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Environmental Assessment

CLUSTER II RANGE ALLOTMENTS

**Bend/Ft. Rock Ranger District
Deschutes National Forest**

Legal Description:

Deschutes County, Oregon
T. 21 S., R 15 & 16 E, Sections 1-36
T.22 S., R 14-16 E., Sections 1-36
T. 23 S., R 11 E., Section 24
Willamette Meridian

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SUMMARY

This Environmental Assessment has been prepared to assess and document the environmental impacts of reauthorizing livestock grazing on three cattle and horse allotments and closing one sheep and goat allotment to livestock grazing within the Cluster II project area. The proposed action is similar to the current management of the allotments, but would be modified to reflect new standards and to implement protection measures for sensitive plants, reduce conflicts with other Forest users, and improve livestock distribution in the allotments. Three alternatives to the proposed action were developed, analyzed, and compared to the proposed action: No Grazing; Current Allotment Management (No Change); and Modified Proposed Action (Extended Monitoring).

The Proposed Action is needed because management plans currently in place on the allotments are outdated and need to be updated to reflect changed laws, regulations, and information. The proposed action is expected to improve or maintain upland vegetation conditions and allow for forage utilization by modifying current grazing practices and implementing cost-effective range improvements. Monitoring is incorporated into the action alternatives. Impacts to resources in the project area have been assessed, and no significant effects will result from the action alternatives.

Based on the information contained in this EA, the responsible official will decide whether to continue to authorize grazing on the allotments within the Cluster II project area. If the decision is to continue authorization of grazing, then the responsible official will decide what management prescriptions will apply.

INTRODUCTION

Document Structure

The Bend-Ft. Rock Ranger District of the Deschutes National Forest has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This environmental assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

Introduction: The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Comparison of Alternatives, including the Proposed Action: This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

Environmental Consequences: This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.

Agencies and Persons Consulted: This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

Appendices: The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Bend-Ft. Rock Ranger District Office at 1230 NE 3rd St., Suite A-262, Bend, Oregon, 97701.

Background

The Cluster II project area encompasses approximately 142,162 acres of National Forest system lands, 1,018 acres of Bureau of Land Management lands, and 500 acres of privately-owned land (Map 2, page 6). Four grazing allotments are involved:

- Sand Springs – 55,967 acres
- Quartz Mountain – 34,087 acres
- Cabin Lake – 26,192 acres
- Crater Buttes – 26,416 acres

The group of allotments in the planning area is located southeast of Pine Mountain and north of Christmas Valley, borders the Newberry National Volcanic Monument on the west and follows the boundary between the Deschutes National Forest and the Bureau of Land Management and private land owners on the east and southeast. Elevations range from approximately 4,500 feet above sea level at the extreme southern end of the planning area to about 6,100 feet above sea level at the top of Quartz Mountain.

Table 1. Project Area Allotment Status

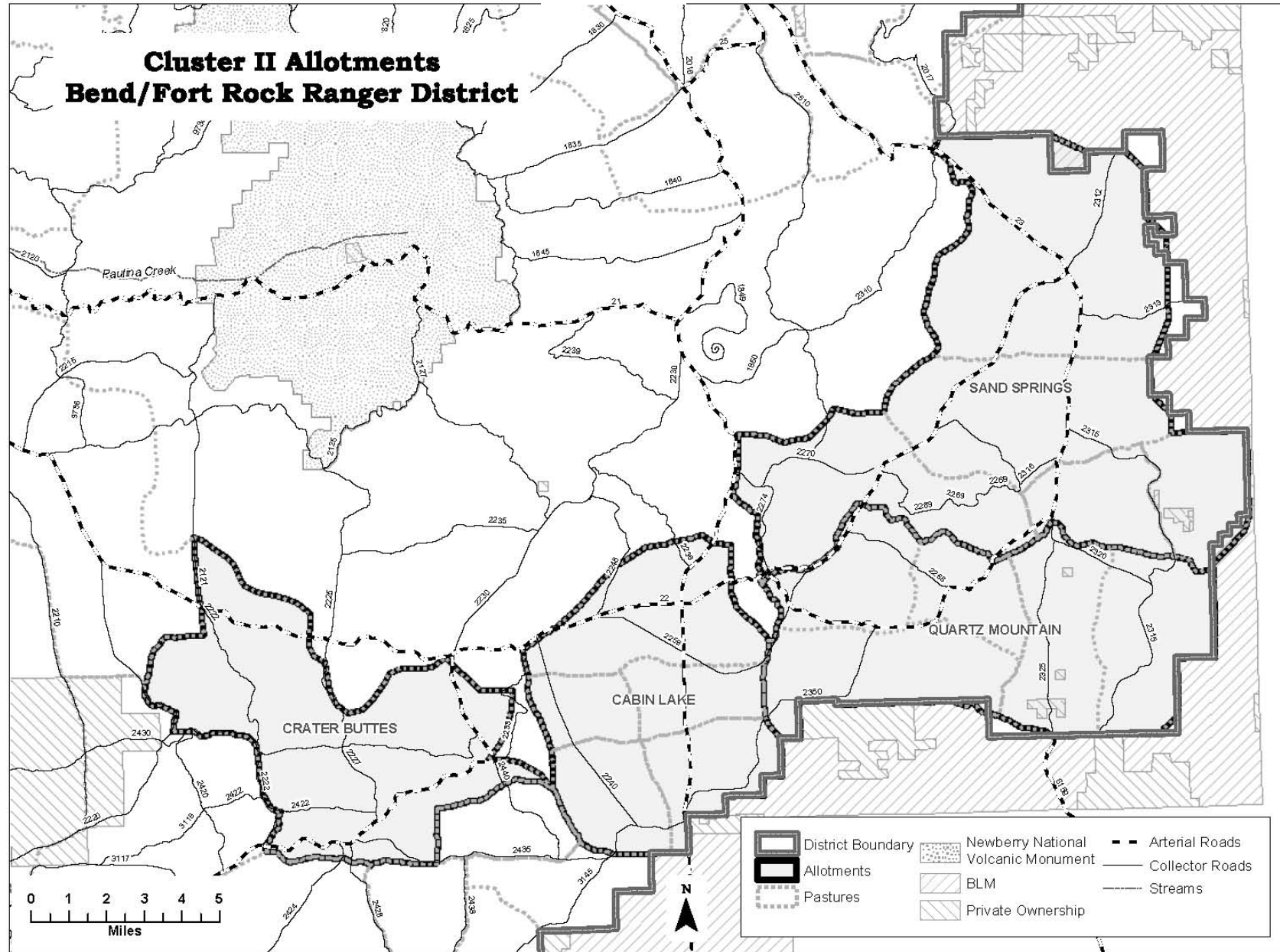
Allotment	Total Allotment Acres	Permitted Livestock Type	Last Year Actively Grazed/Status	Acres of non-Forest Service Ownership in the Allotment	Year of Latest NEPA
Cabin Lake	26,192	Cattle	1994/Vacant	1 - BLM	1964
Crater Buttes	26,416	Sheep	1975/Vacant		1962
Quartz Mountain	34,087	Cattle	2004/Active	326 – Private, 94 - BLM	1981
Sand Springs	55,967	Cattle	2004/Active	974 – BLM, 174 - Private	1984
Total Acres	142,662				

Forest Service records indicate that grazing has been occurring in the planning area since at least the late 1920s. Historic records indicate grazing actually began much earlier, prior to World War I, in the Cabin Lake area. The 1934 Taylor Grazing Act established grazing controls on public lands. The 1990 Deschutes Land and Resource Management Plan (LRMP) identified 34 allotments totaling more than 816,000 acres. The LRMP determined that the allotments are suitable for livestock grazing (LRMP, page 4-10).

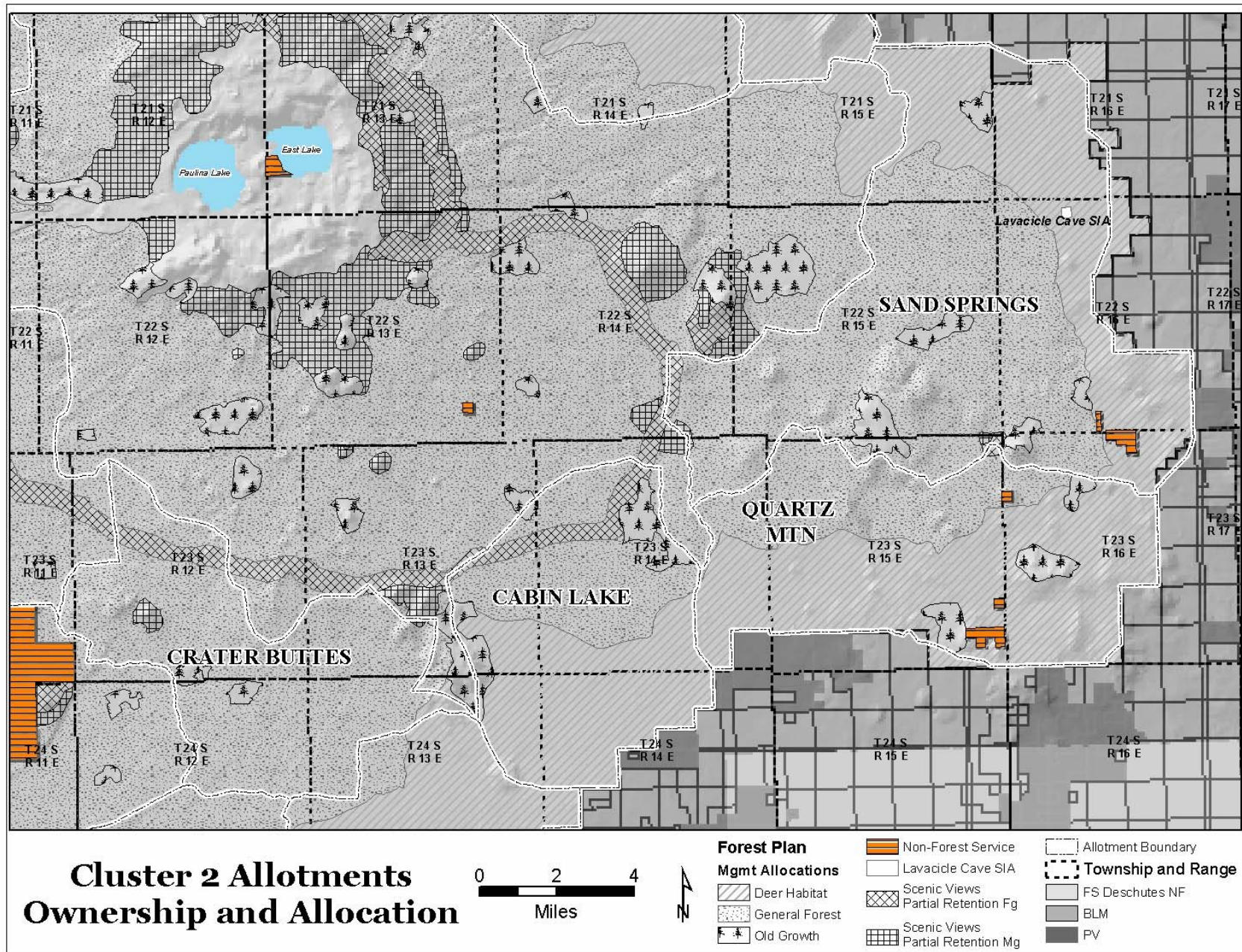
Two allotments are in active status – Quartz Mountain and Sand Springs. These two allotments have permittees that operate annually at or near their current permitted numbers. Permitted numbers were allocated based on the resource conditions, permittee operations, and existing range improvements. Two of the four allotments are vacant with no permittee and no use by livestock. The Crater Buttes Allotment became vacant in 1975 after the permittee chose not to continue grazing in the allotment, and the Cabin Lake Allotment became vacant in 1994 after the permittee chose not to continue grazing

that allotment. There has been interest by private parties to restock these allotments. Vacant allotments cannot be restocked with livestock until an assessment under the NEPA is completed.

Map 1. Cluster II Project Area



Map 2. LRMP Management and Ownership



PURPOSE AND NEED FOR ACTION

The Deschutes Land and Resource Management Plan (LRMP) has the following goal for range management on the Forest: “To manage the forage resources for long-term sustained productivity through attainment of upward or stable vegetative trends, protection of the basic soil and water resources, and meet public needs for multiple resource outputs.” (LRMP 4-49). Section 504 of the 1995 Rescission Act requires National Environmental Policy Act (NEPA) analysis and decisions for all grazing allotments by 2011.

There is a need to improve control of livestock for better distribution, more controlled utilization of vegetation, and protection of other resources.

- There is no boundary fence for the north side and most of the west side of the Cabin Lake Allotment. Livestock are not controlled, and are able to access the heavily forested transitional range north of Road 22 and an Old Growth Management Area on Sugar Pine Ridge, and have been lost in the past due to wandering off. The existing fencing also requires maintenance. The purpose of the proposed action is to fully contain livestock within the Cabin Lake allotment, and exclude livestock grazing from transitional range north of Road 22 and from most of the Old Growth MA on Sugar Pine Ridge.
- The pumice grape fern (*Botrychium pumicola*) needs to be protected in the Sand Springs Pasture of the Sand Springs Allotment, because cattle may be impacting plants by trampling them. The purpose of the proposed action is to avoid potential impacts of grazing to long-term population persistence.
- The purpose of the proposed action is to improve livestock distribution in the Quartz Mtn. and Sand Springs Allotments, facilitate livestock management by providing more control, and allow for a shorter period of time in each pasture to reduce the amount of time each acre of ground is used by livestock, and provide more flexibility when there is drought or the need to provide more specific use of deer winter range areas.
- Monitoring provides a method to ensure that we are maintaining or improving range land conditions as required by the Deschutes LRMP: “Allotments will be managed to achieve or maintain a forage conditions rating of fair or better or to the site’s capability.” (LRMP 4-119). The purpose of the proposed action is to improve monitoring of range conditions.

There is a need to reduce conflicts between livestock grazing and other Forest uses, such as recreation.

- There are safety concerns with livestock around Road 22 in the Cabin Lake Allotment. Road 22 has seen an increase in use by the public, including OHVs. The purpose of the proposed action is to exclude livestock from Road 22 where there are safety concerns.
- Livestock are able to enter the South Ice Cave recreation area. The purpose of the proposed action is to exclude livestock from the South Ice Cave recreation area and eliminate potential user conflicts by separating livestock grazing and OHV activities.

There is a need to provide

- Some areas of the allotments are currently lacking in water sources.

water sources for livestock.

Water sources are also used in distributing cattle throughout the allotments.

There is a need to update the terms and conditions of the Allotment Management Plans and term grazing permits.

- Management Plans currently in place are outdated and do not reflect changed laws, regulations, and new information. Present allotment management plans were implemented between 1962 and 1984. These need to be updated to reflect the most current laws, regulations, and management direction, and to incorporate new or changed conditions and recent science.

There is a need to provide suitable forage to support livestock grazing where consistent with the Deschutes Land and Resource Management Plan (36 CFR 22.2(c)).

- The demand for public land grazing by cattle on the Deschutes NF exceeds the availability of grazing allotments as the Forest continues to receive requests for grazing opportunities. The Sand Springs and Quartz Mtn. Allotments are active, and the permittees want to continue grazing these allotments. The Cabin Lake Allotment is vacant and cannot be restocked until the completion of NEPA. Members of the public have expressed an interest in grazing that allotment. The purpose of the proposed action is to provide suitable forage to support livestock grazing in accordance with multiple-use goals and objectives, on the Cabin Lake, Quartz Mountain, and Sand Springs Allotments.

There is a need to reconsider authorization of unproductive and low demand allotment that is currently vacant (Deschutes LRMP 4-49, RG-4)

- The Crater Buttes Allotment has experienced a significant change in understory vegetation because of past management activities and because of the exclusion of fire. This trend was recognized in 1962 when the previous allotment management plan was completed. As a result, many areas are experiencing conifer encroachment, and the shrub component that sheep were allocated has been reduced. The grazing capacity is much reduced from the 1970s when it was last utilized. Additionally, the demand for public land grazing by sheep declined in Central Oregon and there is currently no interest in grazing the allotment. The purpose of the proposed action is to eliminate an unneeded allotment.

PROPOSED ACTION

The Deschutes National Forest is proposing to authorize the grazing of domestic livestock, cattle, in the Sand Springs, Quartz Mountain, and Cabin Lake Allotments by issuing new 10-year term permits starting with the 2007 grazing season and ending after the 2016 grazing season. The Crater Buttes Allotment, a sheep and goat allotment, would be closed to livestock use.

The Quartz Mountain and Cabin Lake Allotments would be grazed using a rest rotation system. To protect the pumice grape fern (*Botrychium pumicola*) in the Sand Springs Pasture, the Sand Springs Allotment would be grazed using a deferred rest rotation system.

The grazing season within the three open allotments would be variable but would generally be from May through the end of September depending on the allotment and weather conditions. A maximum of 1500 cow/calf pairs would be permitted in the three allotments for the 4-month grazing season. Actual numbers within each allotment and the actual season of grazing would be based on range

condition, permittee requested use, and range readiness. Actual seasons and numbers would be specified in the Annual Operating Plan and be within the limits authorized in the permit.

The following actions would be necessary to implement this alternative (all improvements would be constructed and maintained by the permittee): New fence construction, development of additional water set locations; new condition and trend study plots (Forest Service responsibility); adjustments in allotment and pasture boundaries; waterline extensions; adjustments in the season of use; additional cattleguards to support new fence construction; removal of cattleguards; waterline relocations; a new well; and changes in the current status of existing allotments.

Following is a discussion of specific required improvements and changes in grazing for each allotment (refer to Maps 3 through 6).

Sand Springs Allotment:

The grazing season would change by starting May 15th and ending September 30th each year for a maximum of 122 days. A maximum of 600 cow/calf pairs would be permitted.

To minimize the impacts of grazing on the pumice grape fern population in the Sand Springs Pasture, the period of grazing would be varied on a four-year cycle. For one year out of the four, the pasture would not be grazed and the pasture rested during the entire season. For two out of the four years, grazing would not be allowed until August 1st because the plants will have sporulated by that time. During the fourth year, grazing would occur prior to August 1st and be limited to a maximum of three weeks during that period. No grazing after August 1 would be expected in the pasture during that fourth year.

The number of pastures would increase from four to five by dividing the Watkins Pasture into two pastures (Watkins East and Watkins West) in order to allow for a shorter period of grazing on each acre of ground. The allotment acreage would remain at approximately 55,967 acres.

Approximately 3.5 miles of new division fence would be constructed to divide the existing Watkins Pasture. The fence would be a wildlife friendly 3-strand smooth wire/barbed wire fence with the lower wire no less than 16 inches above the ground and the top wire no higher than 42 inches above the ground. Posts would be metal. This would increase the number of miles of interior and boundary fence to approximately 58.5 miles. No existing fences would be removed.

New fence construction would require mowing up to approximately 3.5 acres of vegetation using a mower pulled by a 4-wheel farm type tractor or other similar piece of equipment. Vegetation would be mowed to a minimum of height of 6-8 inches. The mowed strip width would be approximately eight feet wide.

New fence construction would also require the construction of one road cattleguard on Road 2315 in T22S R16E Section 28. The cattleguard would be located within the existing road prism. It would be constructed using a wheeled backhoe or other similar equipment. No OHV cattleguards would be required.

Approximately 1.25 miles of waterline extensions would be constructed. This would include: approximately one mile extension from the end of the existing line in T22S R16E Section 20 south along side of Road 2315-120 then across country to the corral on Road 2315-240 in T22S R16E Section 22; and an approximately one quarter (0.25) mile extension running east from the existing line in T22S R16E section 4 to a point near the junction of Road 2313-100 and Road 2313-190.

Construction of the waterline extensions would require digging a shallow ditch with a maximum depth of approximately 18 inches. The amount of disturbed area associated with the construction would be less than 10 feet in width. The ditch would be constructed using a backhoe with a bucket width of 24 inches or less in width or by using a "ditch witch" or comparable equipment. Approximately one mile

of the proposed waterline extensions would be placed adjacent in the disturbed area along to Road 2315-120; the remainder of the extensions would be in undisturbed areas away from existing roads. The total amount of disturbed area associated with this construction would be less than two acres, the majority of which would be located adjacent to Road 2315-120.

A total of two new water troughs would be constructed; one along the longer waterline extension and one at the end of the shorter extension. Water troughs would be placed on site and would require no construction other than to connect them to the water line. In contrast to water sets, water troughs would not be removed when the cattle were removed for the season.

The waterline that currently is located in the center of Roads 2270-670 and 2274-410 in T22S R14E Sections 25 and 36 and T23S R14E Section 2, would be moved to the east side of the road. The estimated distance is less than 1.75 miles. The same types of equipment would be expected to be used to relocate this line. The relocated line is expected to be located primarily within previously disturbed areas within the road prism. The expected amount of soil disturbance is approximately two acres or less. Two existing water troughs would not be moved or otherwise relocated.

Three new condition and trend study plots would be established; one each in the western portion of the Kelly-Firestone Pasture, the new Watkins West Pasture, and the new Watkins East Pasture.

Quartz Mountain Allotment

There would be no change in the size of the allotment or the number of cow/calf pairs that would be permitted to graze; a maximum of 600. The number of pastures would increase from five to eight. The grazing season would be changed from the current June 1 to September 30 to one from May 15th to September 30th and would be a variable use period between those dates permitting 600 cow/calf pairs for 122 days or the equivalent.

Approximately five miles of new fences would be constructed to divide the Wigtop (approximately two miles), Aspen (approximately one mile in two segments), and Powerline (approximately two miles) Pastures into the Wigtop East, Wigtop West, Aspen North, Aspen South, Powerline North, and Powerline South. Approximately five acres of vegetation would be mowed to permit construction of the new fences (eight foot strip with vegetation mowed to a minimum height of 6 to 8 inches). All would be wildlife friendly, 3-strand smooth wire/barbed wire with metal posts. No fences would be removed. There would be no change in the number of acres in the allotment due to new fence construction. The total number of miles of boundary and interior fences in the allotment would increase from 46 miles to 51 miles.

Construction of new fences would require the installation of three new road cattle guards. One would be located on Road 2325 (T23S, R15E Section 24); one on Road 2325-700 (T23S R15E section 24), and the third on Road 2315 (T23S R16E Section 21). The number of cattle guards would increase from 14 to 17.

The new fences would also require three new gates. One would be located on Road 2350-810 and one on Road 2350-850 (T23S R15E section 20), and Road 2315-800 (T23S R16E Sections 21/28). The number of gates would increase from 29 to 32.

Six new water sets would be established. The first, located in the southeast quarter of the southeast quarter of section 23 in T23S R15E, would also include the construction of approximately one quarter (0.25) mile of new holding fence. The fence would be a 3-strand, smooth wire/barbed wire fence and would be wildlife friendly with the bottom strand at least 16" above the ground and the top strand 42 inches or less above the ground. The water set would serve four pastures – Powerline North, Powerline South, East 16, and Wigtop East.

Two new water sets are proposed beneath the BPA transmission lines and within the transmission line corridor. The first is located in the southeast quarter of the southeast quarter of section 1 in T23S

R15E. The second is located in section 25 in T23S R15E along Road 2325. New fences would not be required at these sites.

The fourth water set would be located at the intersection of Roads 2315-800 and 2315-820 in the southwest quarter of the northeast quarter in section 25 of T23S R16E. No new fences would be required. The fifth water set would be located in T23S R16E Section 16 on Road 2315-630. The sixth water set would be located in T23S R16E section 17 on Road 2320-760.

Approximately 2.0 miles of new water line would be constructed from the end of the existing line in T23S R15E section 8. One section would continue south along Road 2368-200 then east less than one quarter (0.25) mile cross country to the end of Road 2368-280 in T23S R15W Section 16.

Approximately 0.5 miles of wildlife friendly, 3-strand, smooth wire/barb wire fence would be constructed around the existing dirt reservoir at the end of Road 2368-280 to exclude livestock. A new water trough would be placed at the end of Road 2368-280.

A new well would be drilled at the end of Road 2368-280 and a 5,000 gallon water storage tank constructed on a small ridge located to the west of the reservoir. Both the well and the storage tank would be connected to the proposed water line extension. Less than one half acre would be expected to be disturbed to drill the well and a similar sized area to construct the storage tank. An access road, approximately 500 feet in length and a maximum width of 10 feet, would be required to provide access to construct and maintain the tank. This access road would require no actual construction (such as blading or digging); local terrain permits cross country vehicle access. Drilling of the well would be coordinated with the BLM which has jurisdiction on subsurface activities.

One new condition and trend study plot would be established in the new East Wigtop Pasture.

Cabin Lake Allotment

The allotment would remain with five pastures. The grazing season would be changed to May 25 through September 10. The number of cow/calf pairs would decline from 300 to 240.

The size of this allotment would be reduced from the current 26,192 acres to approximately 21,296 acres, a reduction of approximately 4,896 acres. Pasture One would be reduced by approximately 148 acres, Pasture 2 by approximately 807 acres, and Pasture 3 by approximately 3,951 acres. Pasture 3 would also see a 10 acre increase in the northeast corner of the pasture resulting from the construction of a short segment of new fence. This would result in a net decrease of 3,941 acres.

The reduction in the allotment and pasture sizes would be accomplished by the construction of new fences along the east side of Roads 2240-500 and 2240 and along the south side of Road 22. A small, approximately 40 acre section south of Road 22 and bounded by Road 23 on the west, Road 2300-910 on the south, and OHV Trail 911 on the east would also be fenced out of the allotment. This would require the construction of approximately 11 miles of wildlife friendly, 3-strand smooth wire/barbed wire fence with metal posts. Construction would require the mowing of approximately 11 acres of vegetation. No existing fences would be removed.

New fence construction would require the construction of two new road cattleguards would be required on Roads 2240-550 (T24S R13E section 2) and 23 (T23S R14E sections 16/17). Approximately 15 other system roads would require gates. An existing road cattleguard, located on Road 2240 (T23S R13E section 26) would be removed and relocated on Road 2240-200 (T23S R13E section 26). The number of cattleguards would increase from the current 10 to 12.

All cattleguard placements, removals, and relocations would occur within the existing road prism.

In addition to road cattleguards, two (2) new OHV cattleguards would be needed; one on OHV Trail 911 in T23S R14E section 16 and the other at the intersection of OHV Trails 914 and 993 in T23S R14E section 15. There is no fence line or new fence construction proposed at the site of the latter

cattleguard. Natural features provide a natural barrier to prevent cattle movement outside of the allotment. Placement of this cattleguard would prevent cattle from using the OHV trail to leave the allotment. As with road cattleguards, OHV cattleguard placements would occur primarily within the OHV trail prism.

The number of water sets would remain at 22; no new water sets would be established. There are no water troughs in the allotment and no new ones would be added. The one trick tank would remain; no new ones would be constructed. This tank is currently in need of repair. It would be repaired.

There is approximately one mile of existing water line. No extensions or new lines are proposed.

The existing well would remain; no new ones would be drilled.

Two new condition and trend study plots would be established; one in Pasture Two and one in the eastern portion of Pasture 3.

Crater Buttes Allotment

This allotment would be closed. There are no improvements (fences, water sets, gates, cattleguards, etc.) associated with this allotment, and no new improvements would be added.

There is approximately 6.7 miles of allotment boundary fence associated with the Gebhardt Well Allotment located along the southeast boundary of the Crater Buttes allotment. This allotment boundary fence would remain in place as long as grazing continued in the Gebhardt Well Allotment.

DECISION FRAMEWORK

The Responsible Official for this proposal is the Deschutes Forest Supervisor. The Forest Supervisor will decide whether or not to continue to authorize livestock grazing in the allotments of the Cluster II Project Area. If the Forest Supervisor decides to authorize livestock grazing, the decision will include determining how the grazing resources are to be managed to best meet the goals of the LRMP and meet the purpose and need for the project. The decision will address whether to implement the project as proposed, to implement one of the alternatives, or not to implement the project at all.

The Forest Supervisor will decide if implementation of the Proposed Action or alternatives would cause significant effects requiring analysis in an environmental impact statement. That determination will be based on context and intensity, and weighing the significance of the actions (40 CFR 1508.27).

Implementation will occur through incorporation of the selected alternative into an allotment management plan (AMP) specific to each allotment or groups of allotments.

Management Areas and Direction _____

Deschutes Land and Resource Management Plan:

The Deschutes National Forest Land and Resource Management Plan (LRMP), as amended, guides all natural resource management activities and provides standards and guidelines for the Deschutes National Forest.

The following is a summary of the Management Areas (MA) found in the project area (Map 3, page 15):

Deer Habitat (MA-7): Manage vegetation to provide optimum habitat conditions on deer winter and transition ranges while providing some domestic livestock forage, wood products, visual quality, and recreation opportunities.

General Forest (MA-8): Emphasize timber production while providing forage production, visual quality, wildlife habitat, and recreation opportunities for public use and enjoyment.

Scenic Views (MA-9): Provide Forest visitors with high quality scenery that represents the natural character of Central Oregon.

Old Growth (MA-15): Provide naturally evolved old growth forest ecosystems for 1) habitat for plant and animal species associated with old growth forest ecosystem, 2) representations of landscape ecology, 3) public enjoyment of large, old-tree environments, and 4) the needs of the public from an aesthetic spiritual sense.

Table 2. Forest Plan Management Areas

Forest Plan Management Area	Acres
General Forest	78,461
Deer Habitat	52,965
Old Growth	6,112
Scenic Views	3,606
Other Ownership	568
Outside Deschutes National Forest (BLM)	950
Total Acres	142,662

Forest-wide standards and guidelines for range management are found in the Deschutes LRMP at 4-49 to 4-50. The goal stated in the LRMP is “To manage the forage resources for long-term sustained productivity through attainment of upward or stable vegetative trends, protection of the basic soil and water resources, and meet public needs for multiple resource outputs.”

The Deschutes LRMP was amended in 1995 by the Inland Native Fish Strategy (INFISH) for the protection of habitat and populations of resident native fish. There are no intermittent or perennial streams within the planning area, therefore the direction in INFISH will not be addressed.

Other Direction

Forest Service Handbook 2209.13, Chapter 90 Rangeland Management Decisionmaking sets out direction on planning and analysis, decision implementation, monitoring, review of decision, and modifications in the use or activity based on monitoring results.

Section 504 of the 1995 Rescissions Act requires that all allotments on each National Forest System unit establish and adhere to a schedule for the completion of environmental analyses and decisions for all allotments that require such analysis as required under the National Environmental Policy Act (NEPA) of 1969. The analysis for these four allotments complies with that direction.

Public Involvement

The proposal was first listed in the Schedule of Projects (SOP) for the Deschutes and Ochoco National Forests in the Fall 2004 issue. The SOP is made available over the internet and is also mailed to approximately 93 interested citizens. The proposal was provided to the public and other agencies for comment during scoping which started on November 3, 2004 (see page 134 for mailing list). As part of the scoping process, letters were also sent to The Bulletin, the local newspaper, and the following

Native American Tribes: the Confederated Tribes of the Warm Springs, the Burns Paiute, and the Klamath. In addition, as part of the public involvement process, the agency provided a tour of the planning area on June 10, 2005. Representatives of the Oregon Department of Fish and Wildlife and U.S. Fish and Wildlife Service, and one current permittee attended the field tour.

Four responses to scoping were received: League of Wilderness Defenders/Blue Mountains Biodiversity Project; Oregon Natural Resource Council; Oregon Department of Fish and Wildlife; and Dick Nelson (permittee from outside of project area).

Using the comments from the public and other agencies, (see *Issues* section), the interdisciplinary team developed a list of issues to address.

Issues

The Forest Service separated the issues into Key Issues, Analysis Issues, and Non-significant Issues¹.

Key Issues are those that represent a point of debate or concern that cannot be resolved without consideration of the trade-offs involved. These issues spur the design of alternatives and additional mitigation measures to the proposed action that provide a different path to achieve project objectives. Trade-offs can be more clearly understood by developing alternatives and displaying the relative impacts of these alternatives weighed against the proposed action.

Key Issue #1: Potential Impacts to Pumice Grape Fern, A Sensitive Species

Pumice grape fern is listed on the Region 6 Regional Forester's Sensitive Species List. This species is endemic to Central Oregon where it occupies frost pocket sites characterized by pumice soils and little or no overstory vegetative cover (grasses, shrubs, or trees). The currently known world population is estimated at approximately 25,700 plants. The Sand Springs Pasture of the Sand Springs Allotment contains approximately 2,955 individual plants. There is a concern that grazing may impact these sensitive plants. These potential impacts will be measured with an assessment of long-term persistence of the population.

