors. This is also true of areas that are managed specifically for off-highway vehicle opportunities, which results in fewer visitor conflicts by not encouraging nonmotorized recreation activities within these areas.

Under all action alternatives, a reduction of 330,000 acres of open areas compared to the No Action Alternative would not result in a substantial loss of off-highway vehicle opportunities. This is because a majority of the open areas are located on steep, densely-forested terrain, which is not conducive to cross-country motor vehicle travel. (Only 7% of these lands are classified as nonforest habitat.) For this reason, existing off-highway vehicle use is primarily limited to existing roads and trails in these areas. These existing



routes would continue to be available to off-highway vehicle use until route designations are completed through subsequent transportation management plans. Some of these roads and trails would eventually be closed to off-highway vehicle use if warranted for resource or social concerns.

Under all action alternatives, the “limited to designated roads and trails” off-highway vehicle area designation would increase public safety and decrease visitor conflicts compared to the No Action Alternative. This would result from the onsite management of designated trails and other related developments that are associated with this designation type (e.g., improved signing, construction of parking areas with off-loading ramps, placement of stream crossing structures, and trail construction and maintenance based on standards for off-highway vehicle use). Therefore, although the quantity of area open for off-highway vehicle use would decrease, the quality of the experience for off-highway vehicle users would increase.

Improving off-highway vehicle management under all the action alternatives would primarily be accomplished through subsequent route designations, which would identify specific roads and trails to provide off-highway vehicle opportunities for the public. These routes would be improved or expanded to enhance visitor experiences or to meet increasing demand. Routes that are not designed or suitable for off-highway vehicle use (or are only compatible for certain types of motor vehicles) would be closed or restricted to reduce visitor conflicts and improve public safety.

Appendix K - Recreation includes interim off-highway vehicle management guidelines for the districts. They provide the basis for managing off-highway vehicle use until subsequent transportation management plans are completed.

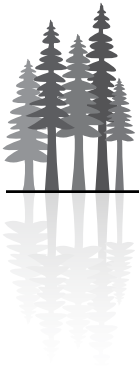
Under the No Action Alternative, there would be three off-highway vehicle emphasis areas in the Salem, Eugene, and Roseburg Districts, totaling 34,200 acres. Under all action alternatives, these existing emphasis areas would be carried forward with some minor acreage adjustments in the Salem and Eugene Districts.

In addition, under all action alternatives, an off-highway vehicle emphasis area (Blue Ridge) would be designated in the Coos Bay District, for a total of 1,600 acres. This area currently provides a multiple-use, off-highway vehicle trail system for the public. The new emphasis area designation would improve the BLM’s management of the area for off-highway vehicle use. This would result from an increase in off-highway vehicle related developments and management presence (e.g., parking areas, restroom facilities, and BLM employees or rangers onsite), which would better accommodate off-highway vehicle riders.

Under all action alternatives, these small changes in off-highway vehicle emphasis areas in the BLM districts would not appreciably increase off-highway vehicle opportunities when considering the entire planning area, but it would improve local opportunities near Coos Bay and Eugene compared to the No Action Alternative.

Off-highway vehicle emphasis areas would vary under all action alternatives on the Medford District. Under the No Action Alternative, there would be three existing off-highway vehicle emphasis areas on this district, totaling 25,600 acres. Under Alternatives 1 and 3, none of these would be designated. Under Alternative 2, the 3 emphasis areas under the No Action Alternative would be designated with some minor acreage adjustments, and 10 additional areas would be designated. Under the PRMP, two of the three existing emphasis areas under the No Action Alternative would be designated as special recreation management areas with some acreage adjustments, and five additional emphasis areas would be designated as special recreation management areas with an off-highway vehicle focus.

The overall feasibility of managing each of these emphasis areas for focused off-highway vehicle recreation was a key factor in evaluating the alternatives. Feasibility was based on the pattern of public and private



ownership within each emphasis area and the complexity of management and enforcement created by these patterns. The distribution of off-highway vehicle opportunities across the district, access from population centers, and known areas of user and adjacent landowner conflict were evaluated.

Alternative 2 would provide the greatest increase in off-highway vehicle opportunities and result in the least amount of user conflict outside of the emphasis areas. However, there would be some redundancy in the distribution of opportunities across the district. Also, the large number of off-highway vehicle emphasis areas would result in the most complex management and enforcement. Alternatives 1 and 3 would provide the least off-highway vehicle opportunities in the Medford District compared to other alternatives. Since it is likely that off-highway vehicle recreation will continue to increase, these two alternatives would result in the continued dispersal of off-highway vehicle use across the district. These two alternatives also would result in the highest level of user conflict, as well as the most complex situation for management and enforcement needed to mitigate these issues. Focused off-highway vehicle opportunities at seven areas distributed across the district would be provided under the PRMP, which would enable the BLM to concentrate management and enforcement efforts better than Alternative 2. There would be a moderate increase in recreation opportunities under the PRMP to accommodate growing demand for off-highway vehicle use area.

Alternatives 1 and 3 would result in a mix of outcomes in the Medford District. Since off-highway vehicle emphasis areas neither allow nor prevent off-highway vehicle use of a particular area (that is only determined through the broader off-highway vehicle area designations of open, limited, and closed), eliminating emphasis areas would simply result in less concentrated off-highway vehicle use. Under these alternatives, off-highway vehicle recreation would not receive the same level and degree of focused management as under Alternative 2 or the PRMP, but would be managed in a more dispersed and diluted manner across the entire Medford District. Off-highway vehicle riders who prefer a more structured recreation experience (i.e., designed trails and other amenities) would be displaced to other areas that offer such an experience. As a result, visitor conflicts and safety concerns would increase due to a lack of onsite management controls. Thus, these alternatives would not improve the quality of off-highway vehicle user experiences compared to the other alternatives, which would potentially lead to the greatest level of social and resource conflict because off-highway vehicle use would be dispersed across a larger area.

As with most recreation developments, dissemination of information to the public about the presence of the recreation developments typically results in higher levels of use. Under Alternatives 1 and 3, the elimination of off-highway vehicle emphasis areas that exist under the No Action Alternative would likely reduce public awareness of these areas, leading to a gradual reduction in off-highway vehicle use over time in these areas at the expense of increasing use in other areas.

The highest increase in higher quality off-highway vehicle opportunities would be provided under Alternative 2 compared to the other alternatives. Under Alternative 2, a total of 13 off-highway vehicle emphasis areas would be designated in the Medford District, for a total of 105,800 acres. This would result in a four-fold increase in acres of off-highway vehicle emphasis areas compared to the No Action Alternative and would result in some excess supply in the distribution of off-highway vehicle opportunities across the district. All of these areas are currently receiving moderate to high levels of off-highway vehicle use; however, 10 of these areas currently receive limited management presence. The large number of off-highway vehicle emphasis areas under Alternative 2 would result in the most complex management and enforcement.

Under the PRMP, seven emphasis areas distributed across the district would be designated as special recreation management areas focused on managing off-highway vehicle recreation, for a total of 67,944 acres. This would result in an increase of 22,344 acres of recreation areas emphasizing off-highway vehicle use compared to the No Action Alternative. All of these areas support moderate to high levels of off-highway vehicle use; however, five of them currently receive limited onsite management under the No Action Alternative. These designations would result in more concentrated levels of off-highway vehicle



use within these areas and likely cause a reduction in dispersed off-highway vehicle use on other Medford District BLM-administered lands. It is assumed that dispersed off-highway vehicle use would decrease, because riders would be attracted to greater opportunities within these off-highway vehicle emphasis areas.

Alternative 2 and the PRMP would result in a loss of nonmotorized recreation opportunities in the Medford District compared to the No Action Alternative. This loss is due to the larger portion of BLM-administered lands that would be designated as off-highway vehicle emphasis areas, which would be managed for focused motorized recreation use (12% larger compared to Alternative 2, and 7% larger compared to the PRMP). Since these areas would be managed to accommodate motorized recreational activities, visitors seeking nonmotorized forms of recreation would be displaced from these areas. This would be especially pronounced for people seeking solitude as an important element in their overall recreation experience. In general, however, off-highway vehicle emphasis areas would tend to focus this activity within specific areas, which would result in an overall improvement in the quality of experiences for all visitors.

Management actions that change the remoteness and naturalness aspects of the recreation setting of areas cause corresponding changes in the public use of those areas. This is because certain settings are more conducive to certain types of recreation activities and preferred by visitors who engage in them (see the *Recreation* section in *Chapter 3*). Since recreation use occurs on the BLM-administered lands that are managed for timber production, modifying these recreation setting characteristics would improve or diminish the BLM's ability to provide opportunities that contribute to meeting recreation demand and quality recreation experiences.

Visitors engage in a wide variety of recreation activities on BLM-administered lands, each with a unique combination of recreation setting preferences. See the *Recreation* section in *Chapter 3* for an illustration of the diversity of settings preferred by each activity. These setting preferences are based on a combination of physical, administrative, and social setting characteristics. When combined together, these primary setting characteristics establish the overall recreation setting of an area. However, this analysis only considers the physical setting characteristics of remoteness and naturalness, because they provide the most direct measure of timber management effects under each alternative.

The effects of future management actions on the levels of recreation demand are projected through 2016. A 10-year period is used because a reasonably accurate projection of road construction and recreation demand beyond 10 years is not possible. For recreation demand, this is due to the continually changing variables, such as regional demographics and new technologies, that influence outdoor recreation trends.

Timber management actions that require new road construction affect the level of remoteness of an area. Increasing the amount or improving the type of access into an area can lead to higher levels of certain types of use. Such changes can also displace certain types of visitors who preferred the area before access was modified. This dynamic relationship between recreation settings, recreation demand, and the distribution of recreation demand is the basis for analyzing the effects of alternatives (Clark and Stankey 1979).

The total amount of roads (including new road construction that would be projected to occur under the alternatives over the next 10 years) is used to classify levels of remoteness. This is done by buffering the different road types that occur on BLM-administered lands. *Table 4-96 (Acres of remoteness levels by alternative)* shows the results of this classification process by alternative. This analysis does not consider the proximity of non-BLM roads located on adjacent lands, since their influence on recreational use of the public lands would be indistinguishable among the alternatives.

Under No Action and all action alternatives, including the PRMP, the front country and rural settings would be static. This is because new road construction for timber harvesting under each alternative would only require additional local and resource roads (often referred to as logging roads). These road types would be developed within the middle country setting or further into the back country or primitive settings. These settings vary by less than 0.5% among all action alternatives. Because of the extensive road network that



TABLE 4-96. ACRES OF REMOTENESS LEVELS BY ALTERNATIVE

Alternative	Remoteness Level (acres)				
	Primitive	Back Country	Middle Country	Front Country	Rural
No Action	8,000	463,000	1,735,000	279,000	70,000
Alternative 1	14,000	461,000	1,731,000	279,000	70,000
Alternative 2	13,000	455,000	1,739,000	279,000	70,000
Alternative 3	13,000	447,000	1,746,000	279,000	70,000
PRMP	14,000	461,000	1,731,000	279,000	70,000

already exists on BLM-administered lands, new road construction under the action alternatives would not measurably change these existing levels of remoteness.

Under all alternatives, there would be no effect to the variety of recreational opportunities that exist on BLM-administered lands when considering remoteness levels. As a result, the majority of BLM-administered lands (82%) would continue to be located within a quarter mile of roads, which are more conducive to motorized forms of recreation. Under all action alternatives, approximately 18% of BLM-administered lands would continue to be within the primitive and back country settings, which are favored by those seeking nonmotorized recreational opportunities.

As with remoteness, timber management activities affect the naturalness aspects of the recreation setting (i.e., forest stand structure and age). This in turn affects where visitors recreate based on their setting preferences.

The amount of timber harvest by type and acres that would occur over the next 10 years is used to classify degrees of naturalness along the continuum of recreation settings from primitive to rural. This analysis is based on forest stand types that are characteristic of these areas. For example, timber harvest that involves thinning dense young stands would shift the naturalness of an area from the front country to the middle country setting. In contrast, the regeneration harvesting of older stands would modify the naturalness of an area from primitive to rural. These changes would influence the distribution of recreation demand for visitors who prefer these different settings.

The scale of this analysis is at the forest-stand level, which varies greatly across BLM-administered lands. In fact, within a one-square-mile block of ownership, there can be more than a dozen different stand types. This results in an equal number of recreation settings, some of which can be relatively small and disjointed. For example, small patches of old forest scattered throughout young even-aged stands can result in the primitive setting being obscured by a more predominate front country setting.

The intermixing of setting types affects visitor experiences, depending on their individual preferences. Since setting preferences are subjective and vary from one person to the next, this interrelationship is not considered in the analysis. Rather, all forest stands on BLM-administered lands within the planning area are analyzed to calculate the total number of acres within each setting type.

This analysis does not consider nonforested lands or BLM-administered lands occupied by existing roads, since the naturalness of these areas are not affected by timber harvesting. Nonforest habitat and roads account for approximately 4% and 3%, respectively, of the BLM's total land base.

See the *Recreation* section of *Chapter 3* for a series of stand visualizations that illustrate these individual setting types.

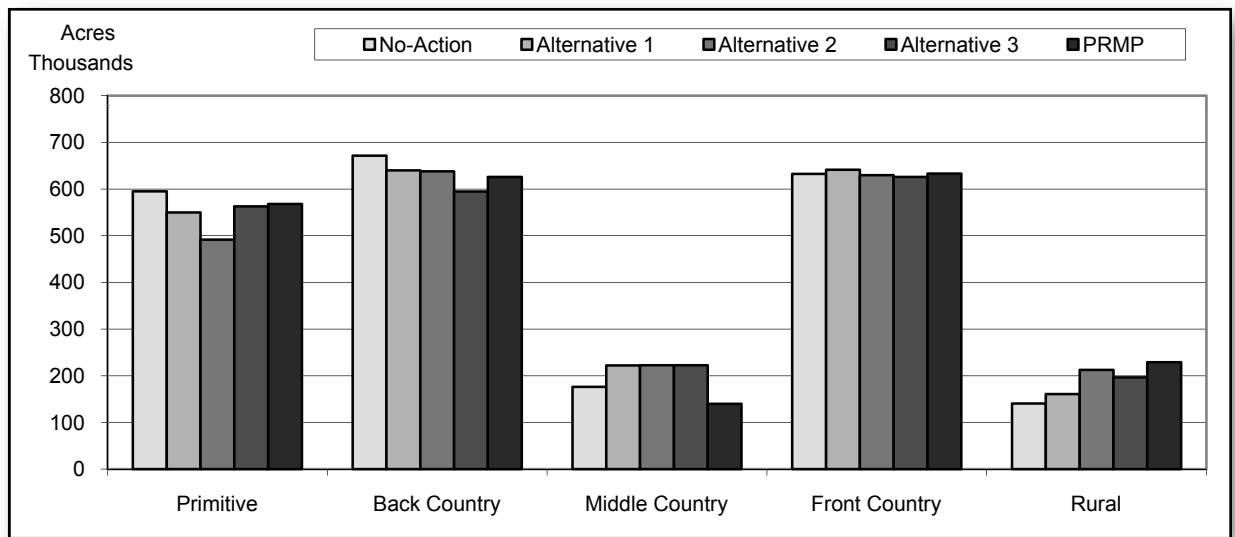
Table 4-97 (Acres of naturalness levels projected for the year 2016 by alternative) and Figure 4-180 (Acres of naturalness levels for the year 2016 by alternative) show the naturalness component of the recreation setting by alternative.



