CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the environmental consequences of implementing any of the planning alternatives (Alternatives A-D) described in Chapter 3. Alternative A, the "No Action" Alternative, is current interim management which is in accordance with the management direction provided in the Medford District Resource Management Plan (RMP) (USDI 1995a) and is used only as a baseline from which to compare the other alternatives. As a result of Alternative A being within the guidance of the Medford District RMP, only a cursory analysis of the affects of implementing Alternative A is provided. Chapter 4 focuses on the potential affects of the proposed alternatives on important resources, processes, uses, and activities described under, Existing Conditions, Chapter 2. Specific attention will be focused on:

- Protection of Monument objects as directed in the Presidential Proclamation
- Ecosystem and Landscape Health
- CSNM Cultural and Biological resources including soils, hydrology, aquatic and riparian resources, wildlife (including special status animal species), vegetation (including special status plant species, weeds, and forest health).
- CSNM Uses and Users including impacts of forestry product use, recreational use, facilities/rights-of-way and scenic quality.
- Social and Economics including local and regional economies projected from each of the alternatives.

Direct, indirect and cumulative impacts (both positive and negative) are addressed for each resource, use or activity. Cumulative impacts are the effects on the environment of each alternative when considered with the effects of past, present, and reasonably foreseeable future actions that might occur inside and/or adjacent to the CSNM.

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Analysis Assumptions and Guidelines

The following assumptions and guidelines were used to guide and direct the analysis of environmental consequences:

1) The action alternatives would be implemented substantially, as described in Chapter 3, including the Management Common To All Action Alternatives.
2) The Bureau of Land Management would have sufficient funding and personnel to implement and enforce the plan.
3) Current trends in recreation use would continue.
4) The planning period for the analysis is the next 10 years at which time the BLM will evaluate the plan and make necessary adjustments. Short-term impacts are those that would occur during the first five years of plan implementation. Long-term impacts are those that would occur beyond the first five years.
5) Specific actions to protect human life would be taken regardless of the management criteria in the plan alternatives.

6) Livestock grazing in the Monument will continue at present levels (Alternative A) and will be governed by applicable laws and regulations. Once sufficient data is available from the Draft Study of Livestock Impacts on the Objects of Biological Interest in the Cascade-Siskiyou National Monument (USDI 2001), a resource management plan amendment addressing livestock grazing activities would be completed.

7) Research and monitoring would be fully funded.

8) The Best Management Practices (Appendix AA) and Monument Aquatic Conservation Strategy (Appendix BB) are common to all action alternatives (Alternative B-D) and are incorporated in the analysis.

9) Site specific NEPA analysis including required surveys would be accomplished before implementation of activities in the proposed alternatives.

Ecological Processes and Landscape Health

Landscape-level criteria affecting ecosystem health include; late-seral conifer connectivity, late-seral conifer fragmentation, and percentage acute disturbance within the range of existing plant communities. These criteria affect the ability of organisms to disperse across the landscape, the abundance of habitat for late seral dwelling organisms, edge effects impacting late seral habitat, and interactions between late seral associated organisms and edge dwelling organisms. Also important are the relative dominance of active processes (fire, timber harvest, livestock grazing) on the current versus historical landscape, and the characteristics of their action across the landscape (frequency, patch size, severity, and pattern). Text within Table 4-1 describe current and desired future condition relating to the identified landscape criteria.

Table 4-1. Current and Desired Future Conditions for Landscape Criteria

Landscape Criteria	Current Condition	Historic Processes/Desired Future Condition
Late-Seral Conifer Connectivity	Past timber harvest activities and the potential for stand replacement wildfire may alter late-seral conifer abundance and connectivity.	Conifer connectivity maintained and enhanced as a result of the predominance of low severity (non-stand replacement) restoration and fuel reduction.
Late-Seral Conifer Fragmentation	Pattern of land ownership and timber harvest practices break late-seral conifer community into small and temporally static patches.	Land ownership pattern and management actions that reduce fragmentation and favor spatial and temporal conifer connectivity.
Percent Acute Disturbance	Disturbance regime and management practices result in an accumulation of acute disturbance across the landscape.	No new long-term acute disturbance (heavy machinery on fragile soils, limit new roads, intense silvicultural practices).
Recovery of Current Acute Disturbance	Acute disturbance accumulates across the landscape	Active restoration of past acute disturbance
Reintroduction of Fire as an Ecosystem Process	Fire used as silvicultural tool only to reduce slash.	Fire is used with silvicultural practices to attain healthy ecosystem and the full range of conditions within all plant communities.
Disturbance Patch Size	Location and size of disturbance determined by land ownership and does not mimic natural disturbances	Disturbance patch size matches historical patch size and forest health objectives
Frequency of Disturbance (fire and silviculture)	Disturbance frequency matches availability of merchantable trees.	Disturbance frequency matches maintenance of healthy ecosystems.
Disturbance Severity	Continued silvicultural practices, road construction/maintenance, uncontrolled visitation, etc, results in an accumulation of acute disturbance.	Low severity disturbance, both spatially and temporally, predominate across the landscape.
Private Land Acquisition for Maintaining Rare and Functionally Important Plant Communities	Many rare and functionally important plant communities are not included within the current CSNM boundaries.	Acquire private lands from willing owners to ensure the maintenance of rare and functionally important plant communities.
Maintenance of Rare Plant Communities	Continued attrition of rare plant communities through weed invasion, fire suppression, human visitation, etc.	The full range of plant communities (a component of biological diversity) are maintained by natural ecological processes.
Practice Adaptive Management including; Pilot Studies, Multiple Treatments, Monitoring within Fixed Plots, and Landscape-level Biological Surveys	Annual budgets and lack of funding frequently do not allow for pilot studies, permanent monitoring plots, landscape surveys, and restoration of non-conifer plant communities.	Practice adaptive management and make use of local educational institutions & students to complete studies; look towards grant writing to fund monitoring and restoration across fiscal years.

Several assumptions are made to allow the interpretation of trend under the alternative management regimes:

- Trends in weed invasion are likely to continue under the current management regime.
- The conifer component of the monument analysis area is dominated by the mid-seral condition.
- Conditions on private land are likely to remain early seral in the longer term.
- Acute disturbance results in changes of vegetation structure not considered part of desired plant community dynamics and requiring extended periods of recovery/ restoration to be considered within the range of natural variability.
- Fire is considered a critical ecological process lacking from the current monument landscape (Alternative A).
- Lack of density management will result in larger and more intense fires over time (Alternative A).
- The use of heavy equipment is necessary to achieve initial restoration objectives relating to plant community composition and structure and the reintroduction of fire across the landscape.

It is apparent that Alternatives A and B are similar and result in minimal improvement of the landscape in the context of the landscape criteria.. Alternatives C and D result in a far greater improvement relative to Alternatives A and B. The ability to use of heavy equipment in Alternative D facilitates the treatment of fuels thereby allowing the re-introduction of fire in a broader area across the landscape.

The alternatives offer no distinction in the acquisition of private lands. Changes in criteria such as late-seral conifer connectivity are therefore dependent on the effects of management practices for the progression of conifer stands towards late-seral condition and the ability to reintroduce fire to the ecosystem. Tables 4-16, 4-17, 4-18 and associated text provide information of grass/shrub/woodland and conifer stand-level issues necessary to understand how landscape criteria are affected by the management alternatives.

Table 4-2 identifies whether the management alternatives have the ability to move current conditions towards the desired future condition(s) described in table 4-1 .

Table 4-2. Trends toward Desired Condition for Landscape-Level Criteria identified in Table 4-1.

Landscape Criteria	Alt. A	Alt. B	Alt. C	Alt. D
Late-seral Conifer Connectivity Consequent to Potential Private Land Acquisition	U	U	U	U
Late-seral Conifer Fragmentation	U	U	I	I+
Percent Acute Disturbance	U	I	I	I+
Recovery of Current Acute Disturbance	D	D	I	I+
Reintroduction of Fire as Ecosystem Process	D	D	I	I+
Disturbance Patch Size	D	D	I	I+
Frequency of Disturbance (fire and density management)	U	I-	I	I+
Disturbance Severity	D	D	I	I+
Potential Private Land Acquisition for Maintaining Rare and Functionally Important Plant Communities	U	U	U	U
Maintenance of Rare Plant Communities	U	I-	I+	I+
Practice Adaptive Management including: Pilot Studies; Multiple Treatments; Monitoring	U	U	I	I

D = Decline I = Improve U = Unaffected (- small change; + large change)

Cultural Resources

Proposed management activities having the potential to effect cultural resources are: off-highway vehicle use, timber harvest, focused/intensive grazing, burning, trail and road building, and road decommissioning. Adverse effects to archaeological/ historical sites is most easily mitigated through site avoidance. Where avoidance is not possible or practical, scientific study of the affected sites may mitigate the anticipated damage to them. Scientific study requires further consultation with concerned Native American groups and other interested parties, and may require consultation with the State Historic Preservation Office and the Advisory Council on Historic Preservation. Since scientific study usually involves excavation, it may also require further environmental review to assess the effects on other aspects of the environment. When there are conflicts between the need to mitigate damage to sites through excavation and the need to protect other values, adverse effects to sites might occur.

Potential Effects by Action

Off-Highway Vehicle Use: Off-highway vehicle use is currently heaviest in the southeastern portion of the CSNM which also has the highest density of archaeological sites. This area is flat and comparatively open; OHV use takes place throughout the area regardless of road designation. OHV use is severely and adversely impacting archaeological sites by displacing surface materials, churning subsurface soils, and disrupting the archaeological context, thus causing irretrievable loss of archaeological information at affected sites. When soils are wet and malleable the impacts are even greater. Avoidance of future effects to archaeological sites will be possible only through

strict enforcement of road closures. However, it is difficult to control OHV use off designated routes; consequently unintended effects to archaeological sites from unauthorized use are likely.

Due to the number and density of archaeological sites in the area, mitigation of effects to archaeological sites through scientific investigation would be a major undertaking requiring phased archaeological study over several years and consultation with numerous groups, individuals, and agencies. Should consultation reveal legitimate concerns on the part of concerned Native American groups, according to cultural resource law and regulation, scientific study and excavation of sites may not be sufficient or appropriate to mitigate effects to the archaeological sites, and adverse effects would be likely.

Grazing: Dispersed grazing does not constitute an effect on archaeological resources, except for locations where specific land disturbing developments (e.g. spring improvements, fencing) are initiated. Where grazing activity is not dispersed, but is focused and intensive, such activity may affect archaeological sites through trampling, churning of soils, and displacement of archaeological materials. Impacts from concentrated grazing may be avoided by designing project which avoid archaeological sites.

Timber harvest: Timber harvest is a ground disturbing activity and has the potential to affect archaeological sites through direct impacts to sites. Such impacts may be mitigated by designing projects to avoid archaeological sites.

Roads: Road construction as well as road decommissioning or obliteration may affect archaeological sites through displacement of subsurface materials and destruction of archaeological context. These activities will need to be studied and designed appropriately. In Table 4-3, slightly higher potential impacts are assigned to those alternatives calling for increased road decommissioning, obliteration, or construction.

Recreation: Archaeological sites in the CSNM currently suffer from unauthorized collecting, which removes significant artifacts from the surface of sites and depletes the archaeological value of those sites. Increased recreational use of the CSNM, especially in those areas with a high density of archaeological sites, will increase this adverse impact to sites.

Burning: Fire is not likely to affect most of the archaeological sites in the CSNM. The remaining historic structures at the former Box-O Ranch, as well as other wooden structures in the CSNM, should be avoided during controlled burns. When avoidance is not possible, impacts may be mitigated by thorough documentation of the historic structure.

The potential for cumulative adverse effects is rated below by taking into account the possibility for mitigation of effects through site avoidance.

Table 4-3. Potential for Adverse Cumulative Effects to Cultural Resource

Alternative	Alt. A	Alt. B	Alt. C	Alt. D
Grazing	L	L	L	L
Timber	L-M	L	L-M	L-M
Roads	L-M	L-M	L-M	M
OHV	L-M	L-M	L	L
Recreation	M	M	M	M
Burning	L	L	L	L
Minerals	N	N	N	N

L = low M = medium H = high N = no impact

Soils

The majority of the soils within the CSNM are influenced by montmorillonitic clays, have high rock content and/or are shallow in depth (see Chapter 2 for details). These soil characteristics make the soils of the CSNM very vulnerable to impacts from management activities and recreational use. Two main concerns will be addressed when describing the effects of the alternatives to the soil resource: soil erosion and soil productivity.

Soil erosion is the detachment and movement of soil by water, wind, ice or gravity. Erosion is a natural process that uses these same forces to form soil from rock in the process known as weathering. Soil erosion is of concern when it accelerates, moving soil particles off site faster than they can accumulate from the weathering of rock. Two detrimental actions occur when soil erosion by water is accelerated. First, eroded soil particles, especially clay particles, often become suspended in water forming sediments that affect water quality. Second, soil decreases in depth when the soil profile loses more particles than it accumulates. Loss of soil depth diminishes water holding capacity and rooting space available for plant growth resulting in a reduction in soil productivity.

Nutrient recycling is another soil productivity concern. It is important that nutrients contained in organic matter, available from needle/leaf fall, plant and animal mortality, animal fecal matter, etc., be consumed, assimilated by insects and soil organisms and returned to the soil. Soil nutrient recycling is very important to soil health, and the plants and animals that depend on it. Soil and plant communities form a sort of symbiotic relationship. When a particular plant community becomes established on a site, a specific group of microorganisms dominate the soil. These organisms become very efficient at recycling plant material and organic matter created by that plant community. Generally, the healthier the plant community, the healthier the soil (and vice-versa). This soil-plant relationship can grow and change slowly overtime. As a plant community matures and produces more organic material, the soil organism population increases and recycles more organic material thus supplying nutrients back to the plants, improving soil structure, water holding capacity and disease suppression (USDA 1999). This process continues until a disturbance agent, such as fire, insect infestation, human activities, etc., breaks the cycle. At this point the soil-plant relationship becomes unbalanced, soil organism types and number are affected which ultimately affects the health of the soil.

The proposed alternatives will have an effect on soil erosion and soil productivity. The baseline against which Alternatives B-D will be measured is Alternative A (No Action). No action, in this case, means that management direction and associated effects to the soil resource would not change from current interim management. The Best Management Practices (BMPs) and Monument Aquatic Conservation Strategy (Appendices AA and BB) would provide adequate guidance and protection when implementing land management practices under any of the proposed alternatives. In addition the Coarse Woody Debris Standards and Guidelines (Appendix JJ) will aid in sustaining soil productivity in the conifer forest. Cattle grazing would continue at current levels under all alternatives and will not be addressed until the completion of the study of its effects on biological resources and processes in the Monument.

Alternative A

Actions taken in Alternative A have minimal short term effects on the soil resource as little ground disturbing activities are occurring which would increase erosion rates and decrease soil productivity. Long-term, taking no action to reduce the fire hazard across the Monument increases the risk of catastrophic fire which would increase erosion rates dramatically and lower soil productivity. In the long-term, all alternatives would have positive effects to the soil resource compared to Alternative A. Although Alternative A does confine mechanized vehicles to designated roads and temporarily closes 77 miles of road, the soil erosion rates from these roads will remain slightly above natural levels. Enforcement of the road closures has been limited as a result of limited law enforcement resources. Closing the Schoheim road (BLM 41-2E-10.1) and associated roads in the Agate Flat area have greatly decrease the amount of soil erosion occurring as a result of mechanized vehicles particularly during the wet season.

Alternative A does not include vegetation manipulation activities (except for noxious weed suppression) which will continue to maintain soil erosion rates at near natural levels. Activities in the action alternatives such as brushing, pre-commercial tree thinning and prescribed burning would minimally increase soil erosion rates which has a slight short-term negative effect but positive long-term effect as it aids in reducing the hazard of catastrophic wildfires. All alternatives would limit some access for fire suppression activities slightly increasing the chance of large wildfires which could be detrimental to the soil resource. This wildfire potential would be offset to some degree in all but Alternative A by successful vegetation management aimed at reducing the areas of high fuel hazard across the Monument landscape.

Alternative B

Alternative B would have moderate short-term positive effects to the soil resource of the Monument when compared to Alternative A. An emphasis on closing roads (31 miles), natural decommissioning of roads (49 miles) or improving the transportation system (3 miles) reduces the soil erosion potential particularly on natural surface roads. The drainage facilities would be improved on all 83 miles of road proposed for management activities but roads that are naturally decommissioned would have culverts removed, natural drainage ways re-established and entrance blocked so that future disturbance could not occur. Natural vegetation would be allowed to re-establish over time. Although natural decommissioning disturbs the less soil than mechanized decommissioning, vegetation re-establishment may take longer (3-10 years) and erosion rates would remain slightly above natural levels until this occurs.

Vegetation manipulation planned under Alternative B is essentially brushing and pre-commercial thinning 3,400 acres of young conifer stands over the next 10 years and continuing the effort to reduce noxious weeds. The excess fuels created by the vegetation management activity would most likely be burning of slash piles which would affect one to two percent of the total treated acreage. This would cause minimal surface disturbance resulting in a slight short-term increase in erosion rates and soil productivity loss. Cumulative effects of Alternative B to the soil resource would be insignificant.

Alternative C

Alternative C would have slight negative effects short-term as approximately 24 miles of existing roads are planned to be mechanically decommissioned. Most of these roads are in the southern portion of the Monument and an increase in erosion and sedimentation would occur the first few years after the decommissioning. Long-term, the soil would be put back into producing vegetation and natural drainage patterns would become stable. Natural decommissioning would occur on about 28 miles of existing roads in the Monument which would have minimal soil disturbance and slight short-term effects. The naturally decommissioned roads would take longer to re-establish vegetation and stabilize drainage facilities than mechanical decommission. Approximately 21 miles of road would have the drainage facilities improved and then blocked which would reduce erosion and sedimentation short-term. About 4 miles of road would be seasonally closed with gates. The remaining road system would receive maintenance based on the transportation management objectives which would continue to provide adequate drainage and limit erosion.

Vegetation manipulation planned under Alternative C could affect up to 7,726 acres over the next ten years for fuel hazard reduction to aid in protecting existing late-successional and old-growth habitat. The majority of the treatment would be the thinning of dense tree stands and burning the excess fuel created by the thinning. Up to 3,000 acres of conifer forest in mid-seral condition could be commercially thinned in the next ten years. Although moderate direct, short-term negative impacts to the soil resource would occur on these acres, Best Management Practices (Appendix AA) should limit the effects. Another 2000-plus acres could be treated in the Diversity Emphasis Area to protect, maintain or restore native plant communities. Most of the treatments would involve broadcast burning which could bare the soil for a short time period and cause a slight short-term increase in erosion rates within the treatment areas. Overall, there is potential that an average of about 1,000 acres a year would be disturbed as a result of vegetation management activities. If the treatment units are several and spread across the landscape, minimal cumulative soil affects would be realized. Long-term these vegetation treatments could increase soil productivity and stabilize the erosion potential by reducing the risk of catastrophic wildfire.

Alternative D

Alternative D would have the greatest effect on the soil resource when compared to the other alternatives. Approximately 52 miles of existing roads would be mechanically decommissioned and 6 miles of existing road to be naturally decommissioned. Affects would be similar to those described in Alternative C but direct short-term negative effects would double as twice the amount of roads are being mechanically decommissioned. Along with approximately 19 miles of additional roads being closed to public access, 3 miles of road would be improved and left open for extended season use. This road management proposal would have slight to moderate negative short-term effects as erosion rates increase but moderate positive long-term effects.

Table 4-4. Cumulative Effects on Soils as a result of Proposed Alternatives

Alternative A	Alternative B	Alternative C	Alternative D
Short-term			
low negative	low negative	low negative	moderate negative
Long-term			
low negative	low positive	moderate positive	moderate positive

Vegetation manipulation planned under Alternative D could affect up to 14,000 acres of land for LSOG habitat protection and potentially another 1,000 acres of for native plant community protect, maintenance and/or restoration. There is the potential of commercial timber harvest occurring on an estimated 11,000 acres (approximately 20 percent of the Monument) over the next 10 years. Incorporating BMPs would minimize the direct short-term impacts but disturbing 20 percent of the Monument in a 10 year period along with road management activities could cause moderate erosion rate increase resulting in slightly negative short-term cumulative but moderate positive impacts long-term.

Hydrology

Proposed management activities likely to have the greatest affect on the streamflow regime within the CSNM are roads, grazing, and vegetation management. Table 4-5 shows how the proposed management activities could affect hydrologic processes within the CSNM. The degree to which these activities affect the peak and low flows varies by alternative. Activities that result in soil compaction or vegetation removal would have the greatest likelihood of increasing the frequency and magnitude of peak flows above natural conditions. Low flows are primarily affected by water diversions for activities such as livestock watering and road operations; and by riparian vegetation removal that leads to lowering of the water table.

Table 4-5. Potential Changes to Hydrologic Processes due to Proposed Management Activities

Proposed Management Activities	Potential Changes to Hydrologic Processes that Affect Streamflow	Potential Changes to Streamflow
	Peak Flows	
Roads	• Reduced infiltration due to compaction: increases surface runoff, decreases groundwater, and reduces time to reach peak. • Disruption of subsurface flow: increases surface runoff, decreases groundwater, reduces time to reach peak. • Increased snow accumulation in transient snow zone. • Decreased snow melt time in transient snow zone.	• Reduced time to hydrograph peak. • Increased frequency of peak flows. • Increased magnitude of peak flows.
Grazing	• Reduced infiltration (see roads).	• Reduced time to hydrograph peak. • Increased frequency of peak flows. • Increased magnitude of peak flows.
Vegetation Management	• Reduced infiltration (see roads). • Reduced interception and evapotranspiration: increases groundwater. • Increased snow accumulation in transient snow zone. • Decreased snow melt time in transient snow zone.	• Reduced time to hydrograph peak. • Increased frequency of peak flows. • Increased magnitude of peak flows.
	Low Flows	
Roads	• Decreased summer streamflow due to water withdrawals for road construction/maintenance.	• Decreased magnitude of low flows.
Grazing	• Decreased summer streamflow due to water withdrawals for livestock. • Lowered water table due to riparian vegetation removal	• Decreased magnitude of low flows.
Vegetation Management	• Reduced evapotranspiration: increased groundwater.	• Increased magnitude of low flows (short term).

Table 4-6 provides a comparison of the potential adverse effects on streamflows (listed in table 4-5) by alternative and proposed management activity. The Best Manangement Practices and Monument Aquatic conservation Strategy (Appendices AA and BB) are common to all action alternatives. Livestock grazing is expected to continue at current levels (Alternative A) until completion of the grazing impact study. Consequently, affects of grazing on streaflows would be the same under all alternatives.