Key Issue #2 – Potential Impacts to Sage-Grouse Habitat

The planning area contains some seasonal habitat for the greater (western) sage-grouse. The planning area currently provides marginal nesting or brood rearing habitat. Surveys in 2004 found droppings; no nests are known. There are no documented or known lek sites. Livestock grazing may impact the available potential habitat, however. This issue will be measured by the amount of existing or potential habitat subject to grazing.

Key Issue #3 – Potential Impacts to Big Game Habitat

Approximately 52,965 acres (37%) of the planning area is in the MA-7, deer winter range, land allocation of the LRMP. Within winter range areas, bitterbrush is the primary browse species for mule

¹ Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record.

deer due to its high palatability and availability in winter, and nutritional levels. Cattle, particularly late in the grazing season when forage species (grasses and forbs) have cured and provide lower nutritional levels and palatability, will browse bitterbrush. When browsed late in the grazing season, browsing by cattle reduces the amount of browse that would be potentially available to mule deer during winter months. This has the potential to reduce the health and vigor of wintering deer and may increase the risk of mortality.

Analysis Issues

In addition to the key issues, other environmental components will be considered in the Environmental Effects section as a way to compare the alternatives, though they did not result in differing design elements between alternatives. These issues are important for providing the Responsible Official with complete information about the effects of the project, such as where project design criteria are being proposed to reduce impacts from the proposed action, or how the project is consistent with Forest Plan direction.

Range Resources/Vegetation

Noxious Weeds

Proposed Endangered, Threatened, Sensitive (PETS) Animal Species

Management Indicator Species

Land Birds including Migratory Species

Soils

Heritage Resources

Other Effects

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Cluster II Range Allotments. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

Alternatives Considered in Detail

Alternative 1

Current management

Table 3. Current Use Levels Compared to Forest Plan Allocations

Allotment	1990 LRMP Allocation	Current Management
Cabin Lake	300 Cow/calf pairs*	0*
Crater Buttes	1,000 sheep.	0
Quartz Mountain	600 Cow/calf pairs*	600*
Sand Springs	600 Cow/calf pairs*	600*

* Number of cow and calf pairs for permitted grazing season.

No allotments would be terminated. The Cabin Lake and Crater Buttes Allotments would remain open but vacant. Grazing would continue in the Sand Springs and Quartz Mountain Allotments.

There would be no changes in the current seasons of grazing or the number of livestock permitted to be grazed. The grazing season for the Sand Springs, Quartz Mountain, and Cabin Lake Allotment currently start June 1 and end September 15 in the Cabin Lake Allotment and September 30 in both Sand Springs and Quartz Mountain. The Crater Buttes Allotment has no designated grazing season.

Stocking levels would remain at 300 cow/calf pairs in the Cabin Lake Allotment and 600 cow/calf pairs in both Sand Springs and Quartz Mountain Allotments. Crater Buttes would be permitted 1000 head of sheep/goats. All allotments would utilize a rest rotation system.

No new improvements such as fences, cattleguards, water sets, water lines, water troughs, or tanks would be constructed in any allotment. No water lines would be extended.

Allotment Specific Conditions

Sand Springs Allotment

This allotment is currently active. It includes four pastures totaling approximately 55,967 acres and is grazed on a rest rotation system. A maximum of 600 cow/calf pairs are permitted with a grazing season running from June 1 to September 30 each year. There would be no change in the size of the allotment, the number or size of the pastures, the length of the grazing season, or the number of cow/calf pairs permitted.

The allotment contains approximately 55 miles of boundary and interior fences. No new fences would be constructed. The permittee would continue to conduct fence maintenance and reconstruction as needed.

The allotment contains 18 road cattleguards. There are also 11 OHV cattleguards where fences intersect with East Fort Rock OHV system trails. No new cattleguards would be constructed. There are 53 gates, including both wire and metal, where fences cross system roads. No new gates would be required.

There are 21 existing water sets and 30 water troughs. There are no trick tanks. No new water sets, water troughs, or trick tanks would be established or constructed. There are approximately 31 miles of existing water line but no wells in the allotment. Water for the water lines would continue to be provided by the China Hat well located outside of the allotment and planning area. No new pipelines would be constructed or wells drilled.

No new study plots would be established.

Quartz Mountain Allotment

This allotment is currently active. It includes five (5) pastures totaling approximately 34,087 acres and is grazed on a rest rotation system. A maximum of 600 cow/calf pairs are permitted with a grazing season running from June 1 to September 30 each year. There would be no change in the size of the allotment, the number or size of the pastures, the length of the grazing season, or the number of cow/calf pairs permitted.

The allotment contains approximately 46 miles of boundary and interior fences. No new fences would be constructed. The permittee would continue to conduct fence maintenance and reconstruction as needed. The allotment contains 14 road cattleguards. There are no OHV cattleguards. No new cattleguards would be added. There are 29 gates, including both wire and metal, where fences cross system roads. No new gates would be required.

There are 10 existing water sets, two water troughs, and one trick tank. No new water sets, troughs, or trick tanks would be established or constructed. There are approximately two miles of existing water line but no wells in the allotment. No new water lines would be constructed and no wells would be drilled.

No new study plots would be established.

Cabin Lake Allotment

This allotment has been vacant since 1995. It includes five pastures totaling approximately 26,192 acres and is grazed on a rest rotation system. A maximum of 300 cow/calf pairs are permitted with a grazing season running from June 1 to September 15 each year. There would be no change in the size of the allotment, the number or size of the pastures, the length of the grazing season, or the number of cow/calf pairs permitted.

The allotment contains approximately 32 miles of boundary and interior fences. No new fences would be constructed. The permittee would continue to conduct fence maintenance and reconstruction as needed.

The allotment contains 10 road cattleguards. There are no OHV cattleguards. No new cattleguards would be required. There are 24 gates, including both wire and metal, where fences cross system roads. No new gates would be required.

There are 22 existing water sets, no water troughs, and one trick tank. No new water sets, water troughs, or trick tanks would be established or constructed. The trick tank needs repair; it would not

be repaired. There is approximately one mile of existing water line and one well. No new waterlines would be constructed or wells drilled.

No new study plots would be established.

Crater Buttes Allotment

This allotment is currently vacant. It has one pasture and totals approximately 26,416 acres. A sheep and goat allotment, 1000 head are permitted but it has not been grazed since 1975. The allotment would remain vacant with no changes in the size of the allotment, the number of pastures, or the number of head permitted.

There are no boundary or interior fences in the allotment; none would be constructed. The Gebhardt Well Allotment boundary fence that borders the allotment on the southeastern boundary would remain (the fence is a Gebhardt Well Allotment improvement, not Crater Buttes).

There are no road or OHV cattleguards; none would be constructed. There are no gates; none would be constructed. There are no water sets, water troughs, or trick tanks; none would be constructed. There are no water lines or wells; none would be constructed or drilled.

There are no range improvements in the allotment. Approximately 6.5 miles of allotment boundary fence associated with the Gebhardt Well Allotment that is located along the southeastern boundary of the allotment would remain until grazing in that allotment (Gebhardt Well) was halted and the allotment terminated.

No new study plots would be established.

Alternative 2

The Proposed Action

The Proposed Action is described earlier in this document, see page 7.

Alternative 3

No Action – No Grazing

Under the No Action alternative, all Term Grazing Permits would be cancelled within two years of implementation of the decision. No **livestock grazing** would be authorized in the planning area. The requirement to implement this decision no sooner than two years following the project decision is pursuant to Forest Service Handbook (FSH) 2209.12 part 16.24, and the code of Federal Regulation 36 CFR 222.4(4)(1). It is in effect an economic mitigation measure directed by policy and regulation. No permits would be issued for any of the four allotments unless a subsequent NEPA decision to restock any or all of the allotments was made.

Maintenance of range developments on the allotments would no longer be the responsibility of the permittees. Range improvements would be removed or rehabilitated. All developments not needed for resource management would be removed. Watersets could be naturally reclaimed, or measures such as ripping and planting could be implemented to restore the areas.

Alternative 4

Extended Monitoring – Sand Springs Pasture

This alternative is identical to Alternative 2 – Proposed Action (see page 7) except for actions and activities proposed in the Sand Springs Pasture of the Sand Springs Allotment. Under this alternative, grazing in the Sand Springs Pasture would be halted for seven years. During this period, additional data would be collected on the *Botrychium pumicola* (pumice grape fern or “BOPU”) populations, including baseline population information. Starting with the 2013 grazing season and continuing through the 2015 grazing season, the permittee would be permitted to graze the pasture using a rest rotation grazing system. Seasonal limitations proposed under Alternative 2 would not be implemented under this alternative. The grazing season during these three years would be the same as described under Alternative 1 – Current Management.

The management objective for this pasture would be to maintain population levels at or above those currently observed. The following description is one monitoring method that could be used, but a different method may be chosen as the site-specific situation is examined in more detail.

Six (6) monitoring plots, including three (3) control plots, would be established. All plots would be approximately one half (0.5) acre in size. Control plots would be fenced to exclude cattle. Existing fenced areas that contain sufficient numbers of grape fern would be used as control plots wherever possible. If there are no suitable fenced areas, up to approximately one half (0.5) mile of wildlife friendly 3-strand smooth wire and barb wire fence would be constructed to fence all of the plots. Although metal posts would be used and would not require ground disturbance to place, a limited amount of digging would be necessary to construct braces at corners. Assuming four (4) corners per plot, a maximum of 12 sites totaling less than 100 square feet of soil would be disturbed. No mowing of vegetation would be expected.

Non-control plots would not be fenced. These plots would be used to monitor the effects of grazing on the grape fern during the 2013-2015 grazing seasons.

To better identify the effects of grazing on the grape fern, up to two (2) additional water sets may be needed to encourage/insure cattle use in grape fern population areas. The water sets would be located within or adjacent to known populations of the grape fern.

During the seven years that the Sand Springs pasture was not grazed, the remaining five (5) pastures would be grazed under a rest rotation grazing system. A maximum of 600 cow/calf pairs would be permitted for up to 92 days or the equivalent during this period. The grazing season would run from May 15th to August 31st yearly.

Starting with the 2013 grazing season, the permitted stocking levels would be increased to a maximum of 600 cow/calf pairs for a period of 122 days or the equivalent. The grazing season would increase by 30 days and run from May 15th to September 30th yearly.

The approximately one quarter (0.25) mile water line extension proposed in T22S R16E section 4 would not be constructed during the 10-year period from 2006 through 2015. The water trough proposed for this section would not be placed. The one (1) mile water line extension proposed into the Watkins pasture and associated water trough would be constructed.

The effects of grazing on the grape fern would be evaluated after the 2015 grazing season. The decision to either close the pasture or continue grazing in the pasture and under what terms and conditions would be made at that time and would require a subsequent analysis and decision. The decision to construct the quarter mile water line extension and place the new water trough would also be made at that time.

Alternatives Not Considered in Detail

Reduce Fuel Loadings through the use of Non-commercial Thinning and Prescribe Fire – This proposal fails to meet the purpose and need. A benefit of grazing is that it helps to reduce fine fuel loading (see pages 53-54 of this EA). The proposed action is to reauthorize grazing, authorize necessary improvements to improve grazing practices and achieve resource objectives, and to update the terms and conditions of the term grazing permits to reflect changed laws, regulations, and information. The reduction of fuel loadings is not identified as part of the purpose or need.

Close the Sand Springs Pasture to Grazing - This would have resulted in increased costs to the permittee due to either reduced stocking levels or a reduced grazing season. It would also have resulted in an increase in cost to the permittee to move cattle into and out of the Sand Springs Allotment. This alternative would have avoided any effects from grazing to the pumice grape fern in that pasture. It would have also forgone the opportunity to collect additional information on both the species and the impacts of grazing on both the individual plants, the species habitat, and on the population – information that would potentially help to identify impacts of future management activities in other areas of the species' habitat. This option is similar to Alternative 4 where a longer period of no grazing would take place and allow for an extended period of monitoring.

Close Sand Springs Pasture for 5 years with grazing permitted for years 6-10 of the permit – This alternative is similar to Alternative 4 in that it would prohibit grazing in the Sand Springs pasture but for five years rather than seven years and then allow grazing in that pasture for the remaining five years of the term permit. The no grazing period was considered to be too short to collect adequate information on the pumice grape fern upon which the effects of grazing could be measured. It was therefore eliminated from detailed study.

Resource Protection Measures

In response to public comments on the proposal, resource protection measures and mitigation measures were developed to ease some of the potential impacts the various alternatives may cause.

Common to Alternatives 1, 2, and 4

Wildlife

Sage Grouse

1. During the nesting and early brood rearing season of May 15 through June 30, determine possible occupancy by sage grouse by doing field reconnaissance within identified areas of suitable habitat as shown on Map #3 in the Wildlife Report. If sage grouse are found, monitoring would need to take place to determine stubble height pre and post grazing to determine the extent of vegetation removal by cattle, and thus possibly make changes to the grazing practices in these areas.

Deer & Elk

2. Fences around guzzlers need to be maintained to prevent cattle from using these water sources, plus maintained from cattle damage.

Ungulates/Fences

3. To minimize impacts of fence construction efforts to movement patterns of ungulate populations, fence standards will be as follows: 38 to 42 inch maximum height for top strand and a bottom strand minimum height of 18 inches where antelope are present, 16 inches where not present. Where antelope are present, the bottom strand will also be of smooth wire (no barbs).

Landbirds

4. To allow territories to be established and to increase the probability of nesting success, grazing will not occur in the allotments any earlier than May 1 to reduce indirect effects of disturbance, and the direct effects of nest trampling (the probability is low) to ground nesting birds.

Old Growth Management Areas

5. Alternatives 1, 2, and 4 – Within the OGMAs, ensure that the production of old growth habitat continues to provide for old growth dependent species. To minimize soil compaction, alleviate damage to roots of trees, and limit the potential of the spread of cheat grass/noxious weeds, watersets will not be placed within any OGMAs.

Botany

Sensitive Plants – *Botrychium pumicola*

6. *Alternative 2* - Grazing would not occur within the Sand Springs pasture until after BOPU has sporulated, after August 1 (except for one year, described following). The grazing regime would remain the same (3 years of grazing, 1 year of rest), but in one out of the three years of active grazing, the cattle would be in the pasture for a variable amount of time between June 1 and August 1. In the remaining two years of active grazing, cattle would not be released into the Sand Springs pasture until after August 1.

Cultural Resources

7. A qualified technician or archaeologist would be on-site during ground disturbing activities, for fence construction and subsoiling, to monitor in areas of known sites and for the presence of buried deposits of cultural resources. In the event that heritage resources are found during implementation of this project, ground disturbing activities will cease until the resources can be evaluated by a professional archaeologist. After evaluation of the resources the project could continue by 1) avoiding the site by relocating the work away from the site; 2) data recovery prior to continuing project work; or 3) modifying the activity to reduce or eliminate the effects on the site.

Noxious Weed Prevention Practices

The following goals and guidelines, relative to grazing management, are listed in the USDA Forest Service Guide to Noxious Weed Prevention Practices. This guide discusses weed prevention practices that support the February 3, 1999 Executive Order on Invasive Species. Information concerning what is occurring in the project area, is located in the Noxious Weed section, page 100.

Goal 1. Consider noxious weed prevention and control practices in the management of grazing allotments.

Grazing 1. Include weed prevention practices, inspection and reporting direction, and provisions for inspection of livestock concentration areas in allotment management plans and annual operating instructions for active grazing allotments.

Grazing 2. For each grazing allotment containing existing weed infestations, include prevention practices focused on preventing weed spread and cooperative management of weeds in the annual operating instructions. Prevention practices may include, but are not limited to:

- altering season of use
- exclusion
- activities to minimize potential ground disturbance
- preventing weed seed transportation
- maintaining healthy vegetation
- weed control methods
- revegetation
- inspection
- reporting
- education

There are few known noxious weed populations within the Cluster II project area. There are scattered spotted knapweed populations present and are being pulled when possible, though not necessarily on an annual basis. There are also Canada thistle populations present in Coyote Flat, which have received biocontrol agents and have been pulled. A few of the above measures have been actively implemented other than the requirements put forth in the annual operating plans. The range manager discusses weed concerns with the permittees at the time of the annual operating plan review. Additionally, the permittees have been given copies of weed maps showing locations of known weed sites. They also receive noxious weed educational pamphlets.

Goal 2. Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds. Minimize transport of weed seed into and within allotments.

Grazing 3. If livestock are potentially a contributing factor to seed spread, schedule use by livestock in units with existing weed infestations which are known to be susceptible to spread by livestock, to be prior to seed-set or after seed has fallen.

This has not been an issue up to this point, especially as the known populations are few and scattered.

Grazing 4. If livestock were transported from a weed-infested area, annually inspect and treat allotment entry units for new weed infestations.

The range program manager has not found noxious weeds on the permittee's ranch as of 2004; their cattle are coming from generally weed-free areas.

Grazing 5. Close pastures to livestock grazing when the pastures are infested to the degree that livestock grazing will continue to either exacerbate the condition on site or contribute to weed seed spread. Designate those pastures as unsuitable range until weed infestations are controlled. This is not the case in these allotments.

Goal 3. Maintain healthy, desirable vegetation that is resistant to weed establishment.

Grazing 6. Through the allotment management plan or annual operating instructions, manage the timing, intensity (utilization), duration, and frequency of livestock activities associated with harvest of forage and browse resources to maintain the vigor of desirable plant species and retain live plant cover and litter.

The range manager conducts annual utilization monitoring, plus long-term condition trend monitoring. When and where possible, areas of vegetation are treated with mowing and prescribed fire to encourage a mix of successional stages.

Grazing 7. Manage livestock grazing on restoration areas to ensure that vegetation is well established. This may involve exclusion for a period of time consistent with site objectives and conditions. Consider practices to minimize wildlife grazing on the areas if needed.

The cattle are kept out of certain areas if there are specific objectives for the area, such as bitterbrush regeneration after a fire.

Goal 4. Minimize disturbed ground conditions favorable for weed establishment in the management of livestock grazing.

Grazing 8. Include weed prevention practices that reduce ground disturbance in allotment management plans and annual operating instructions. Consider for example: changes in the timing, intensity, duration, or frequency of livestock use; location and changes in salt grounds; restoration or protection of watering sites; and restoration of yarding/loafing areas, corrals, and other areas of concentrated livestock use.

To date there are no known noxious weeds at these sites, although cheatgrass is present in abundance at some, and two Russian thistle plants were found and pulled at a watershed in the SE corner of the Aspen pasture. Care is taken to use existing watersheds while minimizing the creation of new ones. Ground disturbance is minimized by moving cattle often and by using rest/rotation grazing systems.

Grazing 9. Inspect known areas of concentrated livestock use for weed invasion. Inventory and manage new infestations.

These areas are inspected annually by the range program manager and are reported and managed as appropriate.

Goal 5. Improve effectiveness of weed prevention practices through awareness programs and education. Promote weed awareness and prevention efforts among range permittees.

Grazing 10. Use education programs or annual operating instructions to increase weed awareness and prevent weed spread associated with permittees' livestock management practices.

The range program manager offers weed site maps, pamphlets, and discusses weed prevention practices with permittees at the time of the annual operating plan meeting.

Grazing 11. To aid in their participation in allotment weed control programs, encourage permittees to become certified pesticide use applicators.

The range program manager does not encourage this because there is not a big enough problem to warrant it.

Monitoring

Sensitive Plant Populations & Habitat

Alternatives 2 & 4

Install monitoring plots within the Sand Springs pasture and, if necessary, follow individual plants for preferably ten years. If it is decided not to follow the fate of individual plants, the monitoring needs to be structured such that a change in population trend can be linked to the proper reason for it. If it is found that grazing is having a detrimental impact to BOPU, a suitable course of action will need to be evaluated at that point, including elimination of livestock grazing in the allotment. The management objective for this pasture would be to maintain population levels at or above those currently observed.

Wildlife

Common to Alternatives 1, 2, & 4

Monitoring will continue to occur to ensure that moderate levels of grazing continue to be met. For allotments under this alternative, 50 percent utilization within the dominant grass species will continue to be met under Forest Plan standard and guides RG-13D. This equates to a minimum stubble height of 3 inches annually within Idaho fescue.

Deer

Triggers for the initiation of monitoring of shrub utilization by cattle in mule deer winter range:

1. If it has been an exceptionally dry season, such as abnormally low snow pack in higher elevations, and lack of spring rains. An index for Bend or Redmond will be used as a reference to determine precipitation level.
2. Grazing that would be occurring after July 15 on a drought year and after August 15 on a normal year.

Areas to focus monitoring (if more than 1/3 of the shrubs are in early seral condition for the winter range habitat unit):

1. Pastures containing high amounts of xeric shrublands or dry ponderosa pine.
2. Pastures containing high open road densities and high OHV densities that would offset deer in winter months, making the shrubs that are available of greatest importance.

Utilization standards:

1. No more than 3 out of 10 annual leaders that are growing to the outside of the shrub.

2. Multi-party monitoring (Forest Service, Oregon Dept. of Fish and Wildlife, Permittees) will collectively monitor some pastures so we understand each other's perspectives and agree on acceptable utilization.

Example of how to monitor:

1. Exclude livestock high use areas such as watersets, roads, or trails. Exclude areas that receive low use by livestock such as fence corners.
2. Break monitoring area up into numbered sections; randomly select section to monitor.
3. Use a 100-foot transect and monitor 30 shrubs along the transect, the actual monitoring will be experimental ranging from an initial ocular estimate to physically measuring subsets of the shrubs.

Pasture use generally lasts for 45 days. During dry years monitoring should occur 2 to 3 weeks prior to the end of the grazing period. Allotments that have been noted to have lower production due to drought conditions should have the highest priority for monitoring. If over utilization by cattle is determined, or if it is within the proximity of the threshold, cattle would be removed.

Cultural Resources

Monitoring at the time of construction of all new fences, new waterlines, waterline extensions, new water set installations and water set rehabilitations would be conducted to ensure unknown sites would not be impacted by the project activities. Monitoring activities would be carried out by an archaeologist or a qualified CR Tech.

There are two sites lying adjacent to a proposed fence line in Township 22S, Range 16E, Section 33 which could be potentially impacted. Prior to construction an archaeologist would be notified to flag the boundaries of the sites so they will be avoided during construction.

Two watersets that have cultural resource sites at the same location will be retired. One water set is located in Township 23S, Range 15E, Section 3, and is managed by wildlife but has not been maintained because of lack of funding and is no longer functional. The second water set to be terminated is located in Township 22S, Range 15E, Sections 26 and 35. This water set, located north of Road 23 had not been used by the last permittee. Neither of these water sets locations will be entered to rehabilitate, to ensure there will be a minimum amount of disturbance to the sites.

To properly assess the potential impacts of grazing on heritage resources within the analysis area a program of monitoring would be established in May, 2007. Monitoring would be for ground disturbance in areas where cattle tend to congregate such as water set locations, along fence lines, or trailing in association to access existing range improvements, such as water sets or water troughs, as these activities have the greatest potential to damage cultural properties. Six areas identified as culturally sensitive by the archaeologist would be designated for monitoring. In 2007 the first year of the grazing permit re-authorization, baseline plots would be established after which each plot would be monitored on an annual basis for four consecutive years up to October, 2011.

Results of monitoring will be documented and filed at the Bend/Fort Rock R.D.

Comparison of Alternatives_____

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 4. Comparison of how each Alternative Addresses the Key Issues

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impacts to Big Game Habitat	Impacts of current management are immeasurable. Impacts are less than Alternatives 2 and 4 because two allotments would remain vacant.	Low impacts to mule deer winter forage; better distribution of livestock.	No livestock utilization of mule deer forage. May benefit mule deer with fence removal.	Impacts similar to but slightly lower than Alternative 2
Impacts to Sage Grouse Habitat	Impacts would be low; very little habitat available. Would not cause a trend toward Federal listing.	Impacts would be low; very little habitat available. More pastures will reduce pressure on vegetation. Would not cause a trend toward Federal listing.	No competition with cattle for vegetation. No impact to populations or habitat.	Impacts would be low; very little habitat available. More pastures will reduce pressure on vegetation. Would not cause a trend toward Federal listing.
Impacts to Pumice Grape Fern (<i>Botrichium pumicola</i>)	May cause a trend toward federal listing within the Sand Springs pasture of the Sand Springs Allotment.	May impact individuals and habitat but will not cause a trend toward Federal listing.	No Impact	May impact individuals and habitat but will not cause a trend toward Federal listing.

Table 5. Alternative Comparison – Grazing and Range Improvements

Allotment Characteristics by Allotment & Alternative	Sand Springs				Quartz Mountain			Cabin Lake			Crater Buttes		
	Alt 1– Current Mgmt	Alt 2 Proposed Action	Alt 3 No Grazing	ALT 4 – Extended Monitoring	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing
Allotment Acres	55,967	55,967	0	55,967	34,087	34,087	0	26,192	21,296	0	26,416	0	0
No. of Pastures	4	5	0	4 (5) ²	5	8	0	5	5	0	1	0	0
Allotment Type	Cattle	Cattle	N/A	Cattle	Cattle	Cattle	N/A	Cattle	Cattle	N/A	Sheep	N/A	N/A
Grazing Season Dates (Cattle)	6/1-9/30	5/15-9/30	N/A	5/15-8/30 (5/15–9/30) ³	6/1-9/30	5/15-9/15	N/A	6/1-9/15	5/25-9/10	N/A	N/A	N/A	N/A
Number of Cow/Calf Pairs	600	600	0	600	600	600	0	300	240	0	1000	0	0
Fences													
Miles of Existing Fences	55	55	0	55	46	46	0	32	32	0	0	0	0
Miles of New Fences	0	3.5	0	3.5	0	5	0	0	11	0	0	0	0
Acres of Vegetation Mowed for New Fences ⁴	0	3.5	0	3.5	0	5	0	0	11	0	0	0	0
Miles of Fence to be Removed	0	0	35	0	0	0	32.5	0	0	25.5	0	0	0

² Only four (4) of the five (5) pastures would be grazed from the 2007 through the 2013 grazing season. All five pastures would be grazed during the 2013 through 2015 grazing seasons.

³ During the 2007 through 2013 grazing seasons, the grazing season in the four pastures being grazed would run from June 1st to August 31st.as grazing the Sand Springs Pasture would not be allowed during this period. The grazing season would be extended to September 30th in the 2014 through 2016 grazing seasons when the Sand Springs Pasture would again be grazed.

⁴ Number of acres of vegetation mowed to construct new fence lines. Vegetation would be mowed to a minimum height of 6-8 inches with a strip width of 8 feet. The mowed strip would also provide access for other vehicles during construction. Fence reconstruction and maintenance does not require mowing.

Allotment Characteristics by Allotment & Alternative	Sand Springs				Quartz Mountain			Cabin Lake			Crater Buttes		
	Alt 1 – Current Mgmt	Alt 2 Proposed Action	Alt 3 No Grazing	ALT 4 – Extended Monitoring	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing
Miles of Fence Remaining Along Common Boundaries (BLM or Private) or Adjacent Allotments ⁵	20	20	20	20	13.5	13.5	13.5	6.5	6.5	6.5	0	0	0
Cattleguards – Road and OHV													
No. of Existing - Road ⁶	18	18	0	18	14	14	0	10	10	0	0	0	0
No. of New Road	0	1	0	1	0	3	0	0	3	0	0	0	0
No. Removed Or Relocated	0	0	16	0	0	0	11	0	1	8	0	0	0
No. of Existing - OHV	11	11	0	11	0	0	0	0	0	0	0	0	0
No. of New HV	0	0	0	0	0	0	0	0	2	0	0	0	0
No. Removed	0	0	11	0	0	0	0	0	0	0	0	0	0
Gates – Metal or Wire													
No. of Existing	53	53	0	53	29	29	0	24	24	0	0	0	0
No. of New	0	4	0	4	0	3	0	0	15	0	0	0	0
No. Removed	0	0	28	0	0	0	18	0	0	17	0	0	0
Water Sets													
No. of Existing	21	21	0	21	10	10	0	22	22	0	0	0	0

⁵ Fences forming a common boundary between National Forest Lands and other ownerships, including BLM and private, or with other active allotments non adjacent National Forest lands, and which would not be removed under no grazing alternatives if grazing is present and continues on those adjacent ownerships. It is probable that those fences would be removed if grazing were halted on those other ownerships in the future. There would be no change in the permitted numbers of cow/calf pairs.

⁶ Road cattleguards include a wire gate. They are included as part of the cattleguard improvement and are not included in the count of gates.

Allotment Characteristics by Allotment & Alternative	Sand Springs				Quartz Mountain			Cabin Lake			Crater Buttes		
	Alt 1 – Current Mgmt	Alt 2 Proposed Action	Alt 3 No Grazing	ALT 4 – Extended Monitoring	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing
No. New	0	0	0	0	0	6	0	0	0	0	0	0	0
No. Removed	0	0	0	0	0	0	0	0	0	0	0	0	0
No./Acres Rehabilitated	0	0	21	0	0	0	0	0	0	0	0	0	0
Water Troughs													
No. Existing	30	30	0	30	2	2	0	0	0	0	0	0	0
No. New	0	2		3	0	1	0	0	0	0	0	0	0
Trick Tanks													
No. Existing	0	0	0	0	1	1	1	1	1	0	0	0	0
No. Repaired	0	0	0	0	0	0	0	0	1	0	0	0	0
No. Removed	0	0	0	0	0	0	0	0	0	1	0	0	0
Water Lines													
No. Miles of Existing	31	31	31	31	2	2	2	1	1	1	0	0	0
No. Miles of New	0	1.25	0	1	0	2	0	0	0	0	0	0	0
No. Miles Relocated	0	1.75	0	1.75	0	0	0	0	0	0	0	0	0
No. Miles Removed ⁷	0	0	0	0	0	0	0	0	0	0	0	0	0
Wells													

⁷ No waterlines would be removed under Alternative 3; all would remain in place but be abandoned with no further maintenance.

Allotment Characteristics by Allotment & Alternative	Sand Springs				Quartz Mountain			Cabin Lake			Crater Buttes		
	Alt 1 – Current Mgmt	Alt 2 Proposed Action	Alt 3 No Grazing	ALT 4 – Extended Monitoring	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing	Alt 1 – Current Mgmt	Alt 2 – Proposed & Alt 4	Alt 3 – No Grazing
No. Existing	0	0 ⁸	0	0 ⁹	0	0	0	1	1	1	0	0	0
No. New	0	0	0	1	0	1	0	0	0	0	0	0	0

⁸ Existing waterlines are connected to the China Hat well which is located outside of the planning area. This well is not included in the improvements listed for the Sand Springs Allotment.

⁹ Existing waterlines are connected to the China Hat well which is located outside of the planning area. This well is not included in the improvements listed for the Sand Springs Allotment.

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above. Interdisciplinary Team members have prepared reports for this project and in some cases, the information presented here is summarized from a report. The Specialists' Reports are incorporated in the Project Record (40 CFR 1502.21) and are available at the Bend-Ft. Rock Ranger District office in Bend, Oregon.

Range Resources & Vegetation

Overview and Historic Conditions

Two allotments (Quartz Mountain and Sand Springs) are in active status with permittees that operate annually at or near their permitted numbers. Current permitted numbers have been allocated based on present resource conditions, permittee operations, and/or existing range improvements. The Cabin Lake and Crater Buttes Allotments are vacant with no permittee and no use by livestock.

Official Forest Service records indicate that livestock grazing has occurred in the area since the late 1920s. Historic records indicate that livestock grazing began much earlier, prior to World War I in the Cabin Lake Area. The 1934 Taylor Grazing Act established grazing controls on public lands.

The Crater Buttes Allotment became vacant in 1975 after the permittee chose not to continue grazing the allotment. The Cabin Lake Allotment became vacant in 1994 after the permittee chose not to continue grazing the allotment. A temporary grazing permit was issued for the Cabin Lake Allotment, but with the lack of current NEPA analysis, a term permit could not be issued. The temporary grazing permit was discontinued after several seasons due to a lack of adequate NEPA.