TABLE 4-97. ACRES OF NATURALNESS LEVELS PROJECTED FOR THE YEAR 2016 BY ALTERNATIVE

Alternative	Naturalness Levels (acres)				
	Primitive	Back Country	Middle Country	Front Country	Rural
No Action	595,000	671,000	176,000	632,000	140,000
Alternative 1	550,000	640,000	222,000	641,000	161,000
Alternative 2	491,000	638,000	223,000	630,000	213,000
Alternative 3	563,000	595,000	223,000	626,000	196,000
PRMP	568,000	626,000	140,000	633,000	229,000

FIGURE 4-180. ACRES OF NATURALNESS LEVELS FOR THE YEAR 2016 BY ALTERNATIVE



When considering the entire land base, under all alternatives there would be a relatively minor effect on naturalness settings by the year 2016. This is largely due to the short duration, approximately 20-25 years, for which timber harvest practices would modify forest stands under each alternative. As a result, the action alternatives would continue to maintain a mix of naturalness settings that provide a variety of recreational opportunities and experiences for visitors.

The alternatives would have some minor effects on visitor use patterns when comparing visitors' setting preferences for different recreational activities (see the *Recreation* section of *Chapter 3*) with changes to individual naturalness settings. This analysis assumes that visitor preferences for naturalness would be similar to their overall recreation setting preferences, which includes physical, administrative, and social setting characteristics.

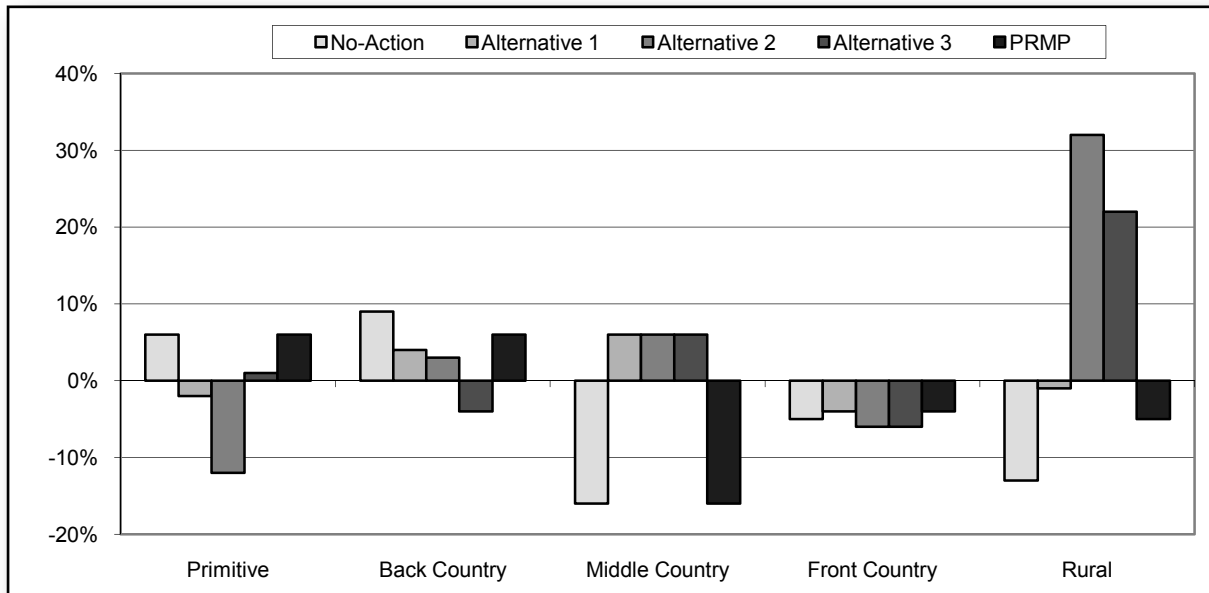
Figure 4-181 (Percent change in naturalness settings by the year 2016 under each alternative) illustrates changes to individual naturalness settings by alternative when using the existing condition for the year 2006 as the baseline.

The action alternatives would have varied effects on the existing levels of primitive and back country settings. The No Action Alternative would result in less than 1% of change within the primitive and backcountry settings. Under the PRMP, primitive and backcountry settings would increase by 6% above existing levels. The more marked changes would occur under Alternative 2, which would decrease primitive settings by 18%, and under Alternative 3 which would decrease back country settings by 11%.

- Existing levels of primitive settings account for 25%, and back country settings for 28%, of all BLM-administered lands in the planning area.



FIGURE 4-181. PERCENT CHANGE IN NATURALNESS SETTINGS BY THE YEAR 2016 UNDER EACH ALTERNATIVE



- Due to their large proportion of the entire land base, small changes to these settings under the action alternatives would not substantially diminish or improve recreational opportunities within these areas.
- The greatest levels of recreational use that occur within these settings are from nonmotorized activities, such as hiking, horseback riding, hunting, and fishing. Visitors seeking these activities may experience localized changes within these settings, but visitor use patterns associated with these activities would not be affected when considering the entire land base.

The action alternatives would increase the middle country settings by 6%. Under the PRMP and the No Action Alternative, middle country settings would decrease by 16%.

- The highest percentage of almost every recreational activity occurs within the middle country setting, which is likely due to a combination of both naturalness and remoteness characteristics.
- Middle country provides the highest level of naturalness within close proximity to roads, which is preferred by visitors who are seeking nature-based experiences that are easily accessible.
- Of BLM-administered lands in the planning area, 68% is classified as middle country based on remoteness levels. However, only 9% is classified as middle country when considering naturalness.
- The action alternatives would slightly increase the proportion of middle country (based on naturalness levels), thereby improving recreational opportunities and experiences for visitors who prefer this setting.

Under all alternatives, the front country setting would be reduced by no more than 6%.

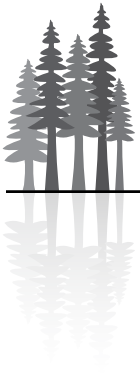
- Of BLM-administered land in the planning area, 31% is classified as front country (based on existing naturalness levels), which is proportionally more than all of the other settings.
- Due to its extensiveness throughout the planning area, small reductions under each of the alternatives would not affect recreational use that occurs within this setting type.



Under the No Action Alternative, the rural setting acreage would decrease by 13%. Under Alternatives 2 and 3, acreage within the rural setting would increase by 32% and 22%, respectively. Under the PRMP, rural settings would increase by 44%.

- Although these increases under the PRMP and Alternatives 2 and 3 appear to be considerable, the rural setting only accounts for 5% of the BLM's total land base.
- The naturalness aspect of this setting is classified as a substantially modified environment, which is typical of an area following a regeneration harvest.
- These areas are generally not conducive to dispersed recreational use; however, high levels of recreation use occur within the developed recreation sites that are located within the rural setting. This is likely due to the experiences derived from improved access, amenities, and social interactions within developed recreation sites. These experiences are generally more important to visitors in the rural setting than those derived from the physical aspects of the environment.
- Since only 5% of the BLM-administered lands are classified as rural when considering naturalness levels, these changes would not noticeably affect overall recreational opportunities and experiences for visitors.
- Substantially modifying the natural setting of certain areas would have a localized effect on visitors who prefer to recreate in those areas. As a result, some localized displacement of visitors would occur.

Although some localized effects would occur within each of these settings, none of the changes would be measurable enough to influence visitor use patterns that are associated with any single recreation activity within the planning area. As a result, all action alternatives would continue to maintain a mix of naturalness settings that provide a variety of recreational opportunities and experiences for visitors.





Wilderness Characteristics

This analysis examines the wilderness characteristics of the BLM-administered lands based on the timber harvesting treatments under each alternative.

Key Point

- The PRMP would cause the least amount of long-term alteration (17%) of wilderness characteristics from regeneration harvesting when compared to all other alternatives.
- Alternative 3 would have the highest degree of long-term alteration of wilderness characteristics (46%) when compared to all other alternatives.
- The PRMP would maintain wilderness characteristics on the greatest percentage of BLM-administered lands compared to the other action alternatives.

The identification of BLM-administered lands with wilderness characteristics is the result of an evaluation of 146 public wilderness proposals received during scoping. Nine areas (26,123 acres) contain the following wilderness characteristics: sufficient size, naturalness, and either outstanding opportunities for solitude or outstanding opportunities for primitive and unconfined recreation (see the *Recreation* section in *Chapter 3* and *Appendix K - Recreation*).

Under all action alternatives, the BLM districts would apply special management to maintain the wilderness characteristics on five of these nine units. See *Table 4-98 (Special management to maintain wilderness characteristics under all action alternatives)* for a summary of this management direction by district.

Except for designated wilderness areas and wilderness study areas, the BLM-administered lands with wilderness characteristics are not identified in the existing (1995) resource management plans. Because of this, the effects of the No Action Alternative on these lands are considered without the application of special management to maintain their identified wilderness characteristics. Under all action alternatives, the special management to maintain wilderness characteristics would not apply to portions of these units that occur on O&C lands in the harvest land base. For analytical purposes, it is assumed that areas in the harvest land base would eventually be harvested in accordance with the management direction contained in the alternatives. Depending on the land use allocation and management direction of the alternative, lands in the harvest land base would receive regeneration harvest, partial harvest, thinning, or uneven-age management (see *The Alternatives* section in *Chapter 2*). Timber harvest would result in a long-term loss of wilderness

TABLE 4-98. SPECIAL MANAGEMENT TO MAINTAIN WILDERNESS CHARACTERISTICS UNDER ALL ACTION ALTERNATIVES

BLM District	Unit Name	Acres	Special Management to Maintain Wilderness Characteristics
Coos Bay	Wasson Creek	3,408	Yes
	Bull of the Woods/Opal Creek Additions	3,203	Yes
Salem	South Fork Clackamas River	919	Yes
	Salmon Huckleberry Additions	637	Yes
	Mount Hebo	81	Yes
Medford	Berry Creek	6,433	No
	Whiskey Creek	5,667	No
	Wellington Mountain	5,659	No
Roseburg	Williams Creek	116	No



characteristics. Under the action alternatives, any existing wilderness characteristics on public domain lands and those portions of O&C lands not in the harvest land base would be retained (see *Table 4-98*).

Of the total amount of the lands with identified wilderness characteristics, the portion that would be in the harvest land base varies by alternative. *Table 4-99 (BLM-administered lands with wilderness characteristics in the harvest land base by alternative)* shows the amount of lands with wilderness characteristics that would be in the harvest land base by alternative.

Timber harvest associated with Late-Successional Management Areas and Riparian Management Areas would diminish the naturalness of wilderness characteristics to a varying degree under the action alternatives, including the PRMP. This would also be the case under the No Action Alternative within Late-Successional Reserves and Riparian Reserves. Limited timber harvest to promote the development of structurally complex forests and to protect streams would occur within all of these land use allocations and would only slightly diminish naturalness if no road construction is necessary. The diminished naturalness would occur initially after treatment, but the long-term implications of such practices would eventually result in a higher degree of naturalness because of the development of structurally complex forest conditions.

Under all action alternatives, opportunities for solitude and primitive unconfined recreation would be diminished within Late-Successional Management Areas and Riparian Management Areas due to the visible evidence of limited timber harvesting. This would also be the case under the No Action Alternative where limited timber harvest would occur within Late-Successional Reserves and Riparian Reserves. Ultimately, to retain these wilderness characteristics, the “imprint of man’s work [should be] substantially unnoticed,” as defined by the Wilderness Act of 1964. Even with the limited timber harvest associated with Late-Successional Management Areas and Riparian Management Areas, this would not be entirely possible to achieve. For example, evidence of thinning operations includes slash piles, yarding corridors, and stumps, which can take decades to become indiscernible.

Because of these effects to wilderness characteristics, timber harvest would be excluded within these areas on public domain lands and those portions of O&C lands not in the harvest land base. *Table 4-100 (BLM-administered lands with wilderness characteristics in late successional management areas and riparian management areas by alternative)* shows the proportion of each unit of BLM- administered land with wilderness characteristics that contain Late-Successional and Riparian Management Areas by alternative.

TABLE 4-99. BLM-ADMINISTERED LANDS WITH WILDERNESS CHARACTERISTICS IN THE HARVEST LAND BASE BY ALTERNATIVE

Unit Name	Total Acres	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Wasson Creek	3,408	0	0	1,989	2,154	0
Bull of the Woods	3,203	144	239	634	641	371
South Fork Clackamas River	919	246	363	389	388	286
Salmon Huckleberry Additions	637	88	121	144	141	102
Mount Hebo	81	0	0	17	19	0
Berry Creek	6,433	563	1,658	3,512	3,465	1,859
Whiskey Creek	5,667	2,074	1,949	0	2,701	0
Wellington Mountain	5,659	1,680	2,185	2,258	2,311	1,922
Williams Creek	116	22	54	54	54	4
Totals	26,123	4,817	6,569	8,997	11,874	4,544
Percentage of Total Acres	100%	18%	25%	34%	46%	17%



TABLE 4-100. BLM-ADMINISTERED LANDS WITH WILDERNESS CHARACTERISTICS IN LATE-SUCCESSIONAL MANAGEMENT AREAS AND RIPARIAN MANAGEMENT AREAS BY ALTERNATIVE

Unit Name	Total Acres	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Wasson Creek	3,408	3,408	3,408	442	10	3,408
Bull of the Woods	3,203	414	430	127	38	846
South Fork Clackamas River	919	134	118	64	42	320
Salmon Huckleberry Additions	637	69	9	2	2	199
Mount Hebo	81	63	19	5	0	80
Berry Creek	6,433	1,342	1,902	170	29	899
Whiskey Creek	5,667	2,198	1,052	2,350	138	5,667
Wellington Mountain	5,659	495	308	329	72	583
Williams Creek	116	0	0	0	0	0
Totals	26,123	8,123	7,246	3,489	331	12,009
Percentage of Total Acres	100%	31%	28%	13%	1%	46%

See Table 4-101 (BLM-administered lands with wilderness characteristics maintained by alternative) and Figure 4-182 (Acres of BLM-administered lands with wilderness characteristics maintained by alternative) for the amount of lands with wilderness characteristics that would be maintained when excluding those portions in the harvest land base, Late-Successional Management Areas, or Riparian Management Areas under all of the action alternatives, and within Late-Successional Reserves and Riparian Reserves under the No Action Alternative.

The PRMP would maintain 2% less wilderness characteristics when compared to the No Action Alternative. Limited timber harvest to promote the development of structurally complex forests would occur within these areas; however, these activities would only slightly diminish naturalness if no road construction is necessary.