Table 4-6. Comparison of Alternatives for Potential Adverse Effects on Streamflows

Resource Value Affected	Potential for Adverse Effects on Streamflows by Alternative and Activity			
	A	B	C	D
Roads				
Peak Flows	M	M	L-M	L
Low Flows	L	L	L	L
Grazing				
Peak Flows	L-M	L-M	L-M	L-M
Low Flows	L-M	L-M	L-M	L-M
Vegetation Management				
Peak Flows	VL	L	L-M	L-M
Low Flows	N	N	N	N

NA: not applicable N: no potential for adverse effects VL: very low potential for adverse effects
L: low potential for adverse effects M: moderate potential for adverse effects

Table 4-7, below, shows a comparison between alternatives of the potential for cumulative effects on peak and low streamflows.

Table 4-7. Comparison of Alternatives for Cumulative Effects on Streamflows

Resource Value Affected	Potential for Cumulative Effects on Hydrology by Alternative			
	A	B	C	D
Peak Flows	L-M	L-M	L-M	L-M
Low Flows	L	L	L	L

WATER QUALITY

Proposed management activities likely to have the greatest affect on water quality within the CSNM are roads, grazing, vegetation management, and recreation. Temperature, dissolved oxygen, bacteria/pathogens, and turbidity/sediment are the key water quality indicators for the beneficial uses most sensitive to the proposed activities. Table 4-8 shows how the proposed management activities could affect these key water quality parameters within the CSNM. The degree to which these activities affect water quality varies by alternative. Activities that result in surface disturbance, riparian vegetation removal, or water contamination would have the greatest likelihood of adversely affecting water quality.

Table 4-8. Potential Changes to Water Quality due to Proposed Management Activities

Proposed Management Activities	Potential changes to Processes that Affect Water Quality	Potential Changes to Water Quality
Roads	• Riparian vegetation removal due to new road construction: reduced stream shade, increased erosion, and increased channel width-depth ratio. • Surface disturbance due to road construction/maintenance: increased erosion and increased channel width-depth ratio.	• Increased temperature. • Decreased dissolved oxygen. • Increased turbidity/sediment.
Grazing	• Riparian vegetation removal: reduced stream shade, increased erosion, and increased channel width-depth ratio. • Streambank disturbance: increased erosion and increased channel width-depth ratio. • Water quality contamination due to livestock in streams.	• Increased temperature. • Decreased dissolved oxygen. • Increased turbidity/sediment. • Increased bacteria/pathogens.
Vegetation Management	• Surface disturbance due to yarding: increased erosion and increased channel width-depth ratio.	• Increased temperature. • Decreased dissolved oxygen. • Increased turbidity/sediment.
Recreation	• Water quality contamination due to inadequate waste disposal by recreational users. • Surface disturbance due to trail building: increased erosion.	• Increased bacteria/pathogens. • Increased turbidity/sediment.

Table 4-9 provides a comparison of the potential adverse effects on water quality (listed in table 4-8) by alternative and proposed management activity. The Best Management Practices and Monument Aquatic Conservation Strategy(Appendices AA and BB) are common to all action alternatives. Livestock grazing is expected to continue at the current level (Alternative A) until completion of the grazing study. Consequently, affects of grazing on streamflows would be the same under all alternatives.

Table 4-9. Comparison of Alternatives for Potential Adverse Effects on Water Quality

Water Quality Parameter Affected	Potential for Adverse Effects on Water Quality by Alternative and Activity			
	A	**B**	**C**	**D**
Roads				
Temperature/Dissolved Oxygen	L-M	L-M	L-M	L-M
Bacteria/Pathogens	NA	NA	NA	NA
Turbidity/Sediment	L-M	L-M	L-M	L-M
Grazing				
Temperature/Dissolved Oxygen	M	M	M	M
Bacteria/Pathogens	M	M	M	M
Turbidity/Sediment	M	M	M	M
Vegetation Management				
Temperature/Dissolved Oxygen	VL	L	L	L
Bacteria/Pathogens	NA	NA	NA	NA
Turbidity/Sediment	VL	L	L-M	L-M
Recreation				
Temperature/Dissolved Oxygen	NA	NA	NA	NA
Bacteria/Pathogens	M	L	L-M	L-M
Turbidity/Sediment	VL	VL	L	L

NA: not applicable VL: very low potential for adverse effects
L:low potential for adverse effects M: moderate potential for adverse effects

Water quality limited streams within the CSNM that are included on Oregon's 1998 303(d) list are shown in Table 2-9. These streams are all listed for exceedance of the state temperature standard. Table 4-10 provides a comparison of the alternatives for probable effects on the 303(d) listed streams. The streams showing no change are primarily on private land and BLM management would not have a significant affect on stream temperatures.

Table 4-10. Comparison of Alternatives for Probable Effects on 1998 303(d) Streams

Stream Name	Probable Effects on 303(d) Streams by Alternative			
	A	B	C	D
Beaver Creek	0	0	0	0
Corral Creek	0	0	0	0
Jenny Creek	+	+	+	+
Johnson Creek	0	0	0	0
Keene Creek	+	+	+	+
South Fork Keene Creek	+	+	+	+
Lincoln Creek	+	+	+	+
Mill Creek	0	0	0	0
Baldy Creek	0	0	0	0
Carter Creek	0	0	0	0
Emigrant Creek	0	0	0	0
Hobart Creek	0	0	0	0
Tyler Creek	0	0	0	0

1/ See table 2-9 for description of listed segment.
+ = beneficial effect; - = adverse effect; 0 = no change

Table 4-11 shows a comparison between alternatives of the potential for cumulative effects on water quality.

Table 4-11. Comparison of Alternatives for Cumulative Effects on Water Quality

Water Quality Parameter Affected	Potential for Cumulative Effects on Hydrology by Alternative			
	A	B	C	D
Temperature/Dissolved Oxygen	L-M	L-M	L-M	L-M
Bacteria/Pathogens	M	M	M	M
Turbidity/Sediment	L-M	L-M	L-M	L-M

Aquatic and Riparian Habitat

This analysis will evaluate the affects of the proposed alternatives based on the assumptions that all activities will comply with the Best Management Practices (BMPs) and the Monument Aquatic Conservation Plan (Appendix AA and BB, respectively). In addition, it is assumed that adequate funding will be available to fully implement the Plan, and required surveys would be completed before project implementation. During the implementation phase, all proposed actions would be analyzed under the NEPA process to determine if the BMPs and Monument Aquatic Conservation Plan objectives are being met. Management actions that do not maintain the existing aquatic habitat condition or lead to improved conditions in the long-term would not meet the intent of either the BMPs or the Monument Aquatic Conservation Strategy would be adjusted or not be implemented. Aquatic habitat restoration efforts are an important objective, although secondary to protection, and would be pursued when possible.
Alternatives are analyzed for their short-term, long-term, and cumulative effects on aquatic species and their habitats. In general, native fish and other aquatic organisms need clean, cool water with cover, spawning gravel, and food to survive. Riparian vegetation plays an important role in maintaining healthy habitat for aquatic organisms. Large wood creates habitat for salmonids by providing cover from predators, refugia from current, and by creating pools. The water that flows through these systems must be of cool temperatures to support cold water fish and gravel, free of oxygen-choking sediments is a necessity for spawning fish. The following discussion will address the activities planned under each alternative and the effects on aquatic species and their habitats.

Alternative A

The "No Action Alternative" would only perpetuate interim management and does not adequately provide or create opportunities for enhancement of the Monument values beyond the immediate protective measures of the Proclamation. Therefore, Alternative A is having minimal short-term negative effects to aquatic resources as the current trend continues. It would have moderate long-term negative effects as roads would be minimally maintained and the high fire hazard conditions increase. Alternative A will be used to compare current interim management with various strategies for active management (Alternatives B, C and D).

Alternative B

Activities proposed under this alternative that may impact aquatic species and their habitat are road decommissioning and vegetation management.

Alternative B proposes natural decommissioning 49 miles of road, closing 31 miles, and improving 3 miles. Reducing road densities is expected to decrease the overall amount of sediment delivered to streams and therefore, improve aquatic species habitat. Blocking, decommissioning, and/or improving road drainage on roads within Riparian Reserves may briefly increase fine sediment input to the system. These actions, however, are expected to reduce road-caused sedimentation over the long-term and allow riparian vegetation to become re-established on road surfaces. As trees grow up in the road bed their roots loosen the compacted soil restoring groundwater flow, thus improving the humid character of the riparian area. These trees also contribute organic material to the streams, provide shade, and increase potential large wood for instream complexity. Long-term recovery of these road systems would be slow as compacted soils in the road prism and cut banks/fill slopes associated with these roads are left to re-vegetate naturally.

Alternative B focuses on promoting continued and accelerated development of late-successional and old-growth habitat by treating the early to mid-seral stage conifer

stands that have potential of becoming late-successional and old-growth habitat (habitat type 3). Vegetation management under this alternative focuses on reforestation and some thinning efforts. Reforestation would be beneficial to aquatic organisms and their habitats. Upland thinning would reduce the fire hazard and accelerate development late-successional characteristics. Thinning activities in the uplands would have limited ground disturbance and, therefore, would not be expected to adversely effect aquatic organisms or their environments. The long-term effects of thinning and acceleration toward late-successional characteristics would improve aquatic habitats by increasing riparian shade and eventually contributing large diameter wood to the stream systems.

Thinning within the riparian reserves would only be initiated to improve riparian and stream habitat. For example, a stand with uniformly-aged young trees might be thinned slightly to encourage increase tree size and species diversity as well as understory canopy layering (for riparian habitat improvement and improved nutrient input to stream). Trees that might provide large wood to stream systems would not be removed.

Alternative C

Activities proposed under Alternative C that may impact aquatic species and their habitat are road decommissioning and vegetation management.

Road decommissioning under Alternative C would include a combination of mechanical and natural decommissioning, road closures, and drainage improvements. Mechanical decommissioning of approximately 24 miles of road would increase erosion and sedimentation in the short-term but these initial, short-term surges of sediment are not expected to adversely effect aquatic species. Natural decommissioning would occur on approximately 28 miles of existing road within the Monument and would contribute less sediment to the system than if the roads were left open. However, the naturally decommissioned roads would take longer to re-establish vegetation and hydrologic function. Road closures and drainage improvements would occur on approximately 25 miles of existing road. Culvert repair, replacement, and/or removal might also contribute an initial pulse of fine sediment to the system due to the instream nature of this work. Potential short-term sediment pulses from these activities are not expected to adversely effect aquatic species. Over the long-term, road decommissioning, road closures, and drainage improvements would reduce sedimentation and peak flows that negatively affect aquatic species and their habitats.

Under Alternative C, one objective is to protect existing and potential late-successional and old-growth habitat from the threat of habitat loss due to catastrophic disturbance (i.e., intense wildfire). If such a fire were to burn across a stream and associated riparian area, it could cause erosion, channel downcutting, sedimentation, and pool filling. Losing riparian vegetative cover would increase water and air temperature which could have substantial negative effects on aquatic species and their habitats. Thinning could reduce the potential for such a catastrophic event and encourage late-successional forest characteristics. Thinning activities in the uplands would have limited ground disturbance and, therefore, would not be expected to adversely effect aquatic organisms or their environments. The long-term effects of thinning would improve aquatic habitats by increasing riparian shade and eventually contributing large diameter wood to the stream systems. Restoration projects could be initiated in stream systems where large wood is lacking. Adding large wood to these systems would provide cover, add complexity to the stream systems, and create pools.

Alternative C attempts to maintain, protect, and restore seeps and springs which are valuable objects of the Monument. Seeps and springs are vulnerable to impacts by livestock. Altered livestock management such as herding and salting would facilitate wetland plant community recovery. Fencing would be used to exclude livestock. Fencing seeps and springs would improve water quality conditions in areas where trampling, sedimentation, and lack of shade negatively affect water quality and aquatic organisms, specifically endemic mollusk species.

Alternative D

Activities proposed under this alternative that may impact aquatic species and their habitat are road decommissioning and vegetation management. Approximately 52 miles of existing roads would be decommissioned mechanically under this alternative. This alternative would mechanically decommission almost twice as many road miles as Alternative C. Mechanical decommissioning would increase erosion and sedimentation in the short-term but these initial, short-term surges of sediment are not expected to adversely effect aquatic species. Over the long-term, hydrologic recovery would occur more quickly than with natural decommissioning. Additionally, 19 miles of roads would be closed to public access and 3 miles of road would be improved or left open for extended season use.

Under Alternative D, vegetation management is more extensive than under other alternatives. Vegetation manipulation could take place on 14,000 acres of LSOG for habitat protection and another 1,000 acres for native plant community protection, maintenance, and restoration. Combined with the road activities the short-term direct affects could result in a substantial amount of sedimentation. In most years, insufficient streamflow would not flush these sediments out of the system resulting in embedded streambed substrates. The lack of well sorted, clean gravel is detrimental to spawning activities and egg incubation.

Alternative D attempts to maintain, protect, and restore seeps and springs as valuable objects of the Monument. Seeps and springs are vulnerable to impacts by livestock. Altered livestock management such as herding and salting would facilitate wetland plant community recovery. Fencing would be used to exclude livestock. Fencing seeps and springs would improve water quality conditions in areas where trampling, sedimentation, and lack of shade negatively affect water quality and habitat for aquatic organisms, specifically endemic mollusk species.

Table 4-12 summarizes the effects of the proposed alternatives to aquatic species and habitats.

Table 4-12. Effects of Proposed Alternatives on Aquatic Species and Habitats

Alternative A	Alternative B	Alternative C	Alternative D
Short-term			
- Status quo	- Moderate decrease in sediment from closing roads	- Potential sediment pulses from road decommissioning - Improved condition of seeps and springs	-Potential sediment pulses from road decommissioning - Improved condition of seeps and springs
Long-term			
- Maintain hazardous fire conditions	- Slow recovery of naturally decommissioned roads resulting in above "natural level" sedimentation rates for a longer period of time - Improved CWD recruitment, lower water temperatures, increase in humidity as a result of an acceleration toward late-successional characteristics in riparian areas - Reduced fire hazard resulting in decrease risk of catastrophic disturbance in riparian areas	- Faster recovery of decommissioned roads resulting in sedimentation rates returning to "natural levels" within a few years after decommissioning - Reduced fire hazard resulting in decrease risk of catastrophic disturbance in riparian areas	- Faster recovery of decommissioned roads resulting in sedimentation rates returning to "natural levels" within a few years after decommissioning -Reduced fire hazard resulting in decrease risk of catastrophic disturbance in riparian areas.

Terrestrial Wildlife

Except for differences in habitat modification allowed under each alternative, the alternatives are almost equal in their expected effects on wildlife. The alternatives have many common features as described in the section on management common to all alternatives. The alternatives all have similar amounts of open roads. In terms of protecting wildlife and habitat from human caused impacts associated with trails, pack stock use, visitor facilities, utility rights of way, and recreationists encroaching on wildlands, the alternatives would be ranked as follows:

- Alternative B(most protective)
- Alternative C
- Alternative D
- Alternative A(least protective).

Accurately quantifying the differences between the alternatives in terms of non-habitat management related effects would be impossible. Furthermore, if it was possible to perform such an analysis, the differences between the alternatives based on such an analysis would be inconsequential when compared to the differences between the alternatives based on the differing amounts and intensities of habitat management allowed in the alternatives.

Because the other differences between the alternatives are so minor, the effects analysis for wildlife focuses on the various ways in which the alternatives allow habitat to be managed. For purposes of this analysis, species have been grouped as late successional associates, or early successional associates. Some species such as deer and elk are associated with both late and early successional habitat. Both long and short term effects are discussed below.

Alternative A

This alternative allows essentially no habitat manipulation or fuels reduction treatment in either the Diversity Emphasis Area or the Old Growth Emphasis Area. Under this alternative there would be no immediate short term effects to wildlife habitat. In the long term, the continuing problem of increasing fire hazard due to fuels build-up in both early- and late-successional habitats would continue. Also, ecosystem health problems associated with lack of fire or disturbance such as encroachment of conifers into oak woodlands, grasslands and brush fields would continue to degrade these important habitats. The lack of fuels reduction and silvicultural treatments in young and middle aged forest stands would not allow as rapid of tree growth and development of late-successional stand characteristics when compared to the “action” alternatives, especially Alternatives C and D. Because Alternative A allows no treatment in mature stands, the currently observed mortality of large trees due to stand density would continue. Large trees are a significant, key, component of the late-successional habitat in the Monument. The loss of large trees in undesirable. Under this alternative the long-term risk of a large acreage, stand replacing, wildfire would continue to increase. Such a fire would render many acres of both early- and late-successional habitats unsuitable for many years. Any late-successional habitat lost to such a fire could take several centuries to recover to its pre-fire condition.

Alternative B

The long- and short-term effects of this alternative on wildlife are expected to be is very similar to those described under Alternative A except that this alternative allows for the treatment of 3,400 acres of potential late-successional habitat (habitat type 3). These are stands of trees that are currently too young and/or too small to provide late-successional habitat features. Treating these stands and placing them on growth, species composition, and structural diversity pathways to develop into functional late-successional habitat as soon as possible would benefit late-successional associated

species in the long-term. The sooner these stands are set up to grow into the desired types of stands, the sooner additional late-successional habitat would be developed. Because these stands currently do not provide late-successional habitat, there would be no negative effects to, or loss of, late-successional habitat resulting from the proposed treatments. Treating these younger stands would also help reduce the fire hazard in the Monument. This alternative allows the least amount of treatment in younger stands of any of the action alternatives, thus it provides the fewest habitat related benefits to late-successional associated species in the long term.

Early-successional associated species would generally not benefit in the short- or long-term under this alternative because this alternative forgoes or defers treatment of early-successional and/or non-conifer habitats except for limited management for control of weeds. As discussed in Chapter 2, much of the habitat in the Diversity Emphasis Area is becoming less suitable for some early-successional associated species due to the lack of fire. Brush fields are becoming decadent and unproductive, oak woodlands are being encroached upon by conifers and brush. This alternative would do nothing to reverse these trends.

Alternative B would allow managers to do the least of any of the action alternatives to address the serious threat that stand replacing fire poses to the wildlife habitats of all kinds in the Monument. If a large, high intensity, fire occurs in the Monument, thousands of acre of many habitat types could be lost all at once.

Alternative C

Alternative C places a high priority on treating stands with high fire hazard ratings that are adjacent to or close to functional late-successional habitat. Some of these stands are currently functioning as dispersal habitat for the Northern Spotted Owl and some are not. Some of these stands have the potential to develop into late-successional habitat and some do not.

Late-successional habitat associated species would benefit long-term as a result of this alternative because 3,185 acres of stands with potential to become late-successional habitat (types 3 and 5) would be treated with that goal in mind. Of these 3,185 acres, approximately 2,346 acres are currently in a small tree/young stand condition that provides no late-successional habitat features (type 3). Treating these 2,346 acres would have no negative effect on late-successional associated species.

The remainder of the 3,185 acres (839 acres) proposed for treatment under this alternative currently has large enough trees and enough canopy closure that it is functional as dispersal habitat for Northern Spotted Owls (habitat type 5) and other species associated late-successional habitat.

The effects of the above treatment in the long-term would be to hasten the development of late-successional characteristics in the younger stands. This would both increase the amount of late-successional habitat on the landscape, and help to create larger blocks of late-successional habitat. The short-term effects of this same treatment would be to reduce the potential threat of a large, intense wildfire destroying functional late-successional habitat in the Monument. By reducing the hazard in the immediate vicinity of the functional late-successional stands, fire suppression forces would have a greater chance of keeping an approaching wildfire out of the late-successional stands. Fuel reduction measures and silvicultural treatments in the type 5 stands mentioned above could temporarily reduce the canopy closure to the point that the stands are no longer functional as dispersal habitat for Northern Spotted Owls. In the worst case scenario that all of the treated habitat type 5 stands were unintentionally rendered unsuitable for Northern Spotted Owl dispersal, there would be a reduction of approximately four percent in the amount of dispersal habitat in the Monument until the canopy in the treated stands returned to approximately forty percent closure.

This alternative allows for fuels hazard reduction treatments in up to 1,770 acres of currently functional late-successional habitat (types 1 and 2). This treatment would occur only in stands that have a high fire risk rating. The 1,770 acre figure represents approximately 15 percent of the functional late-successional habitat in the Monument. These treatments would remove "non-commercial" sized material from the stands which is generally less than 8 inches in diameter. These fuels reduction treatments could have some negative effects on the suitability of the stands in the short-term (5-10 years). However, these treatments would be designed to retain the late-successional characteristics of the stand as much as possible including high canopy closure, snags and down wood. The immediate effects on the overall functionality of the forest stands for late-successional associated species, such as the Northern Spotted Owl, is expected to be minimal. These treatments would be beneficial to late-successional associated species in the long-term because the fire threat to the stands would be reduced and the remaining large/medium sized trees would be healthier because they would have less competition for food, water and sunlight. In the worst case scenario that all of the treated type 1 and 2 stands were unintentionally rendered unsuitable, there would be a loss of approximately fifteen percent of the late-successional habitat in the Monument.

This alternative allows the treatment of 157 acres of habitat type 6. This habitat currently serves as dispersal habitat for spotted owls but has no potential to develop into late-successional habitat due to poor growing site conditions or unfavorable tree species mix. Fuels reduction and silvicultural treatments in these type 6 stands may temporarily reduce the canopy closure to the point where they are no longer functional as dispersal habitat for Northern Spotted Owls. In this worse case scenario, 157 acres of dispersal habitat would be degraded for a period of years until the canopy re-closes to over forty percent. This represents less than one percent of the dispersal habitat in the Monument.

Alternative C also allows the treatment of 2,614 acres of land that has high fire hazard rating and that is currently not providing any late-successional habitat or Northern Spotted Owl dispersal habitat, and does not have the potential to develop late-successional habitat characteristics (type 4). Treating this habitat would have no negative effect on late-successional associated species. Treatment could provide benefits to late-successional associated species by reducing the fire threat to adjacent late successional stands. These stands are usually oak woodlands and brush fields. Early-successional species would benefit from treatments in these stands. Forage availability for a variety of species would be increased, and the loss of early-successional habitat to the process of succession would be slowed. Some of these stands (especially brush fields and grasslands) would essentially be "reset" to an early-successional stage.

Alternative D

This alternative has all the same benefits for late-successional habitat associated species as Alternative C, but provides additional long-term benefits by allowing the treatment of an additional 6,400 acres of habitat type 5. Thus, under this alternative a total of 7,239 acres of habitat type 5 is treatable. This represents 84 percent of the type 5 habitat in the Monument, but only 27 percent of the dispersal habitat in Monument. This treatment would increase the rate of development of late-successional stand characteristics in the treated stands. However, there is a potential short-term cost associated with this long-term benefit. Habitat type 5 is suitable for Northern Spotted Owl dispersal but not for nesting, roosting, or foraging. Treating these stands would put them on the trajectory to become roosting, foraging and potentially even nesting habitat in the future, but in some stands treatment could reduce or eliminate their effectiveness as dispersal habitat in the short-term (for up to approximately 20 years after treatment). In the worst case scenario of all of the treated type 5 acres becoming unsuitable for Northern Spotted Owl dispersal, 27 percent of the current dispersal habitat would be degraded for a number of

years. Treating this additional acres would reduce the fuels hazard on 6,400 acres above the acreage proposed for treatment in Alternative C. The benefits to wildlife of treating hazardous fuels have been discussed under the alternatives above.