Table 6. Allotment Information

Allotment	Total Allotment Acres	Permitted Livestock Type	Last Year Actively Grazed/Status	Acers of non-Forest Service Ownership in the Allotment
Cabin Lake	26,192	Cattle	1994	1 BLM
Crater Buttes	26,416	Sheep	1975	
Quartz Mountain	34,087	Cattle	2004/Active	326 Private / 94 BLM
Sand Springs	55,967	Cattle	2004/Active	974 BLM / 174 Private
Total Acres	142,662			

Livestock grazing in the Cluster II Project Area has provided an economic resource for local communities for many decades. When the 1990 LRMP was completed, 34 individual allotments for a total of 816,109 acres were identified and mapped on the Deschutes National Forest; these areas were considered appropriate for grazing in the Forest Planning process. These allotments were a

combination of sheep and cattle allotments that were either active or vacant. Active grazing allotments have a term grazing permit issued to a permittee and livestock grazing is permitted annually as agreed to by the permittee and the Forest Service.

The Quartz Mountain and Sand Springs Allotments are designed to operate at the upper limit of 600 cow/calf (c/c) pairs and have done so since their last allotment management plans revisions. Permittees may choose to operate below their permittee limits (number of livestock, length of season) on an annual use basis and have at times done so, as displayed in Tables 7 and 8:

Table 7. Sand Springs Allotment Actual Use Record From 1998 to 2004.

	Sand Springs	Watkins East	Watkins West	Quartz	Kelley-Firestone	C/C Bulls Yearlings
2004	6/15: 14*	6/29: 33	8/1: 31	Rest	9/2: 29	540 10
2003	Rest	6/1: 30	7/1: 31	8/1: 30	9/1: 30	540
2002	7/1: 31	Rest	9/1: 30	Rest	8/1: 30	540
2001	Rest	6/1: 30	7/1: 15	7/25: 29	8/24: 37	540
2000	6/15: 16	Rest	Rest	7/1: 47	8/17: 45	560
1999	9/1: 30	6/21: 20	7/11: 21	8/1: 31	Rest	540
1998	Rest	7/15: 47	9/1: 30	Rest	Rest	150 6

Indicates the pasture on date and the number of days in the pasture.

Table 8. Quartz Mountain Allotment Use Record From 1998 to 2004.

	Aspen*	Power-line	Wigtop	16 East	16 West	C/C Bulls Yearlings
2004	Rest	6/12: 45*	7/26: 65	Rest	Rest	350 20
2003	Rest	Rest	Rest	Rest	Rest	Rest
2002	8/12 #: 37 7/18 55	7/22 21	Rest	7/2: 23	5/24: 39	446 20 45 67 Heifers
2001	5/15 + 52	7/5 33	8/7 31	9/6 ^: 17	Rest	507 20
2000	Rest	8/21 59	7/21 32	Rest	5/20 < 62	560
1999	5/17: 45	Rest	7/1: 31 7/1: 31	8/15: 15	Rest	540 60
1998	Rest	5/15: 48	Rest	Rest	5/16: 51	430 20 300
1997	5/15: 71	7/26: 68 7/1: 93	5/15: 78	Rest	Rest	335 15 200 100
1996	Rest	6/16: 72	5/17: 30	8/16: 41	7/1: 46	300 15 20
1995	5/16: 66 6/1: 60	7/26: 67 7/31: 62	Rest	7/1: 63	Rest	250 185 40 395 60

* Indicates the pasture on date and the number of days in the pasture.

Pulled off early in 2002 because of drought and distribution. Off date was 9/17/2002.

^ Took 132 c/c off early from Wigtop, moved early to 16 East due to drought like conditions.

+ In 2001 347 on 5/14, 138 on 5/22, and 22 on 6/1 all into Aspen Pasture.

< 16 West pasture, 60 c/c from 6/25 to 7/20 and 500 from 5/20 – 7/20.

The demand for public land grazing by sheep dramatically declined in the 1970s as the sheep industry in Central Oregon decreased due to a response to market conditions. The sheep industry in Central Oregon has never recovered from that decline. In 2004, there were no sheep being grazed on the Deschutes under a grazing permit. There is still a small local sheep industry, and out-of-state interests that could take advantage of allotments on the Forest including the vacant Crater Buttes Allotment. Sheep could be used to achieve vegetation management objectives such as fuel reduction and management of noxious weeds while utilizing annual production of forage.

The demand for public land grazing by cattle on the Deschutes NF exceeds the availability of grazing allotments as the Forest continues to receive requests for grazing opportunities. There are three vacant allotments on the Deschutes including the Cabin Lake Allotment that have been historically used for cattle grazing. Once an allotment becomes vacant it cannot be restocked with livestock until an NEPA analysis is completed. Since 1992, three vacant allotments on the Deschutes NF have been restocked (after completion of NEPA) and eight allotments have been closed (in favor of other resource values). The available forage has dropped 54,236 acres since 1990.

Two private parties have expressed an interest in grazing the now vacant Cabin Lake Allotment through the Cluster II Project public scoping process. Since 1995, six private parties have informally expressed an interest in the Cabin Lake Allotment including the former permittee who was using the allotment on a temporary basis and was forced to discontinue that use due too a lack of environmental analysis (Personal communications through Don Sargent). This indicates a continuing demand for public land grazing.

The current levels of stocking for the Quartz Mountain and Sand Springs Allotments are at the level provided for under the 1990 LRMP. Annual utilization of forage by livestock is below the actual or total available forage on each allotment. Adequate forage for livestock is available to meet the 1990 LRMP allocations.

The current levels of stocking for the Cabin Lake and Crater Buttes Allotments are below the level provided for under the 1990 LRMP. Annual utilization of forage by livestock is below the actual or total available forage on each allotment. Adequate forage for livestock is available to meet the 1990 LRMP allocation on the Cabin Lake Allotment. Adequate forage for livestock is not available to meet the 1990 LRMP allocation on the Crater Buttes Allotment.

The Crater Buttes Allotment has experienced a significant change in understory vegetation due to past management activities and the lack of fire. Many areas in the allotment have experienced encroachment by conifers and the shrub component that sheep were allocated has been reduced (personal observations by Don Sargent). Some grazing capacity still exists, but it is much reduced from the 1970s when it was last utilized.

Current Condition of Each Allotment

Sand Springs Allotment

The Sand Springs Allotment is located at T21S, R16E and extends south and west to T23S, R14E. (Map 6). The allotment is a four-pasture rest-rotation grazing system. The four pastures are the Kelly-Firestone, Quartz, Sand Springs, and Watkins, with 600 head of cattle (cow/calf pairs) permitted from June 1 to September 30. The Allotment consists of four pastures, but is often managed as a five-pasture system, as the Watkins Pasture lends itself to separation due to its shape and changes in vegetation.

The allotment contains the following plant communities as described by Leonard A. Volland {Plant Associations of the Central Oregon Pumice Zone}(Volland): CJ-S3-11 (50 acres), CP-S1-11 (14,044

acres), CP-S2-11 (6,168 acres), CP-S2-12 (207 acres), CP-S2-13 (104 acres), CP-S2-17 (6,460 acres), CP-S3-11 (6 acres), CP-SX-XX (3 acres), CW-S1-12 (83 acres), SD-29-13 (1,889 acres), SD-93-23 (1,611 acres), CP-S2-18 (1,450 Acres), CP-S1-12 (2,224 Acres), CP-G3-11 (25 Acres), CL-SX-XX (284 Acres), CL-S2-12 (96 Acres), CL-S1-12 (4,001 Acres), CL-G3-12 (62 Acres), CL-G3-11 (31 Acres), SD-33-11 (45 Acres), SD-29-14 (3,089 Acres), SD-29-12 (1,301 Acres), CL-S2-16 (1,804 Acres), CL-S2-14 (7,625 Acres), CL-S2-11 (868 Acres), CL-S1-11 (1,569 Acres) and cinder (13 acres). 924 acres of BLM land and 174 acres of private land are not classified using the Volland plant association guide and are not included in the figures listed above.

Under the 1990 LRMP 600 head of cattle (cow/calf pairs) are permitted from June 1 to September 30. Historically, sheep, horses and cattle have used this allotment on a periodic basis. The allotment is managed at the intensive level.

Table 9. Improvements in the Sand Springs Allotment

Allotment	Developed Water	Cattle Guards	Monitoring	Fence Line
Sand Springs	33 miles of water line with valves and 30 water troughs. 10 historic waterset locations.	18 automobile 11 OHV	1 two way study enclosure 8 current trend study plots	55 miles

Improvements include approximately 31 miles of waterline and associated improvements such as valves and water troughs (30 each), 55 miles of predominately barbed wire fences, 18 cattleguards, 9 OHV cattleguards, one 2-way range study enclosure, 9 watersets, and 8 current trend study plots (Appendix 4 & 5). Water haul provides the only source of water for livestock except for the thirty-two miles of pipeline in the Kelly-firestone, Quartz Mountain, and Sand Springs Pastures (cooperative well agreement). There are 10 historic waterset locations.

The Sand Springs Pasture has no fence along its western boundary to prevent livestock from wandering off of the allotment, but between the natural barrier of lava and the placement of water, loss of livestock via roads and OHV trails has not been a critical issue.

An Environmental Assessment (EA) and Allotment Management Plan (AMP) were completed for the Sand Springs Allotment in 1984. The EA considered use by cattle as beneficial to the winter and spring range for mule deer as cattle prefer grasses and forbs over shrubs and use of the vegetation community would encourage shrub production over grasses and forbs. The periodic use of the area by cattle would allow for the dead material of the older and more decadent shrubs to be reduced through physical breakage from the movement of cattle through the shrub stands. Removal of decadent material coupled with moderate browsing by livestock of shrubs would be a positive influence on bitterbrush conditions by increasing access to live crown by ungulates, encouraging new growth in the form of longer leader length, and increasing leader production. Cattle also browse both current and older stem growth on shrubs that in turn encourages sprouting. These influences would lead to increased forage production. Younger plant material would be more palatable to both domestic livestock and mule deer.

The current condition of the forage species (grasses and forbs) on the allotment could best be described as good production. Forage species are healthy but competition between vegetation is keen. Grasses and forbs are easily out competed by mature shrubs and trees as those species grow taller and can intercept the light needed for photosynthesis. Grasses and forbs are left with what light is able to reach the understory. Trees and shrubs also have deep and expansive root systems with which grasses and forbs most compete. This makes it more difficult for grasses and forbs to obtain nutrients from the soil and to compete for both soil moisture stored beneath the surface and to intercept moisture that reaches the surface of the ground through the tree and shrub canopy. Grasses and forbs in timbered stands also have to contend not only with their own annual production and end of season dead organic

material but also with material that rains down on them from the canopy of shrubs and trees. Annual production in a grass and subsequent annual die off occupies growing space and reduces the production capability of a grass the following growing season. Over time, bunch grasses that have not been grazed or burned by fire actually die out in the center of the plant from all the dead and decaying plant material. In timbered stands needles falling from pine trees accumulate on the forest floor and increase the “PH” of the soil. Grasses under pine stands are less palatable due to the acid uptake by the plants from the soil and have been documented to cause abortions in cattle in spring grazing programs.

The Range Report includes results of monitoring during the 2003 season and over time for the current trend study plots (CTs) on the Sand Springs Allotment (Range Report Appendix 2, located in the project record). This information indicates the vegetation trend at specific locations on the allotment and provides a historic record of changes and in some cases a record of responses to land management actions over a 45-year or longer period of time. In brief summary, the vegetation trend in areas other than where fire or land management actions have taken place has been a decreasing to stable trend in shrub cover with an increase in grass cover and an increasing to a stable amount of bare soil. Where a tree canopy is present it has generally increased in size and cover. None of the plots indicated an invasion of juniper. See the Range Report, Appendix 2 for specific information.

Much of the allotment is classified as transitional range for livestock due to the overstory of lodgepole pine, ponderosa pine and understory of antelope bitterbrush. Some of this overstory is becoming mature in age class and each year at these clusters the understory (grasses and forbs) are subject to greater and greater competition.

Soils in most of the Sand Springs Pasture are derived from geologically recent volcanic deposits that contain coarse pumice material. This coarse pumice soil is of concern to bulls in the spring during breeding season and calves in the fall as it irritates their hoofs.

Quartz Mountain Allotment

The Quartz Mountain Allotment is located at T23S., R14E., and extends east and north to T23S., R16E. The allotment is a five-pasture rest-rotation grazing system. The five pastures are the Aspen, Powerline, Wigtop, Sixteen East, and Sixteen West, with 600 head of cattle (cow/calf pairs) permitted from June 1 to September 30.

The Allotment contains the following plant communities as described by Leonard A. Volland {Plant Associations of the Central Oregon Pumice Zone} with approximate acreage estimates: CJ-S3-11 (9 acres), CL-S1-11 (836 acres), CL-S2-14 (435 acres), CP-S1-11 (18,929 acres), CP-S2-11 (7,529 acres), CP-SX-XX (20 acres), CP-S2-13 (3 acres), CP-S2-17 (4,308 acres), SD-29-12 (815 acres), SD-29-13 (1,100 acres), and cinder (7 acres). 94 acres of BLM land are not classified using the Volland plant association guide and are not included in the figures listed above.

The allotment is a five-pasture rest rotation grazing system, with 600 head of cattle (cow/calf pairs) are allocated under the LRMP from June 1 to October 25.

Table 10. Improvements in the Quartz Mountain Allotment

Allotment	Developed Water	Cattle Guards	Monitoring	Fence Line
Quartz Mountain	2 miles of water line, 2 water troughs, and 1 trick tank. 21 historic watershed locations.	14 automobile	2 range study enclosures 7 current trend study plots	46 miles

Improvements include approximately 46 miles of predominately barbed wire fences, 14 cattleguards, 2 range study enclosures, 2 miles of waterline and associated improvements such as valves and water troughs (2 each), and 7 current trend study plots (Appendix 4 & 5). All pastures are fenced or have natural barriers to prevent livestock from wandering off of the allotment.

There is no livestock water available on the allotment. All water is hauled onto the Allotment via trucks at the permittees expense except for the two miles of pipeline in the Sixteen West Pasture (cooperative well agreement). There are 21 historic watersets on the allotment.

An environmental assessment (EA) and Allotment Management Plan (AMP) were completed for the Quartz Mountain Allotment in 1981 and 1990 respectively. The EA considered use by cattle as beneficial to the winter and spring range for mule deer as cattle prefer grasses and forbs over shrubs and use of the vegetation community would encourage shrub production over grasses and forbs. The periodic use of the area by cattle would allow for the dead material of the older and more decadent shrubs to be reduced through physical breakage from the movement of cattle through the shrub stands. Removal of decadent material coupled with moderate browsing by livestock of shrubs would be a positive influence on bitterbrush conditions by improving access to live crown, encouraging new growth in the form of longer leader length, and increased leader production. Cattle also browse both current and older stem growth on shrubs that in turn encourages sprouting. These influences would lead to increased forage production. Younger plant material would be more palatable to both domestic livestock and mule deer.

The forage conditions on this allotment are in good condition. The majority of the range is in good condition in that it is providing good forage production while maintaining quality native habitat and meeting other resource objectives such as providing mule deer winter habitat.

Some areas of the allotment have recently been treated to manage fuels or to treat stands of timber and these actions have generally increased the amount of forage available by stimulating plant growth through reduction of competition and nutrient release. Over time grasses and forbs are easily out competed by mature shrubs and trees as those species grow taller and can intercept the light needed for photosynthesis. Grasses and forbs are left with what light is able to reach the understory. Trees and shrubs also have deep and expansive root systems with which grasses and forbs must compete. This makes it more difficult for grasses and forbs to obtain nutrients from the soil and to compete for both soil moisture stored beneath the surface and to intercept moisture that reaches the surface of the ground through the tree and shrub canopy. Grasses and forbs in timbered stands also have to contend not only with their own annual production and end of season dead organic material but also with material that rains down on them from the canopy of shrubs and trees. Annual production in a grass and subsequent annual die off occupies growing space and reduces the production capability of a grass the following growing season. Over time, bunch grasses that have not been grazed or burned by fire actually die out in the center of the plant from all the dead and decaying plant material. In timbered stands needles falling from pine trees accumulate on the forest floor and alter the composition of the soil. Grasses under pine stands are less palatable due to the acid uptake by the plants from the soil and have been documented to cause abortions in cattle in spring grazing programs due to pine "toxins."

The Range Report includes results of monitoring during the 2003 season and over time for the current trend study plots on the Allotment. This information indicates the vegetation trend at specific locations on the allotment and provides a historic record of changes and in some cases a record of responses to land management actions over a 50-year period. In brief summary, the vegetation trend in areas other than where fire or land management actions have taken place has been a decreasing to a stable trend in shrub cover with an increase in grass cover and an increase or stable amount of bare soil. Where a tree canopy is present it has generally increased in size and cover. Please see appendix two of the Range Report for more specific information.

Much of the allotment is classified as transitional range for livestock due to the overstory of lodgepole pine, ponderosa pine, and antelope bitterbrush. Some of this overstory is becoming mature in age class and each year the understory (grasses and forbs) are subject to greater and greater competition.

Cabin Lake Allotment

The Cabin Lake Allotment is located at T20S., R14E and extends south and east to T20S., R15E. The Allotment consists of five pastures numbered from One to Five. (Map 3)

The allotment contains the following plant communities as described by Leonard A. Volland {Plant Associations of the Central Oregon Pumice Zone}: CL-S2-11 (247 acre), CL-S2-14 (749 acres), CP-S1-11 (4,686 acres), CP-S2-11 (16,143 acres), CP-S2-12 (3,163 acres), CP-S2-13 (270 acres), CP-SX-XX (30 acres), CP-S2-17 (194 acres), CP-S3-11 (267 acres), CW-S1-12 (106 acres), SD-29-13 (309 acres), SD-33-11 (24 acres), and cinder (3 acres). One acre of BLM land within the allotment have not been classified using the Volland plant association guide and those acres are not included in the figures listed above. One acre of land under private ownership is not classified.

The allotment is a five-pasture rest rotation grazing system, with 300 head of cattle (cow/calf pairs) permitted from June 1 to September 15. Historically, sheep, horses and cattle have used the allotment. Improvements include 32 miles of predominately barbed wire fences, 10 cattleguards, 1 OHV cattleguards, 1 trick tank, one 3-way study enclosure, and 7 current trend study plots (Appendix 5).

There is no livestock water available on the allotment. All water is hauled onto the Allotment via trucks at the permittees expense. There are 22 historic watersets located on the allotment.

Table 11. Improvements in the Cabin Lake Allotment

Allotment	Developed Water	Cattle Guards	Monitoring	Fence Line
Cabin Lake	1 mile of water line, 1 well, and 1 trick tank. 22 historic watersets	10 automobile 1 OHV	1 three way study enclosure 7 current trend study plots	32 miles

Three of the five pastures have no fence along portions of their boundary to prevent livestock from wandering off of the allotment. Fences are needed, as livestock were historically lost each season due to their wandering off of the allotment.

An EA and Allotment Management Plan (AMP) were completed for the Allotment in 1964. The EA considered use by cattle as beneficial to the winter and spring range for mule deer as cattle prefer grasses and forbs over shrubs and use of the vegetation community would encourage shrub production over grasses and forbs. The periodic use of the area by cattle would allow for the dead material of the older and more decadent shrubs to be reduced through physical breakage from the movement of cattle through the shrub stands. Removal of decadent material coupled with moderate browsing by livestock of shrubs would be a positive influence on bitterbrush conditions by encouraging new growth in the form of longer leader length and increased leader production. Cattle also browse both current and older stem growth on shrubs that in turn encourages sprouting. These influences would lead to increased forage production. Younger plant material would be more palatable to both domestic livestock and mule deer.

The forage conditions on this allotment are in fair to good condition. The majority of the range is in fair condition in that it is providing good forage production while maintaining quality native habitat and meeting other resource objectives such as providing mule deer winter habitat. Nine years of non-use has lead to much decadence on forage species such as FEID.

Portions of the allotment have recently been treated to manage fuels and timber. These actions have increased the amount of forage available by stimulating plant growth through reduction of competition

and nutrient release. In the case of fuel treatments to the understory, most of the tree canopy was not affected by the treatment so that the response of understory grasses was limited by competition. Grasses and forbs are easily out competed by mature shrubs and trees as those species grow taller and can intercept the light needed for photosynthesis. Grasses and forbs are left with what light is able to reach the understory. Trees and shrubs also have deep and expansive root systems with which grasses and forbs must compete. This makes it more difficult for grasses and forbs to obtain nutrients from the soil and to compete for both soil moisture stored beneath the surface and to intercept moisture that reaches the surface of the ground through the tree and shrub canopy. Grasses and forbs in timbered stands also have to contend not only with their own annual production and end of season dead organic material but also with material that rains down on them from the canopy of shrubs and trees. Annual production in a grass and subsequent annual die off occupies growing space and reduces the production capability of a grass the following growing season. Over time, bunch grasses that have not been grazed or burned by fire actually die out in the center of the plant from all the dead and decaying plant material. In timbered stands needles falling from pine trees accumulate on the forest floor and alter the composition of the soil. Grasses under pine stands are less palatable due to the acid uptake by the plants from the soil and have been documented in other areas to cause abortions in cattle in spring grazing programs due to pine “toxins.”

The Range Report shows the results of monitoring during the 2003 season and over time for the current trend study plots on the Cabin Lake Allotment. This information indicates the vegetation trend at specific locations on the allotment and provides a historic record of changes and in some cases a record of responses to land management actions over a 50-year period.

In brief summary, the vegetation trend in areas other than where fire or land management actions have taken place has been a stable or decreasing trend in shrub cover with an increase in grass cover. The amount of bare soil varies quite a bit from one current and trend (CT) to the next. This suggests that given the lack of disturbance from fire or land management actions, vegetation on the sites is trending towards higher climax communities and mature vegetation may account for the differences in bare soil both as an increaser and a decreaser depending on the type of vegetation occupying the site (see Appendix 2 of the Range Report for a complete description).

Much of the allotment is classified as transitional range for livestock due to the overstory of lodgepole pine, ponderosa pine and antelope bitterbrush. Some of this overstory is becoming mature in age class and each year the understory (grasses and forbs) are subject to greater and greater competition.

Crater Buttes Allotment

The Crater Buttes Allotment is located at T23S., R14E and extends south and east to T24S., R13E. (Map 4). The Allotment is one pasture.

The allotment contains the following plant communities as described by Leonard A. Volland {Plant Associations of the Central Oregon Pumice Zone}: CL-S2-11 (5,433 acre), CL-S9-11 (156 acres), CP-S2-11 (583 acres), CP-S2-12 (10,073 acres), CP-S2-13 (7,676 acres), CP-S3-11 (357 acres), CP-SX-XX (212 acres), and CW-S1-12 (1,925 acres).

The allotment grazing system consists of a standard practice of routing sheep through the allotment by herding. Sheep are usually brought on to the allotment in the south and then herded north in a pattern that attempts to maximum distribution. 1,000 head of sheep are permitted from June 16 to September 30. Historically, sheep have been the only livestock to use the allotment. Improvements include three condition and trend study plots (Range Report, Appendix 5). The Jones Well water development constructed to provide water for sheep now is solely a water source for wildlife and management of this resource has long since been transferred to the wildlife department.

There is no livestock water available on the allotment. All water is hauled onto the Allotment via trucks at the permittees expense. Temporary watersets were established as needed to provide water for sheep that were constantly on the move.

Table 12. Improvements in the Crater Buttes Allotment

Allotment	Developed Water	Cattle Guards	Monitoring	Fence Line
Crater Buttes	None	None	1 three way study enclosure 7 current trend study plots	None

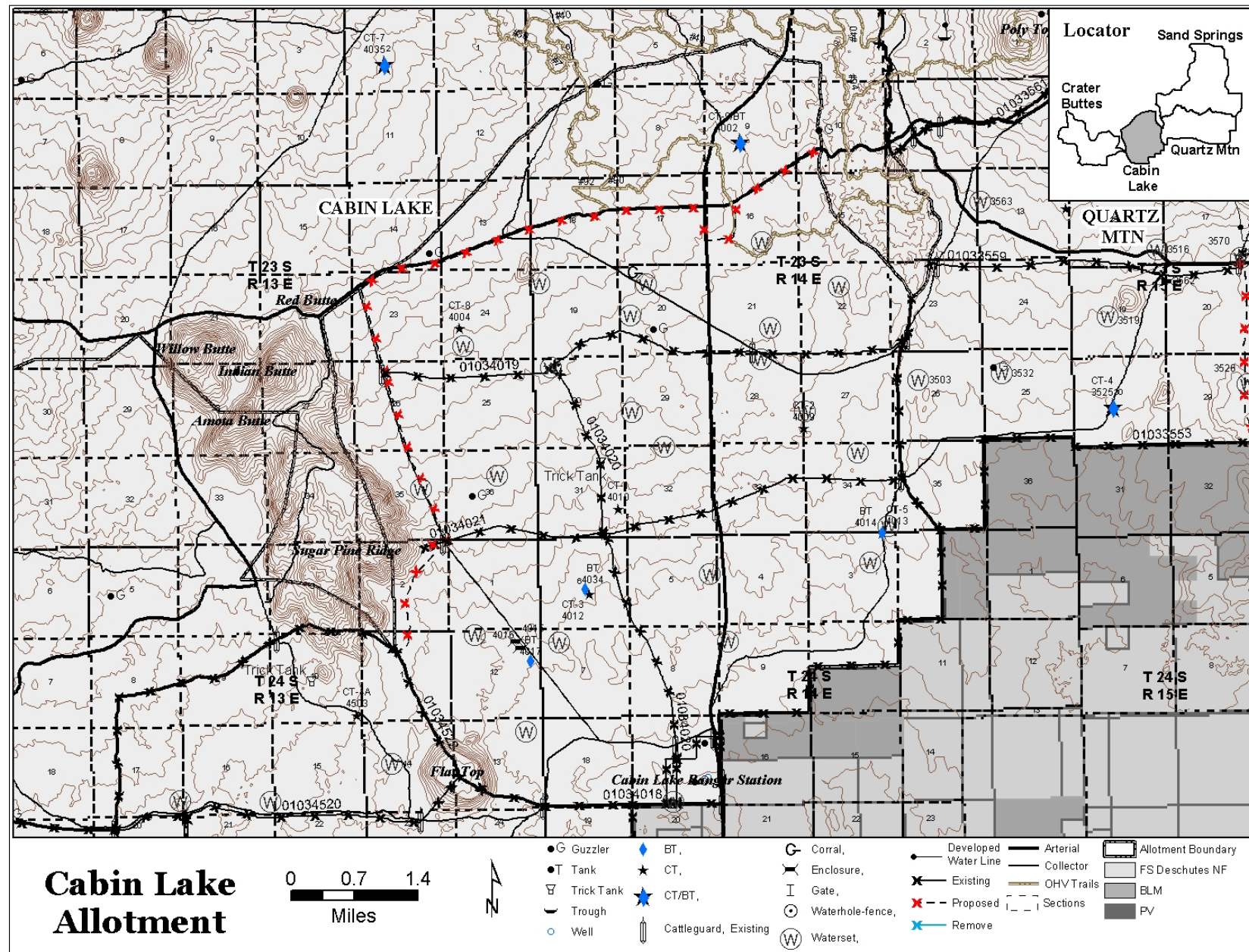
An EA and Allotment Management Plan (AMP) were completed for the Allotment in 1962. The EA allocated 50 percent of the available browse of antelope bitterbrush to mule deer and the remainder to sheep. It was recognized that sheep graze grasses and forbs but that the primary food source will be antelope bitterbrush.

The forage conditions on this allotment are in poor condition due to the increased tree and shrub stocking on the allotment (primarily lodgepole pine, ponderosa pine, and manzanita) and lack of use by livestock. The 1962 EA also noted this same trend as it stated, “The available forage has been progressively reduced as a result of the encroachment of timber reproduction and manzanita brush taking over some of the cutover areas at higher elevations.” The decision made in 1962 increased the size of the Crater Buttes Allotment to compensate for this reduction in forage. The EA noted that the “ponderosa pine areas of this allotment were logged off during the period from 1939 to 1941, with about 50% of the mature timber removed.”

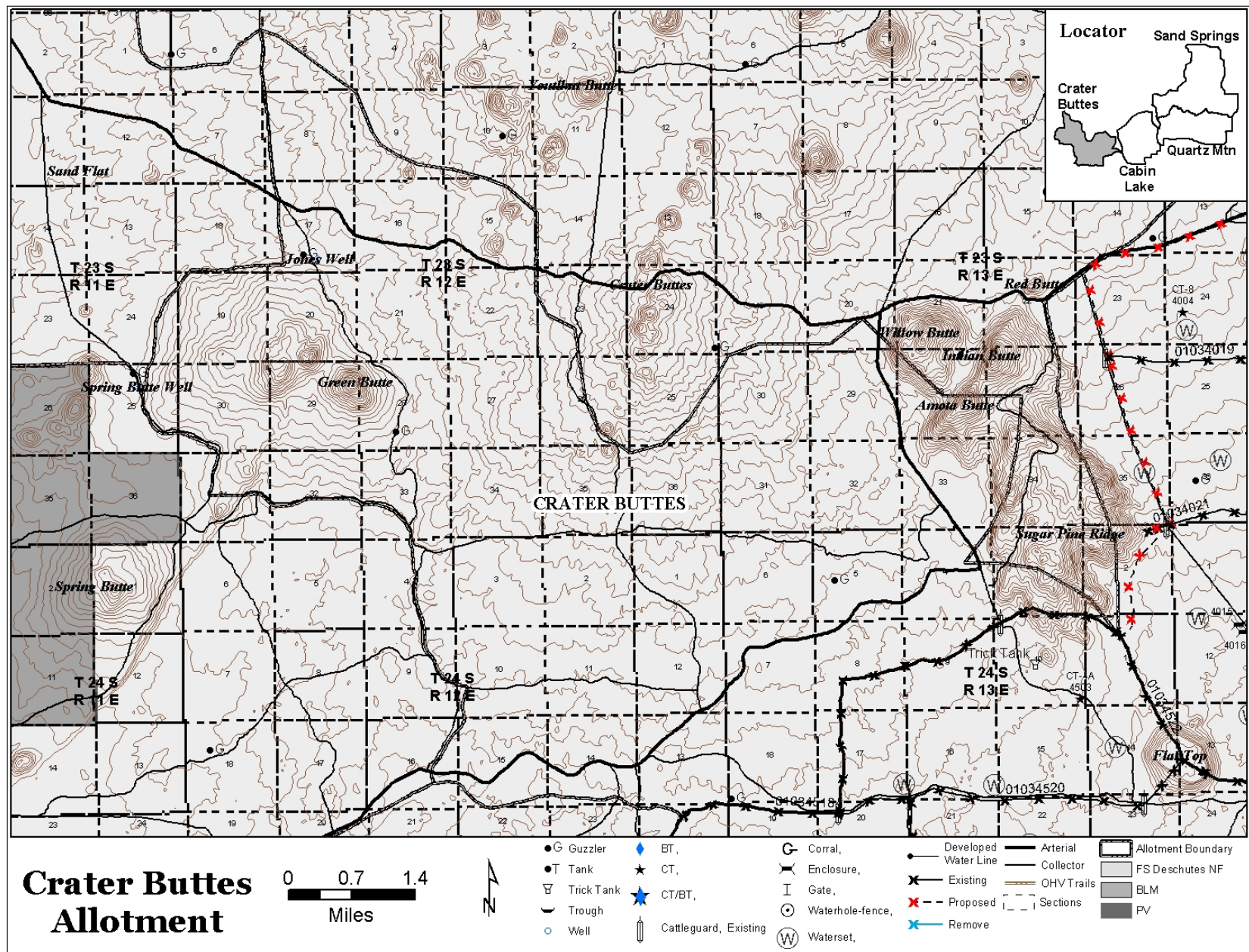
The three CTs have not been formally read since July of 1961.

Much of the allotment is classified as transitional range for livestock due to the overstory of lodgepole pine, ponderosa pine, and bitterbrush. Some of this overstory is becoming mature in age class and each year the understory (shrubs, grasses, and forbs) are subject to greater and greater competition.