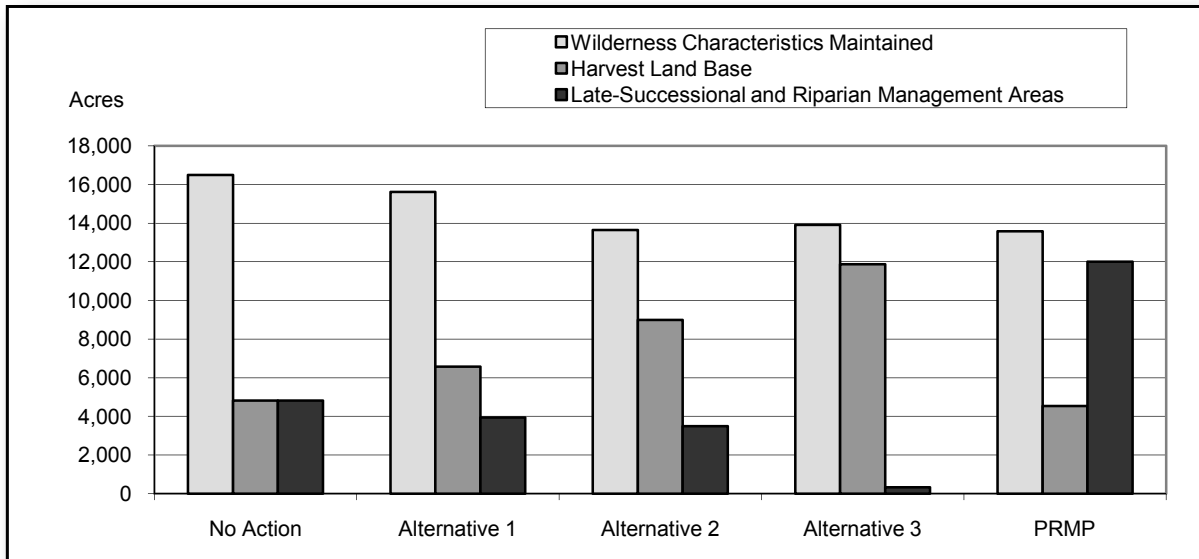
Under Alternatives 1, 2, and 3, fewer acres with wilderness characteristics would be maintained than under the No Action Alternative. Alternative 1 would maintain wilderness characteristics on slightly more lands compared to Alternatives 2 and 3. Under Alternative 1, 4% less would be maintained than under the No Action Alternative. Under Alternatives 2 and 3, approximately 6% and 7% less, respectively, would be maintained. Under Alternative 3, timber harvest would occur in 46% of the areas with wilderness characteristics; under the PRMP, timber harvest would occur in 17% of the areas with wilderness characteristics.

TABLE 4-101. BLM-ADMINISTERED LANDS WITH WILDERNESS CHARACTERISTICS MAINTAINED BY ALTERNATIVE

Unit Name	Total Acres	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Wasson Creek	3,408	2,220	2,220	977	1,244	2,220
Bull of the Woods	3,203	2,645	2,534	2,445	2,524	1,986
South Fork Clackamas River	919	539	438	466	489	313
Salmon Huckleberry Additions	637	480	507	491	491	179
Mount Hebo	81	81	81	22	62	81
Berry Creek	6,433	4,528	2,873	2,751	2,939	3,675
Whiskey Creek	5,667	1,395	2,666	3,317	2,828	5,293
Wellington Mountain	5,659	3,484	3,166	3,072	3,276	3,154
Williams Creek	116	94	62	62	62	112
Totals	26,123	15,466	14,547	13,603	13,915	14,817
Percentage of Total Acres	100%	59%	55%	52%	53%	57%



FIGURE 4-182. ACRES OF BLM-ADMINISTERED LANDS WITH WILDERNESS CHARACTERISTICS MAINTAINED BY ALTERNATIVE



Under all action alternatives, management direction would protect the wilderness characteristics of the five selected units from all discretionary management actions (e.g., recreation developments and road building). However, the wilderness characteristics of these areas would not be protected from nondiscretionary actions, such as road construction associated with reciprocal right-of-way agreements or mining.



Visual Resources

This analysis examines the maintenance of the visual resource quality of the BLM-administered lands under each alternative.

Key Point

The No Action Alternative would maintain existing visual resource quality on the greatest portion of BLM-administered lands in the planning area, followed second by the PRMP, and then by Alternatives 1, 2, and 3.

Visual resource quality is determined through the visual resource inventory process, which is based on a combination of scenic quality, sensitivity levels, and distance zones. The results of this inventory process classified all BLM-administered lands in the planning area as Class I, II, III, or IV. Class I areas have the highest level of visual resource quality, and Class IV areas have the lowest level (see the *Recreation* section of *Chapter 3*).

The BLM also designates visual resource management classes through the land use planning process, and these classes also range from Class I to IV. Class I areas are managed to preserve visual resource quality and Class IV areas allow for major modifications. Except for Class I areas, management classes can vary from the original inventory classes to be consistent with resource management plan goals and objectives (see the *Visual Resources* section of *Chapter 2*).

For the purposes of this analysis, visual resource quality would be retained when an area's visual resource management objectives are either the same or more restrictive than the area's inventoried classification. For example, an area inventoried as Class III that is managed with either Class I, II or III management objectives would retain its inventoried visual resource quality. Conversely, areas that are managed under less restrictive visual resource management objectives than their inventoried classification would potentially have diminished visual resource quality over time due to management actions. An example would be an area inventoried as Class II that is managed under less restrictive Class III or IV management objectives. *Table 4-102 (Visual resource inventory classes and management classes by alternative)* and *Figure 4-183 (Visual resource inventory and management classes in acres by alternative)* show the relationship between visual resource inventory and management classes by alternative.

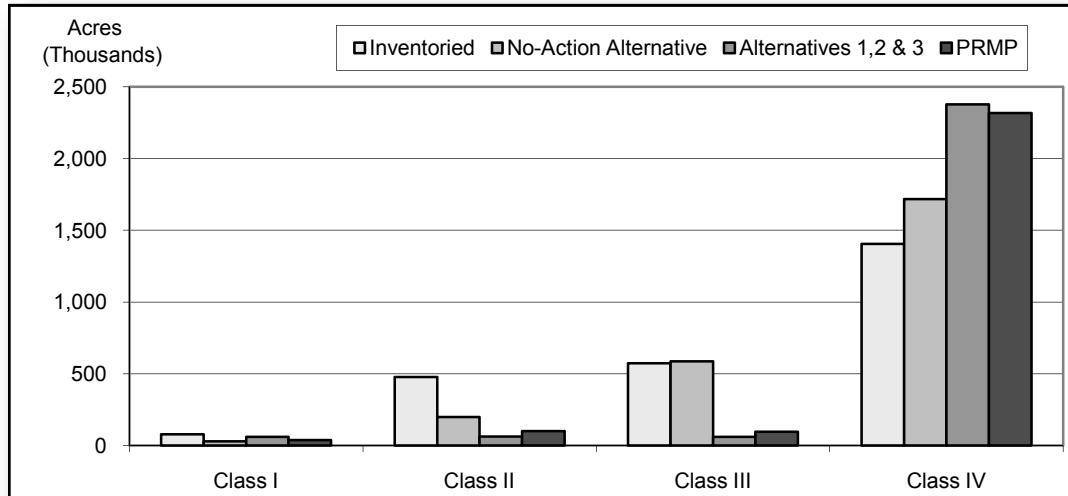
The relationship between inventory and management classes cannot be used exclusively to analyze the effects of alternatives on visual resource quality. Effects depend on the level and type of surface disturbing activities that would occur under each alternative. Major modifications of visual resource quality would take place on forest lands that are in the harvest land base. Therefore, the amount of harvest land base within each visual resource inventory class is used to determine the degree to which existing visual resource quality would likely be affected under each alternative. However, until projects are actually planned and site-specific visual simulations and analyses are completed, the visual effects of management actions cannot be fully

TABLE 4-102. VISUAL RESOURCE INVENTORY CLASSES AND MANAGEMENT CLASSES BY ALTERNATIVE

Visual Resource Inventory Classes	Inventoried	No Action	Alternatives 1, 2, 3	PRMP
	(acres)			
Class I	79,000	29,000	36,000	38,000
Class II	477,000	199,000	59,000	65,000
Class III	573,000	587,000	45,000	46,000
Class IV	1,404,000	1,717,000	2,420,000	2,402,000



FIGURE 4-183. VISUAL RESOURCE INVENTORY AND MANAGEMENT CLASSES IN ACRES BY ALTERNATIVE



predicted. See Table 4-103 (Harvest land base within each visual resource inventory class by alternative) and Figure 4-184 (Harvest land base acres within visual resource inventory classes by alternative) for the amount of BLM-administered lands by inventory class in the harvest land base by alternative.

Existing visual resource quality on BLM-administered lands inventoried as Class I would be maintained under all alternatives. Class I is unique from the other inventory classes, because it is assigned to areas where a management decision has been made to preserve a natural landscape (see the Visual Resources section of Chapter 3). Because of this, no timber harvest would occur within these areas. All action alternatives would protect existing visual resource quality on lands inventoried and managed as Class I.

The existing visual resource quality on BLM-administered lands inventoried as Class IV would also be maintained under all action alternatives. Major modifications that would occur within the harvest land base portions of these areas would not diminish their existing visual resource quality. Areas inventoried as Class IV have low scenic quality or low sensitivity levels (based on indicators of public concern); or they are seldom seen (based on the relative visibility from travel routes or observation points). Because of these factors, regeneration harvest practices are compatible in areas inventoried as Class IV.

Areas inventoried as Classes II and III have higher degrees of scenic quality and sensitivity levels than areas inventoried as Class IV. Because of this, regeneration harvests would diminish existing visual resource quality within these areas. Table 4-104 (Percentage of existing visual resource quality maintained by alternative

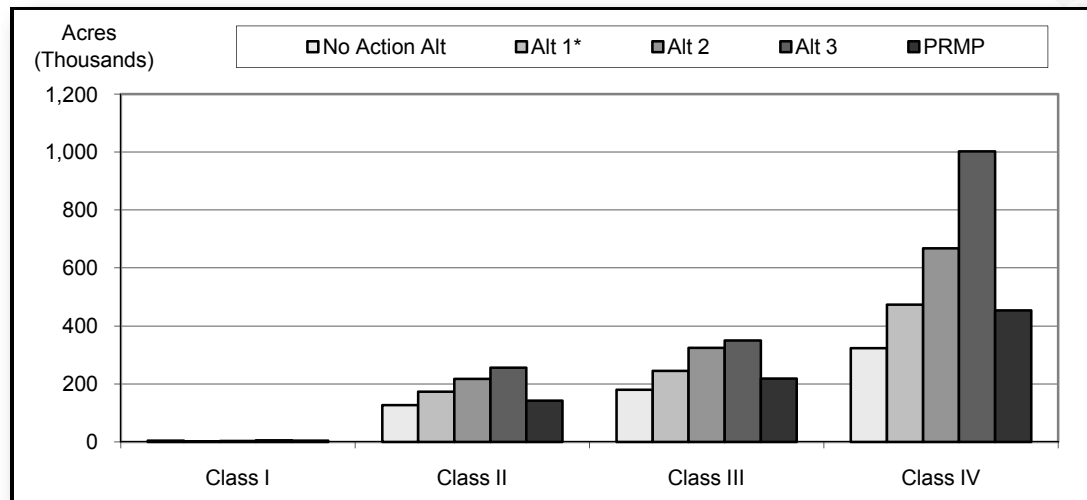
TABLE 4-103. HARVEST LAND BASE WITHIN EACH VISUAL RESOURCE INVENTORY CLASS BY ALTERNATIVE

Visual Resource Inventory Classes	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
	(acres)				
Class I ^a	4,000	1,000	3,000	5,000	4,000
Class II	127,000	173,000	217,000	256,000	142,000
Class III	180,000	245,000	325,000	350,000	219,209
Class IV	324,000	474,000	668,000	1,002,000	454,169

^aSome harvest land base acres overlap Class I areas. This is due to mapping errors associated with the original inventory, which does not align exactly with congressional and administrative areas designated as Class I.



FIGURE 4-184. HARVEST LAND BASE ACRES WITHIN VISUAL RESOURCE INVENTORY CLASSES BY ALTERNATIVE



within areas inventoried as class II and III) shows the percentage of these inventory classes that would be maintained under each alternative based on the portion of these areas that are not within the harvest land base.

Slightly less existing visual resource quality within areas inventoried as Class II and Class III would be maintained under the PRMP compared to the No Action Alternative. The other action alternatives would maintain less existing visual resource quality within areas inventoried as Class II and Class III than the PRMP or the No Action Alternative. The highest portion of existing visual resource quality within these areas would be maintained under the PRMP compared to the other action alternatives. *Figure 4-185 (Visual resource inventory Class II areas maintained by alternative) shows the proportion of areas inventoried as Class II that are within the harvest land base by alternative. Figure 4-186 (Visual resource inventory Class III areas maintained by alternative) shows the proportion of areas inventoried as Class III that are within the harvest land base by alternative.*

TABLE 4-104. PERCENTAGE OF EXISTING VISUAL RESOURCE QUALITY MAINTAINED BY ALTERNATIVE WITHIN AREAS INVENTORIED AS CLASS II AND III

Visual Resource Inventory Classes	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Class II	73%	64%	55%	46%	71%
Class III	69%	57%	43%	39%	62%

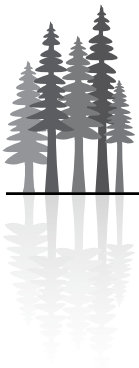


FIGURE 4-185. VISUAL RESOURCE INVENTORY CLASS II AREAS MAINTAINED BY ALTERNATIVE

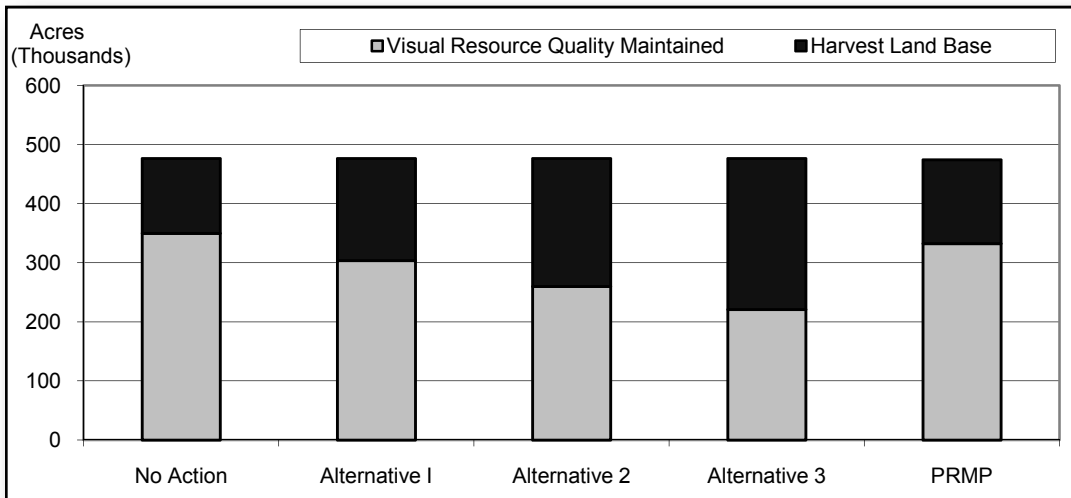
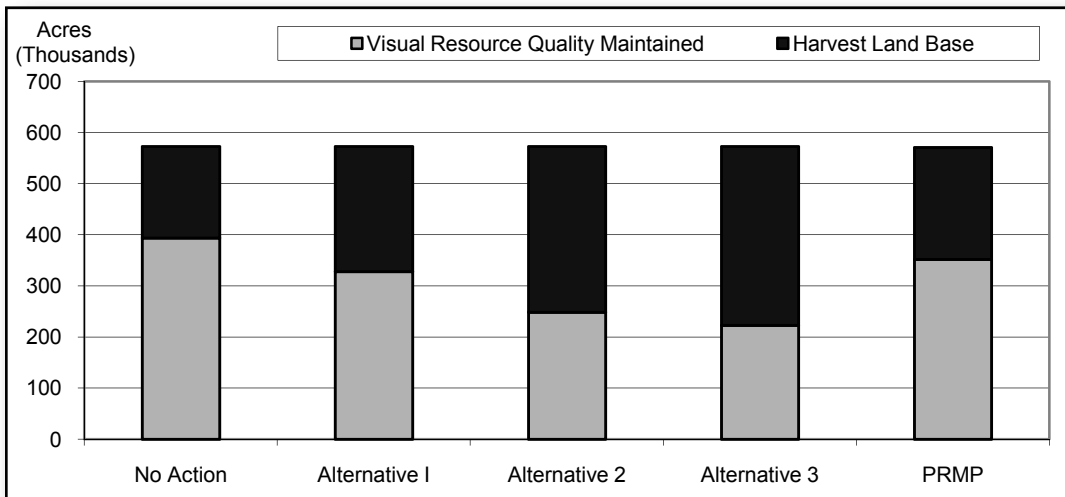


FIGURE 4-186. VISUAL RESOURCE INVENTORY CLASS III AREAS MAINTAINED BY ALTERNATIVE





National Landscape Conservation System

This analysis examines the protection of the National Landscape Conservation System lands under each alternative.