Alternative D would allow commercial sized trees to be cut on approximately 1,770 acres of habitat type 1 and 2 stands. This treatment would occur only if the stands have a high fire risk rating (the same type1 and 2 stands proposed for non commercial treatment in Alternative C) . The 1,770 acre figure represents approximately 15 percent of the functional late-successional habitat in the Monument. This would result in a decrease in habitat quality in the short-term due to loss of canopy closure and stand complexity. The commercial thinning harvest proposed is very modest and would leave the stands in an essentially intact condition, however, to achieve the desired long-term stand development and fire protection, there would have to be some noticeable alteration of the stand structure in the mid-story. This would negatively affect the suitability of the stands in the short-term for late-successional associated species such as the Northern Spotted Owl and Northern Goshawk. The degree of degradation resulting from this treatment is impossible to assess at this time because it depends on the condition of each stand pre-treatment and on the treatment prescription that is applied. Worst case scenario would be the short-term degradation of approximately 15 percent of the currently functional late-successional habitat in the Monument. If these stands were degraded to the point that they did not function as late-successional habitat, they would likely still function as Northern Spotted Owl dispersal habitat.

Alternative D is expected to result in the same effects to early-successional habitat associated species as Alternative C. As Alternative D allows a broader variety of mechanized treatment tools, particularly in the oak woodlands and brush fields, than do the other alternatives, the probability of actually treating the proposed acreage discussed above is higher than under the other alternatives. Mechanized treatments are generally cheaper and faster and thus easier to implement.

Table 4-13 displays the habitat parameters likely to be affected by each activity, and how the habitat would likely be affected.

Table 4-13. Affects of Proposed Alternatives on Terrestrial Wildlife in the Monument

Activities With Potential for Affecting Changes in Habitat Quality	Habitat Parameters Likely to be Affected	Potential Changes in Habitat Parameters
Commercial Timber Harvest (Silvicultural Thinning)	1. Canopy Closure 2. Stand Structural Diversity 3. Stand Species mix 4. Snag Density 5. Down wood 6. Sound/Noise 7. Stand Density 8. Microclimate 9. Weeds 10. New roads	1. Timber harvest/silvicultural thinning can reduce canopy closure. 2. Timber harvest/silvicultural thinning can reduce stand structural diversity in both the short and long term. Timber harvest can increase stand structural diversity in the long term. 3. Timber harvest/silvicultural thinning can alter stand species mix. 4. Timber harvest/silvicultural thinning can reduce snag density both short and long term. 5. Timber harvest/silvicultural thinning can reduce the availability of down wood both short and long term. Timber harvest can increase the availability of down wood both short and long term. 6. Timber harvest/silvicultural thinning can increase noise disturbance in the short term. 7. Timber harvest/silvicultural thinning alters the density of stands. 8. Timber harvest/silvicultural thinning can alter the microclimate in stands. 9. Seeds of non-native invading plants can be carried into new areas by logging equipment. These invaders can propagate in disturbed areas created by logging equipment. 10. Timber harvest/silvicultural thinning often involves new road construction. (see roads below)

Table 4-13. Effects of Proposed Alternatives on Terrestrial Wildlife in the Monument

Activities With Potential for Affecting Changes in Habitat Quality	Habitat Parameters Likely to be Affected	Potential Changes in Habitat Parameters
Roads	1. Direct impacts (eg. vehicles killing animals). 2. Security/ Hiding Cover 3. Dispersal suitability 4. Vegetation 5. Competition with non-native species. 6. Snags	1. Open roads provide vehicle access into wildlife habitat. Vehicles hit and kill wildlife. 2. Open roads provide humans access into otherwise relatively undisturbed habitats. 3. Roads can present barriers (either real or perceived) to some species of wildlife. 4. Invading plants can spread into new areas by propagating along road-side disturbed areas. 5. Non-native animals such often use roads as travel routes to access new areas. 6. Snags and trees with structural defects along roads are often removed officially as hazards or unofficially by firewood cutters.
Prescribed fire	1. Canopy closure 2. Vegetation 3. Snags 4. Down wood 5. Stand Species Mix 6. Hiding cover for small mammals 7. Brush/grass habitat condition 8. Direct loss of Wildlife	1. Prescribed fire can reduce canopy closure in the understory and/or over story. 2. Prescribed fire can alter the herbaceous layer species composition and density. 3. Snags can be lost (burned up or felled) during prescribed burns. Snags can be created by prescribed burns. 4. Prescribed fire can result in loss of down wood in the short term. Prescribed fire can result in mid and long term increases in down wood. 5. Repeated use of prescribed fire can result in long term shifts in stand species composition. 6. Prescribed fire can remove tall grass and brush 7. Prescribed fire can rejuvenate grass/brush habitats 8. Prescribed fire can kill wildlife

Table 4-13. Affects of Proposed Alternatives on Terrestrial Wildlife in the Monument

Activities With Potential for Affecting Changes in Habitat Quality	Habitat Parameters Likely to be Affected	Potential Changes in Habitat Parameters
Wildfire Suppression Operations	1. Snags 2. Weeds 3. New Trails 4. Habitat mix at the landscape level 5. Protection of wildlife from direct loss	1. Snags can be lost when felled as hazards. 2. Seeds of non-native invading plants can be carried into new areas by fire fighting equipment. These invaders can propagate in disturbed areas created by firefighting equipment. 3. Fire control lines can become unofficial OHV trails. (See OHV use above) 4. Wildlife suppression can maintain the current habitats on the landscape in the short term by minimizing loss to wildfire. Wildfire suppression disrupts the disturbance process that is essential for maintenance of some habitat types in the long term. 5. Wildfire can kill wildlife

It would be impractical to analyze the effects of each alternative on each species of wildlife known or suspected to occur in the Monument. For purposes of comparison between the alternatives, the sensitive and special interest species known or suspected to occur in the Monument analysis area are the focus of the effects analysis for wildlife. The Special Status Species (SSS) list represents a wide variety of habitat needs. In this analysis these species serve as partial surrogates for other more common species.

Table 4-14 provides a comparison of the expected effects of the action alternatives on the special status and special interest species known or suspected to occur in the Monument. Alternative A is the no action alternative which would continue current interim management under the 1995 Medford District Resource Management Plan and the Presidential Proclamation. This is the baseline to which the three action alternatives are compared. Table 4-14 summarizes the overall effect that Alternatives B, C, and D are expected to have on the special status and special interest species in the Monument, not on the species as a whole across the entire species range. The alternatives are complex and in some cases one component of an alternative may be beneficial for a species and another component of the same alternative could be detrimental to the same species. Table 4-14 summarizes the overall effect each alternative is expected to have on a particular species considering all of the provisions of each alternative. All indications in the table that an alternative is beneficial or detrimental to a species are relative to the expected effects of Alternative A.

Table 4-14. Special Status and Special Interest Species Comparison of Effects of the Proposed Action Alternatives to the No Action Alternative

Species Affected	Alt. B	Alt. C	Alt. D	Main factor(s) for ratings
Birds				
Bald Eagle	=	+	–	•Increased human disturbance at Hyatt Lake and along Jenny Creek (-) • Increased habitat protection through fire hazard reduction (+)
Peregrine Falcon	=	=	=	•Increased human disturbance at nest site (=)
Lewis Woodpecker	–	+	+	•Active maintenance of oak savannah habitat (+) •Loss of oak savanna habitat due to conifer/brush encroachment (-)
Greater Sandhill Crane	=	=	–	•Increased human disturbance at nesting/feeding wetlands (-)
Western Meadowlark	=	+	+	•Restoration of tall grass habitats in meadows (+)
Western Bluebird	=	=	=	•Snag retention/creation (=)
White Pelican	=	=	=	•No effects anticipated (=)
Northern Spotted Owl	–	+	+ +	•Increased habitat protection through fire hazard reduction (+) •Development of more habitat faster (+) •Minimal young stand improvement or fire hazard reduction (-)
Golden Eagle	+	+ +	+ +	•Increased habitat protection through fire hazard reduction (+)
Northern Goshawk	+	+ +	+ +	•Increased habitat protection through fire hazard reduction (+)
Great Gray Owl	+	+ +	+ +	•Increased habitat protection through fire hazard reduction (+)
White- Headed Woodpecker	+	+ +	+ +	•Snag retention/creation (+)
Black-backed Woodpecker	+	+ +	+ +	•Snag retention/creation (+)
Northern Three-toed Woodpecker	+	+ +	+ +	•Snag retention/creation (+)
Pileated Woodpecker	+	+ +	+ +	•Snag retention/creation (+)
Flammulated Owl	+	+ +	+ +	•Snag retention/creation (+)

Table 4-14. Special Status and Special Interest Species Comparison of Effects of the Proposed Action Alternatives to the No Action Alternative

Species Affected	Alt. B	Alt. C	Alt. D	Main factor(s) for ratings
Reptiles and Amphibians				
Western Pond Turtle	=	+ +	+	•Riparian zone protection (=) •Collection/harassment by additional visitors (-) •Habitat protection from fire hazard reduction (+)
Cascade Frog	+	+ +	+ +	•Habitat protection through fuels hazard reduction (+) •Riparian zone protection (+)
Mammals				
Fisher	+	+	+ +	•Late-Successional habitat development and protection from fire (+)
American Marten	+	+	+ +	•Late-Successional habitat development and protection from fire (+)
Pacific Pallid Bat	+	+	+	•Snag retention/creation (+)
Townsend's Big-Eared Bat	=	=	=	•No change
Terrestrial Mollusks (slugs and land snails)				
Helminthoglypta hertleini	+	+ +	+	•Habitat protection through fuels hazard reduction w/ minimal surface disturbance (+) •Alt. C reduces fuel hazard without heavy equipment(++) •Alt. D reduces more fuel hazard but disturbs more ground with heavy equipment (+)
Monadenia Chaceana	+	+ +	+	•Habitat protection through fuels hazard reduction w/ minimal surface disturbance (+) •Alt. C reduces fuel hazard without heavy equipment(++) •Alt. D reduces more fuel hazard but disturbs more ground with heavy equipment (+)
Trilobopsis tehemana	+	+ +	+	•Habitat protection through fuels hazard reduction w/ minimal surface disturbance (+) •Alt. C reduces fuel hazard without heavy equipment(++) •Alt. D reduces more fuel hazard but disturbs more ground with heavy equipment (+)

Table 4-14. Special Status and Special Interest Species Comparison of Effects of the Proposed Action Alternatives to the No Action Alternative

Species Affected	Alt. B	Alt. C	Alt. D	Main factor(s) for ratings
Special Interest Species				
Klamath Mardon Skipper (butterfly)	=	=	=	•Fencing cattle out of occupied meadow habitat(=)
Black-tailed Deer	+	+ +	+ +	•Habitat improvement through prescribed fire (+)
Roosevelt Elk	+	+ +	+ +	•Habitat improvement through prescribed fire(+)

= : Expected effects of this alternative are identical or very similar to those of the baseline alternative (A).
+ : Expected effects of this alternative are beneficial above the conditions provide by the baseline alternative.
+ + : Expected effects of this alternative are beneficial above the conditions provide by the baseline alternative, and better than other alternatives marked with a single "+".
− : Expected effects of this alternative are more detrimental to the species than those expected under the baseline alternative.
* Some short-term reduction in habitat suitability but long term gains in same.

Summary of Effects on Terrestrial Wildlife

Table 4-15 was developed by tallying the scores for each alternative by species in Table 4-14. The score codes for each species for each alternative in Table 4-15 are relative to the baseline of Alternative A. Alternative C appears to offer the best, most balanced mix of habitat protection and enhancement for terrestrial wildlife in the Monument.

Table 4-15. Summary of Effects on Terrestrial Wildlife of Proposed Alternatives

	Alternative B	Alternative C	Alternative D
Number of "++" species	0	16	14
Number of "+" species	18	7	8
Number of "-" species	2	0	2
Number of "=" species	8	5	4
Total number of positives scores (++ and +) *	18	39	36
Total number of negative scores (-) *	2	0	2
Total score for alternative (total +'s) - (total -'s)	16	39	34

* Scores of "++" count for 2 here. For example, an alternative with 10 species scored as "++" would get 20 points for those species (two pluses times 10 species).

Vegetation

Diversity Emphasis Area

This analysis considers an ability to manage the Diversity Emphasis Area towards a desired future condition identified by each management/ecological objective implicit within the following headings and descriptions within Table 4-16. Most grass/shrub/woodland plant communities of the Diversity Emphasis Area are subject to livestock impact. This analysis does not determine the impacts of livestock on biological elements of the landscape. It is assumed that grazing will be maintained within the CSNM while their impacts to the biological elements and physical environment of the Monument are determined by the livestock grazing impact study. If impacts are identified that can't be mitigated by altering grazing management practices then livestock grazing would be eliminated from the Monument.

Grasslands

Maintain and Protect Existing Native Grasslands

Most grasslands are disturbance mediated. Since healthy grasslands are the first defense against weed invasions, it follows that an ability to use appropriate management tools (principally fire) is critical for maintenance of healthy herbaceous plants communities. Alternatives A and B do not allow the development of a fire maintenance program that would lower the fire hazard. Alternatives C and D are thus considered more appropriate for grassland maintenance. Prescribed fire is also a useful tool in former grasslands currently invaded by shrubs.

A considerable area of the Monument likely subject to historical fire is not appropriate for prescribed fire due to patterns of land ownership, the combination of excessive fuels, topographic position, and danger imposed on other important biological elements. In such cases manual or mechanical treatment methods may be useful for the restoration of grassland communities. While mechanical treatments may expedite (due to relative cost efficiency) treatment of shrub invaded areas, the negative consequences of soil surface disturbance, possible introduction of weeds, and a likely inability to garner sufficient materials for re-vegetation (for example, native grass seed) favor slower techniques more easily tailored to site specific conditions. Alternative C is thus considered more appropriate than Alternative D.

Improve Native Grass/annual Grass Mix to Native Grass Domination

Non-native annual grass invasion within the CSNM is likely to continue (albeit at different rates) regardless of future livestock management. Few tools exist to treat the extensive areas where non-native grasses are a component of grasslands. In the following order of priority, carefully timed applications of prescribed fire, defoliation treatments, and herbicides could favor the native herbaceous component. Alternatives A and B offer none of these tools. Alternatives C and D offer the ability to use prescribed fire, defoliation treatments, and herbicides. However, Alternative C precludes the use of tractor mounted implements (for example, mowers) likely affecting the ability to treat large areas sequentially for 2 or 3 years. Alternative D is thus favored over Alternative C.

Restore Annual Grass Monoculture to Native Grass Domination

The literature identifies the extreme difficulty of converting annual grass plant communities back to native herbaceous domination. Successful conversion may rely on the full suite of tools (Alternative D) applied for 2 or 3 consecutive years in order to treat the broader landscape (see literature review, Appendix GG). Alternative D would best facilitate the restoration of native grasses.

Shrublands

Recreate a Range of Wedgeleaf Ceanothus Stand Ages Across the Landscape

Because of the fire-dependence of seed for germination, prescribed fire is the primary tool whereby wedgeleaf ceanothus shrublands can be rejuvenated. The use of fire is also critical for returning nutrients to the soil to facilitate vigorous growth by both shrubs and associated herbaceous species. In some areas of the landscape, the high fuel-loading may prevent the application of prescribed fire without extensive hand or mechanical treatments. Alternatives C and D are thus favored over Alternatives A and B. Alternative D is favored over Alternative C only in terms of relative cost. Alternative C may allow more site specific treatment and allow the use of harvested materials for restoration purposes. The careful placement of burn-piles on patches of weeds and the consequent growth of annual weeds may be an important component of management. The utilization of woody material for ameliorating growth conditions (for example, shading, or mulch) or for manipulating available nitrogen is also an important management consideration. The ability to achieve such micro-site requirements favors Alternative C over Alternative D.

Woodlands

Reduce Conifer Invasion

Conifer invasion is likely to continue under Alternatives A and B resulting in the further loss of mesic Oregon white oak woodlands and black oak dominated plant communities. Fire, manual treatments and mechanical treatments (in this order of priority) favor Alternatives C and D. Large machinery proposed in Alternative D would damage desired "leave trees". Alternative C is thus favored over Alternative D.

Reduce Shrub Invasion

Drier Oregon white oak communities are susceptible shrub invasion. While shrubs are a natural component of such woodlands, the current accumulation of fuels as a result of past fire-suppression could result in fires with characteristics different from historical fire events. This trend of increasing fuels leading to undesired fire intensities is likely to continue under Alternatives A and B. Since the drier shrub invaded oak woodland communities are also subject to annual grass invasion, the ability to achieve micro-site objectives are more attainable through Alternative C than Alternative D.

Reduce Loss of 'Open Oak Savanna' Communities

Many of the Oregon white oak stands have become more crowded. The former interspaces between largest and oldest individual oaks have filled in with a younger cohort of oak saplings. In historical times, fire thinned out such stands to maintain a more open environment. The effects of fire-suppression are likely to continue under Alternatives A and B. Fire and manual thinning are the desired tools to use since oak woodlands are easily invaded by annuals once the soil surface is disturbed. Large tractor mounted machinery permissible under Alternative D may disturb soil and distribute weed seed while also damaging existing trees. Alternative C best protects and enhances these communities.

Wetlands, Riparian Vegetation, Floodplains, Springs and Seeps

Facilitate Wetland and Riparian Plant Recovery

Refer to hydrology and riparian sections

Repair of Hydrological Functioning

Refer to hydrology and riparian sections

Re-establishment of Riparian Woody Vegetation
Refer to hydrology and riparian sections

Repair of Ponds and Pump Chances
Refer to hydrology and riparian sections

Restore Hardwood Floodplain
The drier portions of floodplains dominated by Oregon white oak have been targeted for conversion to pasture in the past. This site domination by grasses and weeds provide an efficient competitive barrier to the establishment of woody species. Restoration of these sites (particularly on the former Box-O Ranch) would be facilitated by using a tractor mounted auger (Alternative D) allowing young trees to easily penetrate the clay layer common to the area. Alternative C provides for the use of hand-tools to achieve the same objectives. Without these restoration aides (Alternatives A and B), the non-native grass dominated pastures are likely to impede the establishment of native woody species outside of riparian areas.

Landscape Values and Processes

Visitor Impact
The establishment of the CSNM is likely to increase the number of visitors to the area. While visitor impact will be ameliorated through careful planning, any encouragement of visitation will be detrimental to certain plant communities. At most risk are specialized plant communities found on rocky outcrops which generally provide the best vistas of the Monument and surrounding lands. Other interesting plant communities (bogs, rocky meadows, springs, etc.) may also be damaged as their locations become known. Damage (trampling) already apparent at several rocky view sites will be slow to recover under the most favorable circumstances (zero visitation) and unlikely to occur under any of the alternatives presented in this Plan. Alternatives C and D would encourage visitation thereby increasing damage to these biological resources.

Counteract Noxious (and other) Weed Invasion
While noxious weed control is common to all alternatives, such direct weed control fails to address the fact that the maintenance of healthy native plant communities is the first barrier to weed invasion. The inability to use prescribed fire under Alternatives A and B is likely to favor increased rated of weed invasion as a landscape process. The use of heavy equipment (Alternative D) increase risk of spreading noxious weeds, therefore, Alternative C is preferred.

Maintain/Improve Plant Community Richness
Alternatives C and D allow for a landscape perspective in the management of the CSNM. Only by looking at the landscape as a whole are managers likely to recognize patterns of plant community change (succession) under the varied forces of fire use/ suppression, weed invasion, livestock grazing, and others. Only Alternatives C and D allow the judicial application of prescribed fire (and other management tools) to maintain plant community richness across the landscape.

Maintain/Improve Plant Community Balance of Conditions
Plant communities are dynamic, implying that each plant community can occupy a range of conditions. Maintaining such a range of conditions is critical for the maintenance of ephemeral plant and wildlife species with specific and restricted habitat requirements. It is unlikely that hands-off management will solve many of the ecological issues arising from the deleterious effects of past management (timber harvest, fire-suppression, grazing). Alternatives A and B do not provide the necessary tools to recreate the range of conditions historically associated with the plant

communities of the CSNM. These tools are provided by Alternatives C and D, though only Alternative D could hope to achieve landscape management objectives as defined in this Plan.

Reintroduce Fire as an Ecosystem Process

Many plant species of the CSNM are considered directly or indirectly dependent on fire for their persistence on the landscape. Species directly dependent on fire need the heat and products of combustion to facilitate germination, establishment, and growth. Removal of woody vegetation provides more open environments for those plant species unable to compete for water or sunlight against deeper rooted and larger statured woody plant species. The action of fire provides a range of conditions within any particular plant community. The high species richness of the Monument is due in part to the effects of historical fire. Without the use of prescribed fire, the Monument will continue to lose native plant species and plant communities (Alternatives A and B). Of the alternatives that promote the use of prescribed fire as a management tool (Alternatives C and D), Alternative D is favored since it would provide a better probability of attaining defined management goals by allowing the use of heavy equipment to facilitate the application of prescribed fire.

Protect/Maintain Biological Elements for Which the Monument Was Proclaimed

The biological elements protected by the Monument range from individual species (plant and wildlife), plant communities, varied habitat, to aspects of ecosystem functioning and integrity. These components of an ecosystem can only be protected in the longer term by recognizing the role of ecosystem processes (such as fire, succession, weed invasion, herbivory) and using the full range of management tools to ensure the maintenance of the biological elements of importance within a desired range of conditions. This perspective of responsibility and full access to all management tools is best expressed by Alternative D. Alternatives A and B place too many restrictions on management, while Alternative C falls short of Alternative D by restricting the appropriate use of heavy equipment. The use of machinery may allow the reintroduction of fire to re-create habitats lost as a result of past fire suppression activities while also faciliting the reintroduction of weeds. Alternative D is defined as most appropriate for the maintenance of those biological elements for which the Monument was proclaimed only insofar as appropriate use is made of tools allowed by Alternative D following the successful completion of pilot studies.

Table 4-16. Summary of Grass/Shrub/Woodland Plant Community Condition Trends by Alternative.