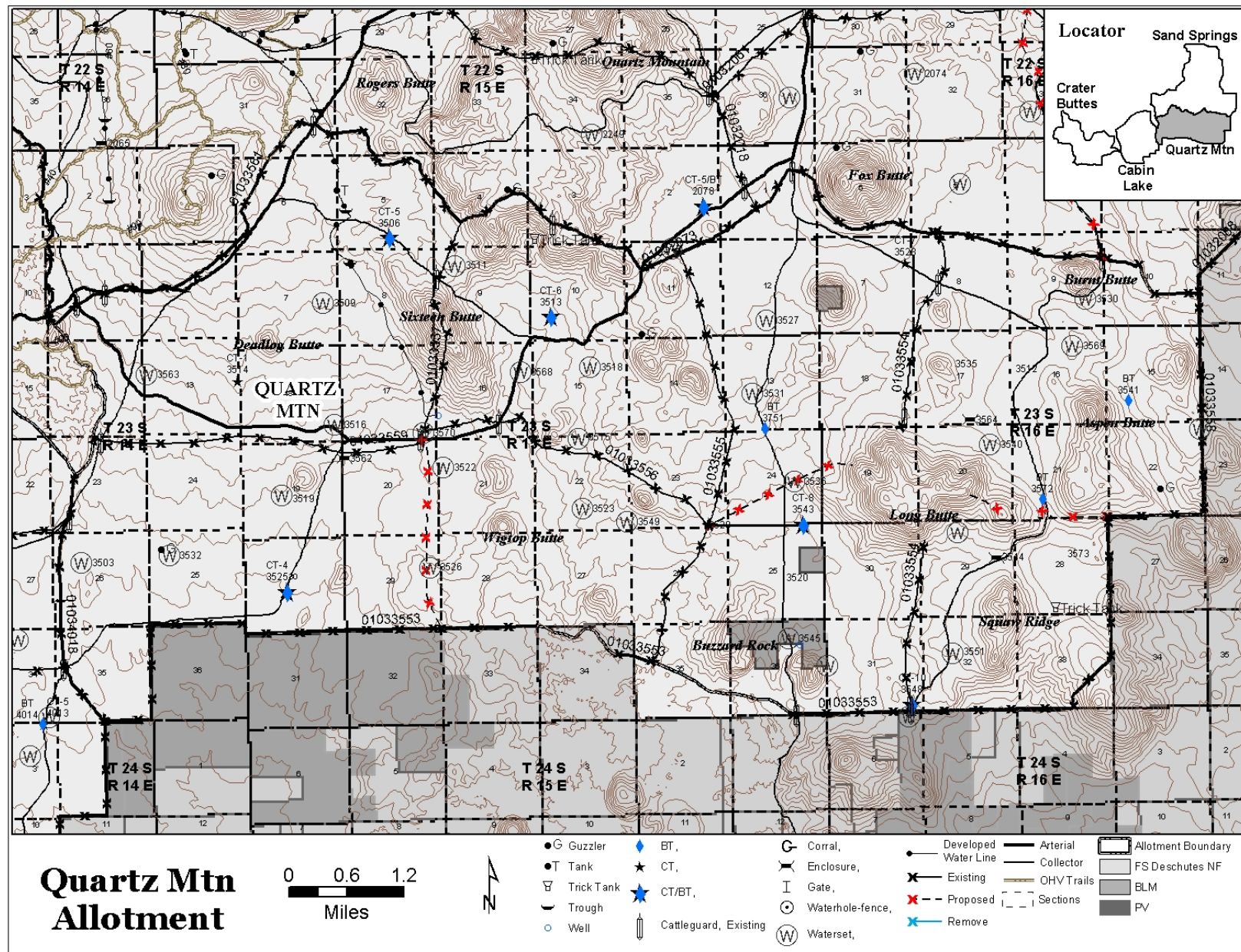
Map 3. Cabin Lake Allotment



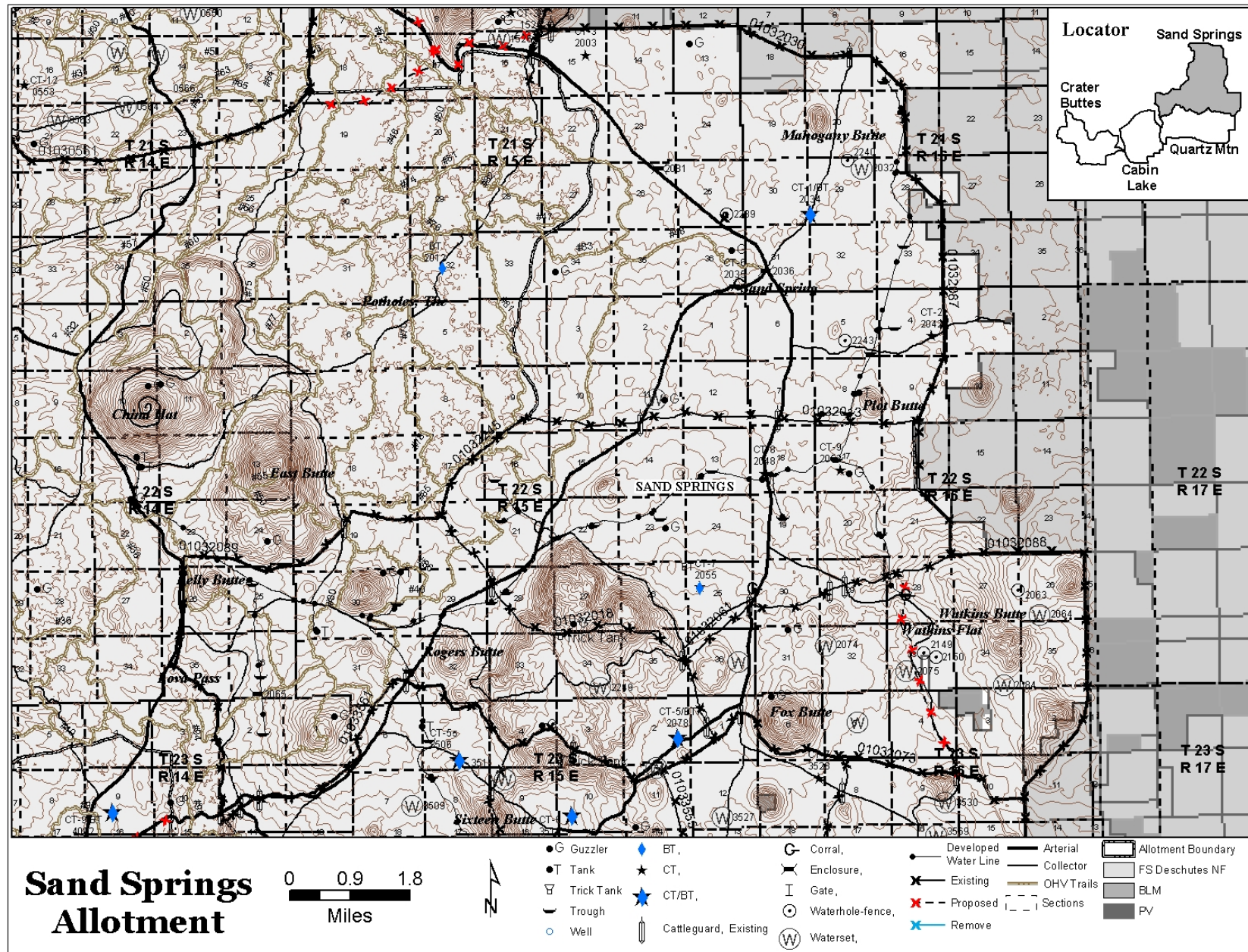
Map 4. Crater Buttes Allotment



Map 5. Quartz Mountain Allotment



Map 6. Sand Springs Allotment



Vegetation

At an appropriate level, timing, and frequency of defoliation (the removal of vegetation, as by herbivore consumption, clipping, and trampling) by grazing animals is a sustainable practice for grazing lands. Grazing management to achieve appropriate and sustainable levels of defoliation is necessarily site-specific and depends on climate, soil, water, nutrients, and many other considerations. Repeated grazing by both domestic and wild grazers that exceeds the ability of vegetation to tolerate such use initiates a chain of events that results in damage to the quality of vegetation, soil, and water in a grazed landscape (CAST 2002). Annual utilization, condition and trend study plots, and 3-way study enclosures are used to monitor vegetation conditions both annually and for the long term.

Due primarily to its abundance and palatability to cattle, Idaho fescue is the primary grass species available for foraging on three of the four allotments under analysis. Idaho fescue is a perennial bunch grass that begins new growth early in the spring, produces seed in mid July, and goes dormant in the fall. Based on the life cycle of Idaho fescue and palatability of the plant, grazing is permitted during the growing season between May and October each year. Winter grazing on Idaho fescue has been attempted on the Forest but has proved unsuccessful because in its dormant stage it provides little forage value. Idaho fescue is the key indicator species used for pasture management. In order to utilize the existing forage resource on these public lands, the 1990 LRMP (4-50) allows for cattle to remove up to 50 percent of the annual growth on Idaho Fescue based on site capability.

Grazing systems on these allotments have been established to provide for a rest-rotation pattern of use on natural rangeland ecosystems. The system applied allows for full rest of at least one pasture in each allotment per grazing season and use on each pasture is rotated (occurs at a different time period) during the grazing season from year to year. These strategies allow for grazed plants to periodically complete one season or growth stage unencumbered by domestic livestock. Plants, like all living organisms, must exert energy to complete growth whether it is for root elongation, shoot elongation, reproduction, or seed development, and allowing rest during these stages from grazing allows the plant to periodically maximize its efforts adding to its long-term health. The grazing program for these allotments is designed to utilize natural rangeland production. The Crater Buttes Allotment is a sheep and goat allotment and the primary forage species there is antelope bitterbrush. Sheep will also forage on grasses and forbs, but as antelope bitterbrush is the most abundant and a very palatable plant for them they will usually select it. The objective is to manage rangeland vegetation on a sustainable basis to not only provide feed for grazing livestock, but also to hold soil in place, to filter water, and recycle nutrients. Antelope bitterbrush is the key indicator species used for allotment management. In order to utilize the existing forage resource on these public lands, the 1990 LRMP (page 4-50) allows for livestock to remove up to 50 percent of the annual growth on antelope bitterbrush based on site capability.

Table 13. Summary of Study Plots

Allotment	N. of Study Plots	No. of Transects
Cabin Lake	7 CTs	15 Transects
	One 3-way (Deer & Cattle Enclosures)	9 Transects
Crater Buttes	3 CTs (Not monitored in 2003)	6 Transects
Quartz Mountain	7 CTs	13 Transects
	One 2-way (Deer Enclosure) and one 3-way (Deer & Cattle Enclosure)	1 Transect No study transects established.
Sand Springs	8 CTs	18 Transects
	One 2-way (Cattle Enclosure)	2 Transects
	Total Transects	64

The Range Report provides a summary of data from 22 condition and trend study plots (CT) and 3 study enclosures that indicates vegetation trend and historic management. In total, 58 100-foot transects were monitored during the 2003 season. The CT plots indicate changes over time in areas where direct management actions such as prescribed fire have and have not occurred and the vegetation community has evolved under livestock grazing, management activities and fire exclusion.

A brief summary of the data reveals that the amount of the main forage species Idaho fescue (FEID) increased on 16¹⁰ of the clusters, was stable on 3 of the clusters and was not present on 3 of the clusters monitored. This indicates a positive trend for forage production and livestock management. Shrubs have decreased on 14¹¹ of the clusters, were stable on 6 and increased on two of those monitored in 2003. The decrease in shrubs was most notable on some of the drier sites along the “fringe” where lack of disturbance especially fire is most predominant. Antelope bitterbrush decreased on 11 of the clusters, increased on 4 was stable on 4 and was not present on 3 of the other clusters. The presence of conifers (mostly ponderosa pine) increased on 9 clusters, was not present on 9 and was stable on 4. This was mostly an evaluation of younger trees on the clusters as there was generally an older overstory present on many clusters. The amount of bare soil increased on 13 clusters, was stable on 6 and decreased on 3 clusters. The amount of vegetation on the clusters has for the most part increased (Hits on all plants) since the clusters were established in the early 1954s to 1962 and the increase in bare soil conditions may be related to maturing/aging plant communities on most sites. The amount of litter on the surface has also decreased even on the rested Cabin Lake Allotment and even with the increase in litter production from pine trees during the Pandora moth infestations that occurred in the late 1990s. Livestock grazing could account for some of the increase in bare soil, but it does not seem to correlate especially if the data from the study enclosures is considered.

The indication of historic or more recent logging was noted on 19 of the monitored clusters. A historical record of fire from 1908 to the present was indicated on only 5 of the clusters but pre-1908 evidence of fire was common. Disturbance has been absent for many years from these clusters as most of the logging occurred between 1920 and 1940 and fire was mostly pre-1908, which is a period of 97 or more years.

The Daubenmire sampling method was applied for the first time in 2003 to monitor cover; the percent shrub cover by allotment was 17% for Sand Springs, 14% for Cabin Lake and 7% for Quartz Mountain.

Grazing, logging, reforestation, mechanical brush removal, fire suppression activities, among others, along with impacts by wildfires have had important influences on the Cluster II Project Area ecosystem. Some of the CT study plots are located in affected areas and monitoring has provided some insight into vegetation responses to these activities. Only two of the transects had recent management activities (mechanical mowing) and both were fairly recent (see Appendix Two of Range Report, Sand Springs Allotment CTs 2 and 8.) Shrub recovery on activity areas (prescribed fire, mowing, crushing, logging, thinning, herbicides) and wildfire sites is taking in excess of eight years on the Cinder Cone Allotment, but is likely to be completed after 25 years in conjunction with grazing and fire suppression activities. Miller (2001) estimated that shrub recover was likely to occur 20 years or longer after a wildfire in mountain big sagebrush communities. Recovery is variable depending on the micro site and the climate over the recovery period. Grasses and forbs respond well to these

¹⁰Changes of less than 5 percent between data from time of establishment to 2003 were not used in determining trend summary information.

¹¹ The line intercept method of monitoring shrubs discriminates against older shrubs by the nature of their growth form; some caution must be used when comparing interpretation of data between younger and older plants.

disturbances increasing their production initially and sustaining their achieved level of success well into mature vegetation conditions in shrubland areas. Bare soil is almost always increased and the reduction of this situation takes longer than eight years to occur. Invading trees are reduced or eliminated depending on the level of treatment and competition with grasses and forbs is greatly reduced.

Noxious weeds have not been found on the CT plots. There are some noxious weed sites in the project area, but they are generally small and being managed by the botany program. The Botany Report documents these sites but those of note are spotted knapweed on Sixteen Butte at the opal mine, spotted knapweed on the top of Quartz Mountain, and Canada thistle near Coyote Flat.

Exotics, mainly cheatgrass do exist throughout most of the project area, but are primarily confined to small isolated locations of historic disturbance with the exception being the southern exposure of many the buttes and cinder cones in the Quartz Mountain and some of the Sand Springs Allotment. Buttes and cinder cones such as Long Butte, Sixteen Butte, Quarter Butte, Buzzard Rock, and a number of the smaller unnamed buttes in the Wigtop and Aspen Pasture exhibit populations of cheatgrass. Fire indicators such as burnt stumps, fire killed mountain mahogany trees, and fire scars on older trees are often present indicating the fire may have contributed to the transition of these sites to cheatgrass. The warmer climate (southern exposure) coupled with the lower precipitation that is associated with these sites, probably makes them more vulnerable to cheatgrass invasion than other sites on the Forest (Presentation by Rick Miller at Central Oregon Community College on December 6, 2004). Cheatgrass is also found scattered through the project area as an uncommon isolate in the plant community.

Cheatgrass is documented at most of the established watersets scattered throughout the project area. It can also be found at locations such as fence corners, bull rubs, livestock bedding areas, livestock salting areas, and at ungulate bedding areas.

Selective grazing (by livestock) can lead to changes in plant species composition, which in its turn affects the structure and function of the plant community. Effects are widespread, influencing everything from competing herbivores to microflora and microfauna. When grasses are the species preferred by herbivores, shrubs may be more competitive and eventually may dominate the system. If herbivores prefer to browse on shrubs rather than to consume herbaceous grasses and forbs, then herbaceous species may come to dominate the system. Thus, the type of grazing animals present can direct the course of succession. When management is applied appropriately, in the correct season, and with suitable intensity, grazing can be used to manipulate vegetation to attain desired management objectives such as decreasing herbaceous plant growth and encouraging shrub growth. If conducted improperly, or when natural herbivore populations are excessive, grazing can affect ecosystem structure adversely (CAST 2002). Monitoring of CTs and 3-way study plots is the method used to detect changes in plant community composition, structure, and function.

If catastrophic wildfires become the dominant influence on ecosystems by changes in the intensity and/or frequency of wildfires as a result of action by human kind, then native ecosystems may be replaced with non-native species and the fauna and flora of native systems may be lost. In light of the presence of so many exotic plant species that are invasive and lack associated biological control agents to balance their populations, control of wildfires takes on a new urgency in today's western rangelands. Public lands are all susceptible to the increased risk of wildfire, as past management activities, increased public use and changing weather conditions have contributed to ever increasing wildfire activity. Exotic species such as cheatgrass are present at low population levels within the project area and project ecosystems are vulnerable to these impacts.

There are small areas, primarily watersets and water troughs, within the project area that have been heavily used by livestock over a long period of time, are detrimentally compacted, and have plant communities that contain cheatgrass and fewer species of plants than adjacent areas. They comprise approximately 0.06 percent of the project area or a total of 87 acres. The number of these areas is

minimized through management to control impacts. The same watersets and water troughs are used each season as needed to achieve proper livestock distribution. Occasionally watersets are rested by altering pasture use or by using alternative sets, or using fewer sets with reduced herd size when that can be achieved, to allow for some rest.

Tree species in the project area are ponderosa pine, lodgepole pine and western juniper. Species conversion due to existing vegetation conditions and changes in historic influences are an issue within the project area. Ponderosa pine and on a much smaller scale, western juniper, are encroaching into many of the shrubland community sites along the eastern boundary of the area. Western juniper is present, but its population levels are not currently a concern over most of the project area. Some small areas are in need of management in the Aspen and Wigtop Pastures of the Quartz Mountain Allotment.

In the case of Fort Rock enclosures, if a connection were to be made, then a connection to an increase in tree regeneration in the absence of mule deer use appears more likely. Mule deer often target young Ponderosa pine trees as rubbing posts and as a food source in the winter and can often have a significant influence on the success of young trees in these areas as compared to summer range habitats. In the Cabin Lake enclosure there was little historical data, but 2003 monitoring showed the greatest number of trees were where livestock were excluded and deer where able to have access. The least number of trees was in the deer enclosure.

Historic records about vegetation on the project area prior to 1910 consist mostly of photo evidence and are limited, especially in regards to the specific area under consideration. Given the proximity of the area to Bend where much of the photo record exists, one could presume that the area was mainly forested by large ponderosa pine trees and that the understory was mainly grasses and forbs with some shrub component. There is no indication that juniper was ever present as a major vegetation component, but it likely existed on some ridges and Buttes such as Squaw Mountain.

Along the fringe of the forested areas the shrub component naturally increased with the reduction in overstory of conifers. In these fringe areas shrubs dominated due to climate and soil regimes and invasion by conifer was more difficult even with the lack of fire. Despite the difficult growing conditions, most of the photo evidence suggests there are more conifer stems per acre today than there were in the early 1900s (Figures 1 and 2). These two photos illustrate conifer increases, even on fringe shrubland sites.



Figure 1. Photo taken between 1911 – 1913.



Figure 2. Photo from approximate location of Figure 2, taken 2004

Historic logging began around 1920 in the project area. Logging was moderate on the north end of the project area and much reduced by the time it concluded in the south (around 1940). As it moved southeast, the number of stems per acre that were removed decreased as a more selective harvest method was implemented. The least amount of harvest seems to have occurred on eastern fringe areas. Eventually grasses and shrubs responded and increased as tree overstory was reduced.

Large planting efforts followed harvest activities in the 1940s and 1950s and their implementation drastically impacted the soil at these sites as well as the existing vegetation. Planting was largely done by machinery such as bulldozers. The ground was bladed and soil was displaced from large strips where trees were placed in bare soil conditions.

Range study plots began to be established in the 1950s on the Allotments in an effort to monitor the condition of range vegetation and to establish a method of determining vegetation trends. Vegetation records begin in the 1950s for the four allotments. The Range Report, Appendix 2 provides a summary of key elements measured over time on the allotments and describes the existing conditions found during the last survey completed in 2003.

Conifer Increases:

Western juniper is an important native species in the Central Oregon Area. It has been expanding its range because of activities associated with man and environmental factors such as climate. Gedney, Azuma, Bolsinger, and McKay (1999), reported that over half the area of the present juniper forest became established between 1879 and 1918. This rapid increase in juniper stand establishment occurred during a period of favorable climatic conditions and reduced fire frequency and intensity. The report indicated that juniper occurred on 2.2 million acres of Eastern Oregon, as of 1988. A similar survey 1936 determined that 420,000 acres contained juniper stands, or approximately (20 percent) of that found in 1988. This expansion is quite evident in Central Oregon and portions of the Cluster II Project Area. Several locations in the project area provide examples where western juniper and also ponderosa pine are actively invading plant communities where long term range survey records indicate they were not present or as anywhere near their current levels in the 1950s.

Western juniper and pine ecosystems are important and provide habitat for unique plant and animal communities. But vastly expanding juniper ecosystems that owe their success partly to human influences alter and reduce the size of other plant communities that are just as important and provide their own unique and special habitats. Shrubland and grassland ecosystems are subject to invasion by

western juniper and these communities are especially important to livestock as they generally provide the best grazing resources.

Fire and Fuels:

The management of vegetation through livestock grazing is an important tool that can be used to aid in fire management. Livestock grazing reduces fuels and has long been recognized as an agent of fire prevention, fuels treatment, and an agent in reducing fire intensity/severity. Grazing of domestic livestock is a valuable tool when dealing with both planned burning for land management and wildfires. Planning the timing and intensity of grazing to influence the fuel *loads* (weight of fuel per unit area) of an area is a valuable consideration in planning for the use of prescribed burning (USDA—NRCS 1997b, 2000, 2002). In most rangeland and pastureland situations, a minimum of 670 to 1,120 kilograms (kg)/ha of *continuous fine fuel* (fuel that ignites readily and is consumed rapidly by fire) is needed to conduct a prescribed burn. A fuel load of 3,370 to 4,500 kg/ha usually is optimal and provides the greatest flexibility in planning the burn (Wright and Bailey 1982). Livestock grazing can be managed to achieve these fuel loads by applying the grazing based on a plan that balances the need for animal forage with an optimal fuel load (CAST 2002).

Grazing also can be managed to decrease the damage done by wildfires. A minimum of 340 kg/ha of continuous fine fuel generally is needed for a wildfire to carry on most grazing lands (Wright and Bailey 1982). Planning the grazing treatment to decrease fuel loads or to cause discontinuities in the fuel bed, thus limiting the spread of unplanned fires during the wildfire season, can be an effective tool in decreasing wildfire frequency and severity (USDA—NRCS 2000).

Table 14. Summary of Large Fire History in Planning Area

Date	Number of Fires By Year
1910	1
1911	1
1914	2
1915	6
1918	2
1920	2
1952	1
1955	1
1959	1
1977	1

Fire was frequent, and it was a major player in shaping vegetation communities in the project area. A fire chronology study completed by Rick Miller (2001) for two sites on the Deschutes National Forest found a mean fire return interval of 14 years for Pine Mountain (northwest of the project area) and 12 years for Squaw Mountain for pre-settlement fire frequency. There is documented large post-settlement fire history in the project area in the early 1900s (Table 15). A large fire is one that is 100 acres or more. The one notable and more recent large fire was the 1959 Aspen Flat Fire. There have been few large fires in the project area since 1920, the exception being the 1959 Aspen Flat Fire, and this is partially attributable to fire prevention, fire suppression, and to some extent livestock grazing.

Fire managers and the general public often overlook the benefit to a reduction in wildfire incidence and intensity as a result of annually grazing public and private lands in increasingly fire prone areas such as central Oregon. But livestock treat many acres in the West annually and these lands provide for a varying degree of fire management as a by-product of annual grazing. Grazing is but one tool in the land managers' efforts at managing fire.

A Ten-Year Comprehensive Strategy Implementation Plan for the National Fire Plan recognizes the potential benefits of utilizing proper livestock grazing for accomplishing resource management objectives. It directs the Forest Service to “Incorporate sustainable livestock grazing practices as part of protection and restoration strategies, where appropriate.” A Washington Office letter dated August 30, 2004, references the Ten Year Plan and goes on to state that to accomplish the goals and objectives of the National Fire Plan by using livestock herbivory as one of many available methods to manage vegetation and fuels in a manner that reduces fire intensity and rates of spread.

The annual removal of forage vegetation through grazing by livestock at allowed levels combined with the mixing and incorporation of organic materials into the soil through the hoof action of cattle provides for hazardous fuels reduction. Research indicates that “Livestock also reduced the frequency of surface fire consuming the herbaceous vegetation, which otherwise would have dried into fine fuels necessary to carry the fire (Belsky & Blumenthal 1997) in western rangelands.” My professional observation is that grazing has had an effect on fire frequency and rate of spread in the Project Area since at least the 1930s. Fire prevention and suppression has been and still is an important management goal for the Deschutes National Forest. Current fire management policy in the project area is to control all wildfires. The kind of low intensity “natural” fires of historic time are not allowed to occur outside of a carefully managed fuels program.

Fuels management is an integral part of the fire management program on the Forest and is currently receiving much fiscal support. Vegetation conditions are monitored and fuels are treated as needed to achieve the desired conditions. Treatments within the project area include prescribed fire, mechanical mowing, thinning, and harvesting timber. Wuerthner (2003) acknowledged the relationship between grazing and fine fuels in his paper by writing that “grazing removes the fine fuels such as grasses that (historically) helped to carry the light intensity fires that once burned at regular intervals throughout much of the lower elevation forests ecosystems of the West. This has permitted young saplings and trees to become established and be recruited into the forest stand.” As part of the cooperative effort between range and fire, it can be necessary to provide for a season of rest (to leave adequate fine fuels) in order to achieve the proper burning conditions. This occurs as necessary within the project area, but is uncommon.

Livestock grazing can cause changes in the condition of vegetation annually and over the long term that benefit the fire management program. In 1996 the Skeleton fire (outside the project area) started from a lightning strike on private land near the Forest Boundary. The fire traveled onto the Coyote Allotment (vacant since 1991) and progressed eastward to pasture two on the Cinder Hill Allotment. Pasture two had been grazed that season and the cows had been moved off to another pasture prior to the fire event. The fire was able to travel through the pasture under extreme fire conditions with one exception. There was a range treatment unit implemented in the fall of 1986 that had been grazed prior to the fire that did not burn; the Skeleton fire simply went around it. The range treatment occurred with the objective of removing the large decadent shrub component and improving forage conditions. This unit, after annual grazing use served as an effective fuel break, some ten years after treatment. Attempts were made to backfire the unit as the fire approached but it would not burn despite the extreme fire behavior being exhibited by both the Skeleton Fire and the Evans West Fire (burning concurrently in pasture one of the Cinder Hill Allotment).

According to (Belsky & Blumenthal 1997) a “large number of authors have suggested that fire began to decline in frequency and forests began to increase in density soon after livestock were first introduced into the Interior West.” Grazing levels in the west were extremely high around the turn of the century and many researchers have documented that the levels of grazing in the early 1900s could not be sustained and had long-term impacts on public lands. Livestock grazing has been substantially reduced since those early settlement days throughout the west and as important has been the development of better grazing systems. Many western rangelands today show improvement in condition and trend, as is the case on many of the study plots on these three allotments. Range management professionals almost unanimously agree that there has been general improvement in the

level of management applied to rangelands and that the general condition of rangelands has improved greatly since the early days of this century, and particularly since 1950 (The Grazer 1999).

Reforestation:

Livestock can have a negative impact on reforestation efforts in young plantations. Impacts are most commonly due to trampling of the tree seedlings and/or their protective cages. Cattle would occasionally remove the growth buds on the seedlings but they are not directly selecting these, as do native ungulates. There are some plantations within the Cabin Lake and Crater Buttes Allotments that may need some protective measures such as fencing to accomplish regeneration objectives if and when the allotment is restocked. The Sand Springs and Quartz Mountain Allotments have both hard fencing and electric fencing programs in place to manage livestock access on existing plantations. Usually, protective efforts are made for an average of ten years after planting to ensure success. This is a cooperative program between the range and silviculture departments

Livestock preference for specific species can be used as a tool for forest regeneration efforts. Livestock have been used as a tool to reduce competing vegetation in forest plantations where the objective has been to increase seedling survival and height growth in an effort to regenerate timber stands after fire and/or logging. The fence around pasture Three of the former Coyote Allotment (outside project area) is an example of this. The fenced area is a wildfire that occurred around 1966 and was later planted. The fence allowed for occasional grazing and is now being removed as the plantation is doing well.

Water Developments

Livestock water is hauled in by the permittee to established waterset locations. There are 70 historic and established waterset locations on the four allotments. Current waterset locations are a reflection of the needs from present and past stocking levels. The number and distribution of existing watersets has also been influenced by other land management activities and resource concerns in addition to range program objectives.

There are eight surface water features on two of the four allotments. The surface features are all “waterholes” and have no surface inlet or outlet. The waterholes are either natural or have been created or enhanced with machinery. None of the waterholes have any discharge into navigable waters. Due to the lack of runoff, these surface waters do not require certification under DEQ regulations. All are fenced to exclude livestock and the actual water surface area covers less than an acre in size. The existing vegetation typically consists of fewer shrubs and more sedges and grasses (typically, the same species as those found in the upland area surrounding the waterhole). The waterholes were historically used by livestock and were in some cases created or enhanced by livestock operators to improve ability to provide water. There are no records on file that would indicate what the waterholes were or in most cases, when they were “improved.”

As their value to provide an early season and annual supply of water for wildlife was recognized, they were fenced to exclude livestock. The waterholes are capable of providing a limited supply of water and this was another reason to allocate this precious eastside water to wildlife. Due to continued use by wildlife and the fact that they generally are dry by mid or late July, there is typically much bare soil and little vegetation difference at these locations. Three of these water holes retain water later in the year or in some years, on a year round basis. There are five other developed waterholes in the Sand Springs Allotment and one in the Quartz Mountain Allotment. All the waterholes are fenced and the responsibility of fence maintenance is with the wildlife departments.

Livestock Watersets

All planned water resources used by livestock in the Cluster II Project Area are provided by the permittee through water haul, piped water system associated with a well, or rain catchment trick tanks. Established watering locations are provided and agreed to each season. These locations are known as watersets. Watersets are where an adequate area for truck access and the placement of water troughs is provided. These locations become “hardened” over time as soil at the site is compacted by both the water truck and by livestock that come to the waterset to drink, rest, socialize, and lick salt that is often provided along with the water. Local soils are deficient in selenium and it is important that selenium via salt supplements is provided for livestock.

Waterset locations are perhaps the highest area of impact for livestock operations on dry upland allotments. Soil compaction from water trucks and livestock has been measured up to 190 feet from the center of a waterset. Vegetation disturbance has been measured out to about 250 feet from the center of a waterset. Often, waterset locations were located at sites that were disturbed by other activities such as logging. Livestock create a trail system to access the watering area and often lounge around after drinking. A typical waterset has an area of compaction of approximately one-acre. For these reasons it is best that once established, that waterset locations are not changed and their impacts on the allotment(s) minimized.

Typical activities at watersets and associated impacts include access by water trucks and associated soils compaction and vegetation disturbance. Waterset activities include: livestock soil compaction at watersets at the drinking location, trailing to the waterset, and bedding or resting under nearby trees for shade; soil displacement through digging activities by livestock such as dusting for insect protection and bull displays; and heavier use of vegetation around the waterset usually occurs up to a quarter mile away as animals feed both entering and exiting the waterset.

For all these reasons, the number of watersets per pasture is generally limited. Although better forage utilization could occasionally be obtained by having more watersets and by rotating multiple watersets, the goal of the program has been to minimize the number and size of watersets to limit impacts.

Due to their size watersets can be easily reclaimed by mechanical methods such as subsoiling, planting, and then protecting the site until recovery is achieved. Watersets also appear to recover well over time without intervention. Natural recovery of watersets has also occurred and has been documented under the Cinder Hill EA (USDA Forest Service 2003).

Use of watersets by dispersed campers, vegetation treatments, and other activities seem compatible at low use levels except when multiple users attempt to use the site at the same time. It does not work well when a permittee goes to a waterset to set up water troughs in preparation for a livestock move and the waterset is in use by others. When a waterset becomes a popular dispersed camping or staging location and use increases the permittee loses the opportunity to use the site as access may be denied or restricted. Multiple use activities occurring at the waterset and at the same time are generally not compatible.

Livestock going to water in large numbers and remaining at the waterset while resting and socializing often raise a lot of dust, would easily enter campsites, would leave droppings, they often intimidate people who are not familiar with them due to their sheer size. For this and other reasons, when designing multiple use sites such as OHV staging areas, harvest activities and dispersed camping areas, watersets need to be separated and or buffered from these activities by at least 200 yards. Dispersed hunting camps during archery season are an issue for livestock management but fall rifle season(s) are not generally a concern as livestock are normally gone by the time hunters arrive.