Key Point

- All alternatives would continue to protect all National Landscape Conservation System designations.

The BLM manages the following National Landscape Conservation System designations within the planning area:

- 1 national monument
- 12 wild and scenic river segments
- 2 wilderness areas
- 5 wilderness study areas
- 1 national scenic trail
- 1 outstanding natural area

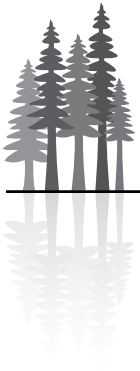
The BLM also manages portions of the Mount Hood Corridor and the Bull Run Watershed Management Unit, along with 57 eligible and suitable wild and scenic river segments, which are related to, but not part of, the National Landscape Conservation System. See *Chapter 2* for a list of these individual designations in the planning area.

All of these designations are withdrawn from timber harvest with the exception of designated, suitable, and eligible wild and scenic rivers that are classified as scenic or recreational. Therefore, only the wild and scenic rivers classified as scenic or recreational are considered in the analysis, because they are the only elements in the National Landscape Conservation System that have the potential to be affected by the actions under the alternatives.

Under all alternatives, limited timber harvesting would be allowed within designated, suitable, and eligible wild and scenic river corridors that are classified as scenic or recreational. Harvesting would be done in a manner that would not impair their free-flowing character, classification, or identified outstandingly remarkable values. There are 72 of these river segments on BLM-administered lands in the planning area, totaling 53,357 acres.

These river segments have different combinations of outstandingly remarkable values that overlay site-specific conditions, each of which requires unique management considerations to guarantee their protection. Because of this, all wild and scenic river corridors would not be included in the harvest land base under any of the alternatives.

Under all alternatives, limited timber harvest would be allowed if designed to have either a positive or neutral effect on a river segment's classification and outstandingly remarkable values. This would result in the protection of all designated, suitable, and eligible wild and scenic rivers under all alternatives.





Soils

This analysis examines the effects of forest and range management activities on soil productivity that would result from the alternatives.

Key Point

- Soil productivity would be maintained or improved under all five alternatives.

Under all alternatives, long-term conservation and the productive capacity of the forest and rangeland soils across the planning area would be maintained.

The same or improved practices that were used from 1995 to 2006 under the current resource management plans (as represented by the No Action Alternative) would be used under all alternatives to provide for soil productivity. It is reasonable to assume that these practices would be implemented under all alternatives, because the management objective for soils under all alternatives is essentially the same. The primary measure of soil productivity for this analysis is the ability of the soil to grow vegetation, specifically commercial trees.

Timber harvest activities can cause soil compaction, displacement, and erosion. The duration and extent of this soil disturbance depends on numerous factors including: soil characteristics, harvest method, amount of area in yarding trails, topography, skill of the individual equipment operators, and the application of amelioration practices.

In general, soil compaction that reduces water infiltration rates and large pore space for gas and water movement constitutes detrimental soil disturbance and can last many years (Froehlich and McNabb 1984, Cafferata 1992). Soil compaction reduces tree growth, but the relationship between compaction and tree growth is complex and difficult to predict because it is dependent on many variables. For example, Miller et al. (1996) found early growth reductions of seedlings planted on compacted skid trails compared to uncompacted locations, but growth of most seedlings on compacted locations caught up to uncompacted locations after eight years.

The early findings after the first decade of the North American long-term soil productivity experiment concluded that “Forest productivity response to soil compaction depended both on soil texture and on whether an understory was present. Growth tended to be reduced by compaction on clayey soils and increased on sandy soils. Effects are attributed to loss of aeration porosity on clays and improvements in available water holding capacity on sands. Trees growing without understory competition generally were unaffected by severe soil compaction through the first 10 years. But 10-year production generally was less on severely compacted plots if an understory was present. In time, compaction effects should be more evident in stands lacking an understory.” (Powers et al. 2005)

A myriad of microbiotic organisms exist in the soil. Some aid in the decomposition of organic matter and subsequent release of plant available nutrients, some fix nitrogen from the air and make it available to plants, and some turn unusable chemical compounds into plant available nutrients. A genetically diverse thriving population of microbes is crucial to the productivity of a soil.

The effects of soil compaction on soil microbial communities and their processes are complex and not universal however. Shestak and Busse (2005) cite research that found decreases in microbial activity having no effect, or a positive response by microorganisms due to compaction. Their research on sandy loam and clay loam soils under laboratory and field conditions in the Sierra’s of northern California found that they “agree with most other studies of soil compaction from the network of LTSP (long-term soil productivity) sites in North America that, so far, show tolerance or resilience by microbial communities.” They conclude, “with the



exception of poorly drained soils or those regions receiving high annual precipitation where saturation is a concern, soil physical changes associated with compaction appear to be of little consequence to the microbial community.” Whether these conclusions hold up in the long term, or are valid for all soils except poorly drained ones, remains to be seen.

Ground-based yarding equipment, such as rubber tired and tracked skidders, has the potential to compact forest soils. Highly mechanized ground-based logging systems (e.g., harvester/forwarders, feller bunchers, and shovels) have become more prevalent recently in timber harvests on BLM-administered lands. However, with these systems, “... research and monitoring confirmed that despite their unique design and use, highly mechanized systems ... for logging younger and smaller timber have the potential to produce significant soil compaction” (Adams 2005).

Under all alternatives when these areas of existing compaction are encountered during future management actions, amelioration of soil compaction would be implemented, if needed, to provide for soil productivity. In some instances, implementation of the amelioration may be delayed if a subsequent entry in the relatively near future would utilize the same compacted skid trail to access the unit.

Under all alternatives, skyline and helicopter logging systems would generally be used on slopes over 35%. These harvest methods decrease log contact with soils compared to ground-based systems by partially or fully suspending the logs over the soils. The more a log is suspended during yarding, the less the soil is affected.

The assumed area of residual detrimental soil disturbance within a timber harvest area remaining after all activities, including amelioration, would vary by logging method. Residual soil disturbance would be: 15% with ground-based logging, 3% with skyline, and 1% with helicopter.

The amount of acres that would be harvested by each logging method varies by alternative. However, when the total acres of assumed residual detrimental soil disturbance is compared to total acres harvested for each alternative, the residual detrimental soil disturbance would be about 5% of soils on BLM-administered lands in the planning area under each alternative. See *Table 4-105 (Residual detrimental soil disturbance compared to total acres harvested)*, which shows the total acres harvested and the assumed acres that would remain in a detrimental condition after timber harvest and amelioration.

Under all alternatives, permanent roads and landings would be constructed as part of forest management activities. These roads and landings would be compacted to increase the bearing strength of the soil in order to hold the weight of trucks and equipment. Some research suggests that the growth of roadside trees may benefit from the increased light and moisture and reduced competition (Miller et al. 1989). Whether this increased growth compensates for the loss of timber production on a permanent road or landing is not known. Temporary roads and landings would have little effect on overall soil productivity because associated compaction would be ameliorated.

New permanent roads and landings would be built under all alternatives. Decommissioning of permanent roads and landings no longer needed for forest management would also occur. During the first 10 years of the plan, the net effect of road building versus road decommissioning would result in less than 1% net

TABLE 4-105. RESIDUAL DETRIMENTAL SOIL DISTURBANCE COMPARED TO TOTAL ACRES HARVESTED DURING THE FIRST TEN YEARS

	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
	(acres)				
Total acres harvested	160,500	204,000	220,100	288,800	297,700
Total detrimental soil disturbance	8,400	10,700	10,800	15,300	15,000



increase over current road and landing acreage under the No Action Alternative; a 2% net increase under Alternatives 1, 2 and 3; and a 3% net increase under the PRMP.

Prescribed fire can cause detrimental soil disturbance if the temperature and duration of a fire heats the soil at depth, such that there is a breakdown in soil structure and decrease in soil productivity. The deeper the burn, the more likely soil productivity would be impaired. “Although the most serious and widespread impacts on soils occur with stand replacing wildfires, prescribed fires sometimes produce localized problems” (Neary et al. 2005).

Under all alternatives, site preparation after timber harvest would include pile and burn (either by machine or hand) or broadcast burning. Burning piles would be more likely to create the higher temperatures that last longer than broadcast burning, increasing consumption of organic matter and volatilization of nutrients, although overall there would be fewer acres affected by pile and burn techniques. Broadcast burns for slash disposal would generally have lower temperatures and shorter duration, leaving surface soils and organic matter mostly intact; however more acres, by definition, would be affected.

Pile and burn, as well as broadcast burning, for site preparation have been implemented on BLM-administered lands since 1995 with practices and techniques designed to reduce the duration and temperature of fire. The annual amount of site preparation prescribed burning would vary from 4,800 acres under the No Action Alternative, to 10,900 acres under Alternative 2. See *Table 4-1 (Estimated annual first decade levels of timber management activity by alternative)*. Under all alternatives, overall soil productivity would be maintained because severe depth of burning would be highly localized and small in area extent. The reason for this is that the areas immediately under the burn piles are small areas scattered around a particular unit, or are under areas of concentrated slash from harvesting.

Under all alternatives, the analysis assumes (based on experience under the 1995 resource management plans) that in the northern districts, approximately half of the acreage within regeneration harvest units would receive slash treatment, and thinning units would not receive slash treatment. The analysis also assumes (based on experience under the 1995 resource management plans) that 90% of harvest units would receive some form of slash treatment in the southern districts. The remaining 10% would not have enough slash to require treatment.

Uncharacteristic wildfire damages soils. Regardless of whether the ignition source is natural or human caused, when soil heating occurs such that there is a breakdown in soil structure, reduction or loss of organic matter and microbial species, water repellency, and surface runoff, the soil functions are impaired and soil productivity can be decreased (Neary et al. 2005).

To reduce the effects of uncharacteristic wildfire, the reduction of hazardous fuels (either through underburning or mechanical biomass removal) would occur in the planning area under all alternatives. In addition, under the PRMP, uneven-age management would be implemented in the Medford District and Klamath Falls Resource Area to reduce the occurrence of uncharacteristic wildfire. Underburning would have similar effects as earlier described for prescribed fire for site preparation after timber harvest.

Little is known about the long-term physical effects of mechanically treating vegetation for biomass removal on soils. However, machines that reduce vegetation into small pieces have the potential to compact soils (Bennett and Fitzgerald). The physical effects of mechanically treating vegetation would be similar to timber harvest activities (refer to preceding text on compaction). Although some machinery made specifically for reducing standing vegetation to woody chips on the soil surface may cause limited compaction, existing timber harvest machines that could be altered to create chips may cause detrimental compaction. However, the mechanical treatment of hazardous fuels reduces the risk of soil damage caused by uncharacteristic wildfire.



Hazardous fuels would be treated using mechanical means under all alternatives. The methods and techniques used would be consistent with past practices, which would maintain or improve soil productivity by decreasing the effects of uncharacteristic wildfire.

Little is known about the long-term biological effects of fuel reduction and biomass removal on soils. If wood chips are left onsite, soil nitrogen would be unavailable for plant growth due to the high carbon-nitrogen ratio until the woody material decomposes. However, this material is an eventual source of nutrients. Some research suggests that if the mulch layer following mastication exceeds three inches that biological damage from soil heating can occur if the mulch is burned. “Field projections indicate that up to one-fourth of treated areas with dense pre-mastication of vegetation would surpass lethal soil temperatures during a surface wildfire” (Busse et al. 2005).

For this analysis, biomass removal for hazardous fuels and whole tree logging as a logging practice is considered as having the same effects on nutrient cycling within soils. Both practices would export most above-ground standing organic carbon off site (see the *Carbon* section of *Chapter 3*).

The importance of organic matter for site productivity is prevalent in the literature (Jurgensen et al. 1997, Rapp et al. 2000, and Hayes et al. 2005). “...The replenishment of organic matter is critical to sustained productivity of forested ecosystems. Organic carbon in forest detritus is the substrate energizing most soil biotic processes that control nutrient and water availability, aeration, and soil structure” (Powers 2002). In addition, Powers cites research that found surface sandy soils of the Sierra National Forest were depleted of plant available moisture by August, but moisture was available throughout the dry summer where logging slash had been retained. Surface organic matter acts as a mulch against solar heating and evaporation, but the mulch value would diminish as forest canopies close and transpiration dominates evaporation. This mulching effect would have more significance in the southern portion of the planning area over the long term because of the warmer drier climate.

The long-term consequences of biomass removal and whole tree logging are not known. A study to determine these long-term effects has begun recently and is called the North American Long-term Soil Productivity experiment. Combining all data from the oldest 26 sites (from the Idaho Panhandle, California Sierra Nevada’s, Lake States, and Southern Coastal Plain) after the first decade, it was concluded that “complete removal of surface organic matter led to declines in soil C concentration to 20 cm depth and to reduced nutrient availability. However, their findings indicate that “biomass removal during harvesting had no influence on forest growth through 10 years” (Powers et al. 2005). They also concluded that “soil C inputs depend only slightly on decomposition of fresh surface residues in the forest types...studied.” They further state, “that the preliminary inputs to soil C come from the decay of fine roots that remained from the previously harvested stand.”

After the first decade of the North American Long-Term Soil Productivity experiment, the findings should be viewed as preliminary. The first decade look at the data was an “early glimpse and may be aberrations once a more complete data set emerges and vegetation more fully occupies our sites” (Powers et al. 2004). None of the North American Long-Term Soil Productivity data observed and used in the study came from western Oregon. However, several sites have been established within the planning area and will provide data in the future.

Western juniper removal to modify wildlife habitat, plant community composition, structure, and/or biodiversity would occur under all alternatives within the Klamath Falls portion of the planning area. The risks and significance to soils associated with burning or mechanical removal of juniper would be the same as previously discussed for hazardous fuels biomass reduction and whole tree logging. However, the machinery used can also include bulldozers to push trees over and pulling chain or cables, and the various cutting and grinding tools, as well as logging equipment. Soil disturbance can be minimal to high,



depending on onsite soil conditions. “Higher levels of surface disturbance can increase the opportunities for weed establishment and temporarily increase erosion potential. However, disturbance of the soil may also be beneficial if applied properly when seeding is required” (Miller et al. 2005).