Management Objective and Conditions	A	B	C	D
Grasslands				
Maintain and Protect Existing Native Grasslands:	D	D	I+	I
Improve Native Grass/annual Grass Mix to Native Grass Domination:	D	D	I	I+
Restore Annual Grass Monoculture to Native Grass Domination:	D	D	I	I+
Shrublands				
Recreate a Range of Wedgeleaf Ceanothus Stand Ages Across the Landscape:	D	D	I+	I
Woodlands				
Reduce Conifer Invasion:	D	D	I+	I
Reduce Shrub Invasion:	D	D	I+	I
Reduce Loss of 'Open Oak Savanna' Communities:	D	D	I+	I
Wetlands, Riparian Vegetation, Floodplains, Springs and Seeps				
Facilitate Wetland and Riparian Plant Recovery:	refer to hydrology and riparian sections			
Repair of Hydrological Functioning:				
Re-establishment of Riparian Woody Vegetation:				
Repair of Ponds and Pump Chances:				
Restore Hardwood Floodplain:	U	U	I	I+
Landscape Values & Processes				
Visitor impact:	D+	D+	D	D
Counteract Noxious Weed Invasion:	U	U	I+	I
Maintain/Improve Plant Community Richness:	D	D	I	I
Maintain/Improve Plant Community Balance of Conditions	D	D	I	I+
Reintroduce Fire as an Ecosystem Process:	D	D	I	I+
Protect/maintain Biological Elements for Which the Monument Was Proclaimed:	D	D	I	I+

I = improve D = decline U= unaffected – = small change + = large change

Forest Health (Old-Growth Emphasis Area)

All of the coniferous forest lands within the Monument were grouped into the Old-Growth Emphasis Area (OGEA). These lands are either currently habitat for late-successional and old-growth (LSOG) dependant species (habitat types 1 and 2) or are capable becoming LSOG habitats in the future (habitat types 3 and 5). This analysis will evaluate how well each proposed alternative will accomplish the goal of protecting and maintaining forest stands currently providing LSOG habitat while enhancing other coniferous forest stands towards LSOG habitat. For a description of current and potential LSOG habitat types refer to the wildlife section in Chapter 2.

Alternative A

Alternative A is interim management and no active management actions would occur on forest lands. This alternative will be used as a baseline to evaluate the effects of the other proposed alternatives.

Recent surveys and stand exams indicate continued ingrowth of white fir and Douglas-fir in many forest stands of LSOG habitat types 1 and 2 (see Appendix T, Tables AT-1, AT-2, AT-3). This establishes a trend of fine fuels, small tree densities, small basal area and large tree mortality continuing to increase throughout all physiographic ecoregions. This phenomenon is particularly noticeable in un-entered LSOG habitat types 1 and 2 that have had little or no disturbance for the past century. Small trees aged by diameter class have confirmed continued ingrowth and increases in stocking levels throughout this time. This ingrowth is accompanied by small tree mortality during the stem exclusion phase that is presently occurring as well. At some point, stem exclusion in white fir understory is likely to be similar to ingrowth indicating a limit to stocking density levels of white fir. At the same time the continuing mortality will likely contribute increased fuel loading. Most of this will result in the accumulation of fine fuels that do not contribute large coarse woody debris (CWD) to forest stands but instead increase the wildfire hazard. Some large CWD will occur through large tree mortality. Replacement for large trees will likely be white fir and Douglas-fir.

Habitat type 3 stands will develop into dense slow growing and fire prone stands of pine or mixed conifer. Even-aged pine plantations which currently comprise the majority of habitat type 3 lands will be at increasingly high risks to bark beetle as basal areas increase without thinning. In some cases, problems symptomatic of overly dense, stressed pine will appear as trees grow. Needle blights, shoot moths and shoestring root rot are examples of potential problems. Some gaps and ingrowth typical of mixed conifer species will occur. These species will grow slowly and will have to contend with fuels buildup of existing overstory pine. Fire hazard will then increase over time further increasing risk to adjacent habitat type 1 & 2 stands. The mixed conifer stands in habitat type 3 would also grow slowly and be overly dense. The likelihood of major beetle infestation and other diseases would be less than in the pine plantations. These stands would develop into mid-seral stands with mixed conifer character that in most cases would not become LSOG habitat 1 or 2 due to high densities. These stands are currently very dense and clumpy because they are usually advance reproduction left after all the overstory was removed and/or clearcutting occurred. White fir is often the dominant species in these mixed stands.

Habitat type 5 forest stands will grow slowly within residual groups of larger trees left from previous logging. Gaps will become occupied over time with a variety of species resulting in a multi-aged canopied structured stands. However, because white fir was usually the species left after logging it will more commonly be the dominant species on site for the foreseeable future. These stands will then tend to stagnate due to dense stocking levels of white fir. They will be more susceptible to catastrophic stand replacement events as fire dependent species of pine and Douglas-fir become less common.

Alternative B

Habitat types 1, 2 and 5 will develop as in alternative A because no treatments will occur under Alternative B in these habitat types.

Ninety percent of habitat type 3 would be thinned over the first decade. These are generally the young tree stands that have minimal overstory component. Selection of favored trees would accelerate growth and increase the amounts of preferred conifer species in these stands. It is thought that reduced densities would mimic, or at least approach, the stocking levels of young stands that developed into LSOG forests in the past. Pine plantation stand densities would be thinned to a level that would decrease fuels and risk to beetle attack. More open grown pine would have the character needed for LSOG structure such as large branches. Lower densities in the pine plantations would allow ingrowth of natural reproduction or underplanting of other conifer species where desirable. Thinning mixed conifer stands would again allow for the selection of fire dependent species and provide an opportunity to remove white fir from these stands.

The thinned stands would become habitat type 2 in a few decades. These treatments would reduce the fuel loading in the treatment area and, as a result, overall catastrophic fire events would be less likely. Currently, some of these stands have a portion of their stocking in commercial sized trees. The option to thin commercially at the preferred spacing would not be allowed in this alternative.

Alternative C

Fifteen percent of habitat types 1 and 2 would be thinned noncommercially and underburned. Ninety percent of white fir less than 6" in dbh would be thinned or burned. About twenty-five percent of the white fir presently in the stand greater than 6" dbh and up to 20" in dbh would be thinned or lost during prescribed burning. See Appendix T (Tables AT-1, AT-2, AT-3) for current stand tables in habitat types 1 and 2. Table 4-19 shows estimated timber volume that may be harvested due to protection treatments. The effects of burning and thinning would not reduce canopy cover, but would reduce lower layers of canopy. Most treatments would involve thinning of small material, pile burning and then broadcast burning. Pre-treatment of fuels prior to broadcast burning is required because ninety years of fire suppression has resulted in such heavy accumulations of fine fuels that objectives could not reasonably be met otherwise.

Habitat type 3 would be treated similarly to Alternative B, but only sixty-two percent would be thinned. Additionally, commercial sized trees would be thinned where applicable resulting in slightly lower stocking levels and removal of material from the site. This alternative would allow removal of commercial size trees from otherwise overstocked groups of larger trees found within habitat type 3. The other affects from treatment would also be similar to Alternative B.

Approximately 839 acres of habitat type 5 would be commercially and/or non-commercially thinned. Groups of dense trees would be thinned from below. Most of the trees removed would be white fir less than 10" in dbh. Some trees up to 20" in diameter would be thinned in order to release preferred species. The thinning across these stands would be highly variable given the current structure of forest stands in this habitat type. Growth within these groups would be accelerated. Pine, incense cedar and Douglas-fir would increase while white fir decreases. Ladder fuels would be reduced thus lowering the risk of catastrophic wildfire in the treated units.

Alternative D

Fifteen percent of habitat types 1 and 2 would be thinned commercially and/or non-commercially as in Alternative C. In addition selected thinning would occur where dense groups of white fir and Douglas-fir are acting as ladder fuels growing next to

dominant trees. A byproduct of the protection thinning would be a likely increase in tree vigor of dominant Douglas-fir and pine. Some gaps would be created allowing for establishment of these less shade-tolerant species. The additional thinning in this alternative would occur in created gaps and around preferred dominant pine.

Habitat type 3 acreage would be treated as in Alternative C except that thinning would be heavier in older natural stands.

Habitat type 5 would be thinned similarly to Alternative C except that much more (approximately 7,239) acreage would be thinned.

Table 4-17 identifies the affects of the proposed alternatives on key structural characteristics and species composition of the coniferous forest in the Monument.

Table 4-17. Affects of Proposed Alternatives on Forest Structural Characteristics and Species Composition(trends)

Forest Structural Characteristics		**A**	**B**	**C**	**D**
Stand Density		I	I	D	D
Canopy Cover		I	U	I	I
Individual tree vigor		D	D	I	I
Average Tree size (Diameter and height)		D	D	I	I
Coarse Woody Debris	Large > 16"	U	D	I	I
Coarse Woody Debris	Small < 16"	I	I	D	D
Snags	Large > 16"	U	D	I	I
Snags	Small < 16"	I	I	D	D
Dwarf Mistletoe (not a disease that is considered a disturbance agent, but is important wildlife habitat at a stand structural level)		I	I	U	U
Species Composition		**A**	**B**	**C**	**D**
Ponderosa pine		D	D	I	I
Sugar pine		D	D	I	I
Douglas-fir		D	D	D	U
Incense cedar		U	I	U	U
White Fir		I	I	D	D
Hardwoods		I	I	D	U

I = increase D = Decrease U = Unaffected

Relative Trends for Disturbance Agents

Assumptions made for disturbance agent effects are based on the degree to which activities such as thinning and prescribed burning will occur. Stand structural characteristics change in response to disturbance agents and also determine to what extent a disturbance agent may alter stand development. For instance, lower densities in natural stands generally will result in lower levels of mortality due to beetles. In addition, species composition will determine the extent to which host specific root rots effect future stand development. Often beetle-pathogen interactions occur together and are affected by density and species composition. Fir engraver/root rot interactions are common in the CSNM particularly in white fir plant communities and the more mesic higher elevation mixed conifer forest communities where white fir is found. Most of the assumptions pertain to mixed conifer because mixed conifer plant communities make up approximately ninety percent of the conifer forest types found in CSNM while white fir accounts for about ten percent (Table 2-18).

Small tree thinning and prescribed burning will be the primary management activities applied across the landscape that will affect forest structure and species composition. Generally, lower stand densities and larger tree size will accompany a shift away from small dense white fir toward larger ponderosa and sugar pine while maintaining other coniferous and hardwood species present. This "species shift" will be toward historic compositions. Specifically, historic forest community attributes and current land designations will drive management decisions. Overall trends indicated in the table below are landscape level trends, but are most applicable to actual individual stand treatments proposed. The limited management activities accomplished during the first decade would likely have little overall effect at the landscape level with the exception of Alternative D.

Table 4-18 summarizes the affects of the proposed alternatives on the disturbance agent trends.

Table 4-18. Affects of Proposed Alternatives on Disturbance Agents Trends in Coniferous Forest Stands

Disturbance Agents		A	B	C	D
Laminated Root Rot	(*Phellinus weirii*)	I	I	D	D
Annosus Root Rot	(*Heterobasidion annosum*)	I	U	D	D
Shoestring Root Rot	(*Armellaria mellea*)	I	I	D	D
White Pine Blister Rust Not normally considered a disturbance agent, but listed here due to it's impact on seedling and pole size sugar pine (i.e. young sugar pine are being lost from the stand and being replaced by white fir, Douglas-fir and incense cedar in mixed conifer stands).	(*Cronartium ribicola*)	I	I	D	D
Fir Engraver	(*Scolytus ventalis*)	I	I	D	D
Western Pine Beetle	(*Dendroctonus brevicomis*)	I	I	D	D
Mountain Pine Beetle	(*Dendroctonus ponderosae*)	I	I	D	D
Wind (windthrow resulting in tree mortality)		I	I	D	D
Wildfire (stand replacing events and tree mortality) **With Prescribed Burning implemented**		I	I	D	D

I = increase D = Decrease U = Unaffected

Not normally considered a disturbance agent, but listed here due to it's impact on seedling and pole size sugar pine (i.e. young sugar pine are being lost from the stand and being replaced by white fir, Douglas-fir and incense cedar in mixed conifer stands).

Potential Timber Volume Yields as a result of Commercial Thinning

Prior to the Presidential Proclamation, about 2,256 acres now in the Monument were in commercial based forest land that contributed to the BLM's Medford District Probable Sale Quantity (PSQ). The annual board foot volume harvest toward the PSQ was approximately 46 million board feet (MMBF), (or 460 thousand board feet (MBF) over a ten year period). This volume was based on the harvest scheduling model, TRIM Plus used by the Medford District to calculate it's PSQ.

Table 4-19 indicates potential levels of harvest, by alternative, on lands to be thinned for LSOG habitat protection over a ten year period. Alternative C and D harvest levels within the OGEA could exceed volume that previously contributed to the PSQ. This is

Table 4-19. Estimation of Possible Timber Volume Harvested in the CSNM under the Proposed Alternatives

Habitat Type	Existing Average Volume/Acre	Volume to be Removed	Potential Acres to be harvested	Total volume to be removed over a 10 year period
Alternative A				
1 & 2	37 MBF	0	0	0
3	6.8 MBF	0	0	0
5	28.4 MBF	0	0	0
Alternative B				
1 & 2	37 MBF	0	0	0
3	6.8 MBF	0	0	0
5	28.4 MBF	0	0	0
Alternative C				
1 & 2	37 MBF	0	0	0
3	6.8 MBF	0.5 MBF	2,346	1.2 MMBF
5	28.4 MBF	4.0 MBF	839	3.4 MMBF
Total			3,185	4.5 MMBF
Alternative D				
1 & 2	37 MBF	1.5 MBF	1,770	2.7 MMBF
3	6.8 MBF	1.0 MBF	2,346	2.4 MMBF
5	28.4 MBF	4.0 MBF	7,239	28.9 MMBF
Total			11,355	33.9 MMBF

MMBF = 1,000,000 bd. ft. MBF = 1,000 bd. ft.

due to more acres of potential treatment on a larger land base. The volume levels expected to be harvested are not projected goals, rather they are potential by-products of activities designed to protect and maintain LSOG habitat. Most of the volume removed would be commercial sized small diameter white fir and Douglas-fir.

Special Forest Products

Alternative A and B

It is thought that overall few affects on most products would be noted overall. Mushrooms in general would likely increase because no picking would occur. Again the affects of annual picking is unknown.

Alternative C and D

Availability of firewood would increase due to thinning activities because material would be made available in log decks and slash piles. However much of the material would be white fir which is not preferred firewood. Affects on other commodities is thought to be negligible.

Bureau Special Status Plants (Rare Plants)

Bureau Special Status Plants include species that are also designated as the Monument Survey and Manage plants (see Appendix Z). The term 'rare plants' refers here to all Bureau Special Status, Monument Survey and Manage vascular plants, bryophytes (mosses and liverworts), lichens, and fungi. It also includes the federally listed endangered plant Gentner's fritillary (*Fritillaria gentneri*).

Much of the area within the National Monument has not had rare plant surveys, so presence is assumed in communities capable of supporting rare plants. The prediction of effects is based on proposed management actions at the landscape level in the different alternatives; spatially explicit treatment areas are not known at this time.

Occurrences of rare plants are documented in grasslands, chaparral, oak woodlands, conifer communities, rocky openings, vernal pools, seeps, and riparian areas (see Chapter 2). Many of these communities are not discrete elements on the landscape. Open grasslands, chaparral and oak woodlands, and conifer communities can blend into a mosaic on the landscape, providing a diversity of habitats for groups of rare plants. Rare plant species have different affinities for certain habitats. Some species are known for fairly specific habitats, like California milkvetch (*Astragalus californicus*) that is known only for open grasslands. The rare fungi *Pithya vulgaris,* and *Bondarzewia montana* are known only for conifer communities. *Pithya vulgaris* strictly occurs on recently downed needles on small branches of white fir. Coralseed allocarya (*Plagiobothrys figuratus* spp. *corallicarpus*) is known strictly for vernal creeks and pools. A terrestrial orchid, clustered lady's slipper (*Cypripedium fasciculatum*), is found in old growth Douglas-fir in the Monument often under older madrone and canyon live oak. Other rare plant species have a wider amplitude and are found in several different types of communities, or are found in transitional zones between homogeneous communities. Species like the federally listed Gentner's fritillaria is known from mixed evergreen, oak woodlands, chaparral and grassland edges. Green's mariposa lily (Calochortus greeni) can be found in Oregon white oak-western juniper / wedgeleaf ceanothus-klamath plum communities, Ponderosa pine - white oak / savanna , and on the margin of open grasslands (now often dominated by annual grasses). Some species occur in microsites within larger, more discrete communities. Rare plant species like *Nemacladus capillaris, Monardella glauca* and *Hieracium greenei* are documented in 'rocky openings' within mixed conifer communities. Vegetation treatments and management activities within grasslands, riparian areas, oak woodlands, mixed conifer and old growth conifer communities have the potential to influence rare plant species.

All the proposed alternatives could impact rare plants and their habitats to varying degrees. Past observations, literature, and professional judgement all are utilized to evaluate effects. For many rare plant species, little is known about their biology and autecological relationships. Very few formal scientific studies have been done on rare plants here in southwest Oregon. Any disturbance activity or event that affects vegetation, the substrate (soil/duff/bark/rocks), the hydrology, microclimate, or successional state of communities containing rare plants, has the potential for causing adverse, neutral or beneficial effects. The magnitude or significance of the effect can depend on the duration and the severity of the event. The predicted direct and indirect impacts vary with activity, the season of the activity, the type of plant community, and species involved. The management activities within the Cascade Siskiyou National Monument that have the greatest potential for affects on rare plants and their habitats are grazing, vegetation management activities, road building, prescribed fire, and fire suppression.

While some activities can cause immediate direct affects, they can also create long-term indirect or cumulative benefits. For example, thinning or burning activities can directly harm rare plants by direct physical damage or soil disturbance, the burning of individual plants, or baking of underground roots and bulbs. However, the resulting habitat can provide more open, optimal conditions for certain rare plant species. Likewise, noxious weed control can result in unintentional kill of non-target species, including rare plants. However, by reducing the competitive weed threat that weeds present, over the long-term the habitat, and ultimately the species themselves, will benefit. Conversely, fire suppression in grasslands, chaparral, and oak woodland habitats can (in the short-term) 'protect' rare plant populations from harm. However, in the long-term, increased densities of 'invading' shrubs and trees can reduce suitable habitat conditions for certain plant species adapted to more open conditions. Fire suppression also in the long-term can result in unprecedented fuel loads in certain habitats, so that the severity of a future wildfire would be extreme.

Table 4-20 describes potential effects to rare plants and their habitats based on proposed management activities. It is recognized that these rare plants include organisms of differing genetics, ecological requirements, and responses. All organisms may not react in the same way to a given activity. Site specific analysis must be done for individual projects based on proposed actions and the species present. The table provides a general response estimate to all rare plants and not necessarily to individual species.

Table 4-20. Potential Effects to Special Status Plants or Habitats as a result of Proposed Activities

Vegetation Management in Diversity Area (Grass/Shrub Woodland Communities)
1. Direct mortality from activities depending on timing of action; prevention of flowering and reduction in seed production; disruption of rare plant pollinators and habitat; reduced population size or loss of populations
2. Physical disturbance and loss of duff, organic, and mineral soils affecting nutrients, hydrology, and growing sites
3. Physical alteration of rare plant substrates especially duff, soil, tree bases, rocks, branches, and downed woody debris
4. Increased exotic annual grasses and weed species by creation of optimal 'weed' habitat; further degradation of already invaded areas by release of weed seed bank and weed spread in resulting early successional habitats
5. Increased reproduction and population size; creation of optimal habitat by simulating 'natural' fire processes
6. Exotic and noxious weed control can adversely affect rare plants if present in treatment areas. Decreased noxious weeds would create more optimal habitat to rare plants

Table 4-20. Potential Effects to Special Status Plants or Habitats as a result of Proposed Activities

Vegetation Management in Old-growth Emphasis Area (Conifer communities)

1. Direct physical injury to rare plants, depending on the season of the action; decrease in reproduction and seed production; disruption of rare plant pollinators and habitat; reduced population size; loss of populations
2. Physical disturbance and loss of duff, organic layer, and mineral soils affecting nutrients, hydrology, growing sites, and important fungal relationships (especially for rare orchids)
3. Physical alteration of rare plant substrates especially duff, mineral soil, tree bases, snags, low limbs, rocks, downed logs
4. Changes in light, humidity, temperature, wind and precipitation interception from a decrease in canopy closure
5. Changes in the successional state of the plant community can adversely affect some and benefit other rare plant species (species specific). Habitat loss often is not permanent
6. Increase in early-successional, under-story species, including the introduction and spread of exotic annual grasses and weeds that can compete with rare plants for space, light, water and nutrients

Fire Suppression (in Diversity or Old Growth Emphasis Areas)

1. Direct mortality from equipment/personnel; prevention of flowering and seed production; reduced population sizes of rare plants by direct physical damage from line building activities
2. Compaction of soil from equipment (dozers)
3. Increased risk of catastrophic, intense, stand replacing fires causing a loss of rare plants and habitat on a large scale
4. Changes in nutrients by use of fire retardant (fertilizer based)
5. Loss of rare plant habitats or substrates by physical disturbance, e.g. falling snags, tractor piling woody debris, dozer line building, organic litter layer raking
6. Changes to native vegetation and further degradation of already invaded areas by spread of introduced grasses or weeds through ground disturbing activities, especially from equipment
7. Increase in later successional communities by excluding fire; increased canopy, higher levels of downed woody debris / fuel loads benefitting some and adversely affecting other rare plants

Prescribed Fire (in Diversity or Old Growth Emphasis Areas)

1. Direct mortality from fire, depending on the timing of the action; prevention of flowering and reduction in seed production; reduced population size
2. Loss of habitats or substrates by physical disturbance, e.g. falling snags, burning of downed woody debris, duff, and organic layers, organic litter layer raking, decrease in canopy cover, baking the soil
3. Increase in exotic grasses and weed species by creation of optimal 'weed' habitat depending on presence existing populations; further degradation of already invaded areas by release of seed bank and weed spread in early successional habitat
4. Decreased risk of large scale, severe, catastrophic wildfire that could adversely affect rare plants and habitat. More frequent, less intense ground fire will benefit some rare plants by creation of more suitable habitat
5. Changes in successional states, structure and composition of plant communities, adversely affecting some and benefitting other rare plant species.

Table 4-20. Potential Effects to Special Status Plants or Habitats as a result of Proposed Activities

Special Forest Products Collection
1. Intense commercial or personal use collection of rare plants can result in decreased population sizes, and potentially reduce genetic diversity by harvesting reproducing individuals and depleting the seed bank through time. Depending on the demand, populations can be eliminated 2. Collection of rare plants is not allowed under the current permit system except for authorized voucher specimens and scientific research
Transportation, Rights-of-Way/Communication and Visitor facilities
1. Permanent loss of rare plant habitat, individuals and small populations from construction of roads, facilities, skid roads, and landings 2. Available water and nutrients for vegetation is redirected by road ditches and culverts 3. Increase in exotic and weed species along roads; further degradation of already invaded areas by spread of introduced or weed species through new road construction, road use and maintenance, and road decommissioning and rehabilitation (soil disturbance) 4. Increased access can result in increased illegal harvesting / collection of rare plants 5. Changes to microclimate in surrounding habitat; edge effect influence 6. Loss of rare plant habitat and populations by road construction, communication facilities and rock source (quarrys) development in desirable rocky ridgetop locations
Mechanized Recreation (Off-Highway Vehicle Use)
1. Direct mortality from crushing; prevention of flowering and reduction in seed production; reduced population size 2. Changes to rare plant habitats, introduction of exotic grasses and weeds, and spread of existing weeds through seed transportation and ground disturbance creating optimal weed habitat (bare soil) 3. Hydrological changes from erosion along trails 4. No affects to rare plants if activity confined to open, existing roads (no off road)
Recreation / Non-mechanized Recreation / Horse/Pack Stock Recreation
1. Illegal harvesting / collection and incidental 'wildflower' picking of rare plants can occur with increased visitor use 2. Direct mortality from human trampling, trail building, and maintenance; browsing and trampling from pack stock; results in prevention of flowering and reduction in seed production; reduced population size or loss of small populations 3. Increase in introduced plants and weed establishment from disturbance; expansion of existing infestations along trails, trail heads, high recreation use sites, and dispersed camp sites

Affects of the Alternatives on Special Status Plants

The affects of the alternatives on Bureau Special Status plants (i.e. rare plants) are discussed by the major categories displayed in Chapter 3. Table 4-20 displays general potential effects from these actions. The discussion below identifies the major effects from the proposed actions under each of the alternatives. Table 4-21 summarizes influences to rare plants from the proposed alternatives.