General guidelines for waterset locations include being located ¼ of a mile or more away from major roads, are not highly visible to the general public, distribute livestock use over the pasture to achieve desired utilization, encourage less use by livestock in public recreation sites, provide less use in tree plantations, and that allow for flexibility in pasture management. These actions also reduce conflicts between user groups.

Range Vegetation Study Areas

Two vegetation treatments, both mechanical mowing of shrubs have been implemented to reduce the threat of wildfire, improve wildlife habitat and increase forage production for livestock at Sand Springs Allotment current trend study plots (CTs) 2 and 8. The results of these activities can be reviewed in Appendix 2.

Official records indicate that livestock have grazed some portions of the area prior to World War I. Beginning in the middle of the 1950s, long-term rangeland monitoring plots were established in the form of Current Trend Study Plots (CTs). Monitoring has occurred over time at irregular intervals based mainly on budget allocations and program priorities. The monitoring that was accomplished provides a valuable window into the responses of native and exotic vegetation to livestock grazing, livestock grazing in conjunction with other vegetation management activities, and to livestock grazing and impacts due to wildfire. Please see Appendix 2 for a complete review of the monitoring and trend data.

CT's were established for each pasture of the Cabin Lake, Crater buttes, Quartz Mountain, and Sand Springs Allotments and were placed in a variety of plant associations (Volland, Plant Associations of the Central Oregon Pumice Zone).

In the mid 1960's another rangeland monitoring system was installed that provided a separate method of determining vegetative responses to livestock use in relation to native ungulate use. Enclosures were constructed that provided for the exclusion of cattle in one area, the exclusion of cattle and native ungulates in another area, and a control plot. Please see Appendix 2 for a complete review of the monitoring and trend data.

In 2001 and 2002, Courtois (2004) and associates conducted a study of 16 range exclosures in Nevada. The exclosures (enclosures) were constructed in 1937 following the passage of the Taylor Grazing Act to access long-term effects of livestock grazing on Nevada rangelands. Their summary found that "few changes in species composition, cover, density, and production inside and outside exclosures have occurred in 65 years, indicating that recovery rates since pre-Taylor Grazing Act conditions were similar under moderate grazing and grazing exclusion on these exclosure sites." Their study also found that "cheatgrass cover inside and outside exclosures was not different in either 2001 or 2002. However, cheatgrass density was greater inside exclosures in two" of the study sites. In regards to shrubs, they found that "the live plant census reported few dead shrub and grass plants, but the vegetation inside exclosures often exhibited decadent growth characteristics. Sagebrush and other shrubs inside exclosures might be approaching their life expectancy, and changes caused by the removal of herbivory might not have reached a detectable level." Results from enclosure monitoring in 2003 in the project area showed similar results except for the presence of cheatgrass (see Range Report Appendix 2). One benefit of grazing is that "within exclosures there is more vegetative ground cover, while outside there are more plants as well as a greater variety of plants" and "from an ecological standpoint we can argue that if we remove the grazing infrastructure from public rangelands, we would see some adverse consequences," he said. "We'd see less variety and too much ground cover, for example, as well as more cheatgrass and the potential for more range fires." (Perryman 2004).

When CT plots were established in the 1950s a number of study plots included the caging of existing shrubs. Often, two separate shrubs were caged at each location to determine the effect of no to low browsing by all ungulates on an individual shrub over time. These cages were known as browse transects or BTs. Table 15 provides the result of monitoring during the summer of 2003 at all known BTs within the project area.

Table 15. Summary of BT Monitoring Summer of 2003 for Project Area.

Allotment	Landmark	% Dead PUTR Crown Within Confines of Wire Cage
Quartz Mountain	Road 2325. T23S., R15E., Sec. 13. Power line.	100%
Quartz Mountain	Road 2250 / CT-4	1) 90 % dead* 2) 15 % dead
Quartz Mountain	Road 2268 / CT-5	95 % dead
Quartz Mountain	Road 2268 900 / CT-6	1) 80 % dead 2) 95 % dead
Quartz Mountain	Road 2315 east of Long Butte.	100 %^
Quartz Mountain	Road 2325 700 / CT-8	1) 100 % dead 2) 100 % dead
Quartz Mountain+	Road 2315 / CT-10	1) 85 % dead 2) 15 % dead
Quartz Mountain	Aspen Flat.	1) 0 % dead 2) 0 % dead
Cabin Lake	Road 2350 / CT-5	1) 50+ % dead 2) 95 % dead
Cabin Lake	Road 2435 900 / CT-3	1) 85 % dead 2) 95 % dead
Cabin Lake	Road 2248 240 / CT-7	1) 95 % dead 2) 50 % dead
Cabin Lake	Road 1800 900 / CT-9	1) 75 % dead 2) 80 % dead
Sand Springs	Road 2312 / CT-1	1) 35 % dead 2) 15 % dead
Sand Springs	Road 2300 / CT-5	1) 30 % dead
Sand Springs	Road 2315 100 / CT-9	1) 55 % dead 2) 70 % dead
Sand Springs	Road 2316 200 / CT-7	1) 100 % dead 2) 70 % dead

On average, Table 16 indicates that sixty-seven percent of the crowns of the antelope bitterbrush shrubs within the cages were dead. In five of the cages the shrubs were entirely dead. In only two of the cages did the shrubs display 100 percent live crowns. If the plants inside and outside the cages correlate with each other in age, then a connection can be made as to browsing and individual shrub decadence. Unbrowsed plants inside the cages had observably more decadent material present than plants surrounding and outside the cages. This could indicate that browsing stimulates shrubs and/or that browsers, through their actions, remove decadent material from shrubs by browsing action or movement through the area, such as breakage.

Economic Aspects of Public Land Grazing

Livestock grazing remains an important multiple-use activity and source of income for local communities in Central Oregon. Traditional uses of public land were established by a national policy of expansion in an effort to settle the west (Gentner and Tanaka 2002). Communities have evolved dependent on traditional consumptive uses. These communities have strong ties to this traditional way of life and their culture reflects this tie. Approximately 85 percent of federal land is grazed by domestic livestock (CAST 2002). Grazing permit holders account for over half the commercial beef cattle in these 11 western states (CAST 2002).

Nationally, the demand for non-consumptive use of public lands has and continues to increase. In the 1980s, visitor days on USFS lands increased by approximately 50 percent (CAST 2002). Within the Cinder Hill Project Area the development and use of the East Fort Rock OHV Area demonstrates this increase. In this case, these two multiple-use activities (OHV use / livestock grazing) have successfully co-existed, but as would be expected, there are shared-use issues. OHVs and livestock often share the use of recreation and livestock trails, are noisy, create dust, interact with each other and can be a safety issue to both. Vehicle users have also been known to harass livestock. The existence of these two uses within the same geographic area does result in additional expenses to both operations.

Gentner and Tanaka (2002) found that the public land livestock grazers that they surveyed ranked consumptive objectives above profit maximizing objectives suggesting that all ranchers are economic satisfiers with varying degrees of importance placed on the earning potential from the ranch. In fact, all groups ranked the traditional and family objectives as the first and second most important objectives and the profit objective was ranked in the middle of the pack across all groups (see Gentner and Tanaka 2002, Table 1). This supports the idea that ranching is a way of life as much or more than it is an economic endeavor and that the use of public lands in conjunction with private lands may not always be a profitable activity for the permittee. Past research has indicated that factors other than profit or economic incentives influence decisions that shape a ranch family's decision to stay on the land. Researchers have found that family, tradition, way of life, rancher image, and place of attachment all motivate ranchers to retain ownership (Smith and Martin 1972, Harper and Eastman 1980, Grigsby 1980, Bartlett et. al 1989, Gentner 1999, Liffman et. al. 2000). Based on New Mexico State University reports, most public land ranches in New Mexico have lost money since 1994 due to rising ranching costs, low cattle prices, and drought (Holechek 2002). These influences (rising ranching costs, low cattle prices, and drought) are prevalent in Central Oregon as well.

The City of Bend has grown substantially in the last 30 years and land use demands have grown with it. The Cluster II Project Area is within reach of the urban growth area of Bend Oregon. Large ranching areas with low levels of subdivisions still exist in Central Oregon, but if current land use and demographic trends continue, these areas could be threatened or disappear over the next 20 to 50 years.

Common problems associated with urban fringe areas are increasing property taxes; vandalism; restrictions on management practices such as burning, weed control and predator control; marauding dog problems; trespass; carelessness with gates and fences; loss of livestock from theft and vehicle accidents; and liability (Huntsinger and Hopkinson 1996). Holechek (2002) identified prosperity, shrinkage of open space, loss of rangeland to other uses, declining profitability and uncertain knowledge of range condition, in his February 2001 article in the Rangelands magazine, Volume 23 No. 1. He directly referenced Central Oregon as a location where "widespread conversions of rangeland to urban housing and ranchettes" was occurring.

Fences

Fence Removal: When range fences are no longer needed to control livestock for the present or foreseeable future, then they need to be removed to provide for safety to both the recreating public and wildlife. If fences are not maintained then over time they become a hazard and unattractive eyesore to all users. Broken, sagging and tangled wires are a danger to animals and people who travel over them especially if they are hard to see due to vegetation growing over them.

Fence removal requires handwork by individuals or groups of individuals. People walk along the fence removing wire fasteners, pulling posts, rolling wire, and stockpiling materials. These materials are then transported to nearby road systems by hand or with the use of an ATV. Once the materials have been transported to the road they are ready for removal by vehicle off of the work site.

On some projects, a gas powered wire roller is used to roll the wire on spools so that the wire can be recycled. This operation usually requires that a vehicle have access to line-up with the fence so that the roller can be mounted in the vehicle and the vehicle is then used as a “platform” for the operation of the roller. This could require off road vehicle access along the fence route.

Fence Maintenance: Fence maintenance is a periodic event that includes reconnaissance of the existing improvement annually. Minimal fence work is generally performed to bring the fence up to a standard where it is effective in managing livestock. Reconnecting broken wires, replacing a broken fence brace, adding fence posts are normal activities that would take place as needed. Maintenance is normally done by the permittee who is responsible for those fences designated in his/her permit and is typically performed by one or two people.

Access for fence inspections / maintenance is gained by vehicle, OHV, horse, or foot to perform this task. The permittee is normally restricted by the same rules as other users unless specific written permission has been given to go outside these rules. This applies to the East Fort Rock OHV area and other area closures.

Minor ground disturbance such as digging a new posthole to replace an existing post, minor vegetation manipulation such as cutting a shrub from a fence wire or driving over brush that has grown into the access road would be anticipated during these activities.

It is also necessary to fell dead trees that are either on the fence or that threaten the fence within the right-of-way (typically assumed to be within 50 feet). Wood from these trees is not removed unless a special authorization is obtained through the permit process for firewood.

Range Resources Environmental Consequences

Direct and Indirect Effects

Alternative 1: Current Management

This Alternative would allow livestock management to continue, as it presently exists (no change). Permits would continue to be issued to the two existing permittees on the Quartz Mountain and Sand Springs Allotments and Forage utilization would remain at or below the 1990 LRMP allocations as shown in Table 16:

Table 16. Current Use Levels Compared to LRMP Allocations

Allotment	1990 LRMP Allocation	Current Management
Cabin Lake	300 Cow/calf pairs*	0*
Crater Buttes	1,000 sheep.	0
Quartz Mountain	600 Cow/calf pairs*	600*
Sand Springs	600 Cow/calf pairs*	600*

* Number of cow and calf pairs for permitted grazing season. Season of use is the same unless noted.

This alternative would issue 10-year term grazing permits to re-authorize the grazing of livestock on the Sand Springs and Quartz Mountain Allotments.

Alternatives 2: Proposed Action

This Alternative would allow livestock management and associated economic returns to continue and increase. Forage utilization would remain below the 1990 LRMP allocations shown in Table 17:

Table 17. Current, LRMP and Proposed Use Levels

Allotment	Existing	1990 LRMP Allocation	Alternative 2
Cabin Lake	0	300 Cow/calf pairs 6/1 - 9/15	240 Cow/calf pairs 5/25 - 9/10^
Crater Buttes	0	1,000 sheep	0
Quartz Mountain	600 Cow/calf pairs 6/1 - 9/30	600 Cow/calf pairs 6/1 - 10/25	600 Cow/calf pairs 5/15 - 9/30^
Sand Springs	600 Cow/calf pairs 6/1 - 9/30	600 Cow/calf pairs 6/1 - 9/30	600 Cow/calf pairs 5/15 - 9/30^*

* Season of use would need to be reduced 2 out of four years if browse objectives for antelope bitterbrush are not being achieved and if BOPU objectives are not met. This would occur until Watkins cross fence is completed.

^ Variable use periods and livestock classes/numbers will be authorized when such variance will materially contribute toward achieving allotment management plan and the Deschutes NF Land and Resource Management Plan goal and objectives. Permitted season of use on the Quartz Mountain and Sand Springs Allotments is not to exceed 600 cow/calf pairs for 122 days or the equivalent.

This alternative would authorize livestock grazing activities on the Cabin Lake, Quartz Mountain and Sand Springs Allotments under the direction provided by the 1990 LRMP (including compliance with applicable laws, regulations and policies). This alternative would issue 10-year term grazing permits to re-authorize the grazing of livestock on the Cabin Lake, Quartz Mountain and Sand Springs Allotments. New permits would be issued beginning in the 2007-operating season. This alternative would modify grazing permits and allotment management plans for each allotment to include updated grazing practices as shown in Appendix 6 and in the discussions that follow. Adaptive management would be applied (The process of adjusting grazing management to monitoring results).

This alternative would discontinue use of livestock on the Crater Buttes Allotment and would officially close the allotment to grazing. No permit would be issued.

Monitoring would occur on all pastures in all allotments except for Crater Buttes using the Grazing Implementation Monitoring Module as directed in the Joint Aquatic and Terrestrial Programmatic Biological Assessment for Federal Lands Within the Deschutes Basin 2003 –2006 (USDA, USDI, USFWS, 2003). Long-term monitoring would occur periodically at historic and substitute current trend study plots established for each allotment (planned for every ten years). These modified grazing practices would be in effect until conditions changed to the point that additional changes or new practices were needed. Specific activities for each allotment are discussed on the following pages.

Allotment boundary changes would occur in the Cabin Lake Allotment with implementation of this alternative by these specific actions: portions of the allotment will be dropped and grazing will be discontinued in these areas. 3, 665 acres of pasture Three north of the 22 road, 286 acres of pasture Three west of the 2240 road, 807 acres of Pasture Two west of the 2240 road and 148 acres of Pasture One west of the 500 road. Ten acres will be added to pasture Three in order to construct a fence and tie in to the natural barrier in the northeast corner of the allotment (Table 18). The Cabin Lake Allotment would be reduced by 4,896 acres with an associated reduction of 60 cow/calf pairs of livestock from June 1 to September 15 each year. The alternative comparison table on page 29 indicates the actual change in acres by allotment as of a result of the boundary changes (new fence construction) and map in Appendix 6 illustrates these actions.

Table 18. Cabin Lake Allotment Changes

Pasture	Current Size	Change	Final Size After Changes
One	4,907 acres	(148 acres)	4,759 acres
Two	3,049 acres	(807 acres)	2,242 acres
Three	9,561 acres	(3,951 acres) & 10 acres	5,620 acres
Four	3,789 acres	0	3,789 acres
Five	<u>4,886 acres</u>	<u>0</u>	<u>4,886 acres</u>
Totals:	26,192	(4,896)	21,296

(00) - Indicates a decrease in acres.

Reforestation plantings have occurred within the planning area due to tree harvest activities. Generally, plantation trees require ten years or more growth before they are no longer vulnerable to livestock. Tree plantations within the Cabin Lake Allotment (Pastures Three and Four) should have reached their desired growth requirements to preclude impacts from livestock by the year 2007. Once reforestation objectives have been achieved, or with the use of exclusion techniques like electric fencing or hard fencing, the Cabin Lake Allotment could be restocked. When the fencing of Pastures One, Two and Three is complete, the Cabin Lake Allotment could be fully stocked to 240 Cow/calf pairs from May 25 to September 10 each season. Grazing could be authorized under a ten year term grazing permit, temporary permits, or the allotment could be retained as a forage reserve to be determined as needed to meet management objectives and budget constraints. Since the allotment is vacant and there are no former permittees with a grazing status on the Forest, a prospectus process will be used to select the “best” permittee for the allotment.

Before pastures Three and Four are opened up to livestock grazing, all reforestation areas (existing and future) would be monitored to make certain that domestic livestock grazing would not hinder reforestation objectives. Livestock would not be allowed onto the pasture(s) until the responsible Silviculturist and range manager concur that operations would meet these objectives.

Where reforestation objectives cannot be met due to domestic animal grazing that has or is occurring, measures would be taken to insure reforestation success. Such measures may include permanent or temporary fencing to exclude livestock, the use of salt licks or relocation of watersets to redistribute livestock use, or the exclusion of animals from pasture/pastures on a temporary basis.

This alternative allows for the use of livestock as a tool to manage vegetation, treat noxious weeds, control competing vegetation in plantations, manage exotic species and manage “light” fuels.

The old growth, scenic views, winter range and general forest areas within the Cabin Lake, Sand Springs and Quartz Mountain Allotments would be available for use by livestock. Use in Old Growth Management Areas would be discouraged by placement of livestock water outside of these allocations. Changing the Cabin Lake Allotment boundary to the east of the 2240 in Pasture Two, will exclude most of the old growth area east of Sugar Pine Ridge from livestock grazing. Old growth areas within the Crater Buttes Allotment will also be excluded from livestock grazing.

Cabin Lake Allotment

The Cabin Lake Allotment is comprised of 26,192 acres: 26,191 acres of National Forest System (NFS) lands and one acre of Bureau of Land Management (BLM) land and no acres of private lands. The Cabin Lake Allotment would be reduced in size to 21,296 acres. Three pastures (One, Two and Three) would require approximately 11 miles of new 3-strand smooth/barbed wire fence with metal posts to achieve this allotment boundary adjustment (T24S., R13E., section 11 to 23/14 section 10). The new fences would compliment existing allotment boundary fences by providing combined

improvements that together enclose the entire allotment, these additions would exclude livestock grazing from the majority of the old growth area on the east flanks of Sugar Pine Ridge, exclude livestock from Road 22 and eliminate that safety and liability concern, discontinue livestock use of some of the heavily forested transitional range north of Road 22, exclude the South Ice Cave recreation area from livestock grazing and potential user conflicts and they would separate livestock grazing and OHV activities north of Road 22 and the popular staging area at the intersection of road 22 and road 18. Approximately two miles of Trail #90 would remain within the new allotment and two new OHV cattleguards will be needed to implement the new fence (T23S., R14E., section 16 & T23S., R14E., section 15). The entire 11 miles will also require the placement of three new cattleguards, one of these will come from an existing cattleguard in pasture Three that will be relocated to T23S., R16E., Section 26, The other two will be located at (T23S., R14E., section 16, & section 17 and one at T24S., R13E., section 2).

The following would be included in the terms of the grazing permit for the allotment: livestock would be moved before or when average utilization reaches the desired use of 50 percent Idaho fescue (estimated to be 3 inches stubble height).

The Allotment has been vacant for over ten years and much of the existing fence needs maintenance or reconstruction. Field surveys in 2004 found that most of the fence was actually in fairly good condition considering the years of neglect.

Two new CT clusters would be established, one in Pasture Two and one on the east side of Pasture Three to monitor long term vegetation condition and trend.

No additional water sets are proposed.

Range readiness will be determined by soil conditions (primarily soil moisture) and to some extent weather but will not be dependent on forage species growth or phenology at the time of turnout.

The multiple new fence construction projects proposed under this alternative are designed to improve livestock management and to better meet resource objectives. Fences will restrict access to some areas, improve livestock distribution, reduce the time livestock are utilizing individual plants and pastures, reduce the time between bites for forage species, allow for increased allotment/pasture flexibility, reduce livestock and mule deer conflicts by increasing the ability to better manage use on browse species and increase forage plant health.

Some use on antelope bitterbrush by livestock can be complimentary or beneficial by removing dead and decadent material and stimulating new growth by promoting sprouting. Antelope bitterbrush is generally abundant within the project area and is thus not a limiting factor. Treating some amount of this shrub is acceptable to meet objectives if use is not too intensive (SRM Meeting, 2005).

Crater Buttes Allotment

The Crater Buttes Allotment would be closed and livestock grazing would end on this historic sheep allotment. There are no improvements to remove or water sets to rehabilitate. The three existing condition and trend study plots would not be monitored.

Livestock grazing in three old growth areas would no longer occur.

Sheep and goats would not be available under allotment management to manage competing vegetation, noxious weeds or fuels.

Quartz Mountain Allotment

The Quartz Mountain Allotment is comprised of 34,087 acres: 33,667 acres of National Forest System (NFS) lands, 94 acres of Bureau of Land Management (BLM) land and 326 acres of private

lands. The Allotment would remain the same size as it currently is. Three pastures (Aspen, Powerline and Wigtop) would be designated to have approximately 5 miles of new 3-strand smooth/barbed wire fence with metal posts to achieve pasture division fences: 1) T23S., R15E., section 28 to 23/15 section 20, Wigtop Pasture, two miles; 2) T23S., R15E., Section 23 to 23/16 section 19, Powerline Pasture, 1.75 miles; and 3) T23S., R16E., Section 20 to 23/16 Section 28, Aspen Pasture, 1.25 miles. The new fences would divide existing pastures and improve distribution, facilitate livestock management by providing more control, allow for shorter time in each pasture reducing the period of use on each acre of ground.

The entire 5 miles will also require the placement of three new cattleguards: T23S., R15E., Section 24 and T23S., R16E., Section 21.

The following would be included in the terms of the grazing permit for the allotment: livestock would be moved before or when average utilization reaches the desired use of 50 percent Idaho fescue (estimated to be 3 inches stubble height).

Establish one new study plot in the new East Watkins Pasture.

Six additional water sets are proposed: 1) T23S., R15E., sec. 23 SE $\frac{1}{4}$ of the SE $\frac{1}{4}$. Establish set and construct a holding fence: 1/4-mile new fence (location flagged summer 2004). The new water set will be serving 4 existing pastures; 2) T23S., R15E., sec. 1 SE $\frac{1}{4}$ of the SE $\frac{1}{4}$: new water set located under power line; 3) T23S., R15E., sec. 25: new water set located on the 011 rd under the power line; 4) T23S., R16E., sec. 28 SW $\frac{1}{4}$ of the NE $\frac{1}{4}$: intersection of the 820/800 roads; 5) T23S., R16E., sec. 17: 760 road; and 6) T23S., R16E., sec. 16: 630 road.

A new pipeline extension will be added that is an additional 2 miles; starting from the existing line in the Sixteen West Pasture and continuing south. Consists of one new water trough and a fenced area around an existing dirt reservoir at the end of the 280 road. T23S., R15E., sec. 8 to sec. 16 and T23S., R15E., sec. 8 to sec. 7.

A new well and one 5,000-gallon storage tank (to be placed on ridge west of reservoir and at the end of the 280 road) will be added to the existing system. T23S., R15E., sec. 8 to sec. 16 and T23S., R15E., sec. 8 to sec. 7. The well will need to be drilled and drilling coordinated with the Bureau of Land Management who has jurisdiction on below surface activities.

The Trick Tank in the Sixteen East Pasture located at T23S., R15E., Section 10 and at the end of the 2268 920 road will no longer be used in order to protect resources. The water catchment apron has already been removed but the enclosure fence will be taken down and as funding allows, the tank will be filled with soil from the existing disturbed site.

Sand Springs Allotment

The Sand Springs Allotment is comprised of 55,967 acres: 54,819 acres of National Forest System (NFS) lands, 974 acres of Bureau of Land Management (BLM) lands and 174 acres of private lands. The Allotment would remain the same size as it currently is. The Watkins Pasture would be divided with the construction of a new division fence. 3.5 miles of 3-strand smooth wire/barbed wire fence with metal posts would be added: T23S., R16E., Section 9 to T22S., R16E., Section 28. The new fence will create two pastures from one existing. The new fences would divide existing pastures and improve distribution, encourage livestock to better utilize the western portion of the Watkins pasture, facilitate livestock management by providing more control, allow for shorter time in each pasture reducing the period of use on each acre of ground.

The existing water system pipeline would be extended: 1) approximately 1 mile of additional line would be added beginning at the T22S., R16E., Section 20, SE $\frac{1}{4}$ and ending in Section 28 (east of the 2315 120 road), this would extend this lateral line south into the Watkins Pasture and 2)

approximately ¼ mile of new water line would be added to the east from the existing line at T22S., R16E., Section 4.

Some relocation of the existing water line in the Kelly-firestone Pasture is also needed. The line would be moved from the center of road 2270 610 & 2274 410 to the eastern shoulder of the roadway. Every attempt will be made to stay within the existing disturbed zone of the roadway, but to avoid trees and large rocks; the relocated water line will have to go around some obstacles and away from the road. This project is located at T22S., R14E., Section 25 and section 36.

There is a need to establish three new study plots, one in the west portion of the Kelly-Firestone Pasture, one in the Watkins West Pasture and one in the Watkins East Pasture. These are very low impact improvements as they entail establishing two to three 100-foot transects with 3 metal stakes per transects. Periodic monitoring occurs along these transects to monitor vegetation changes. Degree of monitoring would be subject to available funding.

As implementation of the Cinder Hill E.A. proceeds, the responsibility of maintaining an existing range fence at T21S., R15E., Section 15 to Section 16 (approximately ¾ mile of fence) will change from the Pine Mountain Allotment permittee to the Sand Springs Allotment permittee.

Elements Common to Alternatives Two and Four

The alternative would allow for annual or periodic vegetation management through livestock grazing and would indirectly help to implement the direction of the 1990 LRMP concerning a well managed fire protection program that is cost efficient, responsive to land stewardship needs and resource management goals and objectives (1990 LRMP 4-9).

Watersets are potential sites for noxious and invasive weeds due to soil compaction, access by all types of vehicles and periodic disturbance. Despite such potential, only one noxious weed population has been documented at a waterset location within the Project area. Noxious weeds are monitored for and managed under the Integrated Weed EA for the Deschutes National Forest.

Compaction at watersets is variable but heavily used watersets average approximately one acre of soil compaction. This area is usually devoid of vegetation or is occupied by disturbance prone or early successional species such as cheatgrass or rabbit brush. Watersets are areas of high impact but are small in size, 3 to 6 are needed per pasture to provide for proper livestock distribution. This alternative adds 8 additional watersets/troughs, three at currently compacted locations.

Watersets are often used by recreationists as camping and or parking locations when watersets are not in use for grazing operations and/or after some period of rest. They seem especially attractive to hunters during the fall months when this area sees its greatest use period. OHV users also select these sites and a concern arises that they may use livestock trails accessing the watersets as OHV trails. Appropriate laws enforcement would be needed to control such use.

Cumulative Effects

Proposed actions under the Aspen, Buick, Flat Top and Opine projects such as prescribed fire, mowing and tree thinning have the potential to decrease available PUTR browse production over the next twenty to twenty-five years after implementation. These project activities could indirectly be a concern to livestock stocking levels, as over the short-term, treatments could reduce winter feed for mule deer. With shrub establishment and recovery will come an increase in young, highly productive shrubs that will provide high quality winter range browse for deer. All of these treatments have the potential to increase forage for livestock.

The proposed actions for the Flat Top, Buick, Opine and Aspen Projects indicate that large acreages of land would be treated in the area over a five to ten year period (Buick project is currently being implemented). If a rest period is required by other resources in respect to livestock grazing activities and due to the large scale treatments proposed, this is in more than one pasture per year, then this would not be achievable unless the permittee were to take non-use for Resource Protection for the period of time that the area needed to be rested from livestock grazing.. This action could be done to accomplish specific resource needs. Such action would have an economic impact on the permittee(s) involved.

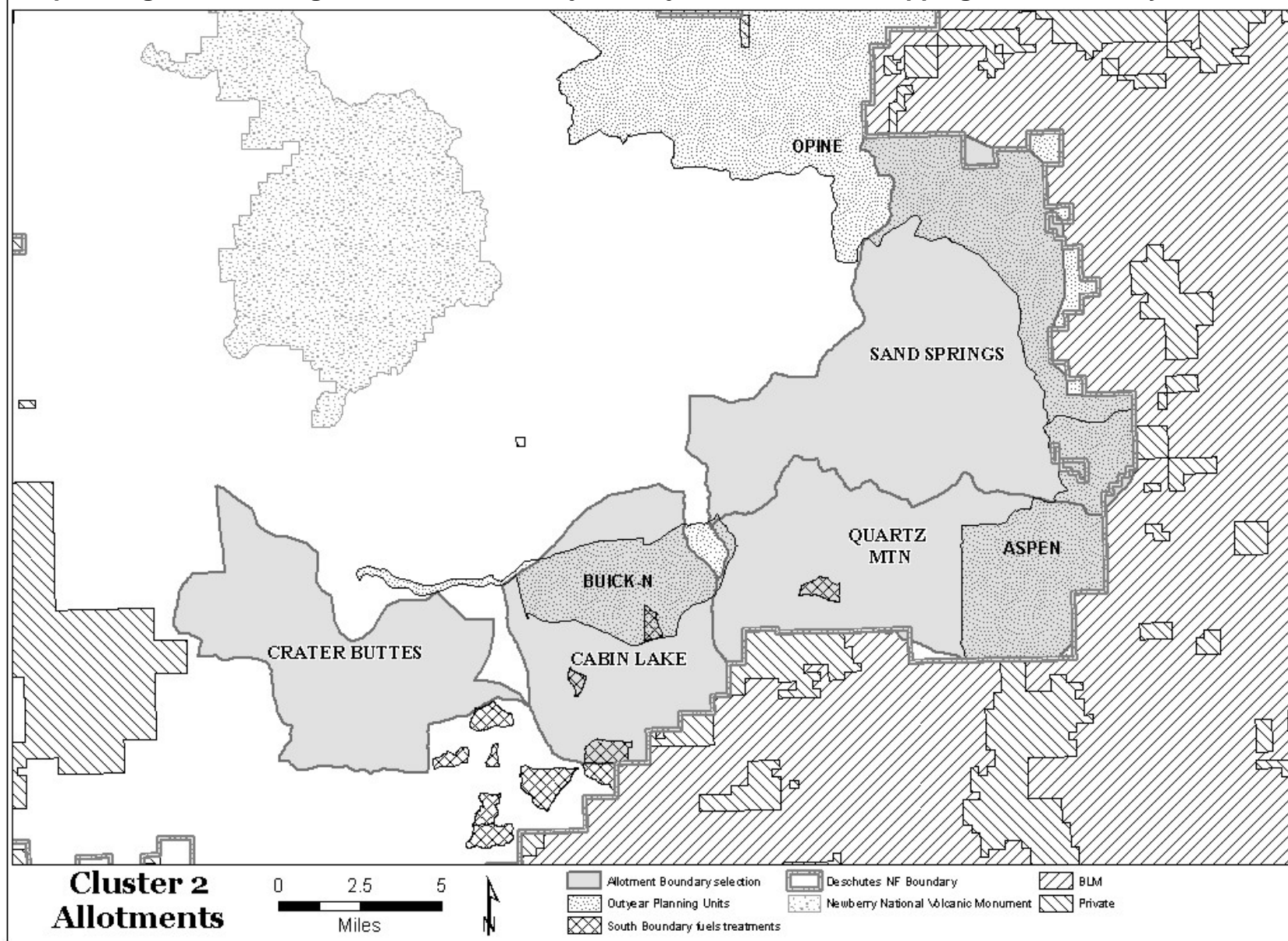
Treatment of large areas of land at one time within an allotment(s) may negate the need for any rest of allotments/pastures as livestock distribution may not be altered significantly or adversely enough to require rest of a specific unit. Large-scale treatments would actually be expected to improve distribution as compared to a strategy of smaller unit size and smaller area treated.

Range Improvements

The permittee may use horses, OHVs, or standard vehicles to inspect and maintain range improvements where resource damage would not occur through his or her action(s). The permittee would be allowed to use closed roads, trails, or areas if the District feels that such access is warranted and if permission is given in writing prior to such use. If it is deemed necessary that access to range improvements is needed for construction or reconstruction of such improvements by an established OHV trail, the permittee can be granted access along trails and through limited access points upon receiving written permission.