In the Klamath Falls portion of the planning area, summer thunderstorms are common in the semi-arid environment. Most surface overland flow and erosion is generated during these thunderstorms. The greater the plant density on any given area, the less opportunity for soil erosion. Studies in sagebrush areas have shown that over time, shrubs produce modified microclimates that cause a several-fold increase in infiltration capacity resulting in decreases in erosion compared to the soil between shrubs. Dominance of juniper on a site has been shown to decrease cover of shrub and herbaceous vegetation. Several studies have shown that cutting juniper resulted in increased shrub and herbaceous cover on sites in southeastern Oregon (Miller et al. 2005).

A study quantified hydrologic changes associated with vegetation recovery 10 years after juniper control in eastern Oregon. They found that by cutting juniper, cover was about four times greater in the cut versus uncut treatment, which resulted in the juniper woodlands rapidly producing large amounts of runoff and cut plots producing almost none. The juniper woodland runoff produced almost 10 times the sediment compared to the cut treatment. They concluded that after 10 years, cutting the juniper allowed the site to move to a hydrologically stable condition, which protected the site from even large thunderstorms (Pierson et al. 2007).

As in other ecosystems, soil carbon in the form of organic matter and soil nitrogen are crucial for vegetative growth; however, there is limited research on nutrient and carbon cycling in western juniper woodlands. There is a lack of long-term assessment of changes to soil processes as plant communities convert to juniper woodlands. In addition, the effects of juniper control treatments on nutrient cycling and nutrient capital have not been well documented (Miller et al. 2005).

Greater amounts of vegetative litter accumulate beneath juniper canopies compared to interspace soils. In most juniper woodland sites, the accumulated litter provides no nutrient value to the herbaceous and/or shrub understory unless the trees are removed. “When trees are removed, herbaceous productivity and cover are significantly greater in canopy-influenced soils compared to interspace zones (Miller et al. 2005).

Juniper expansion into sagebrush grassland has demonstrated the potential to alter the spatial distribution of soil organic matter, carbon, and nutrients. If erosion increases as juniper woodlands develop, the potential loss of nutrients off-site in sediment will ultimately cause a reduction in community productivity (Miller et al. 2005).

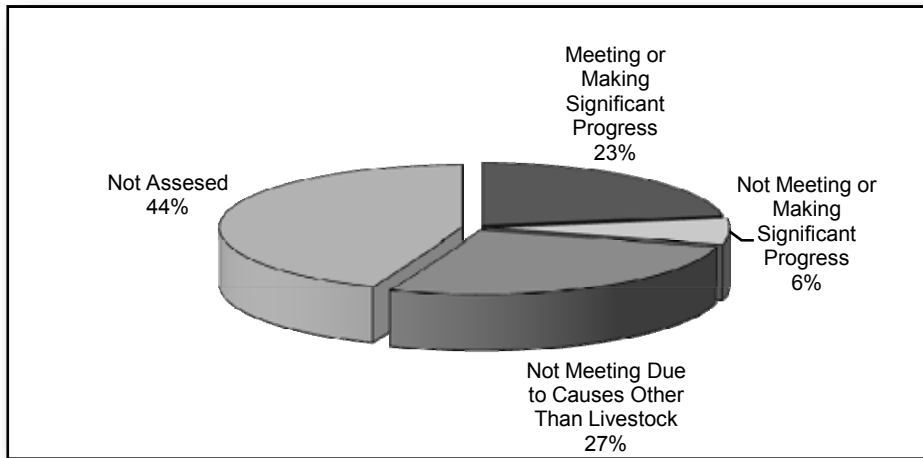
Livestock cause compaction and displacement of soils where there is a concentration of animals. Livestock also exacerbate erosion if bare ground is present due to the churning action of their hooves. This hoof action can compact biological crusts, which play a role in nitrogen fixation and soil stabilization. This would typically be localized and occur around water sources, salt licks, and on the trails leading to these areas. See the *Grazing* sections in *Chapters 2, 3 and 4* for discussions about the levels of grazing.

The rangeland health standards incorporate soil parameters that contribute to rangeland health. These include qualitative indicators for soil/site stability, hydrologic function, and biotic integrity (Pellant et al. 2005). If rangeland health standards are met, it is assumed that soil productivity is maintained.

Figure 4-187 (Status of rangeland health standards assessment) shows the acres that are meeting standards or making progress towards meeting the standards. There are 12 allotments representing about 36,000 acres (approximately 6% of the acreage available for grazing) that have not met or made significant progress towards the rangeland health standards due to livestock concerns. Actions were taken and will continue to be implemented to ensure significant progress towards the standards (see the *Grazing* sections in *Chapter 3* and *Chapter 4*).



FIGURE 4-187. STATUS OF RANGELAND HEALTH STANDARDS ASSESSMENT



Under all action alternatives where rangeland health standards are not being met, grazing management practices would be modified to meet the standards. The nature of the modifications would be based on site-specific circumstances.

Exposed compacted soil surfaces reduce the infiltration of rain water and snowmelt. A long, straight length of compacted soils, such as that which occurs with off-highway vehicle use, is conducive to the overland flow of water. When channelized, overland flow occurs, rills and gullies are formed, and subsequent sediment delivery to streams can occur when close enough to a water body. Currently, there are small localized areas in the planning area where this has occurred due to off-highway vehicle use.

Under the action alternatives, there would be a reduction of 330,000 acres of areas open to off-highway vehicle use. A majority of these open areas are located on steep, densely-forested terrain. This terrain is not conducive to cross-country motor vehicle travel, so off-highway vehicle use is primarily limited to existing roads and trails in these areas. Under Alternatives 1, 2, and 3, there would be 77 acres of Heceta Dunes open to off-highway vehicle use. This 77-acre area would be closed under the PRMP. In the action alternatives, off-highway vehicle use would be limited to designated roads and trails. Under all action alternatives, it is assumed that off-highway vehicle use would cause inconsequential erosion, because roads and trails would not be designated for use if they would cause erosion or sediment (see the *Water* section of this chapter).

Mass soil movement (including landslides, slumps, and debris flows) are natural geologic processes in western Oregon. Depending on geology and soils, the risk of slope failure changes from site to site across the planning area. Factors that contribute to slope instability include steep slopes (greater than 65%); low soil strength; declining root strength; shallow soil depths; and high frequency, duration, and intensity of precipitation. Management actions that contribute to slope failure include timber harvest and new road construction. Sites that have a high risk of mass movement are identified under the Timber Production Capability Classification (TPCC) system and withdrawn from timber management. Although high risk areas are withdrawn from timber management to avoid slope failures, areas judged to be of lower risk have occasionally failed in the past.



Grazing

This analysis examines the livestock grazing authorizations and the forage production in the Coos Bay and Medford Districts, and the Klamath Falls Resource Area in the Lakeview District that would result under the alternatives.

Key Points

- Under all action alternatives, there would be a decrease in livestock grazing authorizations. However, this would not change the current level of grazing since the decrease would occur on allotments that are currently vacant, except in the Coos Bay District.
- Under the No Action Alternative, and Alternatives 1, 2, and 3, there would be an increase in forage production on the west side of the Klamath Falls Resource Area and in the Medford District. The increase would be the highest under the No Action Alternative. Under Alternatives 1, 2, 3, the increase would be the highest under Alternative 3.
- Under the PRMP, there would be a decrease in forage production on the west side of the Klamath Falls Resource Area and in the Medford District.
- Under all alternatives, the quantity of forage production in eastern Klamath Falls would not change substantially.

Livestock grazing authorizations are assessed through changes in acres available for grazing including the number of allotments, animal unit months, and permittees/lessees.

As shown in *Table 4-106 (Livestock grazing authorizations by district and by alternative)* all of the components (acres available for grazing, number of allotments, animal unit months, permittees/lessees) of livestock grazing authorizations would either remain the same or decrease under all action alternatives.

Under all action alternatives, the amount of public land available for livestock grazing through the issuance of a grazing lease would decrease from 560,000 acres (22% of the planning area) to 419,000 acres (16% of the planning area).

In the Medford District and Klamath Falls Resource Area, the decrease occurs on allotments (in whole or in part) that are vacant and not currently grazed. This decrease would not reduce the number of allotments that have an active permit or lease. The reason for this is that the portions of allotments that are proposed for closure in part have an existing permit or lease that includes acres that are not proposed for closure to grazing, so the total number of leases is not being reduced. Only the amount of acreage that can be grazed in those allotments is being reduced. Furthermore, the allotments which are proposed for closure in whole do not have existing leases or permits.

TABLE 4-106. LIVESTOCK GRAZING AUTHORIZATIONS BY DISTRICT AND BY ALTERNATIVE

Grazing	Medford		Coos Bay		Klamath Falls		Total	
	No Action	Alts. 1, 2, 3, PRMP	No Action	Alts. 1, 2, 3, PRMP	No Action	Alts. 1, 2, 3, PRMP	No Action	Alts. 1, 2, 3, PRMP
Allotments	95	55	0	0	96	95	191	150
Leases	0	0	4	0	0	0	4	0
Public Land (Acres)	352,000	217,000	16	0	208,000	202,000	560,000	419,000
Active AUMs	13,416	11,118	23	0	13,401	13,381	26,840	24,499
Permittees/ Lessees	59	59	3	0	92	92	154	151



In the Coos Bay District, four active grazing leases with three lessees covering 16 acres and 23 animal unit months (0.08% of the total animal unit months authorized in the planning area) would be discontinued. See Figure 4-188 (*Change in animal unit month by alternative*) and Figure 4-189 (*Change in the number of allotments by alternative*) for a summary.

The levels of livestock grazing on U.S. Forest Service and BLM-administered lands covered by the Northwest Forest Plan have decreased since the early 1990s with some allotments vacant since the 1970s. Under Alternatives 1, 2, and 3, the quantity of forage production on the west side of Klamath Falls Resource Area and the Medford District would increase; however, the demand for grazing on the BLM (representing 14% of the acres of U.S. Forest Service and BLM-administered lands) is expected to decline. See Chapter 3 for the reasons for the decline in the levels of livestock grazing on Forest Service and BLM-administered lands. Under the PRMP Alternative, the quantity of forage production on the west side of Klamath Falls Resource Area and the Medford District would have a slight decrease.

Management actions needed to achieve the Standards for Rangeland Health for Oregon and Washington, resource management objectives, or other allotment-specific objectives would usually require adjustments in livestock numbers, season of use, or animal unit months, construction of range improvements, or implementation of intensive grazing systems. In the Medford District, three allotments covering 640 acres

FIGURE 4-188. CHANGE IN ANIMAL UNIT MONTHS BY ALTERNATIVE

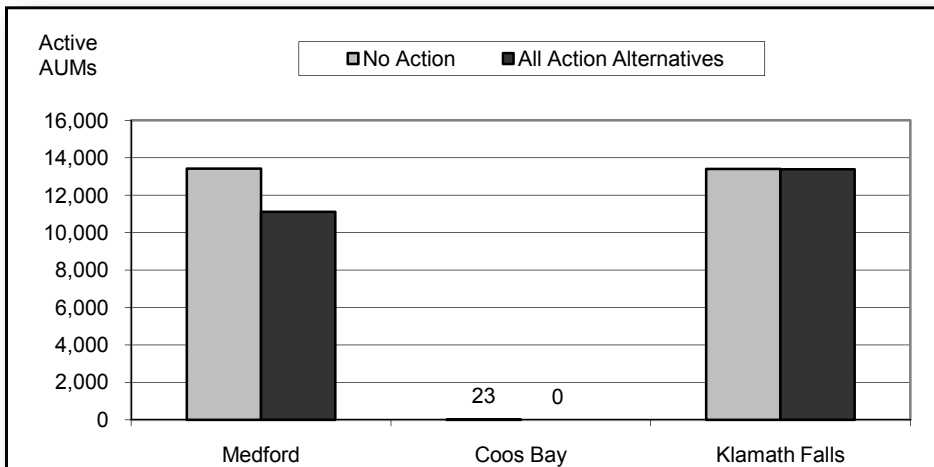
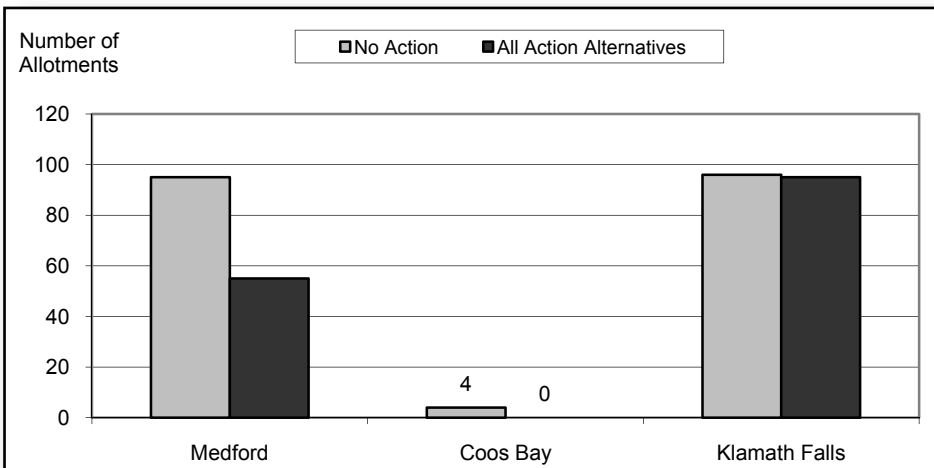


FIGURE 4-189. CHANGE IN THE NUMBER OF ALLOTMENTS BY ALTERNATIVE





have required management actions to meet rangeland health standards since 1999. Based on past rangeland health assessments, adjustments in the next three years in the Medford District would be higher than the last eight years, because 54% of the allotments (representing 65% of the acres) have not been assessed. In the Klamath Falls Resource Area, nine allotments covering 35,404 acres have required management actions to meet rangeland health standards since 1999. Adjustments in the next three years in the Klamath Falls Resource Area would be lower than the last eight years, because more than 90% of the acres (representing 74% of the allotments) have been assessed.

Forage production is affected by changes to vegetation. Changes to vegetation can occur due to range improvements, fuels treatments, timber harvest, and management of areas of critical environmental concern.

Forage and water availability is generally adequate for livestock; however, there are opportunities to improve livestock distribution to restore riparian and upland vegetation, provide additional water sources, and protect riparian areas. Under all action alternatives, the construction of range improvements would be used to improve livestock distribution by:

- shifting grazing pressure from riparian/wetlands to uplands
- shifting grazing distribution within the uplands including areas that are not currently used

The construction of range improvements that would occur under the alternatives is shown in *Table 4-107 (Range improvement construction by district and by alternative)*.

Under all action alternatives, the construction of range improvements that would occur under the alternatives in the Medford District would occur at approximately the same rate as those constructed from 1996 to 2006 (see the *Grazing* section of *Chapter 3*).

Under all action alternatives, the rate of range improvement construction that would occur in the Klamath Falls Resource Area would increase by 245% over the next 10 years, compared to the rate constructed during the period 1996 to 2006. There would be up to 29 reservoirs and 48 miles of fence constructed under all action alternatives within the Klamath Falls Resource Area. See *Chapter 2* and *Appendix M - Grazing*.

Under all alternatives, the management actions that provide for the site-specific protection or restoration of habitat would exclude access (through fencing) to certain traditional watering or foraging areas. Exclusion of these areas from grazing would be so limited in number and so scattered geographically that they would not significantly limit overall watering or foraging opportunities.

Under all alternatives, the quantity of forage production in the Medford District and the Klamath Falls Resource Area would not change significantly because of non-timber management vegetation treatments (refer to *Table 4-3. Estimated first decade levels of non-timber management activity by alternative*). Vegetation treatments would be so scattered geographically that there would be no overall change in forage production.