Alternative A - No Action Alternative

Vegetation Management (Diversity Emphasis Area and Old-Growth Emphasis Area)

Management actions affecting vegetation, with the exception of noxious weed treatments (below), has currently been deferred until completion of a CSNM Plan. There would be no significant effects to any rare plant species or habitat under this alternative. No prescribed burning will occur. Fire suppression tactics would occur with long term adverse effects. (see actions common to all alternatives, below). No significant direct or indirect effects will occur from this 'no action' alternative; existing populations will continue to exist and be exposed to 'natural' stochastic events (e.g. windthrow, wildlfire, herbivory etc.). The cumulative effects are moderate in the Diversity Emphasis Area; past activities and treatments have likely affected populations of rare plants and habitat. Cumulative effects in the Old-Growth Emphasis Area are likely high; past activities and treatments have adversely affected rare plants and populations.

Noxious Weed Control

Noxious weed control treatments have the potential to affect non-target species. A number of habitats in the Monument, especially grasslands, open chaparral and oak woodlands, that contain introduced plants (e.g. annual grasses) and noxious weeds (e.g. yellow starthistle) also contain populations of rare plants. Noxious weeds and other aggressive introduced plants (e.g. annual grasses) threaten rare plants by competing with them for space, light, water and nutrients. Direct, localized adverse effects to individual rare plants can result from hand-pulling, roadside spraying and backpack spraying, depending on the proximity of rare plants from the target weed species, and the mitigation measures designed to protect rare plants. Indirectly, the removal of these weedy species will be beneficial to rare species in these habitats. Through time, if untreated, noxious weeds can eliminate populations and render rare plant habitat unsuitable. Past activities (e.g. grazing, road construction and use, and timber management activities) on federal and non-federal lands have resulted in the introduction and spread of noxious weeds. Recent noxious weed control in the monument has been limited to a few roadsides. Cumulative adverse effects from noxious weed control on rare plants are low; little control has ever occurred.

Special Forest Products

Under interim guidelines for the Monument, commercial and personal use collection of special forest products (fungi, medicinal plants, burls, boughs, etc.) would not be allowed. While the collection of rare plants currently is not authorized under permit, except in special cases regarding scientific research and herbarium voucher specimens, any 'incidental' harvest of rare fungi and rare plants with medicinal properties would be not be allowed. This would have a direct and indirect beneficial effect for rare plants, as individuals and populations will be maintained. Past harvesting has likely affected some rare plant species, like Green's mariposa lily (*Calochortus greenei*). However, the scale and intensity of rare plant collection has been small within the Monument. Cumulative effects are low.

Transportation

Under this alternative, road maintenance, rehabilitation, restoration, and new construction are allowed. These activities would follow the guidelines of the Aquatic Conservation Strategy and Best Management Practices. Rare plants have been found along road edges, and within the road prism of old, closed roads. Without site specific mitigation, rare plant populations and habitat could be adversely affected from these activities, especially new road construction and large scale restoration work that affects vegetated cut and fill slopes or areas adjacent to the road prism. General road maintenance overall has little significant effects. Potential indirect effects are the introduction and spread of noxious weeds in disturbed habitats, and microclimate changes to adjacent occupied habitat from the linear openings created by roads. Past activities undoubtedly have altered habitat and affected populations. Activities on adjacent non-federal lands have likely affected habitat and populations within the Monument boundaries. Cumulative effects are high with regard to the loss of rare plants and alteration of rare plant habitat.

Mechanized Recreation

All vehicles are prohibited from leaving designated roads in this alternative. The use of existing open roads by motorized and mechanized vehicles would have no direct affects to rare plants or habitat. Existing, open roads are not suitable rare plant habitat. Indirectly, mechanized recreation can contribute to the spread of noxious weeds along roadways, and introduce weeds into new areas off the roadway. Some illegal off-road use is likely to occur. This would have some localized adverse effects to rare plants and habitat, especially in open woodlands/ grasslands along open ridge-lines, and in vernally wet meadows. Assuming that vehicles stay on open designated roads, the potential affects to rare plants would be limited. Cumulative effects from mechanized recreation are moderate; past activities have likely affected some rare plants and habitats.

Non-Mechanized Recreation

This activity is unrestricted in the Monument with this alternative. These effects are very hard to predict considering the large area, and the array of future recreation possibilities. Rare plant habitats along ridge lines, high points, and at lakes and riparian sites would experience increased use through time. Unrestricted non-mechanized recreation would have some localized direct effects from trampling on individual rare plants, or picking of rare plant flowers. Based on the current and reasonably foreseeable level of use, these effects would be localized and probably have insignificant effects to the viability of rare plant populations in the Monument. Some indirect effects are possible from the introduction and spread of noxious weeds by hikers along official and unofficial trails, and in dispersed campsites. Cumulative effects on non-mechanized recreation are low, past activities have not likely had significant effects to rare plants.

Recreational Animal Stock Use

Commercial recreational animal stock use is not allowed under this alternative. However, non-commercial recreational animal stock use is unrestricted within the Monument. Off-trail stock use has the potential for localized direct adverse effects to rare plants and habitat. Many rare plants are palatable, including the federally listed Gentner's fritillary (*Fritillaria gentneri*). Unrestricted stock use can directly effect rare plants by trampling and browsing. Indirect effects from modification of habitat include disturbing the soil, duff and other rare plant substrates, and the introduction and spread of noxious weeds that can compete with rare plants. Repeated use can create new trails especially along ridgelines, leading to increased access. Cumulative effects are moderate; past use has likely affected some rare plants and habitats in localized areas.

Visitor Facilities

This alternative does not expand existing visitor facilities at Hyatt Lake, but it allows new parking, trail-head facilities, new interpretive sites, signing, and toilets, as needed. Any ground disturbing actions (construction of new facilities) can affect rare plants if they are present at the site. Direct adverse affects from new construction are possible. The magnitude of these effects however, would be relatively small; few acres in the monument would be directly impacted. Indirect effects include increased visitor use, and an increase and spread of introduced and noxious weeds around recreation sites from visiting vehicles. Cumulative effects are low to moderate; past construction of visitor facilities have potentially affected some rare plants and habitat but the scale of impacts have been limited.

Linear Rights-of-Way and Communication Sites

This alternative allows for continued granting of Rights-of-Way, leases, and permits. Current permits and agreements on existing roads, including road maintenance, will not have significant effects to rare plants, unless major road restoration/relocation work occurs. The building of new roads, new power line construction or expansion, and construction of communication sites (ridge tops and peaks) can directly adversely affect rare plants and habitats. Access roads and the disturbed corridor under power lines can provide for the spread of introduced and noxious weeds into un-infested areas, indirectly affecting rare plants. Cumulative effects are high; past activities have likely adversely affected rare plant populations especially along the existing power line corridors and past road construction for Rights-of-Ways.

Action Alternatives - Alternatives B, C and D

In this section, the action alternatives are discussed by the management actions identified under each alternative. Table 4-21 displays a summary of overall effects.

Vegetation Management (Diversity Emphasis Area)

There is a wide range of effects from the differing action alternatives.

Alternative B focuses on allowing 'natural processes' to occur to maintain diversity of grasslands, chaparral and oak woodlands. Surveying and monitoring will be the emphasis. No prescribed burning will occur. Noxious weed control will be allowed and is discussed separately (see below). No significant direct or indirect effects to rare plants are expected from surveying and monitoring. Cumulative effects are low.

Alternatives C and D vary in the tools used to maintain and restore habitat, and in the intensity and acres of treatment. Any ground disturbing activity has the potential to adversely affect rare plant populations if populations are in the treated area. Reducing shrub and invading tree densities, opening canopies, and reducing the risk of catastrophic wildfire, can provide indirect beneficial effects by maintaining and creating suitable habitat for many documented rare plants associated with these diverse communities.

Alternative C minimizes soil disturbance and does not allow the use of heavy machines, except for road restoration work. Broadcast burning, manual thinning, hand piling and burning of piles are used to reduce shrub and tree densities and restore grasslands, chaparral and oak woodlands. This activity does have the potential to adversely affect localized individuals and small populations of rare plants, mostly from direct physical impacts. Cumulative effects are moderate, some populations and habitat have likely experienced affects from past activities.

Prescribed fire is utilized both in Alternatives C and D in the Diversity Area. Fire has the potential to adversely affect individuals and populations (especially vascular plants) if burning is done in the spring or early summer during the growing season. Spring

burns (after late February) and early summer burns (before July) can directly burn growing plants, reduce reproduction, and population size in the short-term, including affects to the listed plant Gentner's fritillary. Fall burns would have little significant direct effects as most rare plants have gone dormant. Indirectly, over the long-term, the resulting habitat following a thinning or burning activity can provide better growing conditions (increased light and moisture), and reduced fuel loads. This would provide a long-term benefit for many rare plants in the monument found in grasslands, chaparral and oak woodlands. If not addressed and mitigated, prescribed fire also can increase introduced and noxious weed populations, especially in grasslands, by creating optimal growing conditions for those species as well.

Alternative D allows the use of all available tools to aggressively treat the landscape, and includes the use of heavy machines, mechanical chippers, tractors, discs and plows. The increased level of ground disturbance and treatment acres would increase the risk of direct adverse affects on rare plant populations in the Monument. Like Alternative C, in the long-term, the resulting stand conditions would provide better habitat for surviving populations of rare plants. The affects of prescribed fire are similar to the effects of Alternative C, with some potential adverse effects initially, and beneficial effects in the long-term as a result of more diverse, and improved habitats. Cumulative effects are moderate, some past affects have likely occurred to some rare plants.

Vegetation Management (Old-Growth Emphasis Area)

Alternative B allows for the treatment of early to mid conifer stands to move them toward late successional stands. This includes pre-commercial thinning, slash reduction treatments, pile burning, and treatments within riparian reserves in sub-watersheds lacking late old growth. The treatments are non-commercial. Very young stands (often older plantations) often less than 30 years of age, are generally not considered highly suitable habitat for most rare plants found in conifer communities, although a few occurrences have been documented. Several rare plants have been found in small, usually rocky, openings within mixed conifer communities, and in old clearcuts in the Monument. There would be little significant direct or indirect effects to these populations of rare plants in these younger stands; some individual plants could be affected. Thinning activities (cutting trees), piling and burning, in slightly older stands however, does have the potential to have localized adverse affects on some rare plant species and on several rare fungi and lichens that are on the Bureau Special Status list. The continued and accelerated development of late-successional and old-growth stands within the Monument would benefit certain rare plants associated with these habitats in the long-term. A number of rare plant species associated with conifer stands are found in mature and old growth stands. For this alternative, while there could be localized direct effects in the short-term, indirectly some habitat for many rare plants would be improved in the long-term. Cumulative effects are high; past vegetation activities in conifer communities on federal and non-federal lands have likely affected rare plants in the Monument that are associated with conifer communities.

Alternative C focuses on protecting late-successional conifer stands from the threat of catastrophic wildfire. This is accomplished by reducing fuel loads in all high fire hazard conifer stands adjacent to old growth stands by thinning (pre-commercial and commercial) and fuel reduction treatments (slashing/burning). Fuel treatments within existing high fire hazard old growth stands would also occur. Attention will be given to reducing white fir (*Abies concolor*) component from these old growth stands by thinning or using understory burning. Several of the rare fungi species are usually associated with white fir. Several rare plants are associated with mature and old-growth Douglas-fir stands. These activities can directly adversely affect rare plants by physical disturbance, altering the substrate and growing sites, and changing the microclimate. Several rare plant species found in mid to late-successional conifer stands can be adversely affected from burning activities, depending on the intensity and season . Indirectly the resulting habitat following localized under-story burning would benefit

certain rare plants. Indirectly, soil disturbance from machinery and road building can result in increased levels of noxious weeds in affected stands, especially weedy thistle species. The continued and accelerated development of late-successional and old-growth stands within the Monument would provide habitat and benefit certain rare plants associated with these habitats in the long-term, as long as existing populations survive and can colonize these sites. Reducing the risk of catastrophic, stand replacing wildfire indirectly would benefit rare plants, including those in adjacent evergreen hardwood and chaparral communities. The cumulative effects are high; past harvest activities within the Monument on federal and non-federal lands have undoubtedly affected rare plants associated with mature and old-growth conifer forests.

Alternative D incorporates Alternative C with additional treatments on more acres to protect and enhance existing late-successional and old-growth forests by pre-commercial and commercial thinning, and fuel reduction treatments (piling and burning). More acres of potential old-growth would also be treated. The effects of this alternative are similar to Alternative C except that more acres of old-growth would be treated. Adverse direct and indirect effects to later succession rare plants are probable, similar to Alternative C. The continued and accelerated development of late-successional and old-growth stands within the Monument would provide more habitat and benefit certain rare plants associated with these habitats in the long-term, as long as existing populations survive and can colonize these sites. The cumulative effects are high; past harvest activities within the monument on federal and non-federal lands have undoubtedly affected rare plants associated with mature and old growth conifer forests.

Noxious Weed Control

Noxious weed control treatments (hand pulling, mowing, chemical spraying) have the potential to affect non-target species including rare plants in all alternatives. Biological control (i.e. exotic insects) would not have any significant affects on any rare plant species. None of these approved biological control insects have been documented to target any rare plant species known in the Monument. Bio-control measures also generally don't eliminate weed populations in the short-term. The effects to rare plants from noxious weed control is the same for all action alternatives, with the exception that more acres of vegetation treatment and ground disturbance increase under the successive alternatives. As more acres experience ground disturbance, the risk of the spread of existing noxious weeds, and the introduction of new weed species into the Monument increases. If untreated, this will result in more acres of infestation and the need to treat more acres in the future.

A number of 'natural' and disturbed habitats in the Monument contain introduced and noxious weeds, especially grasslands, open chaparral, oak woodland savannahs, roadsides, old landings, skid roads in past harvest units, and old pastures. Noxious weeds and other aggressive introduced plants (e.g. annual grasses) threaten rare plants by competing with them for space, light, water and nutrients. Direct, localized adverse effects to individual rare plants can result from mechanical and chemical treatments depending on the proximity of growing rare plants from the target weed species, and the season of treatment. The use of fire to reduce weeds also can adversely affect rare plants depending on the season of use and intensity of the burn. Burning during the growing season (spring/early summer) would kill individual rare plants if present in the treatment area. Populations may survive depending on the existing seed bank, the severity and pattern of the burn, and the species ability to survive fire (e.g. perennial, deep rooted species). Indirectly, the removal of these weeds will be beneficial to rare species in these habitats in the long-term, so long as individual rare plants survive and are able to re-colonize restored habitats. Through time, if not treated, and if habitats continue to experience disturbance perturbations from drought, wildfire, grazing, and other management activities, noxious weeds will render some plant communities unsuitable for rare plants, and change the ecology of rare plant communities.

Past activities (e.g. grazing, road construction, and timber management activities) on federal and non-federal lands have likely resulted in the introduction and spread of noxious weeds. Recent noxious weed control in the Monument has been limited to a few roadsides treatments for Canadian thistle. Cumulative adverse effects from noxious weed control on rare plants are low; little control has ever occurred in the Monument.

Special Forest Products

Alternative B restricts all commercial and personal use collection of Special Forest Products (SPFs), including fungi and medicinal plants, with the exception of approved scientific research, and existing Tribal rights. As some rare fungi and rare plants have food, herbal, and medicinal uses, this would have a direct beneficial affect; harvesting of rare plants would be reduced. Potential ground disturbance from collection of any SFPs would not occur. Past harvesting of certain plants has affected some rare species like Green's mariposa lily (*Calochortus greenei*), which was commercially collected historically. However, the scale and intensity of rare plant collection overall has been small within the Monument. Cumulative effects are low.

Alternatives C and D restrict all commercial harvests, but allows personal collections for fungi. Harvests of all other Special Forest Products is not allowed. This would protect most rare plants, with the exception of a few rare fungi that are also edible. Some limited direct affects would occur, however the scale and intensity of collection of these few species is probably insignificant. Most mushroom collectors are targeting species like morels or chanterelles, which are not rare. Cumulative effects from past, present and future collections are low.

Transportation

Under all the action Alternatives (B, C, and D), road maintenance, rehabilitation, restoration, removal, and new construction is allowed, following the guidelines of the Monument Aquatic Conservation Strategy and Best Management Practices. The scale of activities differs mainly between leaving open, maintaining, and closing certain roads, and the methods used to close or maintain roads. Certain rare plants have been found along road edges, and within the road prism of old, closed roads. These rare plant populations can be adversely affected from closure and restoration/rehabilitation activities from direct physical effects from equipment. The scale of these effects is limited however, as few rare plants routinely occupy road habitat. These incidental sites are often outliers of existing occurrences off the roadway in the local vicinity. General road maintenance has slight, usually insignificant effects. New road construction, which is allowed under all the alternatives, and large-scale restoration work that affects vegetated cut and fill slopes or intact vegetation adjacent to the road prism, has the potential to directly affect rare plant populations and individuals. Potential indirect effects are the introduction and spread of noxious weeds in disturbed habitats, and microclimate changes to adjacent occupied habitat from the linear openings created by roads. Cumulative effects are high with regard to the loss of rare plants and alteration of rare plant habitat. Past transportation activities have altered habitat and likely adversely affected populations on federal and non-federal lands within the Monument boundaries.

Mechanized Recreation

All vehicles are prohibited from leaving designated roads in Alternatives B, C and D. The use of existing open roads by motorized and mechanized vehicles in the action alternatives would have no direct effects to rare plants or habitat. Existing, open roads are not highly suitable rare plant habitat. Indirectly, mechanized recreation can contribute to the spread of noxious weeds along roadways, depending on the existing densities, and introduce weeds into new areas off the roadway. Some illegal off-road use will occur given access. This would have some localized adverse effects to rare plants and habitat, especially in open woodlands and grasslands along open ridge-lines, and in vernally wet meadows. In Alternative D, new road construction for mechanized

recreation would be allowed. This could have the same direct and indirect effects to rare plants as road construction for other uses (discussed above). If not mitigated, adverse effects from new construction will occur if rare plants are present. Cumulative effects from mechanized recreation are moderate; past activities, especially off road travel in rare plant habitat, have likely affected some rare plants in the recent past.

Non-Mechanized Recreation and Animal Stock Use

Under Alternative B, no new hiking trails would be constructed, camping would only occur in existing campgrounds, only existing BLM trails would be maintained, and a number of recreation activities would not be allowed in the Monument (technical rock climbing, hang gliding, etc.). This alternative would generally confine non-mechanized recreation to existing recreation sites and trails, and reduce any incidental adverse effects (e.g. trampling and picking) to rare plant populations from recreation. Cross country hiking would be permitted, except off trail or roads in the RNAs. Animal Stock use in Alternative B is not allowed, with the exception of permitted cattle grazing in the Monument which will be studied for three years. Alternative B would have a beneficial effect to rare plants and habitats by decreasing localized effects from non-mechanized recreation from current levels.

Alternatives C and D allows 'leave no trace' camping across most of the Monument. Some localized adverse effects (trampling) from hiking, camping and hang-gliders on individual rare plants could occur. The effects from hang gliders and para-sailors launching, landing or crashing into occupied rare plant habitat could have some limited effects to individual rare plants if present in those areas, mostly from soil disturbance and trampling impacts. Hiking, camping and flying off ridges will be insignificant to the viability of existing populations given the levels of current and foreseeable future use. Alternatives C and D allow for new trail construction, and off trail stock use. These actions will have adverse direct effects on localized populations of rare plant species. Trail construction can destroy small populations of rare plants and stock use can trample and browse rare plants. New un-official horse trails can be created through time, especially along open ridge lines that also are habitat for several rare species, including the listed Gentner's fritillary. Indirectly, off trail stock use can spread existing noxious weeds through physical disturbance, especially along ridge lines and open oak woodland / grassland habitats. Alternatives C and D differ in the numbers of stock use allowed, but overall the difference is insignificant with regard to predicted localized effects; effects will depend on where and when the activities occur. Cumulative effects from non-mechanized recreation in the action Alternatives B, C and D, are likely low to moderate; past activities have had some significant localized effects to rare plants.

Visitor Facilities

Alternative B does not expand existing visitor facilities and allows only for the maintenance of existing facilities and interpretive sites. As no new ground disturbing activities would occur this alternative would have no significant direct influences to rare plants species. The maintenance of existing facilities has no significant effects on rare plants. The current and foreseeable future use of the designated facilities would not affect rare plant populations. Cumulative effects are low; past maintenance of facilities have not significantly affected rare plants.

Alternative C allows for the maintenance of existing facilities and some improvement and alteration of existing facilities and interpretive sites. New parking and new trailhead facilities would be allowed at existing sites to protect resources. Some limited ground disturbing activities could occur. Limited direct adverse affects to rare plants are possible if plants are present in those areas. Cumulative effects are low to moderate; past construction may have had some limited affects to rare plants. However, the magnitude of these effects has been small within the Monument.

Alternative D is allows for new construction and development of existing and new sites for recreation and interpretation. The development of new facilities would involve ground disturbing activities, and has the potential for direct adverse effects to rare

plants and habitat if occurrences are present. Ground disturbance and increased visitor use could result in the spread and increase of noxious weeds. Cumulative effects are similar to Alternative C.

Linear Rights-of-Way and Communication Sites

Alternative B does not authorize any new Rights-of-Way or communication sites. No expansion of existing sites and facilities would be allowed; maintenance of existing features under permit would be allowed, subject to valid existing rights. This would not have any significant direct or indirect effects to rare plants within the Monument. Cumulative effects are moderate to high; past activities have likely affected rare plants and habitat, especially from roads and power line construction.

Alternatives C and D have the same effects for rare plants. Both would not allow new communication sites or new facilities development, however new Rights-of-Way permits could be issued. Ground disturbing activities could directly adversely affect rare plants and suitable habitat. Cumulative effects are moderate to high; past activities have likely affected rare plants and habitat, especially from roads and power line construction.

Table 4-21 ranks and compares potential adverse effects to Bureau Special Status Plant species and their habitats by proposed alternatives.