It is also necessary to fell dead trees that are either on the fence or that threaten the fence within the right-of-way (typically assumed to be within 50 feet). Wood from these trees is not removed unless a special authorization is obtained through the permit process for firewood.

In order to implement the proposed action in the Cluster II Project, additional road access, fences, OHV cattleguards and the establishment of areas for livestock watering (watersets) would be allowed.

Map 7. Vegetation Management and Fuels Projects Adjacent to and Overlapping Cluster II Analysis Area

Botany

Key Issue #1 – Impacts to Pumice Grape Fern – Grazing has the potential to impact Pumice Grape Fern, *Botrychium pumicola* (BOPU), which is listed on the Region 6 Regional Forester’s Sensitive Species List, and is endemic to Central Oregon. Alternative design and monitoring have been developed to address this issue.

The BOPU Conservation Strategy, completed in 2001, outlined a procedure to established “managed” and “protected” populations that would allow for a variety of impacts to portions of the total population, but establish a baseline that would ensure that the species as a whole would be maintained or enhanced. These separate populations have not yet been established, and therefore the biological evaluation assumed that all populations fell within a “protected” status until they have been otherwise assigned. This means that authorized actions will maintain or enhance the persistence of the known populations.

A Biological Evaluation was prepared in compliance with the requirements of FSM 2630.3, FSM 2672.4, FSM 10/89 R-6 Supplement 47 2670.44, and the Endangered Species Act of 1973 (Subpart B; 402.12, Section 7 Consultation). The evaluation of the project area involved a pre-field review and field survey.

Proposed, Endangered, Threatened, or Sensitive (PETS) species considered in this evaluation are those listed in FSM 2670.4 Region 6 list dated April 1999 as suspected or documented to occur on the Deschutes National Forest. The Botany report includes a complete list of PETS species suspected or documented on the Bend/Ft. Rock Ranger District and the Deschutes National Forest.

Project Area and Pre-Field Review

The potential for sensitive plant species’ habitat to occur in the project area was evaluated based on the following project area description: Soils are generally comprised of sandy, pumiceous volcanic ash and pumice lapilli over sandy to loamy buried soils. Plant associations include ponderosa/bitterbrush-sagebrush (rhyolite), ponderosa/bitterbrush/squirreltail (rhyolite), ponderosa/bitter-sagebrush/fescue, lodgepole/bitterbrush (rhyolite), and big sagebrush/bunchgrass. Elevations range from about 6100’ at the top of Quartz Mtn., to a low of about 4700’. Average annual precipitation ranges between 15 and 20 inches. As for water-related habitats, there are no creeks or lakes within the project area; there are a few wildlife guzzlers, as well as Sand Spring, which is fenced, and a couple of ponds near the Sand Springs substation that are also fenced, and a few widely scattered catch basins for cattle. Resources used to identify potential sensitive plant habitat were aerial photo interpretation, vegetation map information, as well as personal knowledge of the project area.

Based on the preceding information, a comparison with the habitat requirements of Bend/Ft. Rock Ranger District potential sensitive species, including three mosses, two lichens, and one fungus added to the list in summer 2004, indicates that the following two species are known to exist within the project area (refer to Appendix A of the Botany Report for habitat descriptions and ranges of species on the Forest list):

<u>Species</u>	<u>Probability</u>
<i>Botrychium pumicola</i> (Pumice grape-fern)	High
<i>Castilleja chlorotica</i> (Green-tinged paintbrush)	Low

No habitat for Threatened, Endangered, or Proposed (Candidate) plant species exists within the project area, with the possible exception of *Botrychium lineare*, a Candidate species (see Botany Report for a list of projects and their habitats). Its range distribution is very wide and its habitat varies just as

widely. However, it has not been found on the Deschutes National Forest, or more specifically in the project area, after 14 years of project-level surveys, which include complete lists of plants encountered. The nearest known site lies in northeastern Oregon, in Wallowa County.

Proposed, Threatened, Endangered, and Sensitive (PETS) plant surveys have been conducted over 66% of the project area that contains potential habitat for BOPU, between the years of 1990 and 2004. These previous surveys covered 5,518 acres.

Known Sites

From these previous surveys, approximately 2,400 plants were known from the Sand Springs pasture of the Sand Springs allotment. These are located within the power line corridor and pumice openings.

There are four small BOPU sites in the Kelly-Firestone pasture of the Sand Springs allotment, for a total of 12 plants in that pasture; there are three BOPU sites within the Quartz Mountain allotment, associated with Porcupine Flat, for a total of 28 plants in that allotment. There are two small isolated BOPU sites within the Crater Buttes allotment, for a total of 6 plants.

Field Reconnaissance & Results

For this project, 2,990 acres of the highest-probability habitat within the project was surveyed in the latter part of June and early July, 2004. An additional approximately 150 acres were surveyed in June and July 2005 within the Sand Springs pasture, in high-probability BOPU habitat. The project area mainly offered habitat for *Botrychium pumicola* (BOPU), and thus surveys primarily targeted this species, although about 20 acres were searched for *Castilleja chlorotica* (CACH).

Surveys in 2004 located a total of 546 plants of the pumice grape-fern, all located within the Sand Springs pasture of the Sand Springs allotment. The populations were mainly found in the open, sparsely-vegetated pumice flats habitat that is typical for this species.

Surveys in 2005 added 1,860 plants to the population of BOPU in the Sand Springs pasture.

Added to the pre-2004 surveys, this brings the total of known BOPU plants in the Sand Springs pasture to 4,815. This comprises about 17% of the global population (estimated at 27,560 plants).

It should be noted that new populations were located where surveys had not been conducted before, in the Sand Springs pasture; however, surveys have not been conducted to determine current population counts at known sites. In other words, the global population is being added to but not subtracted from. The population figures, therefore, are the agency's best estimate of overall numbers but should be interpreted with this in mind, as well as the confounding problem of the plant's habit of not appearing above-ground every year, which is discussed in further detail elsewhere in this document.

No other PETS plant species were located.

Surveys were conducted from mid-June through early July 2004 and during the month of June 2005 (a period when BOPU is visible) by trained Forest Service employees. Survey forms are on file at the Bend/Ft. Rock Ranger District.

Effects on *Botrychium pumicola* and Findings of the Biological Evaluation

Forest Service Manual direction (2630.3, 2672.4, and R-6 Supplement 47 2670.44), set a predetermined array of potential findings that must be made for sensitive plants to meet regional direction and the intent of the Endangered Species Act. These findings are: No Impact; May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Toward Federal Listing or Cause A Loss Of Viability To The Population Or Species; Will Impact Individuals or Habitat With A

Consequence That The Action May Contribute To A Trend Toward Federal Listing Or Cause A Loss Of Viability To The Population or Species; and Beneficial Impact. These determinations do not specifically provide for conditions where data to make definitive determinations is not available. Because there is such limited data on the effects of grazing on BOPU, and the Forest Service manual direction does not allow for any flexibility in these determinations, this analysis takes a very conservative approach to the potential for impacts, assuming that grazing is likely to have a detrimental effect to individuals, despite the lack of irrefutable empirical evidence establishing this assumption. This approach, while potentially assuming greater impacts than are actually likely to occur, will more definitively meet the intent of the BOPU conservation strategy and the legal mandate to ensure that management actions will not lead to a trend toward federal listing under the Endangered Species Act.

This section discusses what effects may occur as a result of the proposed project and what risks the effects may have on the viability of proposed, threatened, endangered, and sensitive species.

The Biology of *Botrychium pumicola*

The pumice grape-fern belongs to a primitive order of plants called fern-allies. (While being somewhat related to the “true ferns”, they have their own set of characteristics). The pumice grape-fern is usually no more than about 2 inches tall, and has a leathery, pale-green leaf on one stalk, with a second stalk that holds small bunches of “grape-like” structures that contain the spores. It usually is found in open, cold, sandy, pumice-laden frost pockets within a lodgepole pine matrix at lower elevations in Central and South-Central Oregon, and also occurs in dry alpine habitats. This is the known extent of the global population.

The pumice grape-fern is a perennial plant that does not appear above ground every year. The plants generally appear above ground in mid-May, the spores mature and separate from the plant (i.e. sporulate) in late July, and then die back, overwintering about 2 inches underground. According to research conducted on nine other species of *Botrychiums*, the spores need complete darkness to move on to the next stage of development. They also need a fungal (also known as “mycorrhizal”) partner. This is essential to the plant to receive carbohydrates, minerals, and water critical to its survival. Without the mycorrhizal connection, the grape-fern does not live. Because of this connection, the grape-fern is able to live underground for one to three years without sending up an above ground, photosynthetic portion with no apparent loss of size or other negative effects (Johnson-Groh et al, 2002).

It may take 5-8 years for a grape-fern’s life cycle process (all of which happens underground except for spore production) to occur (i.e. for a spore to turn into an above-ground spore-bearing plant), according to research done on another *Botrychium* species (Johnson-Groh 1998).

Because of the unusual habit of this species to not appear every year, monitoring it can be problematic. It is estimated by the author and by *Botrychium* researchers (Cindy Johnson-Groh, presentation at Botany 2000 Conference) that it would take about ten years of monitoring a member of the *Botrychium* genus before meaningful data could be ascertained.

Effects Common to All Alternatives Considered

In the Sand Springs pasture, and in the so-called Potholes region just to the west of it, there are a total of roughly 5,760 plants. This total is compiled from data collected between 1992 and 2005. It should be noted that because this species is continually shifting numbers (it behaves much like fungi in that it does not emerge every year), and because of the broad span of years the surveys were done, it makes getting exact counts nearly impossible; but this total represents the best information available.

The results of the 2004-05 surveys demonstrated that the populations were found in the broad pumice flats in the Sand Springs area, where other BOPU populations were previously known. This area is within a broad swath east of Newberry Crater, from which an eruption of pumice and ash was emitted about 1,700 years ago. Cattle, elk, and deer do walk through these places and may eat the sparse vegetation found there. Observations from range reconnaissance indicate domestic livestock do not linger there because of the paucity of forage (Don Sargent, pers. comm.).

Using the best information available, there are approximately 4,815 BOPU plants within the Sand Springs pasture of the Sand Springs Allotment. There are about 27,560 BOPU plants in the world. Thus the numbers of BOPU within the pasture equal about 17 percent of the known global population. Population estimates are based primarily on generally recent surveys compared to the time over which grazing has occurred in this area. It is not known what the trend in population numbers is (up, down, or stable) in the Sand Springs pasture.

There are no expected direct, indirect, or cumulative effects to the small BOPU populations outside of the Sand Springs pasture under any of the proposed alternatives, because the individuals are so isolated and few that the chances of wildlife, domestic cattle, or other uses trampling them are negligible, and their contribution to the persistence of the population is low.

It is unknown how cattle use across the breadth of a pasture, and specifically the Sand Springs pasture, affects BOPU. There has been no specific monitoring or research to determine this and anecdotal evidence is scarce and inconclusive: BOPU has been found within a cattle enclosure in Porcupine Flat (located about six miles south of the Sand Springs pasture), and has been found outside that same enclosure. It can be said with some certainty that BOPU does not co-exist with cattle in areas where cattle congregate, such as water sets or loading/unloading points. It could be conjectured that since cattle (and as late as 1970, sheep) have been pastured in the Sand Springs pasture for many years (fairly steadily, at least since 1949) that BOPU and cattle can co-exist. However, the potential disruptive effects of having heavy, hooved animals wandering over the loose sandy soil in which these populations thrive indicates that plants are more likely to be adversely rather than neutrally affected.

One reference that may help shed light on this question is a seven-year BOPU study completed in 2004 by the State of Oregon native plant conservation program (Amsberry 2004). This study was initiated to help determine the effects of timber harvest on BOPU, but the treatments conducted (which included plant burial, soil compaction, shading, biomass removal, and subsurface scraping) could also simulate actions by cattle (particularly soil compaction, biomass removal, and scraping). The problem with trying to apply the results to cattle grazing is that all treatments except shading were done only once, and then monitored, while cattle could conceivably create the same disturbances annually in the same places. In other words, there are no such “controls” on cattle as there were in the study.

Although their study site characteristics varied somewhat, the results generally were that “burial is detrimental in all sites; clipping and shading do not have a negative effect on emergence; and recovery from scraping and compaction may be possible in some sites.”

From these results, one could say that BOPU sites can possibly recover from the effects of grazing (i.e. compaction, scraping, and herbivory), given a long enough period of rest (i.e. years), but it cannot be said with any certainty how annual grazing affects BOPU.

It has been observed that BOPU is relatively abundant in the BPA power lines in the Sand Springs area (which were constructed some time in the 1960's), as well as appearing on the spoils of a site dredged in 1959 for wildlife use. These observations, first noted by USFS botanists in the early 1990s, suggest that BOPU can indeed recover from single-episode, relatively major soil disturbance. (The power lines are maintained by periodically removing encroaching lodgepole saplings by hand).

Cattle also use the powerline corridor. As in the rest of the pasture, there is nothing to prevent them from wandering anywhere they choose. While they may not wander over a known population one year, there is nothing to prevent them from doing so the next.

The author has not observed that BOPU is maintained by disturbance. A good example are the largely undisturbed, healthy populations of BOPU that occur above timberline. Rather, it appears likely that BOPU can *recover* from disturbance. Research on other *Botrychium* species supports this observation (Johnson-Groh et al, 2002). From anecdotal observations, the author feels that this recovery is possible if the disturbance does not displace the soil horizons and is not recurring. Implicit in the recovery is the presence of its largely unseen bank of underground structures, the presence of its all-important mycorrhizal partner, and at least several years.

Cumulative Effects: This section discusses the other uses and administrative actions in the project area—from the past, present, and reasonably foreseeable future—that may have cumulative impacts upon BOPU as well. These other uses and administrative actions include: a land exchange involving BOPU; fire suppression; Off-Highway-Vehicle (OHV) use; timber sales; fuels treatments; and deer and elk use.

Although there currently is an abundance of habitat (open, relatively shadeless pumice flats and basins within the lodgepole pine forest matrix) for BOPU in the Sand Springs pasture, optimum habitat for BOPU in this pasture has been shrinking over the past century, due in large part to the suppression of wildfires. This is based on observations by long-time Bend/Ft. Rock Ranger District personnel who have seen one large pumice flat (containing BOPU) in particular “filling in” with lodgepole seedlings, by observations of forest conditions made by fire researchers, and by comparison of historical aerial photos of the pasture with current conditions. Even just in the last 30 years, the change seen on aerial photos is notable. Fire historically kept the openings intact by removing nearby seed sources; in this case, lodgepole pines. The effects of these conditions on BOPU population trends are unquantified because we have no trend information on this species in this particular area, although it is likely that as BOPU habitat quality decreases, so does its overall numbers.

Increasingly, off-highway-vehicle (OHV) use is happening in the project area in general and in the Sand Springs pasture as well. The pumice openings that are the habitat for BOPU are also prime areas that attract off-road OHV use. The people using these OHVs also sometimes create their own camping areas, often in openings that are also potential BOPU habitat. Because these things cause major disruption to the soil profile, they are damaging to BOPU and its habitat. As with other disturbances to its habitat, it can likely eventually recover from this damage, if no further disruption occurs.

There are other proposed and ongoing Forest Service activities within the project area besides grazing. These include timber sales (within the Opine, Buick, and Aspen projects) and fuels treatments (within the Opine, Flat Top, and Aspen projects). The removal of trees from the broad area that received the pumice from the Newberry Pumice Airfall 1,700 years ago may create openings that may eventually support BOPU, but these areas will most likely begin to re-seed with trees and then again become less-suitable BOPU habitat. The fuels treatments are generally in non-forested areas and may improve BOPU habitat by removing or reducing other vegetative cover, creating conditions that BOPU prefers. Like the tree removal projects, in time, these areas will also begin to “grow up” again and may create less favorable conditions for BOPU.

In 1998, the Forest Service entered into a land exchange with Crown Pacific, a timber company. In the process, 531 plants, or 3.6 percent of the global population then known, was exchanged. Since then, global numbers have increased, partly because of additional surveys and mainly because of a better overall accounting done for the 2001 BOPU Conservation Strategy; the overall number is now roughly 27,560 plants, making the Crown transfer 2 percent of the global population. For the purposes of this analysis, the author is assuming that these plants are no longer contributing to the species’ persistence, primarily because of the lack of specific protection measures in state or county regulation, and because of the general lack of information about the continued condition of the populations. In the agency’s biological evaluation written for this action, this loss was not found to be critical to the

overall viability of the species. This finding is reinforced by the significant increase (87%, or 12,800 plants) of known population numbers since that time.

Deer and elk use the project area and the Sand Springs pasture, both as winter range and sporadically as summer range. As with cattle, their hoof action in the soft sandy pumice can be disruptive to the soil profile and thus the underground structures of BOPU.

ALTERNATIVE 1

Effects on *Botrychium pumicola*:

Direct and Indirect Effects

The current use in this pasture has been running at 540 Animal Unit Months (AUMs) between June 1 and September 30, and would be expected to continue at this level under this alternative. The grazing regime has been Rest-Rotation, which means that every year, one pasture in the allotment is not grazed; this “rested” pasture is a different one every year. Since there are four pastures in this allotment, the Sand Springs pasture is not grazed once every four years.

It is possible that BOPU can persist with annual cattle grazing in the Sand Springs pasture, given that it has up to this point, but it is not known how many animals the species will tolerate in the Sand Springs pasture, nor whether the BOPU population numbers there are trending up or down or are relatively stable.

Because there is such limited data on the effects of grazing on BOPU, and the Forest Service manual direction does not allow for any flexibility in these determinations, this analysis takes a very conservative approach to the potential for impacts, assuming that grazing is likely to have a detrimental effect to individuals, despite the lack of irrefutable empirical evidence establishing this assumption. This approach, while potentially assuming greater impacts than are actually likely to occur, will more definitively meet the intent of the BOPU conservation strategy and the legal mandate to ensure that management actions will not lead to a trend toward federal listing under the Endangered Species Act.

This alternative would not meet the intent of the BOPU Conservation Strategy, to “maintain, enhance, or restore” *Botrychium pumicola* habitat within *Botrychium pumicola*-occupied sites within the Sand Springs pasture.

There are no impacts expected for any other sensitive plant species in any other portion of the project because there are no plants known to be present.

Findings: Implementation of this alternative may cause a trend toward Federal listing for *Botrychium pumicola* (pumice grape-fern). Absent any definitive data concerning the long term effects of grazing during all phases of the plant’s life cycle, this determination is based on the assumption that a significant portion of the populations within the Sand Springs pasture of the Sand Springs allotment are at risk from this activity, and would, in the long term, may be adversely affected by continued grazing under the current management direction. An adverse effect to a significant subset of 17% of the known global population could potentially lead to a trend for federal listing.

ALTERNATIVE 2

Effects on *Botrychium pumicola*:

Direct, Indirect, and Cumulative Effects: The discussion is much the same as for the “Current Management” alternative, except that by keeping the cattle out of the Sand Springs pasture until after BOPU sporulates, the concern over the populations’ well-being is lessened. There is still the possibility that BOPU may be injured or killed by cattle trampling, especially in the one year out of four that they would be in the pasture when BOPU is in its prime and has not yet sporulated, but this is offset by the provision in two other years that they wouldn’t be released into the Sand Springs pasture until after they have released their spores, and thus, essentially completed their above-ground reproductive chore for the year. It is also offset by the one year out of four that the cattle aren’t in the pasture at all. Therefore, there may be individuals impacted by this alternative, but enough protection has been built in that a trend toward Federal listing seems unlikely.

This alternative meets the intent of the BOPU Conservation Strategy to “maintain” BOPU populations. There are no impacts expected for any other PETS plant species in any other portion of the project because there are no plants known to be present.

Findings: Implementation of this alternative may impact individuals and habitat for *Botrychium pumicola* (pumice grape-fern), but will not cause a trend toward Federal listing. Absent any definitive data concerning the long term effects of grazing during all phases of the plant’s life cycle, this determination is based on the assumption that, given the present condition of the population, deferring grazing during the plant’s above ground, spore-producing period will provide for continued maintenance of existing populations, and therefore persistence of the species.

ALTERNATIVE 3**Effects on *Botrychium pumicola*:**

Direct, Indirect, and Cumulative Effects: In the author’s best judgment, removing the cattle from the Sand Springs pasture will maintain or enhance the numerous BOPU populations within it. However, there are no data to support this. This lack of information indicates the need for monitoring to determine how cattle grazing interacts with BOPU.

This alternative meets the intent of the BOPU Conservation Strategy to “maintain” BOPU populations.

Findings: Implementation of this alternative would have no impact upon PETS plants, including *Botrychium pumicola*. Absent any definitive data concerning the long term effects of grazing on plant persistence, this determination is based on the assumption that all individual plants within the Sand Springs pasture of the Sand Springs allotment would, in the long term, not be affected by removal of domestic livestock grazing.

ALTERNATIVE 4**Effects on *Botrychium pumicola*:**

Direct, Indirect, and Cumulative Effects: In the author’s best judgment, removing the cattle from the Sand Springs pasture for seven years will maintain or enhance the numerous BOPU populations within it. However, there are no data to support this. For the following three years, these effects would be offset by the resumption of grazing.

This alternative meets the intent of the BOPU Conservation Strategy to “maintain” populations. There are no impacts expected for any other PETS plant species in any other portion of the project because there are no plants known to be present.

Findings: Implementation of this alternative may impact individuals and habitat for *Botrychium pumicola* (pumice grape-fern), but will not cause a trend toward Federal listing. Absent any definitive data concerning the long term effects of grazing during all phases of the plant’s life cycle, this determination is based on the assumption that, given the present condition of the population, deferring grazing for seven years would provide sufficient opportunity to determine a baseline for comparison with the following three years where livestock grazing would be re-introduced to the Sand Springs pasture.

Table 19. Summary of Effects

	Alt. 1 Current Management	Alt. 2 Proposed Action	Alt. 3 No Grazing	Alt. 4 Modified Proposed Action
Effect	May Cause a Trend Toward Listing of BOPU No Impact to any other PETS	May Impact Individuals and Habitat but will not cause a trend toward Federal Listing, No Impact to any other PETS	No Impact to BOPU or any other PETS	May Impact Individuals and Habitat of BOPU but will not cause a trend toward Federal Listing. No Impact to any other PETS

Wildlife

Threatened, Endangered, and Sensitive Species

A Biological Evaluation was prepared to assess and display the effects to threatened, endangered (listed or proposed for listing) and sensitive wildlife species associated with any alternatives for this project. Effects of the project are evaluated for those species that are documented or suspected to occur within the Cluster II Allotment Project Area (Table 20).

Species other than those classified as endangered, threatened, candidate, proposed, or sensitive, are analyzed in later sections of this EA. There are no known current sites occupied, no known historic sites, and no current or potential habitats for those species that have not been designated. The following table lists TES species that are known or suspected to occur on the Bend-Ft. Rock Ranger District.

Table 20. Threatened, endangered, proposed or sensitive animal species either known to occur or potentially occurring on the Bend-Ft Rock Ranger District. Bolded species are known, suspected, or have some potential to occur in the Project Area.

Species	Common Name	Federal, State, and Forest Classification
Birds		
<i>Haliaeetus leucocephalus</i>	Northern bald eagle	T, MIS, OR/T
<i>Strix occidentalis caurina</i>	Northern spotted owl	T, MIS, OR/T
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	S, SOC*, MIS, OR/E
<i>Bucephala albeola</i>	Bufflehead	S, OR/S
<i>Histrionocus histrionicus</i>	Harlequin duck	S, SOC, OR/S
<i>Centrocercus urophasianus</i>	Greater sage grouse	S, SOC, OR/S
<i>Podiceps auritus</i>	Horned grebe	S, OR/S
<i>Podiceps grisegena</i>	Red-necked grebe	S, OR/S
<i>Coturnicops noveboracensis</i>	Yellow rail	S, OR/S
<i>Agelaius tricolor</i>	Tricolored blackbird	S, OR/S
Mammals		
<i>Lynx canadensis</i>	Canada lynx	T
<i>Martes pennanti</i>	Pacific fisher	C, SOC, OR/S
<i>Gulo gulo luteus</i>	California wolverine	S, SOC, MIS
<i>Sylvilagus idahoensis</i>	Pygmy rabbit	S, SOC, OR/S
Amphibians		
<i>Rana pretiosa</i>	Oregon spotted frog	C, OR/S
Mollusks		
<i>Pristiloma arcticum crateris</i>	Crater Lake tightcoil snail	S
Note: E = Endangered, T = Threatened, C = Candidate for Federal listing, S = USFS Region 6 Sensitive, SOC = USFWS Species of Concern, MIS = LRMP Management Indicator Species, OR/T,E,S = State of Oregon status. * = Birds of Conservation Concern (USDI, 2002).		

As the above table, shows, only two Region 6 Sensitive species (California wolverine and Greater Sage Grouse) were identified under the evaluation of habitat and known locations. The project

contains habitat for both the California Wolverine and Greater Sage Grouse. These two species will be evaluated for effects.

Greater Sage Grouse

Key Issue #2 – The planning area contains some seasonal habitat for the greater (western) sage-grouse. The planning area currently provides marginal nesting or brood rearing habitat. Surveys in 2004 found droppings; no nests are known. There are no documented or known lek sites. Livestock grazing may impact the available potential habitat, however.

Habitat

The sage grouse (*Centrocercus urophasianus*) is a western bird that relies primarily on sagebrush for its nutritional habitat needs. Sage grouse are found throughout the range of big sagebrush, but numbers throughout the west have been declining for many years. These declines are primarily due to loss, degradation, and fragmentation of habitat (Wallestad 1975a). From the late 1800s through 1931, degradation of habitat from grazing and hunting caused severe declines of the sage grouse populations (Edminister 1954). In Oregon, sage grouse were common to abundant in the non-forested areas east of the Cascades during much of the 19th century, but began to decline by the late 1890s (Crawford 1982a). Populations recovered in the teens, with birds being abundant in 1918 and early 1919, but a major die-off occurred in mid-1919 (Crawford 1982a). Population declines continued into the 1920s and extinction of the species in Oregon was predicted. Hunting restrictions brought a slight recovery, but populations declined seriously again during the 1930s (Crawford 1982a). By 1940, sage grouse occupied only half their historic range in Oregon, and numbers declined 60% between the late 1950s and the early 1980s (Crawford and Lutz 1985).

In late winter-early spring, males gather at leks followed a few weeks after by the females to mate (Call and Maser 1986). Leks are usually small open areas of .04 to 4 hectares (.10 to 9.88 acres), preferably surrounded by dense sagebrush that strutting birds can use for food and cover. Surrounding sagebrush is crucial, because strutting birds are especially vulnerable to predators and feed almost entirely on sagebrush during the breeding season. During nesting, sage grouse hens build nests in typically hollowed out ground between or beneath sagebrush plants. A basic requirement of nesting cover is concealment of the sage grouse hen and her nest (Girard 1935, Patterson 1952, Autenrieth 1981). Quality nest sites consist of good overstory branches for cover and a good growth of grasses as well as sagebrush within 70 centimeters (28 in.) (Girard 1935, Nelson 1955, Autenrieth 1981, Gregg et al. 1994). Optimum shrub habitat is within or near late seral conditions (Hall 1985). The availability of forbs is important as well due to the high amount of nutrition, which may help increase the hen's productivity.

During summer months hens with broods require well-sheltered areas that provide protection from predators and the weather. These sites tend to be in close proximity of nests sites. Optimum breeding habitat consists of sagebrush stands that are 40 to 80 cm (16 to 32 in.) tall with a canopy cover of 10 to 25 percent and an herbaceous understory of 15 percent grass canopy and 10 percent forb canopy. This type of habitat only needs to be found on at least 40 percent of the area for brood rearing. Hens with broods may use relatively open sagebrush habitats having less canopy cover (about 14 percent) than optimum nesting habitat (Martin 1970, Wallestad 1971), but need an understory canopy cover of at least 15 percent of grasses and forbs (Sveum et.al. 1998). The chick's diets include forbs and invertebrates (Drut et al. 1994).

As fall progresses, sage grouse move toward their winter ranges. During the winter, sage grouse feed almost entirely on the leaves of sagebrush. Typically winter ranges are large expanses of dense sagebrush, having greater than 20% canopy cover, with an average height of 25 cm (10 in.), on land having little if any slope (Eng and Schladweiler 1972). A late seral condition is preferred. Wintering

areas are crucial to sage grouse and are a major factor determining sage grouse distribution. Elimination of winter range habitat would reduce sage grouse populations over large areas (Eng and Schladweiler 1972).

The seasonal movement of sage grouse is dependent on the quality of seasonal habitat and severity of winter. If all characteristics of seasonal habitats exists in one location then populations are relatively sedentary. Other populations have been noted to migrate as far as 24 to 160 kilometers (15 to 99 miles) between nesting and wintering areas (Call and Maser 1986). A major factor of movement is also weather dependent.

Current Conditions

Through monitoring and habitat classification efforts of the Bureau of Land Management (BLM), a map of sage grouse habitat was prepared displaying seasonal habitat types for the species. Table 21 displays the amount of sage grouse habitat associated with each allotment.

From 1988 to 1993 a study on sage grouse in the high desert of Central Oregon was developed and published by the BLM (1994). The BLM continued to collect unpublished data into 1995. Lek monitoring, as well as tracking of radio tagged birds was done to determine population levels within the study area as well and identify location of nest sites and habitat utilization during breeding, nesting, brood rearing/summering, and wintering areas.

Portions of the Cluster II Allotment project area fall within the sage grouse study area. As a result of the study it was determined that Pine Mountain was a major destination for nesting grouse and long migrational movements occurred from leks many miles away and was utilized by birds from neighboring leks (see Map 1, page 6 – Pine Mountain is adjacent to project area). By tracking radio tagged birds to nest sites, there are 8 known nest locations associated with the non-forested areas of Pine Mountain. These nest sites occur in mountain shrub (bitterbrush and mountain big sagebrush)/Idaho fescue, mountain big sage/Idaho fescue, and pure grassland habitat. The BLM developed and categorized habitat types from the study by monitoring seasonal use of the radio tagged birds. Seasonal use of habitat occurs in two of the allotments within the Cluster II planning area (See Biological Evaluation for map). The amount and types of seasonal habitat within each allotment is addressed in the following table.

Table 21: Sage Grouse Seasonal Habitat and Quantity

Allotment	Season		Amount of Potential Habitat
Quartz Mountain	SP.SU.FA.WT = 0 acres	SP.SU.FA. = 0 acres	60 acres
Sand Springs	SP.SU.FA.WT = 966 acres	SP.SU.FA. = 0 acres	4,290 acres

Note: SP=Spring, SU=Summer, FA=Fall, and WT=Winter.

There are no known nesting sites or leks within the Cluster II project area. The suitable year-round habitat and potential habitat that does occur, occurs along the fringes of the Sand Springs Allotment and the Forest Boundary. There are a very small number of acres of potential habitat within the Quartz Mountain Allotment. There is a known nest site and lek just north of the Sand Springs Allotment within Kotzman Basin (BLM Lands). The habitat within the project area adjacent to this basin has the highest potential for nesting and leks. The habitat that occurs south near Plot, Ko, and Watkins Butte, would mainly be used as late summer and fall habitat, and probably gets too much snow for winter habitat. Sage grouse droppings were found in the Watkins Flat area.

Most of the potential habitat within the project area was created by the Aspen Fire, which burned 15,517 acres in 1959. These areas are currently being encroached by juniper and other conifers, which has most likely changed the use in the area by sage grouse by reducing the herbaceous layer (an important food source) and reducing nesting cover.

The Sand Springs and Quartz Mountain Allotments are currently managed under a Rest Rotation Facilitation Grazing program in that there are 4 to 5 pastures within the allotment and one pasture is rested (without grazing for the season). One pasture is allowed to recover every season and due to the rotation of the rest cycle of each pasture seasonally, grazing occurs during a different time period every season in each pasture. As a result grazing occurs during different growth periods of the plants phenology in each pasture seasonally. In the Sand Springs Allotment, the suitable sage grouse habitat occurs within the Sand Springs Pasture and the Watkins East Pasture, whereas the potential suitable habitat also occurs within these pastures and also the Quartz Pasture. In the Quartz Mountain Allotment, a small amount of habitat occurs within the Aspen Pasture.

Cattle tend to concentrate in areas that are predominantly made up of grasses. As these areas are depleted the cattle begin to secondarily shift to grazing areas in shrub-dominated areas. The Sand Springs Allotment does not contain a natural source of water therefore cattle distribution throughout pastures is also controlled by water sets. Photographs of potential suitable habitat as well as examples of conifer encroachment are available in the Wildlife Specialist's Report, located in the project file at Sisters Ranger District.