TABLE 4-107. RANGE IMPROVEMENT CONSTRUCTION BY DISTRICT AND BY ALTERNATIVE

Range Improvement	Medford		Coos Bay		Klamath Falls		Total	
	No Action	Alt 1, 2, 3, PRMP	No Action	Alt 1, 2, 3, PRMP	No Action	Alt 1, 2, 3, PRMP	No Action	Alt 1, 2, 3, PRMP
Livestock Fences Constructed (units/miles)	18 5 miles	18 5 miles	0	0	11 19 miles	27 48 miles	29 24 miles	45 53 miles
Reservoirs or Springs Constructed/Developed (units)	6	6	0	0	3	29	9	35



Where vegetation treatments would occur:

- In the short term, forage production at the site level would decline following vegetation treatments.
- In the long term (5+ year), treatments would result in increased forage production at the site level and enhanced vigor of vegetation.

Off-highway vehicle use affects livestock grazing through disturbance or harassment to livestock and by the type and access that permittees/lessees use to manage livestock or conduct range improvement maintenance (see the *Grazing* section of *Chapter 3*). Under the No Action Alternative, 17 percent of areas within grazing allotments are designated as open, 79 percent are designated as limited to existing or designated roads and trails, and 4 percent are closed to off-highway vehicle use.

Under all action alternatives, all areas currently designated as open to off-highway vehicle use would be redesignated as limited to designated or existing roads and trails in the Medford District and Klamath Falls Resource Area. This would decrease disturbance or harassment to livestock resulting from off-highway vehicle use. In the Medford District and Klamath Falls Resource area, there would be no substantial effect to livestock operators in the type and availability of access, because administrative access would be authorized as necessary to move livestock or conduct range improvement maintenance.

Under all action alternatives, the designation of off-highway vehicle emphasis areas would not substantively affect livestock grazing because the off-highway vehicle use that would be concentrated within the emphasis area would be limited to designated or existing roads and trails, and livestock would avoid these areas.

Timber management actions affect forage production through changes to vegetation structural stages. Timber harvest that results in the stand establishment forest structural stage classification would increase the amount of grasses and grass-like species that serve as forage (see the *Grazing* section of *Chapter 3*). The young forest structural stage classification would provide the least amount of forage.

See *Figure 4-190 (Changes in structural stage abundance within lands allocated for grazing)*. Over the next 100 years, the amount of the stand establishment forest structural stage classification within lands allocated for grazing would:

- increase from 30,000 acres to 37,600 acres, under the No Action Alternative
- increase from 20,000 acres to 39,500 acres, under Alternative 1
- increase from 18,400 acres to 47,400 acres, under Alternative 2
- increase from 18,000 acres to 76,500 acres, under Alternative 3
- decrease from 57,500 to 23,700 acres, under the PRMP

Under Alternatives 1, 2, and 3, the increase of the stand establishment forest structural stage classification and the decrease in the young forest structural stage classification would result in a corresponding increase in livestock forage production. The increase in livestock forage production would be the highest under the No Action Alternative, which has a higher amount of lands allocated for grazing. Comparing Alternatives 1, 2, and 3, the increase in livestock forage production would be the highest under Alternative 3.

Under the PRMP, there would be a decrease in the stand establishment forest structural stage, a decrease in the young and mature forest structural stages, and an increase in structurally complex forest structural stage classification. This is because the lands allocated for grazing are within the Uneven-age Timber Management Area. This would result in an overall slight decrease in forage production under the PRMP, as shown in *Table 4-108* because the Uneven-age Timber Management Area would be less productive for grazing since it would lack the stand establishment structural stage. See *Table 4-108 (Changes in livestock forage production within lands allocated for grazing by alternative)* and *Figure 4-191 (Changes in livestock Forage Production by Alternative)*.



FIGURE 4-190. CHANGES IN STRUCTURAL STAGE ABUNDANCE WITHIN LANDS ALLOCATED FOR GRAZING

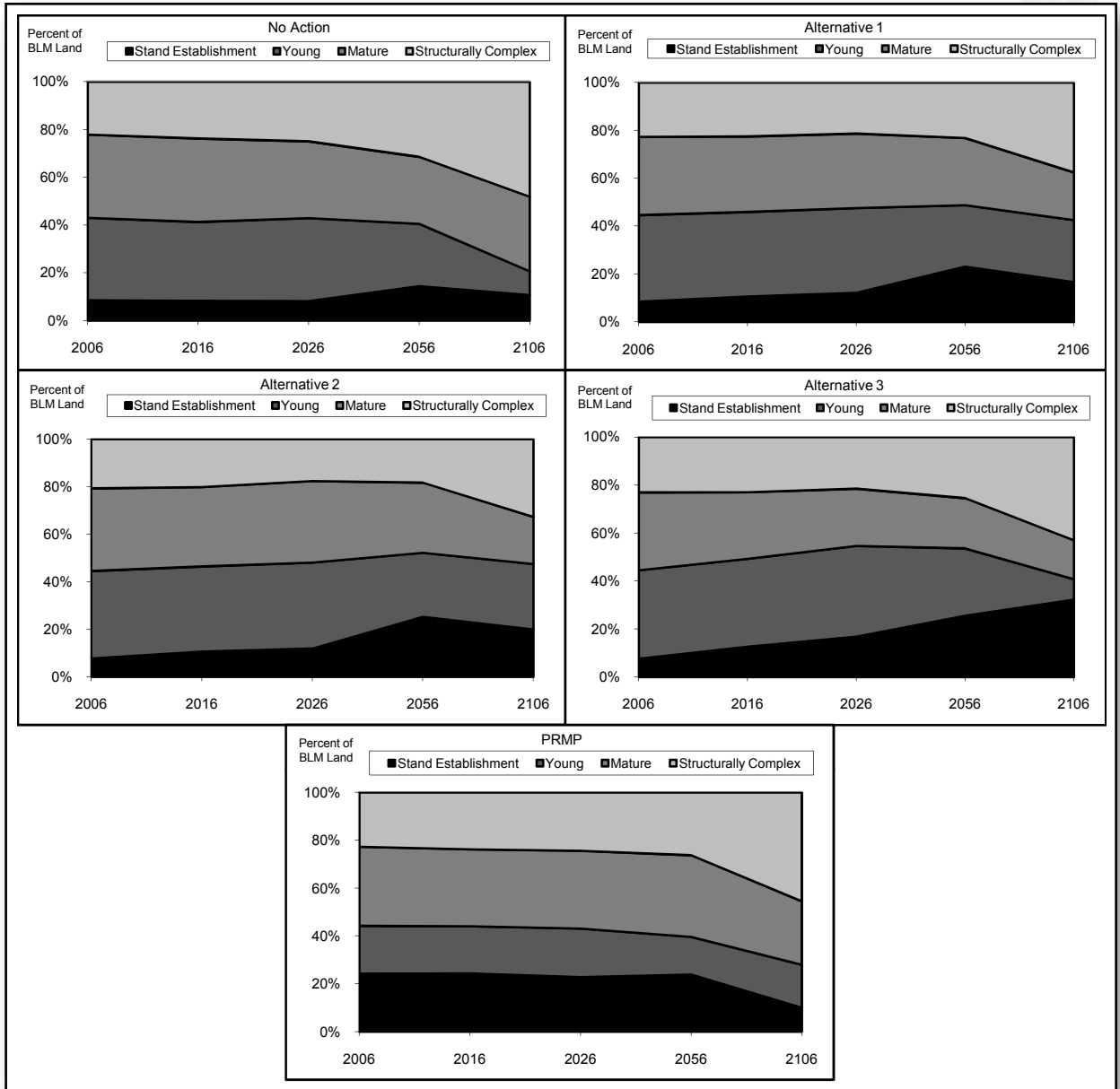




TABLE 4-108. CHANGES IN LIVESTOCK FORAGE PRODUCTION WITHIN LANDS ALLOCATED FOR GRAZING BY ALTERNATIVE

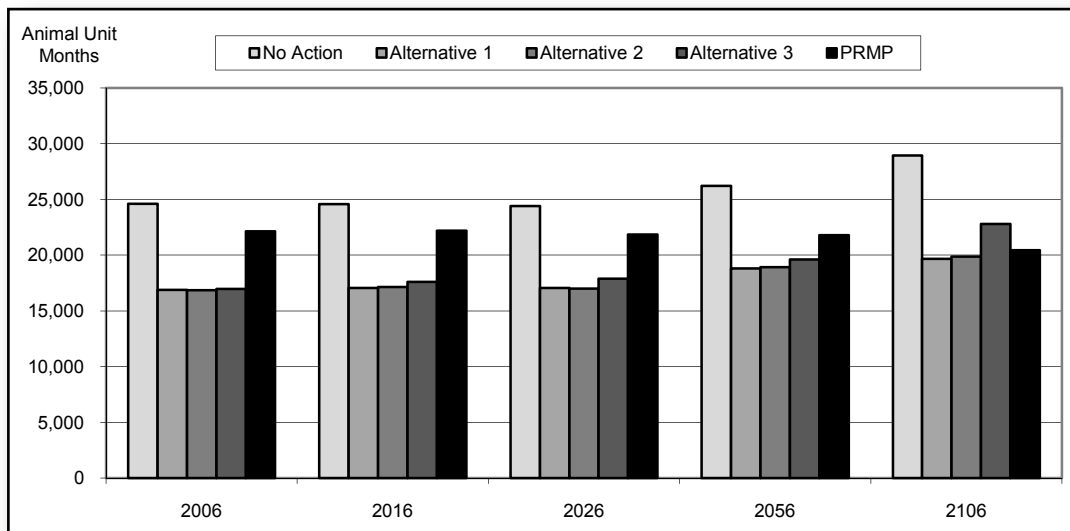
Year	Forage Production (animal unit months)				
	No Action	Alternative 1	Alternative 2	Alternative 3	PRMP
2006	24,620	16,872	16,853	16,972	22,150
2016	24,582	17,059	17,127	17,601	22,192
2026	24,400	17,066	17,006	17,892	21,863
2056	26,223	18,802	18,920	19,616	21,787
2106	28,950	19,673	19,867	22,805	20,447

Management of areas of critical environmental concern affects forage production by applying site-specific protection (exclosures) or management actions (i.e., season of use restrictions).

Under all alternatives, the designation of areas of critical environmental concern would not affect livestock grazing. Even though areas designated as areas of critical environmental concern would decrease under all action alternatives, forage production would not be affected because site-specific protection (exclosures) or management actions (i.e., season of use) would not change in these areas. This is because site-specific protection or management actions are used to meet other allotment objectives, such as to improve livestock distribution and protect sensitive areas (i.e., riparian areas).

Grazing regulations direct the BLM to manage livestock grazing in accordance with the *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington*. The standards are the basis for assessing and monitoring rangeland conditions and trends. If livestock is a significant causal factor in the failure to meet a standard, management is implemented to ensure that progress is being made toward attainment of the standard. A total of 116 allotments (59% of the number of allotments and leases, and 56% of the total number of public land acres within the planning area) have been assessed. Livestock was identified as a significant causal factor in the failure to meet one or more of the standards on all or portions of 12 allotments. See *Table 3-78 (Rangeland health standards assessment results)* in *Chapter 3*. In accordance with regulations, appropriate action has been taken and will continue to ensure that significant progress will be made to meet the standards.

FIGURE 4-191. CHANGES IN LIVESTOCK FORAGE PRODUCTION BY ALTERNATIVE





Wild Horses

This analysis examines the forage production and the appropriate management level within the Pokegama Herd Management Area that would occur under the alternatives and the PRMP.

Key Points

- Under the No Action Alternative and Alternatives 1, 2, and 3, there would be an increase in forage production in the Pokegama Herd Management Area. The increase would be the highest under Alternative 3.
- Under the PRMP, there would be a decrease in forage production in the Pokegama Herd Management Area.
- Under all alternatives, including the PRMP, the appropriate management level of 30 to 50 head would be maintained.

Vegetation treatments affect wild horses by temporarily changing the use of traditional watering or foraging areas and changing forage production. As overstory canopy cover decreases understory forage production increases (USDA SCS 1971, Young et al. 1967). The production of forage within regeneration harvest units is greater than within thinned stands, because the understory vegetation does not have to compete with the overstory for limited resources. Over time, forage production would decline as juvenile trees continue to grow and begin to outcompete forage for the limited resources. The understory production is also influenced by successional stage and forest type (Walburger et al. 2005). The amount of forage production would be higher within a stand establishment forest than within a young, mature, or structurally complex forest. See *Figure 3-150 (Forage production (represented through canopy cover) within a stand establishment forest versus a young forest)* in the *Grazing* section of *Chapter 3*.

Under all alternatives, including the PRMP, wild horses would be excluded from certain traditional watering or foraging areas through fencing intended to protect or restore habitat. Exclusion of wild horses from these watering areas would be so limited in number and so scattered geographically that the fencing would not appreciably limit overall watering or foraging areas or change herd movement and distribution.

Under all alternatives, including the PRMP, the quantity of forage production within the Pokegama Herd Management Area would not substantially change as a result of vegetation treatments. Refer to *Table 4-3 (Estimated Non-Timber Management Activity)* in the *Timber* section of this chapter. Vegetation treatments would be so scattered geographically that there would be no overall change in forage production. Where vegetation treatments would occur:

- In the short term, forage production at the site level would decline following vegetation treatments.
- In the long term (5+ years), vegetation treatments would result in increased forage production at the site level and enhanced vigor of vegetation.

Under all alternatives, including the PRMP, grazing authorizations within the Pokegama Herd Management Area would remain the same. Therefore, there would continue to be adequate forage for livestock grazing, wild horses, and wildlife at the authorized levels. See the *Wild Horse* section of *Chapter 3* for the relationship of grazing to the Pokegama Herd Management Area.

The construction of range improvements would vary between the No Action Alternative and the four action alternatives. See *Table 4-107 (Range improvement construction by district and alternative)* in the *Grazing* section of this chapter. Under all action alternatives, up to two new reservoirs and five new miles of fence would be constructed within the Pokegama Herd Management Area (see *Chapter 2* maps and *Appendix M – Grazing*).



Forage and water availability is not a limiting habitat factor in the Pokegama Herd Management Area; however, distribution of the wild horse herd is not uniform. Under all action alternatives, construction of range improvements would improve wild horse distribution by shifting:

- grazing pressure from riparian/wetlands to uplands
- grazing distribution within the uplands to include areas that are not currently used

Off-highway vehicle use affects wild horses through disturbance or harassment. Areas designated as open to off-highway vehicle use under the No Action Alternative would present more chance for disturbance or harassment to the wild horse herd than areas designated as limited to off-highway use. However, this additional disturbance or harassment would occur on a small percentage of the herd management area, as only 8% is designated as “open to off-highway vehicle use” under the No Action Alternative, and 92 percent is designated as “limited to existing or designated roads and trails.” Effects to the wild horse herd under Alternatives 1, 2, and 3 and the PRMP would be minor, because the off-highway vehicle designation for the herd management area would be designated as “limited to existing roads and trails” or “limited to designated roads and trails.”

Timber management actions affect forage production through changes to the forest structural stages. See *Figure 4-192 (Changes in structural stage abundance within the Pokegama HMA)*. Timber harvest that results in the stand establishment forest structural stage classification would increase the amount of grasses and grass-like species that serve as forage (see the *Wild Horse* section of *Chapter 3*). The young forest structural stage classification would provide the least amount of forage.