Table 4-21. Summarizes the Predicted Overall Effects of Proposed Alternatives on Bureau Special Status Plants by Activities

Activities	Alt. A	Alt. B	Alt. C	Alt. D
Vegetation Mgt in Diversity Emphasis Area	**0**	**0**	− +	− +
Vegetation Mgt in Old Growth Emphasis Area	**0**	− +	− +	− +
Noxious Weed Treatments	− +	− +	− +	− +
Special Forest Products	+	+	**0**	**0**
Transportation	− −	− −	− −	− −
Mechanical Recreation	−	−	−	− −
Non-Mechanized Recreation	−	+	− −	− −
Animal Stock Use	− −	+	− −	−
Visitor Facilities	−	**0**	−	− −
ROW's / Communication Sites	− −	**0**	− −	− −
Fire Suppression	+ −	+ −	+ −	+ −

− = slight, limited adverse effects
− − = adverse effects
− + = short-term adverse effects, long-term beneficial effects
0 = Neutral effect or no significant effects
+ − = overall short-term beneficial effects, long-term adverse effects
\+ = beneficial effects

Analysis of Features Common to All Alternatives that Affect Rare Plants

Monument Aquatic Conservation Strategy

The Monument Aquatic Conservation Strategy provides for some secondary protection for rare plants species, especially those found in riparian, springs and wetland communities. Riparian reserves established for aquatic concerns often provide for protection of certain riparian rare plants. Restoration and enhancement activities are also allowed in riparian reserves when they benefit aquatic habitat and species. Unfortunately, these activities while benefitting aquatic habitat, can adversely affect rare plants that live in the terrestrial component of riparian areas and flood plains. The use of equipment in riparian areas, and the placing of in-stream large woody debris, can crush rare plants, and alter habitat and existing micro-habitat conditions. While wetlands and springs have been identified as high priority for restoration because of rare endemic mollusks, seeps and springs also are highly suitable habitat for rare plants as well. Unless restoration activities in these fragile habitats are designed to address rare riparian plants as well, adverse direct and indirect effects to these species are possible.

Wildfire suppression

Continued wildfire suppression under the existing agreement with the Oregon State Department of Forestry in the Monument has the potential to cause some direct adverse effects to rare plants in the monument, if populations exist in action areas. Much of the lands in the Monument have not had formal rare plant surveys; highly suitable un-surveyed habitat is abundant. Known sites are mapped and available to Resource advisors so as to minimize effects to rare plant sites, including the location of the federally listed *Fritillaria gentneri*. By law (Endangered Species Act, 1973, as amended), emergency consultation with the U.S. Fish and Wildlife Service is required if emergency situations (fires) threaten or affect this species.

Fire suppression tactics allowed in the Monument, especially the use of heavy equipment and bulldozers along ridge lines and in open oak woodlands, can adversely affect rare plants and habitat as fire lines are dug. Off-road vehicles are not allowed in the Monument, with the exception of bulldozers for wildfire. The construction of heli-spots can also affect small areas of suitable habitat for rare plants, especially on open ridge lines. Fire retardant, which is fertilizer based, can change nutrient levels, especially for species adapted to nutrient limited sites (shallow soiled, rocky areas along ridge-lines). Current fire suppression tactics within the Monument allow engines and other equipment off road, although efforts to minimize crossings of stream, seeps and springs is mandated.

At the landscape level, suppressing fires will provide immediate direct protection of occupied rare plant habitat, especially in grasslands, chaparral and mixed evergreen/ oak wood lands. Indirectly, the exclusion of fire in many of these communities that support rare plants will adversely affect populations through time. Increased canopy cover (shrubs and trees), decreased light and moisture can reduce the reproducing population size of many rare plants, and allow succession to reduce suitable habitat. Fire exclusion has lead to increased densities and fuel loads such that a large fire event is inevitable. The resulting event could be of such a severity and at such a scale, that rare plants populations could be eliminated from whole drainages. Some other rare plant species, adapted to late-successional conifer communities may benefit from a late-successional condition, depending on the potential of the site. Cumulative effects from fire suppression tactics are high; past suppression efforts have likely lead to the loss of some rare plant populations, and rare plant habitat. Current suppression tactics will continue to affect plants. Regardless of future suppression tactics, large fire events, perhaps ones more severe that recent historical fires, are inevitable.

Table 4-22 is a compilation of the alternatives comparison table used to help determine cumulative effects. Effects were considered across all land use allocations and includes all proposed management activities.

Table 4-22. Cumulative Effects to Rare Plants and Associated Habitat

Proposed Activity	Overall Cumulative Effects by Alternative			
	A	B	C	D
Vegetation Mgt in Diversity Emphasis Area	Moderate	Low	Moderate	Moderate
Vegetation Mgt in Old Growth Emphasis Area	High	High	High	High
Noxious Weed Treatments	Low	Low	Low	Low
Special Forest Products	Low	Low	Low	Low
Transportation	High	High	High	High
Mechanical Recreation	Moderate	Moderate	Moderate	Moderate
Non-Mechanized Recreation	Low	Low	Low	Low
Animal Stock Use	Moderate	Moderate	Moderate	Moderate
Visitor Facilities	Low-moderate	Low	Low-Moderate	Low-Moderate
Rights-of-Way/ Communication Sites	High	High	High	High

Noxious Weeds and Introduced Plants

Noxious weeds and other introduced species alter ecological systems, reduce biodiversity and degrade habitat quality. The change in plant communities species composition is the most obvious effect. Left unmanaged, noxious weeds and introduced plants will often obtain and maintain site dominance. Many areas within the Monument, especially grasslands and open oak woodlands contain populations of introduced and noxious weed species. Altering the species composition also changes the physical structure of the plant community. Once these plants are established, they can alter soil properties, available soil moisture, the nutrient cycle, and indirectly, the insect, plant, and animal populations. Noxious weeds and introduced plants are usually associated with disturbed ground. However, some species can invade undisturbed and managed land in good condition, once introduced into an area.

Interspersed private lands compound the problem of weed management. Often, these lands are highly disturbed with established weed populations. Roads and trails passing through infested private land serve as seed sources for vehicles and recreationists to spread.

With few exceptions, any ground disturbing actions associated with the activities proposed in the different alternatives have the potential to exacerbate existing occurrences of introduced and weed species, depending on 1) proximity to existing populations (i.e. a source), 2) the scale and magnitude of the disturbance, and 3) effectiveness of any concurrent weed control treatments and re-vegetation efforts. Limited weed treatment control has occurred in the past on the lands within the Monument.

Management activities with the greatest potential for promoting weed establishment and spread are, grazing, vegetation treatments involving mechanical means, new road or trail construction, off-roadway vehicle and stock use, and the construction of new facilities. Even without significant disturbance from management actions, many introduced and noxious weed populations will continue to increase especially in grasslands, open oak woodlands, along roads and at visitor facilities. Table 4-23 reflects these slight increases. Noxious weed treatment is common to all alternatives and will result in a decrease of weeds in areas treated.

Thinning or fuel treatments in conifer communities, which is designed to protect and facilitate the development of old-growth communities, can cause soil disturbance resulting in available growing sites for weeds. Mechanical recreation on open roads can still spread weeds depending on the existing densities of weeds on the roads and road edges, however the effects are relatively slight. The construction of new roads, for any use, can result in increases in weeds if they are present or introduced into bared soil areas. Non-mechanized recreation can bring in new weeds into trail-heads, and spread weeds along trails and in camping areas. Stock use, especially off trail, can result in weed spread and introduction, mostly due to soil disturbance along trails, and weeds in feed and straw.

Prescribed fire used as a tool to reduce densities of other vegetation and fuels, and restore plant communities (especially grasslands, chaparral, and oak woodlands) can result in decreases or increases in introduced and noxious weed species depending on the timing of the burns, the proximity to seed sources, the severity, and how fast the site is regenerated with native species. In Alternatives A and B, no prescribed fire will occur. This “no-action” would still result in increases in introduced and noxious weeds in areas where large infestations currently exist, especially in already degraded habitats. Prescribed burning that is proposed in Alternative C and D, especially in the Diversity Emphasis Area will aid in rejuvenating plant communities, stimulating perennial grasses, and improving the health of these sites to resist weed invasions. Unfortunately,

many of these sites already have high densities of annual grasses and exotic weeds like star-thistle such that just burning alone will likely not decrease these occurrences, and could increase populations. Decadent chaparral communities that have few remaining species in the under-story, once opened up by fire or mechanical means, can be sites that weeds can invade from adjacent occupied areas. Alternative D will also utilizes heavy machinery for treatment, which will have some inherent level of soil disturbance associated with it.

The Table 4-23 below provides an overall comparison of the proposed alternatives as they influence weed establishment and spread.

Table 4-23. Predicted Effects of Noxious Weeds Trends from Activities in Proposed Alternatives

Proposed Activity	A	B	C	D
Vegetation Mgt in Diversity Emphasis Area	Slight Increase	Slight Increase	Slight Increase	Increase
Vegetation Mgt in Old Growth Emphasis Area	Slight Increase	Increase	Increase	Increase
Noxious Weed Treatments	Decrease	Decrease	Decrease	Decrease
Special Forest Products	No effect	No effect	No effect	No effect
Transportation	Increase	Increase	Increase	Increase
Mechanical Recreation	Slight Increase	Slight Increase	Slight Increase	Increase
Non-Mechanized Recreation	Slight Increase	Slight Increase	Increase	Increase
Animal Stock Use	Increase	Slight Increase	Increase	Increase
Visitor Facilities	Slight Increase	Slight Increase	Slight Increase	Increase
ROW's / Communication Sites	Increase	Slight Increase	Increase	Increase

Cumulative effects of introduced and noxious weeds are moderate to high for all alternatives. Past activities have resulted in the establishment and expansion of weeds within the Monument. Historical and current control efforts have not occurred on very many acres on lands in the Monument. Existing occurrences will continue to spread, especially in grassland, open oak woodlands, and along roads without disturbance. Some proposed activities to provide for the health landscape processes, (e.g. thinning dense oak woodlands, burning grasslands or decadent chaparral) can in specific areas result in increased noxious weeds). Weed occurrences on non-federal lands are likely to continue to increase providing a source of seed to adjacent federal lands.

Fuels Management

Alternative A - Interim Management

The current trend of increasing fuel loadings would continue until fuels management activities are initiated. The use of prescribed fire would be delayed a minimum of one year. This delay would have short term minimal impacts on reducing fire hazard.

Alternative B

Fuels management activities would be utilized to mitigate slash that is created when thinning late-sucessional and old-growth (LSOG) habitat type 3. Approximately 3,400 acres would be treated over the next decade. Of these acres approximately 2,300 acres are of moderate and high fuel hazard within 1/4 mile of LSOG habitat types 1 and 2. The fuels reduction work on these acres would have some impact on protecting habitat types 1 and 2. The fuels reduction work would reduce ladder and surface fuels which in turn would reduce fire behavior such as fire intensity and flame length. By reducing flame length direct fire supression efforts would be more effective which could reduce the size of a wildfire. The reduciton of the size of a wildfire would minimize resources damaged. The change of fire intensity and flame length in these stands would also reduce the chance of a crown fire initiating in these stands which would reduce mortality to the forest stand.

Elsewhere in the CSNM, the use of prescribed fire would occur in unique cases such as the control of noxious weeds. This limited use would continue the absence of fire on a large portion of the CSNM. The probability increases, due to increased fuel loadings, when a fire starts under high to extreme fire conditions, it will burn at higher intensities than historically occurred in the low to moderate fire regimes which exist in the CSNM. Ecological objectives such as the development and maintenance of vegetative diversity in fire prone ecosystems would not be met within the CSNM.

Alternative C

This alternative better utilizes a landscape approach in fuels management. A landscape-level approach to fuels management is the most effective method in modifying fire behavior (intensity and size) of a wildfire. "A landscape-level approach to fuels looks at the large areas as a whole, in an attempt to fragment existing continuous, heavy fuel in high risk areas" (Weatherspoon and Skinner 1996). "Landscape-level treatments have been proposed as a fuel management strategy that can aid wildfire control and help achieve more broad-based ecosystem management goals" (Agee and Edmonds 1992, Weatherspoon 1996, Weatherspoon and Skinner 1996), "particularly in areas that have historically low- to moderate-severity fire regimes" (Agee 1993).

Areas of high fuel hazard within habitat 1 and 2 are proposed for treatment. The predicted fire behavior, within the areas of high fuel hazard, would produce flame lengths of six feet and greater. These predictions are from a surface fire burning under weather conditions that are typical in the CSNM for the months of July through September. Flame lengths of this size utilized in fire effects models estimates that over 50 percent of the trees in habitat types 1 and 2 would be killed. Treating existing surface fuels and ladder fuels of non-commercial size would alter the fire behavior of a surface fire which would minimize mortality to trees in habitat types 1 and 2.

All areas of high fire hazard and all moderate fire hazard of habitat 3 within 1/4 mile of habitat types 1 and 2 would also be treated. The treatment of these 6,000 acres further aids in the protection of habitat types 1 and 2 by reducing fuels that are currently available to burn in the event of a wildfire.

The alteration of these fuels would change existing fuel levels such that a higher probability exist that wildfires would burn at lower intensities. Fires which burn with lower intensities cause less damage to vegetation and soils and also allows direct suppression efforts to be utilized under more extreme weather conditions. When direct attack suppression methods can be used, fire size can be reduced under most cases.

Ecological objectives such as the development and maintenance of vegetative diversity in fire prone ecosystems would also be met. In the grasslands prescribed fire would increase native grass domination. Prescribed fire would help recreate a range of wedgeleaf ceanothus stand ages across the landscape and in Woodlands would help restore the balance of herbaceous plants, shrubs and trees.

Prescribed fire would also be used strategically on the landscape to reinforce natural features such as major ridge lines to aid in the suppression of wildfires. The ridge line that runs from Pilot Rock to Soda Mountain and Keene Ridge which runs from Soda Mountain to Jenny Creek has been identified as a critical natural feature for fire suppression by ODF. Wildfires which may start south of this ridge line under extreme weather conditions are a concern due to the high fuel hazard and limited access which exist in this area. Indirect suppression efforts would need to be taken along this ridge line in order to keep fires from burning onto private land and into the northern portion of the CSNM. Prioritizing fuels management work along and adjacent to this ridge line would increase the chance that this natural feature could be effectively and safely utilized in wildfire suppression efforts.

Alternative D

This alternative also utilizes a landscape approach in fuels management. An additional 4,400 acres of moderate hazard within 1/4 mile of habitat types 1 and 2 would be treated under this alternative. The treatment of these acres would further aid in the protection of habitat types 1 and 2 by reducing fuels that are currently available to burn in the event of a wildfire.

Ecological objectives such as the development and maintenance of vegetative diversity in fire prone ecosystems as described in Alternative C would also be met. The treatment of the additional acres would further help in meeting these objectives under this alternative.

Additional acres would also be treated along and adjacent to the ridge line that runs from Pilot Rock to Soda Mountain and Keene Ridge which runs from Soda Mountain to Jenny Creek. This would further increase the safety and effectiveness of this ridge line when used for indirect suppression of wildfires.

Wildfire Suppression

Suppression methods currently utilized within the CSNM would not be further restricted under any of the alternatives. Road access plays an important role in determining response time of initial attack forces to a fire. Road access is limited in the CSNM which is south of Soda Mountain, Pilot Rock, and Keene Ridge. Specific roads in this area which are critical for initial attack forces have been identified by the Oregon Department of Forestry. Refer to Table 4-24 for a list of these roads. The following is a description of each alternative in regards to road closures within the CSNM.

Alternative A - No Action

There would be no impacts to suppression efforts from what exist today. All existing roads that were identified by ODF that are critical for suppression needs in the area south of Soda Mountain, Pilot Rock, and Keene Ridge would be available for fire suppression efforts.

Alternative B

As in Alternative A, there would be no impacts to suppression efforts from what currently exist. All existing roads that were identified by ODF that are critical for suppression needs in the area south Soda Mountain, Pilot Rock, and Keene Ridge would be available for fire suppression efforts.

Several short road spurs throughout the CSNM would be decommissioned under this alternative. This could have some impact to initial attack response time but the expected impacts would be minimal.

Alternative C

All existing roads that were identified by ODF that are critical for suppression needs in the area south Soda Mountain, Pilot Rock, and Keene Ridge would be available for fire suppression efforts.

The same short road spurs that would be decommissioned under Alternative B would be decommissioned under this alternative. This could have some impact to initial attack response time but again impacts are expected to be minimal.

Improvements would be done on the Skookum Creek road and the Soda Mountain lookout road which could increase response time to fires. This would be a positive impact to suppression efforts.

Alternative D

Road systems that tie together greatly assist in suppression efforts. They allow access from different directions and more importantly they provide for more than one escape route for suppression forces. One important tie route that exist in the CSNM is the system that runs from Keene Ridge through Agate Flat to the Copco road. The roads that allow this to occur are the Skookum Creek road which runs from Keene Ridge to

Table 4-24. Key Roads needed for Wildfire Suppression Efforts within the CSNM

Road Name	Road Number/General Location
Power line Roads (Skookum Creek Road)	BLM 40-3E-27.2
Pilot Rock Jeep Road	BLM 40-3E-30.0
Tie Through Road to Emigrant Creek	Private road in T.40S.,R.2E., Section 36
Randcore Pass Road through Private Property to Agate Flat	BLM 40-4E-19.2
Randcore Pass to Rosebud Helipond	BLM 40-3E-19.1
Soda Mountain Road	BLM 39-3E-32.3
Mill Creek to Soda Mountain Road	BLM 40-3E-12.0
Access across Jenny Creek in multiple locations to private property	
Access from California	Copco Road

the Schoheim road in the Agate flat area which then ties into the Copco road. Alternative D would decommission the lower 1-1/2 miles of the Skookum Creek road which would in effect block this tie system. With this system blocked, when utilizing the Skookum Creek road for initial attack, the only escape route would be back up the road to Keene Creek. Escape routes uphill are not ideal and, in most cases, are too dangerous to use. In some cases, suppression tactics would be very limited due to the concern for fire fighter safety with only one escape route which is uphill. Indirect measures would be taken which could lead to larger acres burned.

As in Alternatives B and C several short road spurs throughout the CSNM would be decommissioned. Impacts would be the same as described under those alternatives.

Improvements would be done on the portions of the Skookum Creek road and the Soda Mountain lookout road. These improvements could increase response time to fires which would be a positive impact to suppression efforts.

Air Quality

All the alternatives propose to use prescribed fire so consequently all alternatives will have some smoke related impacts.

The Clean Air Act requires each state to develop and implement a State Implementation Plan (SIP) to ensure that National Ambient Air Quality Standards are attained and maintained for particulate matter (PM10). Within the implementation plan developed for Oregon, a goal to reduce particulate matter emissions (PM10) by 50 percent by the year 2000 was established. PM10 was also identified by the State Implementation Plan as the basis for non-attainment within the Grants Pass and Ashland/Medford area.

The focus of the analysis for each alternative of the effects on air quality from prescribed burning is on the production of PM10 (Particulate Matter smaller than 10 microns). In the Final Medford District Proposed Resource Management Plan/EIS (October 1994) base line emissions were established to measure the Medford District's progress towards meeting the 50 percent reduction of particulate matter emissions. This baseline of 20,000 tons per decade is used for this analysis.

To obtain some indication of how future burning within the CSNM may impact emission reduction goals, the estimated emissions of each alternative was compared to this baseline. For each alternative, projected emissions are well below the baseline value (refer to Figure 1). Based on this, it appears that prescribed burning proposed for the CSNM would not compromise the ability to reach and maintain prescribed burning reduction goals under any of the proposed alternatives.

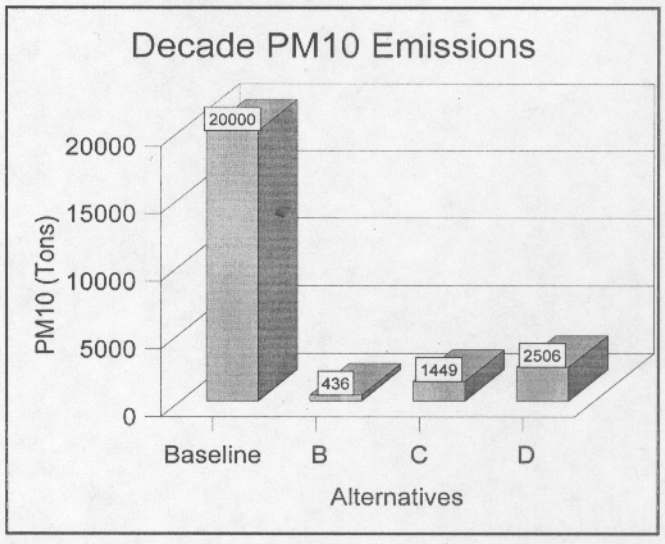

Figure 1: Decade PM10 Emissions

Under all proposed alternatives, prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan (OSMP) and the Visibility Protection Plan. Prescribed burning under all alternatives is not expected to effect visibility

within the Crater Lake National and neighboring wilderness smoke sensitive Class I areas (Kalmiopsis and Mountain Lakes) during the visibility protection period (July 1 to September 15). Prescribed burning is not routinely conducted during this period primarily due to the risk of an escape wildfire.

Prescribed burning emissions, under all alternatives, is not expected to adversely effect annual PM10 attainment within the Grants Pass, Klamath Falls, and Medford/Ashland non-attainment areas. Any smoke intrusions into these areas from prescribed burning are anticipated to be light and of short duration.

Prescribed burning would be scheduled primarily during the period starting in January and ending in June. This treatment period minimizes the amount of smoke emissions by burning when duff and dead woody fuel have the highest moisture content, which reduces the amount of material actually burned. Broadcast burning, handpile burning, and underburning would also be planned during the winter and spring months to reduce damage to the site from high intensity burning and to facilitate control of the units being burned.

The greatest potential for smoke intrusions into the non-attainment areas would come from underburning activities. Current avoidance strategies for prescribed fire assumes that smoke can be lifted from the project site and dispersed and diluted by transport winds. However, underburning requires a low intensity burn that would not have the energy to lift the smoke away from the project site. Smoke retained on site could be transported into portions of non-attainment areas if it is not dispersed and diluted by anticipated weather conditions. Localized concentration of smoke in rural areas away from non-attainment areas may continue to occur during prescribed burning operations.

Transportation System

The proposed management activities that are likely to have the greatest effect on the transportation system within the CSNM are road closures and road decommissioning. The degree to which these activities affect transportation by vehicle varies by alternative. Most of the proposed road changes are located south of State Highway 66. Table 4-25 shows the proposed management activities that would affect the transportation system. Maps 31, 32, and 33 show individual roads with proposed management activities.