Determination of Impacts

Direct/Indirect Impacts

Alternatives 1, 2, and 4

There are no identified nest sites within the Sand Springs and Quartz Mountain Allotments, thus no direct impacts are expected. As a result of the habitat analysis from the BLM study completed in 1993, suitable spring, summer, fall, and winter habitat was identified along the north boundary of the Sand Springs Allotment adjacent to Kotzman Basin and the east boundary of the allotment near Ko Butte (adjacent to BLM lands). This habitat, especially the area adjacent to Kotzman Basin, has the highest potential for nesting sage grouse or leks.

Management recommendations for minimum grass height for nesting/early brood rearing habitat varies between management guides from 14 to 18 centimeters (BLM et al. 2000, and Connelly et al. 2000). If utilization by cattle in these areas reduces grass height to below these levels, this could decrease the potential for the habitat to be suitable for nesting (minimum stubble height in the project area is 7.6 cm). This type of utilization would reduce the amount of forbs that are essential for nesting and early brood rearing as well as reduce the amount of cover, thus increasing the susceptibility of predation to nesting sage grouse and sage-grouse broods. Therefore, these alternatives may impact sage grouse and their habitat. The number of acres of suitable nesting/brood rearing habitat is low, and no nests or leks have been found in the area, so the impact would be low, and not lead to listing of the species.

About 4,350 acres of potential habitat for brood rearing and late summer/fall use was mapped for the Cluster II project area, 99% of which is located within the Sand Springs Allotment. This potential habitat was mapped based on the findings of droppings, suitable vegetation requirements, and connectivity to other blocks of potential suitable habitat. This potential habitat would most likely be used for late summer and fall use by sage grouse, which still needs to provide shelter (less than optimum nesting habitat) grasses and forbs. Although it is described as potential habitat, it is important to try and retain the necessary habitat components for this species.

Grazing by cattle may impact this potential habitat and its use by sage grouse, but the impacts are low because of the lack of potential nesting habitat (located on the edges of the project area) and the fact that watersets help to distribute cattle across the allotments (there are no watersets within suitable or potential habitat). If Forest Plan Standards and Guidelines continue to be met for grazing within the potential habitat, the quality of habitat should remain to support the current sporadic use it gets by sage grouse.

Alternative 3

Under the no grazing alternative, short-term benefits would be no competition between sage grouse and cattle. The only utilization that would occur within the nesting areas is by native ungulates and seasonal utilization would be low. This alternative would have no impact to sage grouse populations or habitat.

Cumulative Impacts

Alternatives 1, 2, 3, and 4

The Aspen and Opine Project Areas overlap with the Sand Springs and Quartz Mountain Allotments. These projects propose a variety of vegetation manipulation proposals from mowing to thinning. Through the development of alternatives, there is approximately 110 acres of fuels treatments that would occur within potential habitat of the Sand Springs Allotment. The importance of the potential habitat is unknown, but these proposed treatments would have minimal to no impact to sage grouse because it could still be used for foraging. None of the units occur within suitable year around habitat for the sage grouse. Cumulatively, these proposed treatments would have minimal to no additive impacts to sage grouse habitat with the implementation of the Aspen and Opine Projects. The habitat could still be used for foraging. None of the units occur within suitable year-around habitat for the sage grouse.

Conclusions

Suitable and potential sage grouse habitat is present within the Sand Springs Allotment (with a small amount of potential habitat occurring within the Quartz Mountain Allotment). There are no known nest sites to date, but these habitat areas are being used by sage grouse for foraging and possibly brood rearing, with some areas being adjacent to known nests or leks. Current utilization standards and guides within the Forest Plan, coupled with rest/rotation practice in the pastures of the allotments, will still maintain viable habitat for this species. Alternatives 2 and 4 would put less pressure on the vegetation than that of Alternative 1 because these alternatives propose to increase the number of pastures within those allotments (Alternative 1 would open the vacated Cabin Lake Allotment, which does not contain any suitable or potential sage grouse habitat), which would allow a shorter duration of livestock use on a given area. Alternative 3 would be the most beneficial, by removing the cattle, and thus all pressure on the available vegetation, but again, if Forest Plan Standards and Guides continue to be met (by monitoring utilization and trends), impacts to sage grouse from cattle grazing are expected to be low and would not contribute to a trend toward federal listing or cause a loss of viability of the population or species.

California Wolverine

Habitat

Populations in the Cascade Mountains are believed to be small and scattered. Wolverine habitat in Oregon lies within the Hudsonian life zone at elevations from 6,000 feet to above timberline. Dominant tree species are white bark pine, mountain hemlock, and subalpine fir (Ingram 1973). In winter, wolverine will move lower in elevation into mixed conifer and lodgepole pine habitats within the Canadian Life Zone described by Bailey (1936). Wolverine habitat is probably best defined in terms of adequate year-round food supplies in large, sparsely inhabited wilderness areas (USDA 1994). Preference for forest type is also related to abundance of prey species, and also to avoidance of high temperatures and of humans (USDA 1994). Wolverines tend to rely on cover provided by mature and intermediate timber, and tend to avoid openings such as those caused by fires and clearcuts (Hornocker and Hash 1981). The wolverine will frequent open areas above timberline (Ingram 1973).

Home ranges may encompass 10 to 80 square miles. This variation may be related to differences in the abundance and distribution of food. Although large carrion is a key element in the wolverine diet, the diet requires scavenging and hunting smaller prey, such as small to medium-size rodents, marmots, and hares. They also eat birds and their eggs, insects, fish, and a variety of roots and berries. They have been known to attack animals as large as moose that are foundering in deep snow (Csuti et. al. 2001).

Den sites are usually located in rocky crevices or on the ground under a snow bank (Ingram 1973). Dens can also be found under tree roots, protruding rocks, in caves, or in burrows within overhanging banks.

The essential component of wolverine habitat may be isolation and the total absence of disturbance by humans. The greatest impact on the potential of the land to support wolverine in the Pacific Northwest Mountains is forestry, settlement, and access (USDA 1994).

Current Conditions

The Cluster II Allotment Project Area provides lower elevation winter habitat for wolverine. Populations of wintering deer and elk reside in the project area and could provide a source of carrion for the wolverine. This area does not receive abundant use by winter recreationists, so although it is lower elevation, it does afford some solitude.

A sighting of two wolverines (one adult, one sub-adult) occurred between the Crater Buttes Allotment and the Cabin Lakes Allotment in the fall of 2000 (source, Oregon Department of Fish and Wildlife). Potential denning habitat is present in this area. The sighting was investigated by ODFW and considered credible. Another credible sighting was documented near Moffit Butte about 10 miles west of the project area in 1995.

Determination of Impacts

Direct, Indirect, and Cumulative Impacts

There are no direct, indirect, or cumulative impacts expected to occur to wolverines or their habitat by the no action or action alternatives. It is unknown if wolverine are residents within the project area or just traveling through. If they are residents using potential denning and lower elevation foraging, cattle grazing is not expected to have an impact on wolverine denning habitat (grazing would not occur in areas suitable for denning) or their prey species (wolverines have a large home range and have a range of diet preferences).

Conclusions

Alternative 1 through 4 - The no action and action alternatives would have no impact on wolverines and their habitat.

Management Indicator Species, Species of Concern, and Other Wildlife

A variety of mammals and birds utilize the habitat available within the Cluster II Allotment Analysis Project area. Refer to the following table for a list of species with special status. Species bolded and italicized will be evaluated to determine potential impacts from the project.

Table 22. Species List

SPECIES	STATUS	HABITAT OR SPECIES PRESENT?	WILL THE PROJECT POTENTIALLY IMPACT SPECIES OR HABITAT?
Birds			
<i>Golden eagle</i>	<i>MIS</i>	Yes	Yes
<i>Red-tailed hawk</i>	<i>MIS</i>	Yes	Yes
<i>Northern goshawk</i>	<i>MIS, SOC, OR/S</i>	Yes	Yes
<i>Cooper's hawk</i>	<i>MIS</i>	Yes	Yes
<i>Sharp-shinned hawk</i>	<i>MIS</i>	Yes	Yes
Great gray owl	MIS, OR/S	No	
Cavity nesters (woodpeckers)	MIS, OR/S	Yes	No
Great blue heron	MIS	No	
Waterfowl species	MIS	No	
<i>Ferruginous hawk</i>	<i>SOC, OR/S</i>	Yes	Yes
<i>Olive-sided flycatcher</i>	<i>SOC, OR/S, watch list species</i>	Yes	Yes
<i>Greater sage grouse (see BE)</i>	<i>S, SOC, OR/S, Watchlist species</i>	Yes	Yes
Tri-colored blackbird (see BE)	S, OR/S	No	
Harlequin Duck (see BE)	S, SOC, OR/S	No	
Black Tern	SOC	No	
<i>Swainson's hawk</i>	<i>OR/S, Watchlist species</i>	Yes	Yes
Short-eared owl	Watchlist species	No	
Flammulated owl	OR/S, Watchlist species	Yes	No
Calliope Hummingbird	Watchlist species	Yes	No
Lewis's Woodpecker	MIS, OR/S, Watchlist species	Yes	No
White-headed Woodpecker	MIS, OR/S, Watchlist species	Yes	No
Greater Sandhill Crane	OR/S	No	No
Pygmy Nuthatch	OR/S	Yes	No
Hermit Warbler	Watchlist species	No	
Pinyon Jay	Watchlist species	Yes	No
<i>Brewer's sparrow</i>	<i>Watchlist species</i>	Yes	Yes
Williamson's Sapsucker	MIS, Stewardship species	Yes	No
Red-naped Sapsucker	MIS, Stewardship	Yes	No

SPECIES	STATUS	HABITAT OR SPECIES PRESENT?	WILL THE PROJECT POTENTIALLY IMPACT SPECIES OR HABITAT?
	species,		
Black-backed woodpecker	MIS, OR/S, Stewardship species	Yes	No
Gray flycatcher	Stewardship species	Yes	Yes
Dusky flycatcher	Stewardship species	Yes	Yes
Northern shrike	Stewardship species	No	
Gray jay	Stewardship species	Yes	No
Stellar's jay	Stewardship species	Yes	No
Clark's nutcracker	Stewardship species	Yes	No
Mountain bluebird	Stewardship species	Yes	Yes
Sage thrasher	Stewardship species	Yes	Yes
Nashville warbler	Stewardship species	No	
Black-throated gray warbler	Stewardship species	Yes	No
Green-tailed towhee	Stewardship species	Yes	Yes
Sage sparrow	OR/S, Stewardship species	Yes	Yes
Fox sparrow	Stewardship species	Yes	Yes
Lincoln's sparrow	Stewardship species	No	
Cassin's finch	Stewardship species	Yes	No
Rough-legged hawk	Stewardship species	Yes	No
Pine grosbeak	Stewardship species	No	
Mammals			
Deer	MIS	Yes	Yes
Elk	MIS	Yes	Yes
California Wolverine (see BE)	S, MIS, SOC,	Yes	No
American Marten	MIS, OR/S	Yes	No
Pacific Fisher (see BE)	C, SOC, OR/S	No	
Pygmy Rabbit (see BE)	S, SOC, OR/S	No	
Preble's shrew	SOC	No	
Western big-eared bat	MIS, SOC, OR/S	Yes	Yes
Fringed myotis	SOC, OR/S	No	
Long-eared myotis	SOC, OR/S	Yes	Yes
Long-legged myotis	SOC, OR/S	Yes	Yes
Small-footed myotis	SOC, OR/S	Yes	Yes
Yuma myotis	SOC	No	
Pallid Bat	OR/S	Yes	Yes
Amphibians and Rattles			
Northern Sagebrush Lizard	SOC	Yes	Yes
Cascade Frog	SOC, OR/S	No	
Tailed Frog	SOC, OR/S	No	

MIS = Management Indicator Species, Deschutes National Forest LRMP

SOC = USFWS Species of Concern

S = Federal sensitive species

C = Federal candidate species

OR/S = State of Oregon sensitive species

Partners in Flight Watchlist species = Bird species with the greatest range-wide concerns, most need of conservation attention.

Partners in Flight Stewardship species = Bird species that merit special attention for conservation action within their core range.

Management Indicator Species

BIG GAME

Key Issue #3 – Approximately 52,965 acres (37%) of the planning area is in the Forest Plan Management Area MA-7, deer winter range. Within winter range areas, bitterbrush is the primary browse species for mule deer due to its high palatability and availability in winter, and nutritional levels. Cattle, particularly late in the grazing season when forage species (grasses and forbs) have cured and provide lower nutritional levels and palatability, will browse bitterbrush. When browsed late in the grazing season, browsing by cattle reduces the amount of browse that would be potentially available to mule deer during winter months. This has the potential to reduce the health and vigor of wintering deer and may increase the risk of mortality. This issue will be measured by acres of deer winter range habitat open to grazing.

Both deer and elk commonly occur within the project area, with deer being more abundant than elk. Through personal communication with Corey Heath, Big Game Biologist for the Oregon Department of Fish and Wildlife, elk use does not occur throughout the project area and seems to be tied to topographical/elevational areas.

Palatability of forage for deer and elk overlap with that of cattle. Deer are known to be browsers that consume mostly shrubs and forbs. However, with the green up of spring grass they often forage on the succulent grass shoots. Elk and cattle have strong dietary similarities and elk probably compete more with cattle than any other large herbivore. Depending on the make up of plant communities across the range they can consume a large amount of forbs and shrubs. This occurs primarily when green grasses and sedges are unavailable. Elk as well as cattle avoid the use of shrubs that are high in volatile oils such as juniper, rabbitbrush, sagebrush, etc, because that they lack mechanisms to reduce the toxic effects of these substances.

Habitat utilization by deer and elk can vary if shared with cattle. Elk use has been known to be considerably lower on ranges cohabitated with cattle. Movement of cattle into unused pastures caused movement of elk to ungrazed or lightly grazed pastures in Oregon (Skovlin et.al. 1968). Deer and elk prefer pastures unoccupied by livestock (Skovlin et. al. 1968). However, there is a higher impact on elk due to the overlap in diet and the direct impact on forage by livestock. Timing and duration of grazing as well as livestock can also have an impact on mule deer habitat. If cattle are allowed to graze too early, reducing the spring regeneration of grasses or too late, shifting their diet to shrubs and forbs, then impact to mule deer could be great in the time of year they are dependent on these plant types.

Deer

Current Conditions

The project area consists of mule deer winter range. There are 7 Winter Range Habitat Units (WRHU) associated with the Cluster II project area totaling approximately 55,569 acres. Approximately 39% of

the project area is comprised of mule deer winter range habitat. The following table is a summary of the WRHUs associated with the project area:

Table 23. Summary of WRHUs Within the Cluster II Project Area.

Winter Range Habitat Units	Acres
Aspen	15,011
Cabin Lake	11,911
Flat Top	570
Lavacicle	6,355
Mahogany	8,177
Pine Mountain	250
Wigtop	13,295
TOTAL	55,569

There are three planning areas associated with the project area, Aspen, Buick, and Opine (See Map 7, page 65). Aspen and Opine planning areas are associated with one or more of the above listed WRHUs, Buick planning area is not. An analysis was completed for each WRHU associated with a planning area. Within each planning area, treatments were prescribed to promote winter range habitat for both long term and short-term benefits to mule deer populations as well as other species relying on the shrub components and other characteristics within these areas. Due to the importance of winter range habitat to mule deer populations, the Oregon Department of Fish and Wildlife (ODFW) has worked closely with the Bend-Ft. Rock Ranger District on the prescriptions developed and the amount and timing of treatment of winter range habitat.

There are small natural fuels treatments within each WRHU that have occurred since 1994. In review, units that were treated from 1994 to present are still displaying early seral conditions. All units were vegetated but shrub production was variable and existing shrubs were low growing and displayed early seral characteristics.

An agreement was made between ODFW and the Forest Service on treatments to WRHUs. Within each WRHU the Forest Service would manage each area on a seral stage schedule, where during each planning effort the Forest Service would maintain 1/3 early seral, 1/3 mid seral, and 1/3 late seral shrub habitat as a result of project area treatments (e.g. mowing and prescribed burning). The following is a summary that shows the existing condition of each WRHU that is associated with the Cluster II Project Area. The summary shows the amount of early seral shrub habitat as a result of project area treatments. The acreages and analysis was generated through the activities layer of the Bend-Ft. Rock Geographic Information System:

Table 24. Early Seral Habitat as a Result of Disturbance

WRHU	Total Acres of WHRU	Acres of Early Seral Habitat due to Veg. Treatments.	% Of WHRU in Early Seral Habitat due to Veg. Treatments and Wildfire.
Aspen	15,011	0	0%
Cabin Lake	11,911	718	6%
Flat Top	570	0	0%
Lavacicle	6,355	685	10%
Mahogany	8,177	0	0%
Pine Mountain	250	0	0%
Wigtop	13,295	404	3%

Effects

Direct/Indirect Impacts

Alternative 1 (No Change): Alternative 1 would maintain current levels of grazing (grazing would only occur within the Sand Springs and Quartz Mountain Allotments, the Cabin Lake and Crater Buttes Allotments would remain open, but vacant) and the timing of grazing would be from June 1 to September 30. All allotments would still be on a rest/rotation pattern.

Grazing pressure overall throughout the project area would be low, but on an allotment level, grazing would continue to be highest on the Sand Springs Allotment. The Sand Springs pastures are grazed under a rest rotation system, and are close to fully stocked under Allotment Management Plan Standards (i.e. 600 head). The stocking level at the Quartz Mountain Allotment has in most years come close to being fully stocked also. Without increasing the number of pastures being grazed, utilization is localized and not spread throughout the allotment. There is a higher potential for cattle to browse shrubs that would be utilized by mule deer in the winter. On an animal-by-animal basis there are certain livestock that have a palatable affinity toward bitterbrush, therefore bitterbrush utilization would be incidental. Depending on the moisture for the season, if the grasses dry up early in the season the cattle may switch to browsing the bitterbrush, depleting forage that is needed for mule deer during the winter and early spring.

This alternative has the potential for lower impacts than that of Alternatives 2 and 4 because two allotments would be vacant. For the short-term, the Cabin Lake Allotment would be left vacant, which contains a large portion of the Cabin Lake WRHU, thus bitterbrush utilization would not come from cattle in this WRHU.

Impacts from current grazing practices are expected to be low, as under current conditions, early-seral vegetation occurs from 0 to 10% of any given WRHU within the project area (see Table 25).

Direct impacts to mule deer are immeasurable thus far. Current water set locations and movement will alleviate some grazing pressure from livestock on winter forage.

Alternative 2 (Proposed Action): Alternative 2 would close the Crater Buttes allotment permanently, allow cattle back into the Cabin Lake Allotment, increase the number of pastures and water sources in the Sand Springs and Quartz Mountain Allotments, change the timing of grazing to earlier in the spring and increase water sources. All allotments would be on a rest/rotation pattern.

The issue of cattle browse utilization within the project area is similar with this alternative. Alternative 2 proposes an overall higher number of livestock across the project area.

Under this alternative, localized utilization would be reduced in the Sand Springs and Quartz Mountain Allotments. Sand Springs Allotment would increase from 4 to 5 pastures, the Quartz Mountain Allotment would increase from 5 to 8 pastures, and the Cabin Lake Allotment would be re-opened with 5 pastures. This would alleviate the issue with localized grazing from Alternative 1 and grazing pressure should decrease due to better distribution as a result of the increase in pastures. The grazing period would shift to earlier dates, which would minimize the potential of cattle browsing mule deer forage. The dates of the grazing period would shift from June to September to May to September.

Slight changes would occur to the Cabin Lake Allotment, which would become active with this alternative. Due to some fence construction within three pastures, the allotment would decrease in size by 4,896 acres. Pasture One would be reduced by 148 acres, pasture Two by 807 acres, and pasture three by 3,941 acres. The grazing period would decrease from June 1 to September 15 to May 25 to

September 10. This would also decrease the potential for cattle to utilize mule deer forage. The number of head of cattle is also being reduced from 300 cow/calf pairs to 200 cow/calf pairs.

Under this alternative a combined total of 19.5 miles of new fence would be constructed. Fences are known to be factors limiting deer movement, but the fence would be a wildlife friendly 3-strand smooth wire/barbed wire fence with the lower wire no less than 16 inches above the ground and the top wire no higher than 42 inches above the ground.

A result of better distributions of livestock by increased number of pastures and watershed placement, and an earlier grazing period to better utilize green pastures, there would be low impacts to mule deer winter forage.

This alternative also has the potential for higher impacts than that of Alternative 1. Because the Cabin Lake Allotment would be re-opened, this WRHU that has been ungrazed by cattle for 10 years would once again see impacts to bitterbrush from cattle. Based on the current distribution of early-seral habitat, if Forest Plan Standards and Guides for grazing utilization are met, impacts from current grazing practices are expected to be low.

Alternative 3 (No Grazing): This alternative may benefit mule deer and their habitat. With this alternative there would be no cattle grazing at all within the project area. As a result there would be no concerns with livestock utilization of mule deer forage. Over time, fences within the area would be removed and would allow deer the ability to move more freely throughout the area, this would also remove the possibilities of deer/fence fatalities.

With this alternative there would be no negative impacts to mule deer or their habitat.

Alternative 4: This alternative would be similar to that of Alternative 2. However, the Sand Springs pasture within the Sand Springs Allotment would be closed for seven years, and then grazed on a rest rotation grazing system. This alternative would have less impact to mule deer than those of Alternative 2, but not significantly, because of this pasture closure. It would still have greater impacts than Alternative 1 or 3.

Cumulative Effects

Vegetation management projects overlap with the Cluster II Project, and will impact mule deer forage and winter range habitat within the designated WRHUs. These treatments are associated with the Aspen and Opine Project Areas and will be implemented within the next 5 to 10 years (see Map #7). The Aspen and Opine Project Areas would have both mowing and prescribed burning associated the fuels treatment units. The following table summarizes the amount of mule deer winter range habitat that will be impacted by the treatments of the above listed project area within the next 5-10 years. These treatments would shift the seral condition of shrubs to an early stage limiting short-term forage availability. However, there are also some vegetation treatments proposed for the Aspen Project that would thin the overstory canopy and could have long term beneficial impacts on mule deer browse species. These treatments could potentially open stands up and provide for better regeneration of shrubs, due to added growing sites and allowing sunlight to reach the forest floor. The biggest concern would be in the Lavacicle WRHU. Cumulatively, there would be additive negative impacts from the Opine Project in the Lavacicle WRHU. That project would increase early-seral shrub conditions from 10% to 30%. This remains below the 33% level agreed upon with ODFW, but because it is reaching that level, monitoring should occur after fuel treatments have been completed.

Table 25. Summary of Cumulative Impacts

WRHU	Total Acres of	Acres of Fuels	% Of WHRU
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	WRHU	Treatments	Affected by Fuels Treatments
Aspen	15,011	2,742	18%
Cabin Lake	11,911	0	0%
Flat Top	570	0	0%
Lavacicle	6,355	1,305	20%
Mahogany	8,177	144	2%
Pine Mountain	250	0	0%
Wigtop	13,295	0	0%

Elk

Current Conditions

The project area does not contain any Key Elk Habitat Areas designated by the Deschutes Land and Resource Management Plan (LRMP). ODFW has identified an elevation band where elk herds are frequently seen that occurs along similar boundaries as the winter range habitat units for deer. Over half of this area is currently grazed. They also appear to be regularly tied to guzzlers and the water troughs associated with the Cabin Lake water line.

Effects

Direct and Indirect

Alternatives 1, 2, & 4: Elk populations are increasing yearly from historical levels within the project area, however utilization within the project area is limited to specific elevation bands. Under all the alternatives, grazing will be implemented on a rest rotation system, which will defer grazing on a different pasture annually. Although livestock and elk forage preference overlaps more so than deer, impacts to elk are minimal and immeasurable under these alternatives. The area of use by elk within the project is not as widespread as that used by deer and occurs at higher elevations. Indirect impacts by cattle to elk would be minimal as long as forage utilization standards continue to be met annually and a rest rotation facilitative grazing program continues to be implemented.

Fences also pose similar problems to elk as they do deer in that they limit the ability for elk to migrate freely throughout the forest. Elk and fence interactions can be fatal as well, but is not as common as with deer. As a result of the size of the animal they are known to attribute to fence damage. There are low immeasurable impacts to elk and their habitat as a result of these alternatives.

Alternative 3 (No Grazing): This alternative would have no negative impacts to elk or elk habitat due to the lack of grazing that would occur within the Cluster II Project area.

Cumulative Effects

Fuels treatments associated with the Aspen, Buick, and Opine Project Areas will occur within the next 5 to 10 years. In the short-term these treatments could potentially reduce forage opportunities for elk within the Cluster II Project Area by consuming forage during mowing and burning operations. However, the reduction would be insignificant due to the annual regeneration of grasses.

Cumulatively, these proposed treatments in Aspen, Buick, and Opine Project areas would have minimal to no additive impacts to elk habitat. In the long-term these fuel treatments would create an

influx of grasses and forbs creating potential foraging areas for elk. Vegetation treatments associated with these projects could also promote elk forage by opening stand up to allow for more sunlight and growing space for ground vegetation.

RAPTORS

Current Condition

Golden Eagle

Generally, golden eagles occur in grass-shrub, shrub-sapling, and young woodland growth stages of forested areas, or in forest with open lands nearby for hunting. Essentially it needs only a favorable nest site, usually a large tree or cliff, a dependable food supply, mainly of medium to large mammals and birds, and broad expanses of open country for foraging. It especially favors hilly or mountain country, where take off and soaring are facilitated by updrafts; deeply cut canyons rising to open sparsely treed mountain slopes and crags represent ideal habitat (Johnsgard 1990).

Many buttes, as well as other steep topographic features within the project area provide ideal habitat for golden eagles. The project area provides a variety of open as well as timbered habitat that contains a rodent prey base. These areas provide an opportunity for both nesting and foraging habitat within the project area. There are three known historical nest sites within the project area, with only one known to be active within the past few years. These nest sites are known locations within the district database.

Red-tailed Hawk

Red-tails are largely perch hunters. Although often observed soaring in thermals, this is seldom used as a vantage point from which to spot prey (Ballam 1984). Consequently any habitat that provides suitable perches and is open enough to permit the detections of ground-dwelling prey typically supports Red-tailed Hawks. They frequent woodlands, agricultural land, clearcuts, grasslands, sagebrush plains, alpine environments, and urban areas. In winter when the energetic demands of rearing young are less, they expand their range into areas with fewer perches than during the breeding season. Red-tails construct nests in a variety of situations including trees, utility poles, and cliffs and place their nests higher than other buteos (Cottrell 1981). They consume a wide variety of prey including small to medium-sized rodents such as ground squirrels, cottontails, voles, and pocket gophers, as well as snakes (Cottrell 1981).

This species has an extremely wide tolerance for habitat variation. Generally the species prefers open woodland areas associated with forest edges for nesting. Due to the high amount of fragmentation within the project area, it provides an abundance of foraging habitat. Suitable nesting trees are also abundant.

There are eleven historic nests sites within the project area. Of these nest sites, 10 have been surveyed within the past two years, with one known to be active. The other sites were either not active, or most likely have an alternate nest. These nest sites are known locations within the district database.

Northern Goshawk

In Oregon goshawks tend to select mature or old-growth stands of conifers for nesting, typically those having a multi-layered canopy with vegetation extending from a few meters above ground to more than 40 meters high. Nesting sites chosen are fairly near a source of water and are of moderate slope, usually having northerly aspects. This habitat type is quite similar to that used by the Cooper's hawk,

but the trees tend to be older and taller and have a better-developed understory coniferous vegetation (Johnsgard 1990). Foraging occurs within these mature stands where small opening occurs. These birds forage on passerines, but often utilize small mammals such as rodents as well as the occasional snowshoe hare. Some gallinaceous bird species are also preyed upon such as blue, ruffed, and spruce grouse (Johnsgard 1990).

Suitable habitat for goshawks occurs within all allotments within the project area. There are two known historic goshawk nest sites within the project area. These sites have not recently been surveyed to determine nesting status. These nest sites are known locations within the district database.

Cooper's Hawk

In Oregon, this hawk can be found in coniferous, mixed, and deciduous forests, as well as riparian, juniper, and oak woodlands. Vegetative profiles around nest were trees 30-60 and 50-70 years old in northwest and eastern Oregon respectively, with a tree density of 265/ac and 469/ac. Cooper's Hawks commonly nest in deformed trees infected with dwarf mistletoe (Reynolds et al. 1982).

There are four historic Cooper's hawk nest sites identified within the project area. One of these sites has been active within the past few years. These nest sites are known locations within the district database.

Sharp-shinned Hawk

Throughout the state, sharp-shinned hawks co-exist with both Cooper's Hawks and Northern Goshawks, both of which are competitors and potential predators (Bildstein and Meyer 2000). Studies of these closely related species in Oregon have described patterns of resource partitioning: each species tends to utilize different prey sizes, different forest stand structures for nesting, and different foraging zones within the canopy (Reynolds et al. 1982). Nests have been located at elevations from 393 ft. in the Coast Range to 6,593 ft. on Bly Mtn (Reynolds et al. 1982). Vegetative characteristics consistently found at nest sites include high tree density and dense canopy cover, which generally produce cool shady conditions (Reynolds 1983). Mean tree density at nest sites was 478 trees/ac for all sites in Oregon, with a range of 257 trees/ac in N.W. Oregon's old-growth forest to 1,057 trees/ac in Eastern Oregon (Reynolds et al. 1982). Nesting habitat differs structurally in terms of forest stand age form that is used by Cooper's Hawks and Northern Goshawks in Oregon, with Sharp-shinned Hawks preferring the youngest forests, usually 25-50 yr old, even aged stands (Reynolds et al. 1982).

Sharp-shinned hawks prefer nest groves of even aged stands of 40 to 60 year old conifers with a dense canopy. Nesting can occur in dense stands of second growth trees beneath an over-mature overstory. This type of habitat does occur within the project area.

There is one known historical nest site within the project area. Recent surveys indicated that this site is not currently active.

Effects

The Sand Springs and Quartz Mountain Allotments are currently managed under a Rest Rotation Facilitation Grazing program in that there are 4-5 pastures within the allotment and one pasture is rested (without grazing for the season). The Cabin Lake Allotment, if re-opened, would be on the same program. One pasture is allowed to recover every season and due to the rotation of the rest cycle of each pasture seasonally, grazing occurs during a different time period every season in each pasture. As a result grazing occurs during different growth periods of the plants phenology in each pasture seasonally.

Direct/Indirect Impacts

There are no expected direct impacts of cattle grazing to nesting habitat from the no action or action alternatives. There would also be no direct impacts to raptors from the no action or action alternatives.

Cattle grazing, in general has been known to reduce forbs and shrub cover, or change the composition of forbs and shrubs. The intensity and severity depend upon a number of factors including the number of animals grazing in an area, timing and length of grazing, weather conditions, rest/rotation patterns, and the combination of other factors including thinning, fuels treatments, or wildfires.

For raptors, the reduction of forbs and shrubs can impact their prey species of ground dwelling birds and small mammals. These ground species depend on the shrubs for cover for nesting and hiding from predators, and the forbs for food. The presence of cattle also increases the presence of predatory species on the eggs and young of ground dwelling species. These predators include species such as jays, magpies, and ravens, and nest parasites including brown-headed cowbirds.

If Forest Plan Standards and Guides continue to be met (by monitoring utilization and trends), negative impacts could still occur to raptors and raptor prey species from cattle grazing (because of the reasoning above) in any of the grazing alternatives, but this impact is expected to be low.

Alternative 1 (No Action): Alternative 1 would maintain current levels of grazing (grazing would only occur within the Sand Springs and Quartz Mountain Allotments, the Cabin Lake and Crater Buttes Allotments would remain open, but vacant) and the timing of grazing would be retained from June 1 to September 30. All allotments would still be on a rest/rotation pattern.

Current utilization standards and guides within the Forest Plan, coupled with rest/rotation practice in the pastures of the allotments, will still maintain viable habitat for raptors and raptor prey species with all alternatives. For raptors, Alternative 1 would have fewer impacts to raptors than that of alternative 2 and 4, but have greater impacts than that of Alternative 3. Two of the four allotments would be grazed, leaving the other two free from grazing and competition between cattle and raptor prey species. The cattle would be brought on later in the spring, which would leave spring green-up forage available to the ground dwelling species that depend upon it.