Over the next 100 years, the amount in the stand establishment forest structural stage classification within the Pokegama Herd Management Area would:

- decrease under the No Action Alternative from 900 acres to 700 acres
- increase under Alternative 1 from 900 acres to 3,500 acres
- increase under Alternative 2 from 1,000 acres to 3,000 acres
- increase under Alternative 3 from 900 acres to 5,900 acres
- decrease under the PRMP from 4,600 acres to 900 acres

Under Alternatives 1, 2, and 3, the increase of the stand establishment structural stage classification and decrease in the young forest structural stage classification would result in a corresponding increase in forage production.

Under the No Action Alternative, there would be

- a decrease of the stand establishment structural stage classification
- a decrease in the young forest structural stage classification
- an increase in the structurally complex forest structural stage classification

These effects under the No Action Alternative would result in an overall increase in forage production. The increase in forage production would be the highest under Alternative 3.

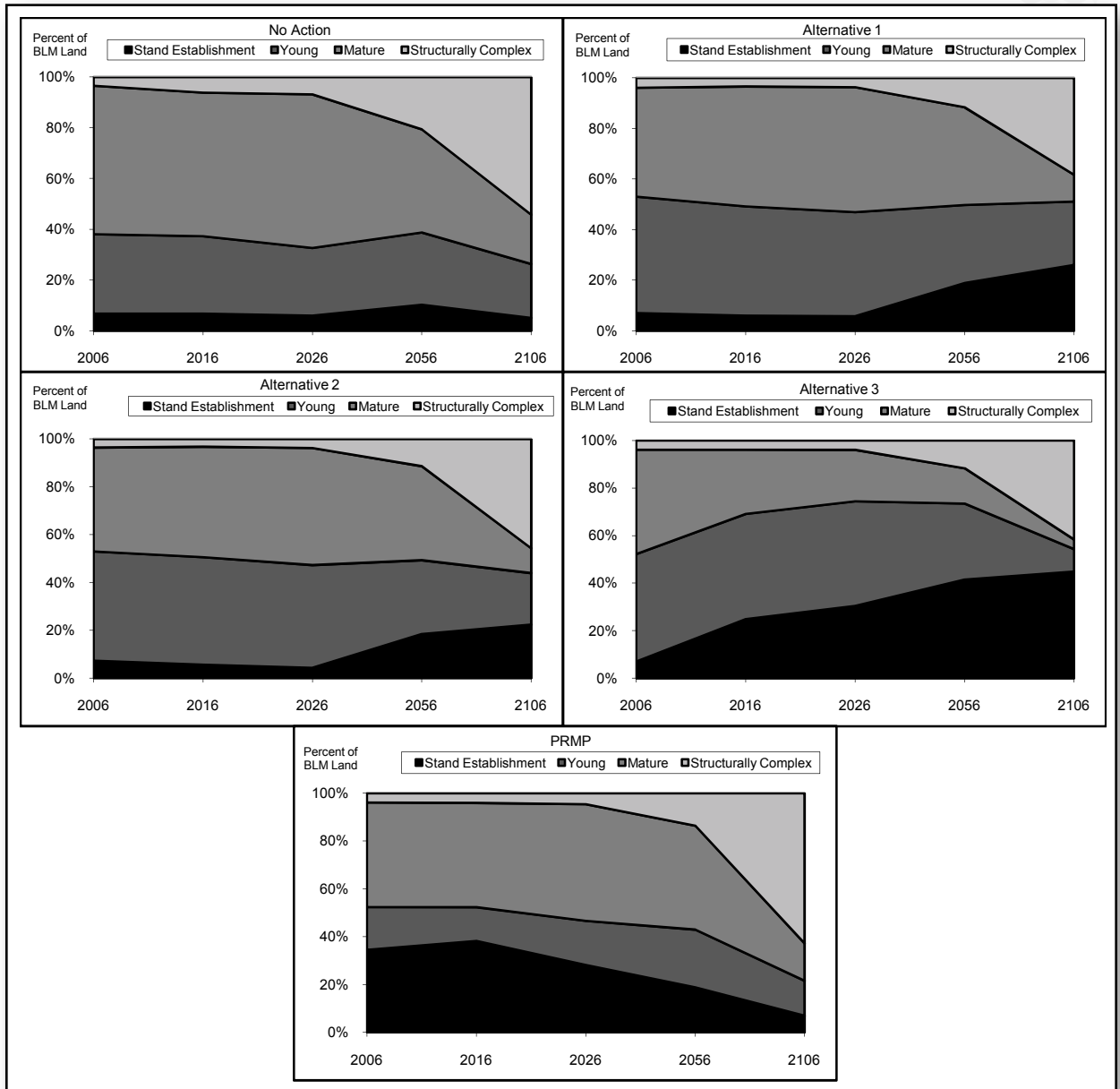
Under the PRMP, there would be:

- a decrease in the stand establishment forest structural stage
- a decrease in the young and mature forest structural stages
- an increase in structurally complex forest structural stage classification

These effects would occur because the lands allocated for grazing are within the Uneven-Aged Management Area. This would result in an overall slight decrease in forage production under the PRMP. See *Table 4-109*



FIGURE 4-192. CHANGES IN STRUCTURAL STAGE ABUNDANCE WITHIN THE POKEGAMA HERD MANAGEMENT AREA





(Changes in wild horse forage production by alternative) in the Grazing section of this chapter and Figure 4-193 (Changes in wild horse forage production by alternative) below.

Increases to forage production by itself would not change the Appropriate Management Level. The Appropriate Management Level is based on:

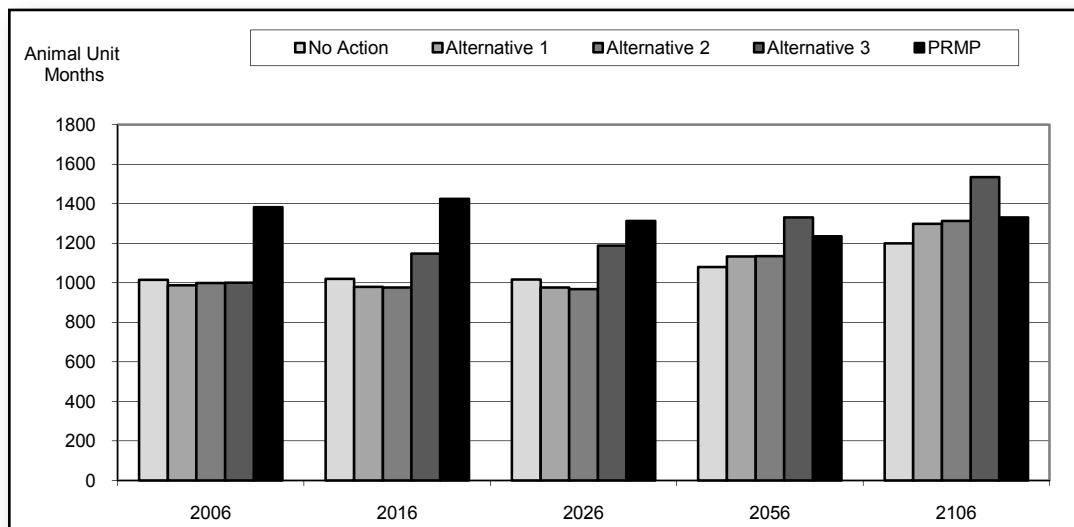
- suitability of an area for grazing (distance from water, topography, temperature, and forage type and availability)
- forage allocations for deer and elk
- wild horse distribution on BLM-administered land and private land
- utilization (amount of forage consumed)

All of these factors would be considered to determine when changes in wild horse numbers would be required (see the *Wild Horses* section of Chapter 3).

TABLE 4-109. CHANGES IN WILD HORSE FORAGE PRODUCTION BY ALTERNATIVE

Year	Forage Production (animal unit months)				
	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
2006	1,015	987	998	1,001	1,382
2016	1,019	979	976	1,147	1,424
2026	1,017	976	968	1,188	1,313
2056	1,080	1,133	1,134	1,331	1,235
2106	1,200	1,298	1,313	1,535	1,330

FIGURE 4-193. CHANGES IN WILD HORSE FORAGE PRODUCTION BY ALTERNATIVE





Areas of Critical Environmental Concern – Relevant and Important Values

This analysis examines the designation of areas of critical environmental concern (ACEC) and the relevant and important values that would receive special management attention under the alternatives.

Key Points

- Values that would be fully protected under all alternatives (whether or not special management was applied under a designation of an area of critical environmental concern) include any species listed under the Endangered Species Act, bald eagles, fish, migratory birds, raptors, herons, riparian and aquatic resources, and cultural resources.
- Under the PRMP and the No Action Alternative, special status species would be fully protected, in addition to the species listed in the previous key point, whether or not special management was applied under a designation of an area of critical environmental concern.
- Important and relevant values that would not be protected under some other authority or land use plan decision would be degraded or lost if special management was not applied under designation of an area of critical environmental concern.

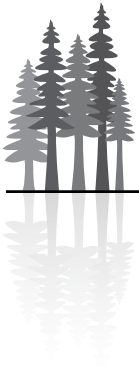
Since designation of an area of critical environmental concern is part of the land allocation decision made in a resource management plan, it is not a resource affected by the plan. However, the different designations of Areas of Critical Environmental Concern (ACEC) in the various alternatives would have differing effects on the resources (important and relevant values) that the designations are intended to protect. Discussions of the analyses of the effects of the alternatives on the resources are included in the applicable section of this environmental impact statement. The important and relevant values associated with the areas of critical environmental concern are listed in *Appendix N - Areas of Critical Environmental Concern*. In addition to the more thorough and detailed analysis of environmental consequences in the respective sections of *Chapter 4*, a broad discussion of the various resources intended to be protected by designation of an area of critical environmental concern is provided here.

Although there are 131 existing and potential areas of critical environmental concern within the planning area (see the *Areas of Critical Environmental Concern* section in *Chapter 3*), only 122 existing and potential areas of critical environmental concern were analyzed for designation under the action alternatives. Five of the other nine existing or potential areas did not meet the criteria (i.e., relevance and importance, or the need for special management) for further consideration. The five areas that no longer meet the ACEC criteria are:

- Little Grass Mountain and Sheridan Peak in the Salem District
- Cottage Grove Old Growth and Lake Creek Falls in the Eugene District
- Iron Creek in the Medford District

There are four other existing areas of critical environmental concern that no longer require designation because they are managed under other special designations that provide protection to their relevant and important values:

- North Umpqua River in the Roseburg District is congressionally designated as a wild and scenic river.
- Sterling Mine Ditch in the Medford District is covered under the National Historic Preservation Act as eligible for listing.
- Jenny Creek and Pilot Rock in the Medford District are included within the Cascade-Siskiyou National Monument.



Under each of the action alternatives, some areas of critical environmental concern were analyzed for designation excluding harvest land base acres on O&C lands. Some of the original designations and nominations included only small areas of O&C harvest land base that were included to create more logical units based on administrative boundaries or topographic features. Therefore, in some cases, the exclusion of the O&C lands would still allow for the effective application of special management attention for the relevant and important values.

The names of the areas of critical environmental concern that would be designated under the various alternatives, their associated acres, and their important and relevant values are found in *Appendix N - Areas of Critical Environmental Concern*.

Areas of critical environmental concern are established to protect the important and relevant values that require special management attention (see the *Areas of Critical Environmental Concern* section in *Chapter 3*). The lack of special management attention for those areas that require it would result in the eventual degradation or loss of many of those important and relevant values if those important and relevant values are not otherwise protected under law, some other authority, or a resource management plan decision.

In some instances, relevant and important values identified for a particular ACEC do not require special management attention because they would be otherwise protected under law, some other authority, or resource management plan decisions. Examples would be an ACEC in which water, fish, or species listed under the Endangered Species Act were listed as relevant and important values. Water, fish, and federally listed species do not need additional special management attention through designation as an area of critical environmental concern, because they would otherwise be protected by management direction under all alternatives or by law. Values that would be fully protected by law or management direction under all alternatives and, therefore, would not require the special management attention of ACEC designation include any species listed under the Endangered Species Act, bald eagles, fish, migratory birds, raptors, herons, riparian and aquatic resources, and cultural resources. In addition, under the No Action Alternative and the PRMP, special management under designation of an area of critical environmental concern would not be needed for special status species because the Bureau Special Status Species Policy would be applied.



Cultural Resources

This analysis examines the damage to cultural, paleontological, and traditional use sites that would result from the alternatives.

Key Points

- The amount of damage to cultural, paleontological, and traditional use sites would vary little between all of the alternatives. Under all five action alternatives, no more than 2% of sites would be damaged per decade across the planning area.

Practices discussed in this analysis are the same or similar to those practices that have been implemented under the current resource management plans (represented by the No Action Alternative). It is reasonable to assume that these practices would continue to be implemented in a similar manner under all alternatives because the cultural, paleontological, and Native American traditional use resource management objectives of all alternatives are essentially the same.

Nearly all impacts to cultural and paleontological sites would be reduced or eliminated under all alternatives through the use of pre-disturbance site discovery methods and the application of avoidance or other protection measures. However, site avoidance would not always be possible, which would result in some incidental or inadvertent loss of sites or site values. Examples include:

- sites that cannot be entirely avoided by project redesign without eliminating the resource benefits provided by the project
- projects that cannot be relocated or redesigned (For example, a ridge saddle may be the only economic and engineering feasible location for an access road.)
- site values that are visually dependent on setting, e.g., spiritual locations and sacred sites
- sites that are not fully identified prior to ground-disturbing actions due to lack of surface manifestations or reduced surface visibility (For example, some sites are partially or entirely below the ground surface, or surface artifacts are not visible during inventory due to dense ground vegetation and thick duff cover.)

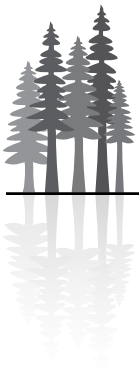
Sites are not evenly distributed across the landscape or across landforms. The range of site locations is similar for the northern and coastal areas (Salem, Eugene, and Coos Bay Districts) and for the southern areas (Roseburg and Medford Districts). The Klamath Falls Resource Area has the most recorded sites (see the *Cultural Resources* section on *Chapter 3*).

From 1998 through 2006, the number of newly discovered sites per year was also unevenly distributed:

- 2 new sites in the northern and coastal areas (Eugene, Coos Bay and Salem Districts)
- 55 new sites in the southern area (Roseburg and Medford Districts)
- 86 new sites in the Klamath Falls Resource Area

Any ground-disturbing action can damage or destroy cultural, paleontological, and traditional use resources (see the *Cultural Resources* section of *Chapter 3*). From 1998 through 2006, site damage occurred to 22 (0.8%) out of 2,843 recorded cultural sites in the planning area. This damage resulted from timber harvest, fire and fuels management, recreation management, and off-highway vehicle use.

- Timber harvest activities damaged 10 sites between 1998 and 2006. The rate of site damage averaged one site per 7,640 harvested acres in the northern and coastal area, and one site per 9,125



harvested acres in the southern area over the past decade. There was no damage to sites in the Klamath Falls Resource Area.