Table 4-25. Proposed Management Activities to the Transportation System

Activities	A*	B	C	D
Mechanical Decommission	0 miles	0 miles	24 miles	52 miles
Natural Decommission	0 miles	49 miles	28 miles	6 miles
Improve Drainage and Block Road to the Public	77 miles	28 miles	21 miles	12 miles
Improve Road and Leave Open	0 miles	3 miles	0 miles	3 miles
Block Road to Public	0 miles	3 miles	4 miles	7 miles
TOTAL (miles)	77	83	77	80

*Under interim management (Alternative A), all motorized and non-motorized mechanized travel is prohibited on the Schoheim road (BLM road 41-2E-10.1) and temporarily restricted on roads leading to it (see Plate 1) as a result of the designation of the CSNM. Persons who are exempt from the prohibition are: 1) Any federal, state, or local officers engaged in fire, emergency and law enforcement activities; (2) BLM employees in official duties: (3) persons authorized to travel on designated routes by the Monument Manager (or designee). Other roads were temporarily closed through the RMP process (since 1995) accounting for the miles identified. The restrictions will remain in effect until the implementation of the CSNM Resource Management Plan/ Record of Decision. The planning process may result in a decision to maintain or partially modify this prohibition.

Recreational Use

A perspective to keep in mind when reviewing this section is that the Monument was not proclaimed for recreation reasons. Recreation use is secondary to the purpose of the Monument and as a result recreational uses are restricted as compared to past use levels.

Mechanized Recreation

Mechanized recreation includes all motorized vehicles, including snowmobiles, and human powered transportation devices including, but not limited to, mountain bikes, game retrieval carts, skate boards and even in-line skates.

The current level of cross-country vehicle use within the Monument is low, due to the relative isolation of the area from population centers, limited winter access, and the terrain and vegetation. The only legal public access route to Agate Flat was from Pilot Rock across the Schoheim Road. All existing roads and the Agate Flat area as a whole, receive moderate use during big game hunting seasons and the majority of cross country travel occurred in Agate Flat during this time.

Under all alternatives the existing OHV closure within the Congressionally designated Pacific Crest National Scenic Trail (PCNST) will continue.

For all recreation activities, Alternative A is the existing situation as designated by the RMP with the wording of the Proclamation applied. This Alternative is designed to protect the lands included in the Proclamation until a management plan is written.

Under all alternatives, all forms of mechanized recreation are restricted to roads designated for public access. The Proclamation closed the entire Monument to cross country travel by motorized and mechanized equipment, and restricted their use to roads designated for public access. Refer to the transportation system section for road closures.

Under Alternatives C and D, existing roads could be designated for non-motorized recreational uses in the future and under Alternative D new roads could be constructed in the future for these uses.

All these alternatives will have a negative effects on mechanized use of the Monument, with Alternatives A and B having the greatest negative impact. Alternatives C allows for new designations, which is less restrictive than Alternatives A or B. Alternative D allows for new designations and new construction is the least restrictive of the alternatives.

Non-Mechanized Recreation

Non-mechanized recreation includes, but is not limited to, hiking, camping, fishing, backpacking, picnicking, rock climbing, hunting, horseback riding, hang gliding, and para-sailing. Recreational animal stock use will be addressed separately.

Under all alternatives, the PCNST and the two associated side trails are the only designated trails within the Monument. Under Alternative A, no new hiking trails would be constructed pending completion of this Plan, but hiking would be allowed throughout the Monument. Under Alternative B, no new hiking trails would be constructed anywhere within the Monument and hiking in the Oregon Gulch and Scotch Creek RNAs would be confined to existing roads and trails. Alternative C allows for new hiking trail designation and construction in the future but only within the primary visitor use zones (see map 42). As in Alternative B, hiking within the RNAs would be restricted to existing roads and trails. Alternative D allows for the designation and construction of new hiking trails across the Monument except within the WSA and RNAs. As in Alternatives B and C, hiking within the RNAs would be confined to existing roads and trails. Under all alternatives, cross-country hiking (off of designated trails), would be allowed with the exception of the RNAs.

Alternative B would have the greatest negative impact on hiking with no new trail construction or designations. Alternative A would have the next greatest impact with no new construction considered until the CSNM Resource Management Plan is completed. Alternative C is the next restrictive with new designation or construction allowed in the designated visitor use concentration zones, and Alternative D would have the least negative impact on hiking. Although these alternatives appear to have a negative impact on hiking, there were no proposals for new trail construction or designation within the Monument before the Proclamation, so the magnitude of the negative impact is relatively low.

Camping would be allowed under all alternatives but with the following restrictions; under Alternative A, camping would be allowed throughout the Monument as would campfires. Under Alternative B, camping would only be allowed at the Hyatt Lake Recreation Complex (HLRC) designated campsites, and no trace dispersed camping would be allowed along the PCNST. Campfires would only be allowed in designated fire pits at the HLRC. Dispersed “no trace” camping would be allowed across the entire Monument in Alternative C with the exception of the RNAs and structures on the former Box-O Ranch which would be closed to camping. Campfires would be allowed across the Monument except within the RNAs where they are prohibited. Organized groups with existing permits would be allowed to camp outside of the HLRC as long as their permit is valid and renewal of the permit is a possibility. No new applications for group camping outside of the HLRC would be accepted. Group camping for administrative purposes would be allowed.

Alternative D would allow dispersed “no trace” camping across the Monument except for the RNAs and structures on the former Box-O Ranch, just like Alternative C. Organized groups with existing permits would be allowed to camp and apply for renewal as in Alternative C but a limited number of new applications for group camping outside of the HLRC would be considered. As in Alternative C, campfires would be allowed across the Monument except within the RNAs. As in Alternative C, group camping for administrative purposes would be allowed.

Alternative A, by allowing camping and campfires throughout the Monument, would have no effect on these activities since it is the existing situation. Alternative B would be the most restrictive by allowing camping and campfires only at the HLRC. Alternative C is more restrictive than A and less restrictive than B since it allows for existing organized group camping outside of the HLRC. Alternative D is less restrictive than C since it also allows for new group camping applications as well as allowing existing permits to continue, and it is more restrictive than Alternative A. In summary, the order of greatest negative impact to least negative impact would be B, C, D, then A.

Activities such as technical rock climbing, hang-gliding, or para-sailing would be allowed under Alternative A with no restrictions. Alternative B, on the other hand,

would not allow these activities anywhere within the Monument. Alternative C would not allow technical rock climbing within the Monument, but hang-gliding and para-sailing would be allowed by permit only and only in an area designated by the Monument planning staff after analysis of the application. Alternative D would allow technical rock climbing on Pilot Rock only, and hang-gliding and para-sailing would be allowed throughout the Monument except for the WSA and RNAs.

For these activities, Alternative A would have no negative impact since it does not restrict these activities at all. Alternative D would be more restrictive than A but less than C or B, and Alternative C would be more restrictive than Alternatives A or D and less restrictive than B. There are no documented occurrences of these activities taking place in the Monument to date, so although these Alternatives might have a negative impact on paper, they have no negative impacts on existing uses, just potential uses.

Recreational Animal Stock Use

Alternative A would allow stock use throughout the Monument except within the RNAs. Commercial recreational stock use for recreational purposes (Special Recreation Permits, or SRPs) would not be considered until the Monument Management Plan is completed. Alternative B would not allow this use anywhere within the Monument. Alternative C would allow recreational stock use within the Monument except within the RNAs where it would be prohibited. The number of stock per group would be 4 animals on overnight trips and 6 animals on day trips. On overnight trips, animals must be tethered at least 200 feet from any water's edge. From November 15 to May 1, animal stock use will not be allowed in the South Management Zone (see map 42). There would be no Special Recreation Permits issued for commercial activities using animals. Alternative D would also prohibit stock use within the RNAs but the number of animals allowed on trips would be increased to 8 animals on overnight trips and 12 animals on day trips. The animals must be tethered at least 100 feet from any water's edge on private overnight stays and there is no requirement to provide feed for the animals (grazing allowed), but if feed is provided it must be certified weed free. Commercial stock use would be allowed under this alternative but not within the WSA or RNAs. Special Recreation Permits involving animal use would be limited to 3 and these permits would have specific restrictions to ensure protection of the objects within the Monument. Some of these restrictions would include staying on pre-designated routes and using designated campsites. Commercial stock would have to be tethered at least 200 feet from any water's edge and food for commercial stock must be brought in(no grazing), and the feed must be certified weed free. Commercial stock use would not be allowed in the South Management Zone from November 15 to May 1.

There are no current Special Recreation Permits (SRPs) issued for commercial recreation activities within the Monument so impacts to existing permittees are non-existent. Impacts would only be to potential activities in this case.

Since Alternative B would not allow animal stock use, either private or commercial, anywhere within the Monument (except on the PCNST) it would have the greatest negative impact on these activities. Alternative C would be the next most restrictive by not allowing commercial SRPs by restricting use in the South Management Zone, and by the reduced number of stock allowed. Alternative D would be somewhat less restrictive than Alternative C by allowing a limited number of SRPs and by allowing more animals per group.

Impacts to Wilderness Opportunities

The existing BLM Wilderness Study Area (WSA) was delineated based on criteria established in 1978 in the Department of Interior's " Wilderness Inventory Handbook". The Handbook states, for BLM lands to be eligible for consideration as wilderness there must be at least 5000 contiguous roadless acres of public land. The existing Soda Mountain WSA was a result of this inventory. Actions proposed under the transportation section have the potential to change the number of contiguous roadless acres. These acres would not increase the size of the existing WSA, but they could be added to future Oregon wilderness legislation by Congress.

Under Alternatives B, C, and D, where varying sections of the Schoheim Road would be decommissioned, the amount of contiguous roadless acres would increase. Increasing the amount of roadless acres adjacent to the Soda Mountain WSA could increases the amount of area suitable for WSA designation. This could also give Congress the opportunity to expand the wilderness, if they so choose, in the future. The amount of area that may become suitable for WSA designation as a result of increasing the contiguous roadless area varies by alternative. The amount of time to achieve this "roadless acreage increase" would also vary by alternative, with natural decommissioning taking the longest amount of time to achieve a "roadless" condition. Alternative B could increase the area suitable for possible WSA designation by approximately 6,700 acres but these acres would not be suitable for approximately 5 to 10 years as a result of the roads being naturally decommissioned. Alternative C and D could make approximately 7,275 acres of roadless area adjacent to the Soda Mountain WSA suitable for WSA status. Alternatives C and D both implement mechanical decommissioning which would take less time to achieve "roadless" conditions but the amount of decommissioning accomplished is dependent on future funding. If immediate funding is available to implement the proposed decommissioning, approximately 6,700 acres could be suitable for wilderness designation in about 5 years under Alternative C and about 7,275 acres under Alternative D. Alternative C proposes both mechanical and natural decommissioning to accomplish the "roadless" suitability. Approximately 6,700 acres could be suitable in about 5 years as a result of mechanical decommissioning but the remaining 575 acres would not be suitable for about 5 to 10 years as a result of natural decommissioning. Once these areas meet the suitability criteria for wilderness designation they would be managed as WSA.

Land Use Authorizations

Background

The realty program operating under the jurisdiction of the Medford District Office of the BLM is oriented towards public service. Authorizations are the result of applications from the private, commercial, and government sectors. The BLM does not actively solicit or advertise the availability of land use authorizations. However, when applications are received for legitimate uses as chartered under FLPMA, BLM is obligated to accept, process, consider, and ultimately make a decision on these requests. Table 4-26 provides a comparative rating system for the proposed alternatives being addressed in this Plan. They represent a reasoned projection of impacts to the program based on past actions and projected future consequences.

Table 4-26. Land Use Authorization Impacts

Impacts to Environment	Impacts to Private Interests	Impacts to Commercial Interests
Alternative A (No Action)		
Minor to moderate, based on size & extent of authorization	None or Minimal	None or Minimal
Impacts minimized by mitigation using BMP's*	Applications processed & generally approved with environmental mitigation	Applications processed & generally approved with environmental mitigation
Minimal	Existing authorizations renewed upon request and review	Existing authorizations renewed upon request and review
Alternative B		
None	Maximum, due to loss of opportunity for land use authorizations	Maximum, due to loss of opportunity for land use authorizations
None	Maximum, due to no new applications accepted due to land use planning redirection**	Maximum, due to no new applications accepted due to land use planning redirection
None	Maximum, if not renewing existing authorizations	Maximum, if not renewing existing authorizations
Alternative C		
Minimal	Minimal, due to protection under past VERs or for landlocked parties**	Moderate, due to loss of opportunity for land use authorizations
Minimal	Maximum due to no new applications accepted due to land use planning redirection**	Maximum, due to no new applications accepted due to land use planning redirection**
Minimal	Existing authorizations renewed upon request and review	Existing authorizations renewed upon request and review
Alternative D		
Minor to moderate, based on size & extent of authorization	None or Minimal	Favorable or None
Impacts minimized by mitigation using BMP's*	Applications processed & generally approved with environmental mitigation	Applications processed & generally approved with environmental mitigation
Favorable if Communication Site Management Plan is developed, fully implemented and involves all authorized users	Existing authorizations renewed upon request and review	Existing authorizations renewed upon request and review

* Best Management Practices ** BLM would still accept & process applications for access to landlocked private parcels.

Minerals

Under all four alternatives, the Federal lands within the Monument are withdrawn from mineral entry under the Mining Law of 1872. However, use of common mineral materials from existing rock quarries varies by Alternative and is discussed below.

Alternative A
Common mineral materials would be available from existing quarries for extraction, processing, and transport for projects approved for administrative (BLM) use. Approved projects would have to mitigate for potential damage to aquatic resources, stream channels, and riparian habitat. If mitigation was not possible, the project would not be approved.

Alternative B
Under Alternative B, common mineral materials from existing quarries within the Monument would not be available for use. Projects within the Monument needing this type of material would have to utilize similar material from alternate sources located outside the Monument. This alternative would shift any potential environmental damage from use of common mineral materials from those federal lands within the Monument to other federal holdings outside the Monument. Potential adverse environmental impacts associated with extraction of common mineral varieties from inside the Monument would be avoided under this Alternative.

Alternative C
Common mineral materials would be available from existing quarries for extraction, processing, and transport for projects approved for administrative (BLM) use. Approved projects would have to mitigate potential damage to aquatic resources, stream channels, and riparian habitat. If mitigation was not possible, the project would not be approved. (Same as Alternatives A)

Alternative D
Common mineral materials would be available from existing quarries for extraction, processing, and transport for projects approved for administrative (BLM) use. Approved projects would have to mitigate potential damage to aquatic resources, stream channels, and riparian habitat. If mitigation was not possible, the project would not be approved (Same as Alternatives A).

Social and Economics

Community Effects

Table 4-27 compares the social and economic effects of the proposed alternatives based on findings from post-designation community interviews conducted by social scientists from the University of Idaho, College of Natural Resources. The social scientists used the themes that emerged from the interviews to guide a comparison of activities within the proposed alternatives. The results of these interviews and more information on the specific themes are presented in Appendix FF.

Table 4-27. A Comparison of Perceived Community Effects of Alternatives Based on Findings from Post-designation Group and Individual Interviews

Issues/Concern	A	B	C	D
Vegetation Management of Diversity Area	• Wildfire risk not satisfactorily addressed. • Negative economic impacts of limited opportunities for noxious weed control compared to all other Alternatives. • Reduced opportunities for ecosystem restoration on public land compared to all other Alternatives. Perceived disincentive for restoration on nearby private land. • Reduced vegetation management job opportunities compared to all other Alternatives	• Increased vulnerability of nearby private property to wildfire compared to Alternatives C and D. Wildfire risk not satisfactorily addressed. • Negative economic impacts of limited opportunities for noxious weed control compared to Alternatives C and D. • Reduced opportunities for ecosystem restoration on public land compared to Alternatives C and D may provide disincentive for restoration on nearby private land. • Reduced job opportunities compared to Alternatives C and D.	• Decreased vulnerability of nearby private property to wildfire compared to Alternatives B. Wildfire risk may be satisfactorily addressed. • Satisfaction with enhanced opportunities for noxious weed control compared to Alternatives B, perceived positive economic impacts. • Enhanced opportunities for ecosystem restoration on public land compared to Alternatives B perceived as incentive for restoration on nearby private land. • Enhanced vegetation management job opportunities compared to Alternatives B. • Pilot projects and effectiveness monitoring could allay skepticism about BLM management efforts. • Greater emphasis on restoration could contribute more positively to amenity and nonmarket values (community attractiveness, wildlife habitat, clean water, biodiversity, etc.) of the community than Alternatives A and B. This is perceived to enhance intrinsic benefits and to have positive economic impacts on local businesses. • Controlled burns address wildfire risk, but also perceived to increase possibility of damage to private property from out of control prescribed burns.	Same as Alternative C but somewhat dependent on the management tools employed to meet objectives.

Table 4-27. A Comparison of Perceived Community Effects of Alternatives Based on Findings from Post-designation Group and Individual Interviews

Issues/Concern	A	B	C	D
Vegetation Management of Old-Growth Emphasis Area	• Wildfire risk not satisfactorily addressed. • Dissatisfaction with limited opportunities for noxious weed control compared to all other Alternatives This is perceived to have negative economic impacts. • Reduced opportunities for ecosystem restoration on public land compared to all other Alternatives Perceived disincentive for restoration on nearby private land. • Reduced vegetation management job opportunities compared to all other Alternatives.	• Increased vulnerability of nearby private property to wildfire compared to Alternatives C and D. Wildfire risk not satisfactorily addressed. • Dissatisfaction with limited opportunities for noxious weed control compared to Alternatives. C and D. This is perceived to have negative economic impacts. • Reduced opportunities for ecosystem restoration on public land compared to Alternatives C and D. Perceived disincentive for restoration on nearby private land. • Reduced vegetation management job opportunities compared to Alternatives C and D.	• Decreased vulnerability of nearby private property to wildfire compared to Alternatives B. Wildfire risk may be satisfactorily addressed. • Enhanced opportunities for ecosystem restoration on public land compared to Alternatives B perceived as incentive for restoration on nearby private land. • Enhanced vegetation management job opportunities compared to Alternatives B. • Greater emphasis on ecosystem restoration could contribute more positively to preservation of amenity and nonmarket values (community attractiveness, wildlife habitat, clean water, biodiversity, etc.) of the community than Alternatives A and B. This is perceived to enhance intrinsic benefits and to have positive economic impacts on local businesses.	• Decreased vulnerability of nearby private property to wildfire compared to Alternatives B and C. Wildfire risk may be more satisfactorily addressed. • Enhanced opportunities for ecosystem restoration on public land compared to Alternatives B and C perceived as incentive for restoration on nearby private land. • Enhanced job opportunities compared to Alternatives B and C in commercial thinning. • Greater emphasis on ecosystem restoration could contribute more positively to preservation of amenity and nonmarket values (community attractiveness, wildlife habitat, clean water, biodiversity, etc.) of the community than all other Alternatives. This is perceived to enhance intrinsic benefits and to have positive economic impacts on local businesses.

Table 4-27. A Comparison of Perceived Community Effects of Alternatives Based on Findings from Post-designation Group and Individual Interviews

Issues/Concern	A	B	C	D
Transportation System	• Negative impact on OHV and other mechanized recreational opportunities due to road closures/ decommissions. However, non-mechanized recreation opportunities may be enhanced. • Negative economic impact due to loss of OHV related expenditures in local community. • Road closures/ decommissions perceived to have negative impact on fire fighting capabilities. • Perceived reduction of risk of accidental fires by reducing public access through road closures/ decommissions.	• Same as A. In addition: • Fewer opportunities for jobs than Alternatives C and D related to road decommissioning or improvement. • Reduction in recreation opportunities from restricted access to Pilot Rock more so than Alternatives C and D. Perceived negative economic impacts. However, amenity and nonmarket values may be enhanced. • Perceived lesser potential for habitat restoration through natural decommissioning projects, than Alternatives C and D. Amenity and nonmarket values may be enhanced, but less so.	• Same as A plus: • Fewer opportunities for jobs than Alternatives D related to road decommissioning or improvement • Restricts access to Pilot Rock more so than Alternatives D (but less than Alternatives B), which will reduce recreation opportunities. Perceived negative economic impacts. However, amenity and nonmarket values may be enhanced. • Greater potential for habitat restoration through mechanical decommissioning projects than Alternatives B. Enhances protection of amenity and nonmarket values (community attractiveness, wildlife habitat, clean water, biodiversity, etc.).	• Same as A plus: • More opportunities for jobs than all other Alternatives related to road decommissioning or improvement. • Provides greater access to Pilot Rock than all other Alternatives which will increase recreation opportunities. Amenity and nonmarket values may be reduced. • Improved road access compared to Alternatives B and C may encourage more tourist visitation. Perceived positive economic impact. • Alternatives C and D have greater potential for habitat restoration through mechanical decommissioning projects than Alternatives B. Enhances protection of amenity and nonmarket values (community values, wildlife habitat, clean water, biodiversity) • Paving of Soda Mtn. Road will improve access to PCNST, thus increasing recreation opportunities. Perceived positive economic impact. • Perceived negative impact due to local residents increased visitation resulting in increased traffic, trespassing, private property damage, and risk of accidental fire.

Table 4-27. A Comparison of Perceived Community Effects of Alternatives Based on Findings from Post-designation Group and Individual Interviews

Issues/Concern	A	B	C	D
Special Forest Products	• Greater protection of amenity and nonmarket values (community attractiveness, wildlife habitat, clean water, biodiversity, etc.) than Alternatives C and D.	• Greater protection of biodiversity and amenity and nonmarket values (community attractiveness, wildlife habitat, clean water, biodiversity, etc.) than all other Alternatives	• Less protection of amenity and nonmarket values (community attractiveness, wildlife habitat, clean water, biodiversity, etc.), than Alternatives A and B.	• Less protection of amenity and nonmarket values (community attractiveness, wildlife habitat, clean water, biodiversity, etc.), than Alternatives A and B.
Mechanized Recreation	• Dissatisfaction with lack of opportunity for off-road non-motorized mechanized recreation for local residents or tourists. • Perceived negative economic impact due to lost revenue from tourists. • Protection of amenity and nonmarket values enhanced. Perceived as positive.	• Same as A.	• Compared to Alternatives A and B, provision of future options to enhance recreation opportunities for local residents and tourists perceived as positive. • Perceived positive economic impact due to increased revenue from tourists. • Compared to Alternatives A and B, greater potential negative impacts to amenity and nonmarket values that are perceived as important. • Perceived negative impact due to increased visitation resulting in increased traffic, trespassing, private property damage, and risk of accidental fire.	• Same as C.

Table 4-27. A Comparison of Perceived Community Effects of Alternatives Based on Findings from Post-designation Group and Individual Interviews

Issues/Concern	A	B	C	D
Non-mechanized Recreation	• Allows greatest opportunity for non-mechanized recreation opportunities compared to all other Alternatives perceived as both positive and negative. • Positive economic impact due to potential to attract non-motorized tourist revenue. • Negative impact due to increased visitation resulting in increased traffic, trespassing, private property damage, and risk of accidental fire. • Greatest potential negative impacts to amenity and nonmarket values that are perceived as important.	• Dissatisfaction with lack of non-mechanized recreation opportunities compared to all other Alternatives • Negative economic impact due to low potential to attract non-motorized tourist revenue compared to all other Alternatives • Greatest potential positive impacts, compared to all other Alternatives, to amenity and nonmarket values that are perceived as important.	• Allows greater non-mechanized recreation opportunities compared to Alternatives A and B, but less than Alternatives D. • Positive impact due to greater protection than Alternatives D to amenity and nonmarket values that are perceived as important.	• Provision of greater non-mechanized recreation opportunities than all other Alternatives perceived as both positive and negative. • Positive economic impact due to potential to attract non-motorized tourist revenue. • Negative impact due to potential decrease in amenity and nonmarket values that are perceived as important. • Negative impact due to increased visitation resulting in increased traffic, trespassing, private property damage, and risk of accidental fire.

Table 4-27. A Comparison of Perceived Community Effects of Alternatives Based on Findings from Post-designation Group and Individual Interviews

Issues/Concern	A	B	C	D
Animal Stock Use	• Availability of animal stock recreation opportunities perceived as positive.	• Dissatisfaction with loss of all stock use opportunity for recreational or other purposes. • No option for local stock-related job opportunities.	• Availability of animal stock recreation opportunities perceived as positive. • Negative economic impact due to loss of possible revenue from commercial stock operations as compared to Alternatives D, but more positive than Alternatives A or B. • Greater protection of amenity and nonmarket values that are perceived as important than Alternatives D. • No option for local stock-related job opportunities. • Negative impact to local residents due to increased visitation resulting in increased traffic, trespassing, private property damage, and risk of accidental fire.	• Availability of animal stock recreation opportunities perceived as positive. • Positive economic impact due to greatest possible revenue from commercial stock operations compared to all other Alternatives • Least protection of amenity and nonmarket values that are perceived as important than all other Alternatives • Positive economic impact due to increase in local stock-related job opportunities. • Negative impact to local residents due to increased visitation resulting in increased traffic, trespassing, private property damage, and risk of accidental fire.

Table 4-27. A Comparison of Perceived Community Effects of Alternatives Based on Findings from Post-designation Group and Individual Interviews

Issues/Concern	A	B	C	D
Visitor Facilities	• All current accommodations available for visitors.	• Dissatisfaction with lower amount of accommodations available for visitors compared to Alternatives C and D, resulting in negative economic impacts due to reduction in tourist revenues. • Negative impact to local residents due to increased visitation resulting in increased traffic, trespassing, private property damage, and risk of accidental fire. • Slightly negative impact due to potential decrease in amenity and nonmarket values that are perceived as important.	• Lower amount of accommodations available for visitors compared to Alternatives D, but more than Alternatives A and B. • Greater emphasis on visitor facilities could result in fewer tourists trespassing on private property compared to Alternatives A and B. • Negative impact to local residents due to increased visitation resulting in increased traffic, trespassing, private property damage, and risk of accidental fire. • Increased signage perceived as positive in terms of resource protection and reduction of tourist trespass on private property, but negative in terms of aesthetics. • Slight to moderate negative impact due to potential decrease in amenity and nonmarket values that are perceived as important. Impacts are less than Alternatives D, but greater than Alternatives A and B.	• Higher amount of accommodations available for visitors compared to Alternatives B and C, which could result in possible increase in tourist revenues. • Greater emphasis on visitor facilities could result in fewer tourists trespassing on private property compared to Alternatives A and B. • Negative impact to local residents due to increased visitation resulting in increased traffic, trespassing, private property damage, and risk of accidental fire. • Increased signage perceived as positive in terms of resource protection and reduction of tourist trespass on private property, but negative in terms of aesthetics. • Moderate negative impact due to potential decrease in amenity and nonmarket values that are perceived as important.

Environmental Justice

Executive Order 12898 of February 11, 1994 as amended by Executive Order 12948 provides that "each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations." Environmental Justice "is achieved when everyone, regardless of race, culture, or income, enjoys the same degree of protection from environmental and health hazards and equal access to a healthy environment in which to live, work, and play" (Whorton and Sohocki 1996). The management actions, directions and strategies in this proposed Plan comply with Executive Order 12898 as amended and there will be no disproportionately high effects on minority, low-income populations or Indian Tribes as a result of the proposed management alternatives.

Monument Designation Effects

A literature review was conducted with the intent of shedding light on the possible effects that the designation the CSNM might have on the local communities in terms of their economic and social make-up. This review of the literature has been purposely limited to publications relevant to the management goals and size of CSNM and specifically to the effects of designation on local communities. For example, publications devoted to the effects on local communities of large, brand name, industrial tourism sites such as Yellowstone National Park were considered irrelevant due to the extreme differences in scale and magnitude from CSNM and were excluded from this review on that basis. However, the management goals of CSNM are more consistent with those of wilderness and/or roadless areas in the West, and the extensive literature on the effects of these areas was included. The literature on this subject is vast, and this review is an attempt to present the most relevant conclusions and empirical findings, while at the same time avoiding unnecessary redundancy of repeating similar findings. The results of the literature review are listed on Table 4-28.

Table 4-28. Literature Review relating to Monument Designations	
Author(s)	***Findings/ Conclusions***
Effects on the Local Economy	
ECONorthwest, 2000	The number of jobs in the extractive sector in Oregon is declining and is expected to continue to decline in the future. Employment impacts from designation of the Siskiyou Wild Rivers National Monument represent initial, or short-term impacts, which overstate the true employment consequences of the designation in the long run. Estimated number of jobs created by a 3 percent increase in tourism to the area would be 210, and the large majority would be in the low-skill, low-wage service sector.
Miles, 2000	Visitation to three national parks in the Pacific Northwest is highly seasonal, and these parks have not greatly stimulated growth in gateway communities, as was the case at some national parks in other areas. Weather, terrain, adjacent public lands, wilderness qualities and management emphasis (and the lower-spending users they attract), and timber culture of the region (which may result in a slow to embrace tourism development attitude) all contribute to constraints on tourism development.
Rudzitis and Johnson, 2000	Designation has effect of reducing/eliminating extractive industries from the area, but amenities offered by wildlands attract tourists, businesses, and new residents. This increases population, visitor spending, incomes, and the local tax base.
Power, 2000	The study found that, based on the evidence, formerly timber-dependent communities in Washington stand to benefit far more, economically, if roadless National Forest lands in their community are left intact and protected than if these areas are opened to new roads and timber harvests. Given that high quality living environments can attract new residents and economic activity, the attractiveness of a community in terms of its social, cultural, and natural environments is an important part of its economic base and source of economic vitality. This has allowed people's and firms' location decisions to be based more on their preferences for what they perceive to be higher quality living environments.
Southwick and Associates, 2000	Extractive industries play an increasingly small role in job creation and income generation in Oregon. Economic sectors that benefit from the presence of environmental amenities and protected areas, such as tourism and retirement, are increasingly important sources of economic growth in Oregon. Counties with the highest proportion of land in protected areas (wilderness, national parks, and national monuments) are growing the fastest. Protecting lands from extractive activities does not result in slower income and employment growth. It may not be designation itself that causes economic growth, as such transactions are only a paper transaction. Instead, the presence of amenities such as scenery, recreational opportunities, and knowing these amenities are protected, may be enough to attract tourists and retirees, and to encourage businesses to relocate nearby thus strengthening and diversifying local economies.
Lerner and Pool 1999	Parks and open space create a high quality of life that attracts tax-paying businesses and residents to communities. Open space boosts local economies by attracting tourists and supporting outdoor recreation.

Table 4-28. Literature Review relating to Monument Designations	
Author(s)	***Findings/ Conclusions***
Duffy-Deno, 1998	Found no evidence that federal wilderness is directly or indirectly associated with either population-density or total-employment-density growth between 1980 and 1990, suggesting that wilderness designation may cause, on average, little aggregate economic harm to county economies. Also found no empirical evidence that county-level resource-based employment is adversely affected by the existence of federal wilderness.
Power, 1996	Empirical analysis shows that mining, timber, and agriculture make a much more modest contribution to local economies than is usually assumed. During a period of decline in extractive sectors, many "extractive-dependent" communities experienced rapid economic expansion in non-extractive sectors.
Rudzitis, Hintz, and Watrous, 1996	Among the fastest growing counties in the nation are those adjacent to federally designated wilderness areas. The population of wilderness counties increased six times faster than the national average for other non-urban counties in the 1980s, and nearly twice as fast as other non-urban counties in the West. A similar trend was found in population for counties near national parks.
Synder, Fawson, Godfey, Keith, and Lilieholm, 1995	The economic gains from recreation appear to be inconsequential and probably would not offset the economic losses associated with wilderness designation. Nonmarket benefits of wilderness designation were not considered.
Effects of Tourism on Local Communities	
ECONorthwest, 2000	The publicity surrounding the designation of new national monuments by Clinton in January of 2000 increased awareness of national monuments in general, and of those designated. It is likely a result of this recent publicity that new visitors will be attracted to monuments across the U.S.
Lankard and McLaughlin, 1999	The cultural heritage tourist "niche-market" is fast becoming a focus of national, state and regional tourism efforts. The profile of a cultural heritage tourist includes: primarily upper-income, college educated, includes multiple destinations in their travel, stays an average of one-half day longer, and spends an average of $65 more per day.
Rogers, 1999	Most of the visitor groups (58%) spent less than a day at the park. Of those groups that spent less than a day at the park, 49% spent four hours or less. The most common activities were the scenic drive (85%), visiting geological/geothermal features (71%), photography (57%), hiking 2 hours or more (51%), and hiking less than 2 hours (45%). The average visitor group expenditure within fifty miles of Lassen Volcanic NP was $206. Of the total expenditures by groups within fifty miles of Lassen Volcanic NP, 43% was for lodging, 27% was for food, 15% was for travel, and 15% was for other expenses.
Hoffman and Meeham, 1998	The median visitor group (average of 5 persons) expenditure within 50 miles of Whiskeytown NRA was $34.50. Of the total expenditures by groups within 50 miles of Whiskeytown NRA, 58% was for food, 29% was for travel, and 13% was for "other" items, such as recreation, film, and gifts.

Table 4-28. Literature Review relating to Monument Designations

Author(s)	*Findings/ Conclusions*
Lerner and Pool, 1999	Outdoor recreation represents one of the most vigorous growth areas in the U.S. economy, and much of this is supported by public and private parks and open land.
Power, 1996	In most communities the primary economic relationship between amenities, such as protected landscapes, and the local economy is not likely to be tourism.
Littlejohn, 1994	Most visitors (59%) spent less than one day in the park; 25% spent two or three days. They participated in sight-seeing (91%), walking/hiking two hours or less (64%), wildlife/bird viewing (39%), picnicking (36%), and beachcombing (34%). The average per capita expenditure was $45. The greatest proportion of their expenditures was spent for lodging (37%), followed by food (33%).
McCool and Martin, 1994	Tourism can bring changes to communities, such as a general disruption of residents' lives owing to increased population during the tourist season, increases in crime, displacement of residents by new developments, conflict in values, and impacts on the local culture. Individuals highly attached to their (tourism-developed) communities are newcomers and viewed the benefits of tourism more positively than less attached individuals, suggesting that these individuals themselves are tourists who have settled in these places.
Allen, Hafer, Long, Perdue, 1993	Proposed that rural communities with low tourism development and low economic output, or high tourism development and high economic output, have favorable attitudes towards tourism development. The former eagerly anticipate economic benefits from tourism development, while the latter have already realized some of the benefits. Rural communities with mixed levels of tourism development and economic output are less supportive of efforts to develop tourism opportunities.
Murphy and Keller, 1990	Touring vacationers are mobile because they bring their own transport and the destination-oriented tourist either arrives by car or can hire one at the destination. Found that tourists travel a great deal within a destination region.
Perdue, Long and Allen, 1987	Perceived impacts of tourism, positive and negative, increase with increasing levels of tourism, up to a threshold. When more than 30% of economy is derived from tourism, there is little additional change.
McCool, 1985	Study of Rattlesnake National Recreation Area and Wilderness visitation before and after designation found no effect of designation on visitation, suggesting that designation does not inevitably lead to increases in recreation use. Postulates that other factors, such as media attention, could influence visitation more than designation itself.

Table 4-28. Literature Review relating to Monument Designations

Author(s)	*Findings/ Conclusions*
Effects on Social Change in Local Communities	
Rudzitis and Johnson, 2000	Along with new residents and businesses come new values, customs and cultures. Increased population can lead to more congestion, crime and housing shortages.
Fortin and Gagnon,1999	In a newly protected area in Quebec, Canada, local use of public lands within the protected area decreased after designation. For example, prohibitions on recreational and economic use, curbs on spontaneous local use of the area, and increased police and warden presence all reduced local use of the area.
Nelson, 1997	Change is inevitable in the wake of rapid in-migration. It is highly likely that cultural values and political ideology contribute to restructuring in the non-metropolitan West.
Brown, 1993	Population growth in a rural area of Utah led to decreased levels of community satisfaction for old-time residents.
Freudenberg, 1982	As newcomers with different sets of politics, different economic means, and different experiences moved to rural areas, the social diversity of these less-populated communities increased substantially, and traditional power structures changed. Newcomers often present a challenge to traditional political and social fabrics in rural communities and held opinions about the future of the community that directly contradicted that of old-time residents. Some newcomers challenged traditional political and social norms. Social disruption resulted.
Rank and Voss, 1982	New rural immigrants with higher socioeconomic status were more likely than other groups to become involved in community affairs. In the process, they may clash with other residents, and disrupt some community organizations.
Schroeder, 1982	Non-economic benefits of park-related tourism to local communities include support for cultural and natural area preservation, and encouragement of community pride as a result of being recognized by outsiders as interesting and worthy of protection.
Intrinsic Value/ Nonmarket Values	
ECONorthwest, 2000	The intrinsic character of the forests, and the species that inhabit them, make important contributions to the overall economic well-being of those who care about such things and the proposed national monument with associated logging restrictions can create economic benefits by reinforcing this well-being. For some environmental issues, such as maintaining the biodiversity, intrinsic values may be very large.
Power, 2000	Non-commercial forest values (clean drinking water, healthy watersheds for fish and wildlife, recreational opportunities, scenic beauty, open space, and climate stabilization) are critical to the economic well-being of families in counties with substantial tracts of National Forest land.
Lerner and Poole, 1999	Open space conservation is often the cheapest way to safeguard drinking water, clean the air, and achieve other environmental goals.
Power, 1996	America's forested landscapes have economic value simply for the environmental goods and services that flow from them.

Table 4-28. Literature Review relating to Monument Designations	
Author(s)	***Findings/ Conclusions***
Effects on Cooperation Between Local Communities and Federal Land Agencies	
Solecki, 1994	During the implementation phase of protected area establishment in the western USA, community concerns and reactions may include the following: fear of losing local autonomy; private landowner objections; lack of local political commitment and/or administrative capacity; and problems between agencies operating in the area (not) cooperating.
Carroll, 1988	The tone of community-agency relationships is largely dependent on the willingness and ability of agency managers to develop linkages to the community based upon face-to-face interaction with community members. There is a relatively brief window of opportunity after designation to develop a trusting, interactive community-agency relationship. Once poor relations become established, they are stubbornly persistent.

The bulk of the literature concerns the economic effects of protected area designation and concentrates on the opportunity costs in terms of shutting out extractive industries (collectively defined as mining, manufacturing, and agriculture) and/or the potential benefits in terms of increased tourism and in-migration. Some studies also refer to the nonmarket benefits provided by protected areas. Few studies have been done specifically on the social impacts of protected area designation.

Designation has the effect of impacting the extractive industry sector. However, the number of jobs in the extractive sector has been declining in Oregon and this trend is expected to continue regardless of future designations. The literature suggests that protected area designation causes little aggregate harm at the community level or indeed provides an economic boost. In the West, during a period of decline in the extractive sector, many "extractive-dependent" communities experienced rapid economic expansion in the non-extractive sectors. A study by Power (2000) found that formerly timber dependent communities in Washington stand to benefit far more, economically, if roadless National Forest lands in their community are left intact and protected than if these areas are opened to new roads and timber harvests. In fact, among the fastest growing counties in the nation are those adjacent to federally designated wilderness areas. However, these economic studies use county level data which may mask the adverse economic effects felt at the local level.

The growth associated with protected areas is generated by the presence of natural amenities such as attractive scenery, recreational opportunities, the presence of wildlife, clean air and water, and other traits associated with protected areas. "These amenities tend to attract tourists, retirees, recreationists, and entrepreneurs who desire to visit or relocate near such areas knowing the amenities are protected and will remain available into the future" (Southwick Associates 2000). These people bring new sources of income, which then creates new jobs in the area, which can strengthen and diversify the local economy. The majority of new jobs and businesses typically come in the service sector.

Increased levels of tourism can be one result of protected area designation. Outdoor recreation is one of the most vigorous growth areas in the U.S. economy, and the recent designation of new national monuments by President Clinton has heightened awareness of national monuments in general. This publicity may lead to increased visitation.

Because of the important social changes associated with increased visitation mentioned above, and to help predict possible post-designation visitation to CSNM, National Park Service data on annual visitation were analyzed for similar newly designated NPS areas in the years after designation. With respect to monuments, the last president before Clinton to use the Antiquities Act to designate a monument was Jimmy Carter, and all of his were in Alaska. Before that it was Lyndon B. Johnson. This means that most monument designations were quite a long time ago, making for poor comparison with Cascade-Siskiyou National Monument. Also, visitor statistics were only available from 1979 onward. Analysis was therefore limited to designations from 1978 onward.

There were, however, various other congressional designations of parks, monuments, preserves, national recreation areas, and scenic & recreational rivers that may be informative. These areas were included in the analysis if they met the following criteria: 1) natural area designation (as opposed to cultural/historic); 2) within approximately the last 20 years; 3) where visitation statistics were available in the years immediately after designation. Many areas were eliminated because visitor statistics were not available for the years after designation.

Six different areas that met the above criteria and included in the analysis are (see Table 4-29):

- Chattahoochee River NRA (1978)
- Upper Delware Scenic & Recreational River (1978)
- Great Basin National Park (1986)
- El Malpais National Monument (1987)
- Petroglyph National Monument (1990)
- Mojave National Preserve (1994)

There were a few others, like Mount St. Helens, but various extenuating circumstances (i.e., volcanic explosion) made these data of limited comparative usefulness.

Table 4-29. Recent National Park Service Unit Designations and Visitation in the Years After Designation

NPS Unit (year designated)	Year	Recreation Visits	% Annual Increase	Avg. Annual % Increase
Chattahoochee River NRA	1978	no data	no data	
Chattahoochee River NRA	1979	no data	no data	
Chattahoochee River NRA	1980	345,956	1st year	
Chattahoochee River NRA	1981	471,051	26.56%	
Chattahoochee River NRA	1982	665,192	29.19%	
Chattahoochee River NRA	1983	1,081,924	38.52%	31.42%
Upper Delware Scenic & Recreational River	1978	no data	no data	
Upper Delware Scenic & Recreational River	1979	no data	no data	
Upper Delware Scenic & Recreational River	1980	77,764	1st year	
Upper Delware Scenic & Recreational River	1981	156,437	50.29%	
Upper Delware Scenic & Recreational River	1982	106,502	-46.89%	
Upper Delware Scenic & Recreational River	1983	223,096	52.26%	18.56%
Great Basin National Park	1986	40,359	1st year -	
Great Basin National Park	1987	63,532	36.47%	
Great Basin National Park	1988	73,559	13.63%	
Great Basin National Park	1989	70,259	-4.70%	
Great Basin National Park	1990	65,026	-8.05%	
Great Basin National Park	1991	63,864	-1.82%	7.11%
El Malpais National Monument	1987	no data	no data	
El Malpais National Monument	1988	23,546	1st year	
El Malpais National Monument	1989	52,554	55.20%	
El Malpais National Monument	1990	78,993	33.47%	
El Malpais National Monument	1991	69,119	-14.29%	
El Malpais National Monument	1992	75,916	8.95%	20.83%
Petroglyph National Monument	1990	no data	no data	
Petroglyph National Monument	1991	no data	no data	
Petroglyph National Monument	1992	68,065	1st year	
Petroglyph National Monument	1993	66,870	-1.79%	
Petroglyph National Monument	1994	85,869	22.13%	
Petroglyph National Monument	1995	88,196	2.64%	7.66%
Mojave National Preserve (1994)	1994	no data	no data	
Mojave National Preserve	1995	no data	no data	
Mojave National Preserve	1996	no data	no data	
Mojave National Preserve	1997	378,977	1st year	
Mojave National Preserve	1998	374,378	-1.23%	
Mojave National Preserve	1999	391,694	4.42%	0.64%
Mojave National Preserve			**OVERALL**	14.37%

Source: National Park Service Visitation Database Reports - http://www2.nature.nps.gov/npstats/system.cfm

Within each unit, huge variability in visitation, especially in the first few years after designation, suggest problems with both the validity and reliability of the data. Visitation to parks, monuments, and other types of protected areas may be affected by seasonal patterns of visitation, differing types of attractions and visitor facilities, proximity to other points of interest, pubic notoriety, and other factors that make each area unique. Although these data have limitations, there are several conclusions that can be drawn.

- *Percent annual increase* in visitation increases in the 5 years after designation ranged from -47% to +55%.

- In comparing the units, *average annual % increase* over the five years after designation ranged from 1% to 31%.

- The *average annual increase overall*, across all five years and all units, was 14%.

These patterns suggest that in the years after designation, while visitation will likely fluctuate, a modest increase is likely to occur. The proportion of the increase associated with designation, as opposed to increases that would have occurred without designation, is unknown.

Since CSNM is located in between several other popular National Parks and Monuments including Crater Lake, Lava Beds, Redwood, and others (map 40), it is reasonable to expect that some visitors to those areas will visit CSNM, even if it is not their primary destination (Murphy 1990).

It should be pointed out that designation and the new regulations it brings, while attracting new visitors to the area, may also have the effect of reducing use of the area by local residents. A review of visitor surveys from other parks and protected areas in the Pacific Northwest reveals that most visitors spent one day or less in a given area and spend modest amounts, principally on lodging and food.

The Shakespeare Festival held each year in Ashland represents a potential pool of visitors for the CSNM. These visitors are considered part of the "cultural heritage niche-market," who stay on average a half-day longer in an area and spend an average of $65 per day more than other tourists. This market along with travelers of the I-5 corridor represent untapped markets that the Monument could target. Some use by these markets is likely to occur simply because of their proximity to the area, regardless of actions taken by the BLM.

Tourism and in-migration due to amenity attraction can bring changes to the local communities. Among the possible effects are a general disruption of residents' lives owing to increased population during the tourist season, increases in crime, congestion, displacement of residents by new developments, housing shortages, conflict in values, and impacts on the local culture.

The benefits of preserving intrinsic or nonmarket values associated with protecting wildlands can be significant. Among these values cited in the literature as important to communities are clean drinking water, healthy watersheds for fish and wildlife, recreation opportunities, scenic beauty, open space, climate stabilization, and encouragement of local pride.

Cooperation between the land management agency and the local population can be affected by designation. Community concerns during the implementation phase of protected area establishment may include fear of losing local autonomy, private landowner objections, lack of local political commitment, and problems between agencies operating in the area not cooperating. A study by Carroll (1988) found that there is a relatively brief window of opportunity after designation to develop a trusting, interactive community-agency relationship, and that once poor relations are established they are stubbornly persistent.