- For road construction, no sites were reported damaged in the planning area between 1998 and 2006, making a 0% damage rate from that activity. However, sites damaged by road construction were recorded prior to 1998, so it is assumed damage would occasionally occur.
- Fires and fuels management activities damaged 9 sites between 1998 and 2006. The rate of site damage averaged one site per 11,052 treated acres in the southern area, and one site per 9,775 treated acres in the Klamath Falls Resource Area over the past decade. No sites were damaged in the northern and coastal area. Fuel treatments also reduce the risk of wildfires damaging sites. Although fuel treatments would reduce the risk of wildfires damaging sites, there is no quantified data on risk reduction.
- For recreation site development and use, a total of one site (in the Medford District) was damaged. Damage to one site does not provide enough data to develop a meaningful correlation between the number of recreation sites constructed or the number of acres of recreation construction and the risk of damaging cultural sites. However, it is assumed that site damage would occasionally occur.
- Off-highway vehicle use that occurs on existing and designated roads does not impact cultural sites. Use that occurs outside of existing and designated roads would potentially damage sites. The Medford District and the Klamath Falls Resource Area have each reported one damaged site. The number of cultural sites damaged is too small to demonstrate a meaningful correlation between amount of off-highway vehicle use and rate of site destruction. However, it is assumed site damage would occasionally occur.

No sites were reported damaged by other types of ground-disturbing activities in the planning area during the period 1998 through 2006. However, sites damaged by range improvements, wildfire suppression, and natural disturbance are recorded in the planning area. This damage occurred prior to 1998. Since site damage has occurred as a result of a variety of ground-disturbing activities and from natural causes in the past, it would be expected to occasionally occur in the future at approximately the same rate as in the past, that is, under the current (1995) resource management plans.

The past rate of damage is used to project the rate of damage to cultural sites that would occur under the alternatives for the first decade of plan implementation.

No data is available to quantify the impacts to paleontological resources within the planning area. These sites have been recorded infrequently with only 45 locations documented.

Under the No Action Alternative, harvest would increase in the next decade to 97,400 acres in the northern and coastal areas, which would result in 13 (2%) of the sites being damaged; and to 58,800 acres in the southern area, which would result in six (0.3 %) of the sites being damaged. There would be very few or no sites damaged in the Klamath Falls Resource Area.

Under the No Action Alternative, damage to cultural sites would occasionally occur due to road construction, recreational site development and use, and off-highway vehicle use.

Under the No Action Alternative, ground-disturbing hazardous fuels treatments would occur over the next 10 years on 156,480 acres in the southern area, which would result in 14 (0.8 %) of the sites being damaged; and on 69,700 acres in the Klamath Falls Resource Area, which would result in 7 (0.3 %) of the sites being damaged. Fuels treatments in the northern and coastal area would not result in damage to sites.



Under the No Action Alternative, total damage would occur to an average of 4 sites per year, and 1% of known sites would be damaged in the next decade. This includes:

- one site per year and 3% of sites in the northern and coastal areas
- two sites per year and 1% of sites in the southern area
- less than one site per year and 0.3 % of sites in the Klamath Falls Resource Area

Under Alternative 1, harvest would occur on 122,240 acres in the next decade in the northern and coastal areas, which would result in 16 (4%) of the sites being damaged. An additional 78,360 acres would be harvested in the southern area, which would result in 9 (0.5%) of the sites being damaged. There would be no sites damaged in the Klamath Falls Resource Area.

Under Alternative 1, damage to cultural resources would occasionally occur due to road construction, recreational site development and use, off-highway vehicle use, other resource management actions, and natural causes.

Under Alternative 1, ground-disturbing hazardous fuels treatment over the next 10 years would occur on 156,480 acres in the southern area, which would result in 14 (0.8%) of the sites being damaged; and on 69,700 acres in the Klamath Falls Resource Area, which would result in 7 (0.3%) of the sites being damaged. Fuels treatments in the northern and coastal areas would not result in damage to sites.

Under Alternative 1, total damage would occur to an average of 5 sites per year, and 1% of known sites would be damaged over the next 10 years. This includes:

- less than two sites per year and 4% of sites in the northern and coastal areas
- two sites per year and 1% of sites in the southern area
- less than one site per year and 0.3 % of sites in the Klamath Falls Resource Area

Under Alternative 2, there would be 126,580 acres harvested over the next 10 years in the northern and coastal areas, which would result in 17 (4%) of the sites being damaged; and 90,410 acres in the southern area would be harvested which would result in 10 (0.5%) of the sites being damaged. There would be no sites damaged in the Klamath Falls Resource Area.

Under Alternative 2, damage to cultural resources would occasionally occur due to road construction, recreational site development and use, off-highway vehicle use, other resource management actions and natural causes.

Under Alternative 2, ground-disturbing hazardous fuels treatment over the next 10 years would occur on 156,480 acres in the southern area, which would result in 14 (0.8%) of the sites being damaged; and on 69,700 acres in the Klamath Falls Resource Area, which would result in 7 (0.3 %) of the sites being damaged. Fuels treatments in the northern and coastal area would not result in damage to sites.

Under Alternative 2, total damage would occur to an average of 5 sites per year, and 1% of known sites would be damaged over the next 10 years. This includes:

- less than two sites per year and 4% of sites in the northern and coastal areas
- two sites per year and 1% of sites in the southern area
- less than one site per year and 0.3% of sites in the Klamath Falls Resource Area

Under Alternative 3, there would be 147,970 acres harvested over the next 10 years in the northern and coastal area, which would result in 19 (5%) of the sites being damaged; and 126,000 acres would be harvested in the southern area, which would result in 14 (0.8%) of the sites being damaged. There would be no sites damaged in the Klamath Falls Resource Area.



Under Alternative 3, damage to cultural resources would occasionally occur due to road construction, recreational site development and use, off-highway vehicle use, other resource management actions, and natural causes.

Under Alternative 3, ground-disturbing hazardous fuels treatment over the next 10 years would occur on 156,480 acres in the southern area, which would result in 14 (0.8%) of the sites being damaged; and on 69,700 acres in the Klamath Falls Resource Area, which would result in 7 (0.3%) of the sites being damaged. Fuels treatments in the northern and coastal areas would not result in damage to sites.

Under Alternative 3, total damage would occur to an average of 5 sites per year, and 1% of known sites would be damaged over the next 10 years. This includes:

- two sites per year and 5% of sites in the northern and coastal areas
- three sites per year and 2% of sites in the southern area
- less than one site per year and 0.3% of sites in the Klamath Falls Resource Area

Under the PRMP, there would be 178,900 acres harvested over the next 10 years in the northern and coastal area, which would result in 23 (6 %) of the sites being damaged; and 110,200 acres would be harvested in the southern area, which would result in 12 (0.6 %) of the sites being damaged. There would be no sites damaged in the Klamath Falls Resource Area.

Under the PRMP, damage to cultural resources would occasionally occur due to road construction, recreational site development and use, off-highway vehicle use, other resource management actions, and natural causes.

Under the PRMP, ground-disturbing hazardous fuels treatment over the next 10 years would occur on 156,480 acres in the southern area, which would result in 14 (0.8%) of the sites being damaged; and on 69,700 acres in the Klamath Falls Resource Area, which would result in 7 (0.3%) of the sites being damaged. Fuels treatments in the northern and coastal areas would not result in damage to sites.

Under the PRMP, total damage would occur to an average of 6 sites per year, and 1% of known sites would be damaged over the next 10 years. This includes:

- two sites per year, and 6 % of sites in the northern and coastal areas
- three sites per year, and 1% of sites in the southern area
- less than one site per year, and 0.3% of sites in the Klamath Falls Resource Area

Cultural inventory programs started on the districts in 1976. The current inventory coverage ranges from 50% of the land base on Klamath Falls Resource Area, to 4% on the Eugene District (see *Table 3-84* in the *Cultural Resources* section of *Chapter 3* for inventory coverage percentages). If inventory continues at the current rate, 100% inventory would not be completed for 30 years on the Klamath Falls Resource Area and for more than 100 years on the Eugene District, assuming all acres are eventually inventoried. Minimally, for the first three decades of plan implementation, site discovery is projected to occur as previously uninventoried land is surveyed. In the northern and coastal areas, the past rate of new site identification has been two sites each year, and the rate of damage from timber harvest is projected to range from one to two sites each year. Projecting the current rates of discovery and damage into future decades, the percentage of total sites damaged would increase. In the southern area, the rate of new site identification has been 55 sites per year, and the number of sites damaged ranges from two to three sites each year. In the southern area, the percent of sites damaged would decrease overall in future decades. In Klamath Falls Resource Area, the rate of new site discovery has been 86 sites each year, and less than one site each year has been damaged. The percent of sites damaged in Klamath Falls Resource Area would decrease overall in future decades.



However, rates of site damage would be expected to decrease over time even in the northern and coastal area due to the following conditions:

- In subsequent decades of plan implementation, harvest will shift to second growth stands where survey and disturbance has already occurred.
- New road construction would decrease after the road system is completed.
- Stands reserved from timber harvest may never be inventoried and any sites would remain undamaged.

A summary of the cultural resource sites projected to be damaged under the alternatives during the first decade is shown in *Table 4-110 (Percent of total cultural resource sites damaged under the alternatives over the next 10 years)*.

Adverse impacts to Native American traditional use sites include alteration of sites and site settings, loss of vehicular access to sites, and noise and visual intrusions to site setting. Disturbance or destruction of spiritual sites occurs when physical elements such as cairns, mounds or burials are damaged or removed. Adverse impacts to traditional use resources include reduction or elimination of resources such as huckleberries, bark, hazel and other resources. Competition for special forest products such as berries, bear grass, firewood or greenery contributes to the reduction of traditional resource quantities. Activities that result in the removal of competing vegetation, including timber, could provide a beneficial impact through increased growth of traditional use plants such as huckleberries and hazel.

Management actions that would affect traditional use sites and resources include any that would result in ground disturbance, alterations of plant communities, and access restrictions. These include timber harvest, road construction and road decommissioning, fire and fuels management, permitting use of special forest products, noxious weed eradication, and off-highway vehicle management.

Consulting with tribal governments and tribal members early in project planning to identify locations and resources of concern would reduce or eliminate most effects to sites and resources of interest to tribal members.

Under all five action alternatives, avoidance of traditional use sites that are identified by tribal governments within the planning area would be the preferred and most common method to eliminate or reduce adverse impacts. However, if avoidance would not be possible, other impact reduction measures would be developed in consultation with the tribal government having an identified interest. Examples of such measures include timing the management action to occur during a period of time when traditional users are not present on the site and permitting use of an alternative location acceptable to traditional users. In those instances, when tribal governments would not be able to provide traditional use site locations in advance of projects, it would not be possible to take measures to protect the site or resource of concern.

TABLE 4-110. PERCENT OF TOTAL CULTURAL RESOURCE SITES DAMAGED UNDER THE ALTERNATIVES OVER THE NEXT 10 YEARS

Area	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Northern and Coastal Areas	3%	4%	4%	5%	6%
Southern Area	1%	1%	1%	2%	1%
Klamath Falls Resource Area	0.3%	0.3%	0.3%	0.3%	0.3%
Total - All Areas	1%	1%	1%	1%	1%



Energy and Minerals

This analysis examines the availability, quantity, and abundance of energy and mineral resources under each alternative relative to demand.

Key Points

- All alternatives would maintain similar levels of availability and quantity of energy and mineral resources on the public lands.
- Under all alternatives, almost all lands would remain available for the location of mining claims under the Mining Law.
- Under all alternatives, common varieties of rock would continue to be available from existing sites. A few quarries may be closed, reclaimed, or potentially replaced by new sites.

Under federal law and BLM policy, all public lands are open for energy development and mineral exploration and development, unless specific lands are closed or withdrawn from mineral entry. Opportunities for new exploration for all types of minerals would be provided under all alternatives. Most of the planning area would remain open to mineral entry. Such entries would be subject to restrictions as required by law, or as a result of decisions supported by site-specific environmental analysis.

Oil and Gas

Under all alternatives, almost all lands would continue to be available for oil and gas leasing and the exploration and development for conventional oil and gas. Although prices for oil and gas are expected to continue to rise relative to the costs of exploration and development, the actual physical occurrence of oil and gas in most parts of the planning area is currently speculative.

No federal oil and gas leases have been issued within the planning area since the current resource management plans were adopted in 1995. Lands in the southern portion of the Salem District and east of the Mist gas field have the best potential to attract leasing and exploration interest for conventional natural gas.

Quarries

There are about 370 existing quarries for common variety minerals on BLM-administered lands in the planning area. It is assumed that up to 20 of these quarries would be depleted over the next 10 years and would likely be replaced by the expansion of existing quarries or the opening of new sites. Demand for common variety material is closely correlated with population growth/urban expansion and road maintenance.

Mining Claims

Under all alternatives, most lands would continue to be open for the location of mining claims under the Mining Law of 1872 (as amended). The highest levels of activity would continue to be in portions of the Medford District, followed by portions of the Roseburg and Eugene Districts. See *Table 4-111 (Current claims, notices, and plans of operations within the planning area)*, which has district-specific information.



TABLE 4-111. CURRENT CLAIMS, NOTICES, AND PLANS OF OPERATIONS WITHIN THE PLANNING AREA

BLM Districts	Claims	Notices	Plans of Operation
Salem	129	0	1
Eugene	204	5	0
Roseburg	191	24	1
Coos Bay	565	0	0
Medford	1,427	100	3
Klamath Falls Resource Area (Lakeview District)	2	2	0

Coal Bed Methane

The current Coal Bed Natural Gas play on private and county lands that are south of Coos Bay may eventually extend to BLM-administered lands, although no lease nominations have been received to date. Based on the current level and location of activity, it is likely during the next 10 to 15 years that leases would be issued and that up to 77 wells would be drilled. Drilling of this number of wells would result in about 525 acres of total disturbance from the construction of access roads, drill pads, and product gathering pipelines. The location of well pads and roads for the purpose of drilling would be limited to existing roads in riparian reserves under the No Action Alternative and to Riparian Management Areas under all action alternatives. Under all alternatives, most development activity would occur on existing log landings and associated roads. See *Appendix Q - Energy and Minerals* for a detailed discussion of Coal Bed Natural Gas.

Biomass

The biomass opportunities that would result from timber sales would range from 5 to 10% of the standing merchantable volume of stands that would be harvested under each alternative. The analytical assumption used to derive this level is that only boles would be available for removal, as no method has been demonstrated that can consistently remove limbs economically and effectively except with ground-based, mechanized ground operations. This level would equate to between 0.35 and 0.7 dry tons per thousand board feet harvested. This analysis discusses biomass opportunities rather than actual levels of utilization under the alternatives. The basis for this discussion is that the extent of the utilization in this emerging market and industry, which has been highly variable to date, will depend on development of business infrastructure, mills and generators, overall energy costs, and market conditions that are speculative.

Several factors would interact to vary the amount of tons per thousand board feet harvested. These variables include market conditions at the time of harvest, and the location and type of stand. Other factors include the amount of nonmerchantable hardwoods, the amount of submerchantable material designated for cutting and removal in fire-prone stands, and the level of defect within a stand. Thinning would typically contain material that consists mainly of tops and submerchantable stems, whereas older stands would contain more cull material and broken pieces. In addition, with ground-based operations where the yarding of whole trees is required, the potential biomass in the limb component may be included in both the thinning and harvesting of older stands.

Topography, vegetation, and yarding systems would affect the availability of biomass. Areas suitable for ground-based equipment would have a higher recovery level. Areas of steep, dense brush would have a lower recovery level due to the difficulty of locating the material and bringing it to a landing with cable yarding systems.