Alternative 2 (Proposed Action): Alternative 2 would close the Crater Buttes allotment permanently, allow cattle back into the Cabin Lake Allotment, increase the number of pastures and water sources in the Sand Springs and Quartz Mountain Allotments, change the timing of grazing to earlier in the spring and increase water sources. All allotments would be on a rest/rotation pattern.

This alternative would have the greatest impacts to raptor prey species. Opening the Cabin Lake Allotment would increase the area that cattle would be grazing (this allotment would be 21,296 acres), and thus increase the area of potential impacts.

Cattle would also be brought on earlier in the spring, leaving them to forage on spring green-up forbs that are important to ground-dwelling species during this time of year.

The number of pastures would increase in the Sand Springs and Quartz Mountain Allotments, which could take some of the pressure off of the vegetation by allowing a shorter duration of livestock use on a given area, which would be beneficial to the plant resource. This could minimize impacts to raptor prey species and their habitat. This alternative reduces localized grazing by better distributing cattle across a larger area of the pasture as well as maximizing forage availability. During dry years the likelihood of habitat degradation is less due to the grazing being distributed over larger areas as well as areas that are more resilient and have higher site potential due to locations. The potential still exists

for habitat degradation from overgrazing if monitoring standard and guides are not followed, but the potential is much less due to the better distribution of grazing.

Adding water sources such as troughs and watersets may benefit raptors. Many of these water sets attract raptor prey species, making them ideal places for raptors to hunt, if there are fence posts or trees around to provide perches. A downside is that these areas also become heavily impacted by cattle because they congregate in these areas, denuding the vegetation and changing the composition of the vegetation by introducing non-natives such as cheatgrass.

So, although some specifics of this alternative may be more beneficial than those of alternative 1, this alternative is still opening up an entire allotment that hasn't been grazed for years that would put new pressure on the vegetation and the species that reside within that allotment.

Alternative 3 (No Grazing): This alternative would have the least impact to raptors. There would be no grazing within the allotments, reducing all competition between the livestock and raptor prey species.

Alternative 4: This alternative would be similar to that of Alternative 2. However, the Sand Springs pasture within the Sand Springs Allotment would be closed for seven years, then, grazed on a rest rotation grazing system. This alternative would have less impact to raptor prey species than Alternative 2, but again, greater impacts than alternative 1 or 3.

Although there are potential negative impacts associated with grazing, it is expected that if Forest Plan standards and guidelines are met, that the impacts would not lead to a downward trend of any species.

Cumulative Impacts

Alternatives 1, 2, and 4: There are fuels treatment units (prescribed burning and mowing) within the project area that are associated with the Aspen, Buick, and Opine Project Areas. These treatments within the project area would remove raptor prey species habitat by removing grasses and shrubs. This would be 4,235 acres within the Cabin Lake Allotment, 2,522 acres within the Quartz Mountain Allotment, and 1,669 within the Sand Springs Allotment. This would cumulatively reduce the amount of available habitat for raptor prey species within the project area by 5% across the entire project area. The greatest impact would be in the Cabin Lake Allotment, reducing areas utilized by raptors for foraging as well as minimizing the availability of prey within nesting areas.

The cumulative impacts associated with Alternatives 2 and 4 would be higher as this would open up the Cabin Lake Allotment to grazing, and the acres of fuels treatments is highest in this allotment.

Alternative 3: Aspen, Buick, and Opine fuels treatments could still reduce raptor prey species habitat availability, but there would be no additional impact by livestock grazing under this alternative. Cumulatively there would be no additive impact from this alternative.

BATS

Current Condition

Western big-eared bat

Occurrence of this species is documented on the Deschutes NF. This species of bat depends on caves for hibernation, for raising their young, and for day and night roosting. They forage in a broad range of forested conditions, from open savanna to fully stocked conifer stands. Prey species are strongly associated with bitterbrush, ceanothus, and other shrub species (Miller 1995). Most foraging is suspected to occur within five miles of their day roosts. Past studies have shown that foraging along

forest edges occurred most often, apparently related to availability of prey species (moths) and protective habitat for predation (Clark 1993). They depend on open water to meet moisture requirements.

Large winter hibernating populations of these bats occur in a few caves on the Bend-Ft. Rock Ranger District. The population is estimated to be 600 individuals in central Oregon (including the Deschutes National Forest and immediately adjacent areas). There are about 2,500 in Oregon. Population trends for central Oregon, based on winter counts in hibernacula, have indicated a decline of about 25% since 1986. The decline is probably related to disturbance of hibernating bats, disturbance to the maternity roosts, and effects of recent wildfires (causing a loss of habitat for prey species such as moths). Cattle grazing could place an additional impact on the shrub component, which is important for bat prey populations.

The project area contains several known and unknown (un-named and not on local maps) caves that have known occurrences of use by the western big-eared bat and several other bat species. Utilization of the caves varies between species from hibernacula in the winter months to day roost sites during the warm season. The project area also contains forested lava that provide both foraging areas within Late and Old Structure stands (LOS) as well as roosting habitat within the rock crevices of the lava.

Determination of Impacts

Direct/Indirect Impacts

No direct impacts to the western big-eared bat are expected with the No-Action or action alternatives.

Alternatives 1, 2, and 4: There is not a high density of known caves within the project area. There is forested lava habitat that provides roosting habitat. Utilization of shrubs and grasses by livestock could impact forage availability for western big-eared bats. Many insects rely upon the grasses and shrubs within the project area. If intense utilization of grasses and shrubs occurs within the project area, forage for bats could decline. As with the impacts associated with raptors, alternative 1 would have fewer impacts to the western big-eared bat than the impacts from Alternatives 2 and 4.

Alternatives 2 and 4 would provide additional water sources (troughs and watersets), which could benefit western big-eared bats. A downside is that these areas also become areas that get heavily impacted by cattle because they congregate there, denuding the vegetation and changing the composition of the vegetation by introducing non-native vegetation such as cheatgrass.

Although there are potential negative impacts associated with grazing, it is expected that if Forest Plan standards and guidelines are met, that the impacts would be low, but would not lead to a downward trend of the western big-eared bat.

Alternative 3 (No Grazing): There are no direct or indirect effects associated with this alternative.

Cumulative Impacts

Alternatives 1, 2, and 4: There are fuels treatment units (prescribed burning and mowing) within the project area that are associated with the Aspen, Buick, and Opine Project Areas (See Map 7, page 65). These treatments within the project area would remove foraging habitat by removing grasses and shrubs. This would be 4,235 acres within the Cabin Lake Allotment, 2,522 acres within the Quartz Mountain Allotment, and 1,669 within the Sand Springs Allotment. Cumulatively, this could potentially reduce western big-eared bat forage availability within the project area by 5%, with the greatest potential loss within the Cabin Lake allotment at 16%.

Alternative 3: Aspen, Buick, and Opine, fuels treatments could still reduce western big-eared bat forage availability, but there would be impacts by livestock under this alternative. Cumulatively, there would be no additive impacts.

SPECIES OF CONCERN (SOC)

RAPTORS

Ferruginous hawk

The ferruginous hawk is the largest of Oregon's hawks. They are sensitive to human disturbance and tend to reside in remote areas. This species is at home in the sagebrush plains of the high desert as well as the bunchgrass prairies along the northern foothills of the Blue Mountains. Their principal prey is ground squirrels, rabbits, and hares. They will also prey upon pocket gophers, as well as birds, reptiles, and insects (mostly crickets) (Marshall et al. 2003).

Habitat for this species occurs within the project area, but there are no documented sightings.

Direct/Indirect/Cumulative Impacts

Impacts for the Ferruginous hawk would be similar to the Management Indicator Species raptors discussed on page 38.

BATS

Current Condition

The project area contains several known and unknown caves that have known occurrences of use by several of the bat species listed below. Utilization of the caves varies between species from hibernacula in the winter months to day roost sites during the warm season. The project area also contains forested lava that provides both foraging areas within Late and Old Structure stands (LOS) as well as roosting habitat within the rock crevices of the lava.

Long-eared myotis

Occurrence of this species is documented on the Deschutes NF. They are known to roost in caves, under tree bark, in snags, and under bridges. Despite its occurrence in a wide variety of habitats, it has been closely associated with old-growth forests or components of old growth. Maternity habitat consists of fallen logs, snags, and buildings. Hibernating individuals have been found in caves, crevices, and buildings in western Oregon and Washington, but wintering ecology and distribution are largely unknown (Csuti et al 2001).

Long-legged myotis

This species of bat has been documented as occurring on the Deschutes, and is most closely associated with forested habitat, most notably old growth stands. Day and night roost habitat mainly consists of large diameter snags (Ormsbee 1995) and rock crevices. Foraging occurs in mature open stands and

early seral stage stands. Trees and large snags provide the most important habitat for nursery colonies. These bats have been documented to hibernate in caves on the Forest.

Small-footed myotis

Roosting, nursing, and hibernating habitat occurs on the Deschutes National Forest (NF). Hibernacula and maternity consists mainly of lava tubes and small caves, while roosting habitat consists of rock crevices, caves, cliff faces and buildings (Csuti et al 2001).

Determination of Impacts

Direct/Indirect Impacts

No direct impacts are expected to any of the above listed bat species with the no action or action alternatives.

Alternatives 1, 2, and 4: There is not a high density of known caves within the project area. There is forested lava habitat that provides roosting habitat, as well as large trees and snags. Utilization of shrubs and grasses by livestock could impact forage availability for the above bat species. Many insects rely upon the grasses and shrubs within the project area. If intense utilization of grasses and shrubs occurs within the project area, forage for bats could decline. As with the impacts associated with raptors, alternative 1 would have fewer impacts to bat species than the impacts from Alternatives 2 and 4.

Alternatives 2 and 4 would provide additional water sources (troughs and watersets), which could benefit bat species. A downside is that these areas also become areas that get heavily impacted by cattle because they congregate in these areas, denuding the vegetation and changing the composition of the vegetation by introducing non-native vegetation such as cheatgrass.

Although there are potential negative impacts associated with grazing, it is expected that if Forest Plan standards and guidelines are met, any impacts would be low, and any impacts would not lead to a downward trend of any species.

For the pallid bat, a reduction of shrub habitat in areas where they forage could make them more vulnerable to predation by species such as owls and snakes.

Alternative 3 (No Grazing): There are no indirect impacts associated with this alternative.

Cumulative Impacts

Alternatives 1, 2, and 4: There are fuels treatment units (prescribed burning and mowing) within the project area that are associated with the Aspen, Buick, and Opine Project Areas (See Map 7). These treatments within the project area would remove foraging habitat by removing grasses and shrubs. This would be 4,235 acres within the Cabin Lake Allotment, 2,522 acres within the Quartz Mountain Allotment, and 1,669 within the Sand Springs Allotment. This could potentially reduce bat forage availability within the project area by 5%, with the greatest potential loss within the Cabin Lake Allotment at 16%.

Alternative 3: Aspen, Buick, and Opine, fuels treatments could still reduce bat forage availability, but there would be no impact by livestock under this alternative. Cumulatively, there would be no additive impacts.

REPTILES

Northern Sagebrush Lizard

The sagebrush lizard is usually the most common lizard of the sagebrush plains. It also occurs in open forests of juniper, ponderosa pine, and lodgepole pine that have open brushy understories. In our region it is seldom found above 5,500 feet, but in the southwest it occurs up to 10,000 feet. These lizards are ground dwellers and are usually first seen scurrying between bushes where they take cover. They seldom climb except to escape, but in some areas they climb onto boulders. They have occasionally been observed resting on the larger branches of sagebrush but never more than a few centimeters above ground level. The lizard is active from about early April to late September with some slight yearly and geographic variation in timing. The reproductive season lasts from early May to late June or early July. In June, females deposit 2 to 7, usually 4, eggs with tough, white, leather shells. Larger females tend to have larger clutches. Eggs average 7.5 by 12.0 mm in size, weigh about 0.25 g freshly laid, and are buried a few centimeters deep in loose soil, usually at the base of a shrub. Eggs hatch about two months after they are deposited. Hatchlings first appear in mid-August; and both sexes mature in about 22 months at 50mm SVL (snout vent length).

Sagebrush lizards eat beetles, flies, butterflies, caterpillars, ants, wasps, spiders, ticks, mites, aphids, scorpions, and a wide variety of other arthropods.

When disturbed they utilize shrub cover for security or rodent burrows, rock crevices, and surface litter. Snakes are known to prey upon them such as striped whipsnakes and night snakes. Predatory birds and lizards are likely to eat them as well.

Current Condition

There are identified occurrences of the sagebrush lizard within Deschutes County that are illustrated within "Amphibians and Reptiles of the Pacific Northwest" (Nussbaum 1983). There are no documented occurrences within the wildlife database for the Bend-Ft. Rock Ranger District. The project area contains similar habitat given from the description with the literature, it is highly likely that the species occurs within the project area. Three of the allotments within the Cluster II project area contain open shrub communities that provide suitable northern sagebrush lizard habitat. They are the Sand Springs Allotment (21,938 acres), Quartz Mountain Allotment (21,680 acres), and the Cabin Lake Allotment (5,019 acres).

Cattle grazing, in general has been known to reduce forbs and shrub cover, or change the composition of forbs and shrubs. The intensity and severity depend upon a number of factors including the number of animals grazing in an area, timing and length of grazing, weather conditions, rest/rotation patterns, and the combination of other factors including thinning, fuels treatments, or wildfires.

For lizards, including the northern sagebrush lizard, the reduction of shrubs can impact their available hiding and nesting cover, leaving them vulnerable to predation, and the reduction of forbs can impact their availability of prey species of arthropods which feed upon the seeds of the forbs. The presence of cattle also increases the presence of predatory species on the eggs and young of lizard species. These predators include species such as jays, magpies, and ravens. Cattle can also trample lizard nests, crushing the eggs.

Overgrazing could potentially reduce the amount of herbaceous material that provides habitat for the lizard as well as reducing habitat for the prey species of the lizard (insects) as well as causing direct impact to the lizard from trampling.

Determination of Impacts

Direct/Indirect Impacts

Alternative 1 (No Change, Current Management): Alternative 1 would maintain current levels of grazing (grazing would only occur within the Sand Springs and Quartz Mountain Allotments, the

Cabin Lake and Crater Buttes Allotments would remain open, but vacant) and the timing of grazing would be retained from June 1 to September 30. All allotments would still be on a rest/rotation pattern.

This alternative may negatively impact the northern sagebrush lizard, but the impacts would be less than that of alternative 2 and 4, and greater than that of alternative 3. Two of the three allotments with suitable habitat would be grazed, leaving one allotment free from grazing (Cabin Lake Allotment at 5,019 acres) and the possible impacts to sagebrush lizard habitat.

Overgrazing could potentially reduce the amount of herbaceous material that provides habitat for the lizard as well as reducing habitat for the prey species of the lizard (insects) as well as causing direct impact to the lizard from trampling. However, through the monitoring that has occurred, no overgrazing has been documented and the allotments have met Forest Plan standards. Therefore the impacts to the sagebrush lizard as a result of this alternative would be low.

Alternative 2 (Proposed Action): Alternative 2 would close the Crater Buttes allotment permanently, allow cattle back into the Cabin Lake Allotment, increase the number of pastures in the Sand Springs and Quartz Mountain Allotments, change the timing of grazing to earlier in the spring and increase water sources. All allotments would be on a rest/rotation pattern.

This alternative would have the greatest impacts to the northern sagebrush lizard. Opening the Cabin Lake Allotment would increase the area that cattle would be grazing in suitable habitat for the lizard by 5,019 acres, increasing the potential for negative impacts across the project area thus reducing the vegetation that provides hiding, nesting, and foraging for the lizard.

This alternative would provide additional water sources (troughs and watersets) for the cattle. These areas get heavily impacted by cattle because they congregate at the water source, denuding the vegetation and changing the composition of the vegetation by introducing non-native vegetation such as cheatgrass. This could negatively impact northern sagebrush lizard habitat.

Although there are potential negative impacts associated with grazing, it is expected that if Forest Plan Standards and guidelines are met, that the impacts would be low, and not lead to a downward trend of this species.

Alternative 3 (No Grazing): This alternative would have no impact to the northern sagebrush lizard or its habitat. There would be no grazing within the allotments, and therefore no loss or reduction of hiding, nesting, and foraging habitat.

Alternative 4: This alternative would be similar to that of Alternative 2. However, the Sand Springs pasture within the Sand Springs Allotment would be closed for seven years, then, grazed on a rest rotation grazing system. This alternative would have less impact to the northern sagebrush lizards hiding, nesting, and foraging habitat than Alternative 2, but again, greater impacts than alternative 1 or 3.

Cumulative Impacts

Alternatives 1, 2, and 4: There are fuels treatment units (prescribed burning and mowing) within the project area that are associated with the Aspen and Opine Project Areas. These treatments within the project area would remove northern sagebrush lizard habitat by removing grasses and shrubs. This would be 2,522 acres (11% loss) within the Quartz Mountain Allotment, and 1,669 acres (8% loss) within the Sand Springs Allotment. The amount of treatment to this type of habitat on a landscape level is minimal. However, the fuels treatments would remove existing habitat by burning and mowing. Cumulatively, these treatments would remove approximately 9% of the available habitat, which could have a negative cumulative impact on the sagebrush lizard by fragmenting and reducing available habitat for the sagebrush lizard as well as minimizing the availability of prey. The greatest impact would be in the quartz Mountain Allotment.

Alternative 3: Aspen and Opine fuels treatments could still reduce northern sagebrush lizard habitat, but there would be no impact by livestock under this alternative. Cumulatively, there would be no additive impacts.

Focal Species

Neotropical migratory birds have become species of interest recently, due to the downward trend of landbirds in the west. The decline of these populations are a result of many complex issues, but factors believed to be responsible include; loss, fragmentation, and alteration of historic vegetation communities. Other probable causes to the decline include predation from feral species, nest parasitism, and use of pesticides associated with agriculture areas. There is currently a Memorandum of Understanding between the Forest Service and the U.S Fish and Wildlife Service (USFWS) (January 2001) that provides for enhanced cooperation between the Forest Service and USFWS (Executive Order 131186). Specific activities are identified where cooperation between the parties will substantially contribute to conservation and management of migratory birds, their habitat, and associated values, and thereby advances many of the purposes of the Executive Order. Additionally, federal agencies are developing memoranda of understanding with the USFWS to further migratory bird conservation as called for by Executive Order 131186.

The Deschutes National Forest is currently following guidelines from the “Conservation Strategy For Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington” (Altman 2000) and the “Conservation Strategy For Landbirds In The Columbia Plateau of Eastern Oregon and Washington” (Altman, Holmes 2000). The conservation strategy for the Columbia Plateau is the strategy utilized for this project area, and addresses key habitat types as well as biological objectives and conservation strategies for these habitat types found in the Columbia Plateau, and the focal species that are associated with these habitats. The conservation strategy lists three priority habitats: 1) Shrub-Steppe Habitat 2) Riparian Habitat and 3) Unique Habitats. There is no riparian habitat within the project area. Proceeding below a discussion of the listed priority habitats and the bird species found within them.

Shrub-Steppe

Much of the conservation strategy placed emphasis on sagebrush habitats, particularly big sagebrush communities. Among shrub-steppe habitat types, big sagebrush has several obligate or near-obligate species, and probably has been impacted more than other types. Other forms of sagebrush such as low sage are of less value to birds, and less threatened than big sagebrush (Paige and Ritter 1999 *as in* Altman and Holmes 2000). Landbird conservation in shrub-steppe habitats emphasizes maintaining healthy ecosystems through representative focal species for several habitat conditions in five habitat types.

Unique Habitats

The conservation strategy is also directed toward unique habitat in the Columbia Plateau. The conservation strategy list five unique habitats as well as focal species associated with these unique habitats.

Tables 26 and 27 summarize priority habitats and habitat features as well as focal species that are found in the High Lava Plains Subprovince associated with the project area.

Table 26: Shrub-Steppe Habitat

Habitat	Habitat Feature/ Conservation Focus	Focal Species by Subprovince
		High Lava Plains/Basin-Range/Owyhee
Steppe (Grassland)	native bunchgrass cover	grasshopper sparrow
Steppe-Shrubland	interspersed of tall shrubs	loggerhead shrike
	burrows	burrowing owl
	deciduous trees and shrubs	sharp-tailed grouse
Sagebrush	large areas of sagebrush with diverse understory of native grasses	sage grouse
	large unfragmented patches	sage sparrow
	sagebrush cover	Brewer's sparrow
	sagebrush height	sage thrasher
Shrublands	ecotonal edges of herb, shrub and tree habitats	lark sparrow
	upland, sparsely vegetated desert scrub	black-throated sparrow (BR and OW only)
Juniper-Steppe	scattered mature juniper trees (savanna)	ferruginous hawk

Table 27: Unique Habitats

Habitat	Habitat Feature/ Conservation Focus	Focal Species by Subprovince
		High Lava Plains/ Great Basin/Owyhee
Aspen	large trees and snags with regeneration	red-naped sapsucker
Agriculture Fields	bobolink	bobolink (GB and OW only)
Juniper Woodland	Mature juniper with regeneration	gray flycatcher
Cliffs and Rimrock	undeveloped foraging areas	prairie falcon
Mountain Mahogany	large diameter trees with regeneration	Virginia's warbler

The bolded species are those that can be found within the project area. Some are also listed as watchlist or stewardship species.

Existing Condition

Habitat types that exist within the project area are: steppe-shrubland, sagebrush, shrubland, juniper-steppe juniper woodland, aspen, cliff and rimrock, and mountain mahogany.

Within the conservation strategy cattle grazing is specifically addressed within Shrub-steppe habitat, which addresses all shrub-dominated habitats. The grazing recommendations are as follows:

Overgrazing could negatively affect habitat by altering species composition, reducing residual vegetation, inhibiting vegetation recruitment, and increasing encroachment of noxious weeds. Grazing may not adversely impact vegetation if relatively light pressure is rotated between pastures and deferred on an annual and seasonal basis. Implement grazing practices that are consistent with growth of native plants and forbs. This may include increasing rest cycles in rest-rotation systems, and/or deferring grazing until bunchgrasses have begun to cure. Manage livestock numbers or time on rangeland to maintain the

ecological integrity of the plant community through fencing exclusions or time management. Exclude livestock grazing from relatively pristine areas.

Determination of Impacts

Cattle grazing, in general has been known to reduce forbs and shrub cover, or change the composition of forbs and shrubs. The intensity and severity depend upon a number of factors including the number of animals grazing in an area, timing and length of grazing, weather conditions, rest/rotation patterns, and the combination of other factors including thinning, fuels treatments, or wildfires.

All of the action alternatives would implement rest rotation grazing which will allow one pasture to be rested each season and each pasture that is active would be grazed at a different growth stage each season. Therefore utilization can be minimized within each allotment and grazed plants would be allowed to develop within a different growth season yearly.

For raptors such as Swainson's hawk and prairie falcon, the reduction of forbs and shrubs can impact their prey species of ground dwelling birds and small mammals. These ground species depend on the shrubs for cover for nesting and hiding from predators, and the forbs for food. For landbirds, the reduction of forbs and shrubs can also impact prey species including insects and seeds from forbs and shrubs that may be consumed. The presence of cattle also increases the presence of predatory species on the eggs and young of ground dwelling species. These predators include species such as jays, magpies, and ravens, and nest parasites including brown-headed cowbirds.

Rest rotation facilitative grazing strategies of Alternatives 1, 2, and 4 will continue to be implemented within the active allotments. To ensure nesting, cover, and forage habitat is available, Forest Plan grazing standards will be met.

Direct/Indirect Impacts

Direct negative impacts to landbirds common with all action alternatives would be that concentrations of livestock may trample nests, crushing or exposing eggs or nestlings.

Alternative 1 (No Change): Alternative 1 would maintain current levels of grazing (grazing would only occur within the Sand Springs and Quartz Mountain Allotments, the Cabin Lake and Crater Buttes Allotments would remain open, but vacant) and the timing of grazing would be retained from June 1 to September 30. All allotments would still be on a rest/rotation pattern.

This alternative would have fewer impacts to landbirds than that of alternative 2 and 4, but have greater impacts than that of alternative 3. Two of the four allotments would be grazed, leaving the other two free from grazing impacts to the species and their habitats.

Depending on the amount of moisture within each growing season, if grasses dry up early in the season this could potentially affect both grasses and shrubs by over utilization within the two allotments which would remain open and grazed, which may compromise nesting and foraging habitat as well as perching habitat within the shrub communities. However, there have been no areas within the project that have not met Forest Plan utilization standards, but the potential exists under this alternative due to the localized grazing pressure of cows (no net increase in pastures within the allotments). These impacts are immeasurable thus far.

Alternative 2 (Proposed Action): Alternative 2 would close the Crater Buttes allotment permanently, allow cattle back into the Cabin Lake Allotment, increase the number of pastures in the Sand Springs and Quartz Mountain Allotments, change the timing of grazing to earlier in the spring and increase water sources. All allotments would be on a rest/rotation pattern.

This alternative would have the greatest impacts to landbirds. Opening the Cabin Lake Allotment would increase the area that cattle would be grazing (this allotment would be 21,296 acres), and thus increase the area of potential impacts.

The number of pastures would increase in the Sand Springs and Quartz Mountain Allotments, which could take some of the pressure off of the vegetation by allowing a shorter duration of livestock use on a given area, which would be beneficial to the plant resource. This could minimize impacts to landbird habitat. This alternative reduces localized grazing by better distributing cattle across a larger area of the pasture as well as maximizing forage availability. During dry years the likelihood of habitat degradation is less due to the grazing being distributed over larger areas as well as areas that are more resilient and have higher site potential due to locations (Refer to Wildlife Report for maps). The potential still exists for habitat degradation from overgrazing if monitoring standard and guides are not followed, but the potential is much less due to the better distribution of grazing.

Adding water sources such as troughs and watersets may both benefit and have a negative impact on landbirds. They would provide a water source for birds, but many of these water sets attract raptor prey species, making them ideal places for raptors to hunt, if there are fence posts or trees around to provide perches. These areas also become areas that get heavily impacted by cattle because they congregate in these areas, denuding the vegetation and changing the composition of the vegetation by introducing non-native vegetation such as cheatgrass.

So, although some specifics of this alternative may be more beneficial than those of alternative 1, this alternative is still opening up an entire allotment that has not been grazed for years that would put new pressure on the vegetation and the species that reside within that allotment.

Although there are potential negative impacts associated with grazing, it is expected that if Forest Plan Standards and Guidelines are met, that the impacts would not lead to a downward trend of any species.

Alternative 3 (No Grazing): This alternative should have no negative impacts on landbirds. Since livestock grazing would not occur in the planning area, an increase in forage and cover should occur in the area. This may provide more nesting opportunities for ground-nesting species and hiding cover. Since browsing of shrub species would not occur from livestock, where shrubs exist, the quality of and quantity of shrub habitat may improve.

Alternative 4: This alternative would be similar to that of Alternative 2. However, the Sand Springs Pasture within the Sand Springs Allotment would be closed for seven years, then, grazed on a rest rotation grazing system. Thus, this alternative would have lower impacts to landbirds than those of Alternative 2 because of this temporary closure. An increase in forage and cover should occur in the pasture, providing more nesting opportunities for ground-nesting species and hiding cover. Since browsing of shrub species would not occur from livestock for this period, where shrubs exist, the quality of and quantity of shrub habitat may improve.

Cumulative Impacts

Alternatives 1, 2, and 4: There are fuels treatment units (prescribed burning and mowing) within the project area that are associated with the Aspen, Buick, and Opine Project Areas (See Map 7). These treatments would remove nesting, foraging, and perching habitat within the project area and would further impact overall landbird habitat within the project area. Additional direct impacts could occur from treatments by crushing and burning of nest sites of ground-nesting birds. The fuels treatments would be 4,235 acres within the Cabin Lake Allotment (16% loss), 2,522 acres within the Quartz Mountain Allotment (7% loss), and 1,669 within the Sand Springs Allotment (3% loss). This would cumulatively reduce the amount of available habitat for the listed species by 5% across the entire project area. The greatest impact would be in the Cabin Lake Allotment, reducing areas utilized by the focal bird species for nesting, foraging, as well as minimizing the availability of prey within nesting areas.

The cumulative impacts associated with Alternative 2 and 4 would be higher as this would reauthorize grazing in the Cabin lake Allotment, and the acres of fuels treatments are higher in this allotment.

Alternative 3: Aspen, Buick, and Opine fuels treatments could still reduce habitat available for landbirds and directly impact nests by crushing and/or burning them, but there would be no impact by livestock under this alternative. Cumulatively, there would be no additive impacts from this alternative.

Old Growth Management Areas

An Old Growth Management Area (OGMA) is managed to provide large trees, abundant standing and downed dead trees, and vertical structure (multiple vegetative canopy heights), except in lodgepole pine types where a single canopy level is common. Such stands would vary in size and be located so that a wide variety of conditions are represented (LRMP page 4-149). The Forest Plan Standards and Guidelines relating to range in OGMA states that “Livestock grazing is generally not compatible with an old growth area.” (LRMP p. 4-150).

The Forest Plan does not elaborate on the lack of compatibility of grazing and old growth, but species that utilize old growth are also dependent on the grasses forbs, and shrubs within the understory of these areas, predominantly bird species.

Current Condition

There are thirteen OGMA within the project area, the following table summarizes the locations and sizes of the OGMA (Map 3, page 15):

Table 28: Summary and Location of OGMA

OGMA #	Allotment	Acres
382	Sand Springs	345
454	Sand Springs	535
474	Sand Springs	188
476	Quartz Mountain & Sand Springs	937
487	Sand springs	290
502	Quartz Mountain & Sand Springs	261
503	Cabin Lake	1,000
504	Cabin Lake	296
517	Quartz Mountain	623
526	Cabin Lake & Crater Buttes	1,534
528	Quartz Mountain	590
532	Crater Buttes	270
534	Crater Buttes	230

Direct/Indirect Impacts

There are no identified direct impacts to Old Growth Management Areas for any of the alternatives.

Alternative 1 (No Change): Under Alternative 1, grazing would continue within its current status. There is currently no grazing within OGMA #503, 504, 526, 532, and 534. The rest of the OGMA are within active allotments. All of these OGMA are within the rest rotation facilitative grazing programs and are therefore not utilized every year and utilization occurs during different months on a

yearly basis. Compaction to root systems over-time may increase the likelihood of premature death of individual trees or the stand. This could potentially remove herbaceous habitat that is essential for forage and nesting habitat for passerines as well as providing habitat for prey species of overhead predators such as accipiters that utilize the overstory canopy. It may also hinder the growth and full development of individual trees in heavy use areas. Utilization of these areas can continue to occur if grazing continues to meet Forest Plan standards for stubble height. There would be no impact to OGMAs if localized grazing within the OGMAs can continue to be minimized by use of watersets outside these areas and with pasture rotation.

Alternative 2 (Proposed Action): The effects of the proposed action are essentially the same as Alternative 1. However, with alternative 2, OGMA #503, 504 would receive grazing. OGMAs # 526, 532, and 534 would not receive grazing because they occur within the Crater Buttes Allotment, which would be closed. The portion of #526 that occurs within the Cabin Lake Allotment would be fenced out with a change in the allotment boundary. There are additional OGMAs that could be impacted, but no impacts would be expected if localized grazing within the OGMAs can continue to be minimized by use of watersets outside these areas and with pasture rotation.

During scoping, ONRC suggested an alternative that eliminates or reduces impacts of grazing in Old Growth Management Areas. Alternatives 2, 3, and 4 address this concern. Alternatives 2 and 4 provide for more fencing to exclude certain OGMAs and the location of watersets outside of OGMAs. Alternative 3 does not allow any grazing.

Alternative 3 (No grazing): Under the no grazing alternative the only grazing that would occur within the OGMAs would be from wild ungulates. No livestock would be permitted to graze these areas. Therefore impacts from grazing listed above under Alternatives 1 and 2 would not occur within these areas. Therefore there is no impact.

Alternative 4: The impacts of this alternative are identical to that of Alternative 2. There would be no impact to the other two OGMAs if localized grazing can continue to be minimized by use of watersets outside of OGMAs and pasture rotation.

Cumulative Impacts

None of the alternatives are expected to have any additive cumulative effects to the OGMAs.

Conclusion

There are a variety of wildlife species that utilize the habitat within the Cluster II project area. For decades, these species have been coexisting with cattle and grazing impacts. Grazing practices on the District have improved tremendously over time, and Forest Plan Standards and Guides are in place to ensure that over utilization of forage does not occur. The evidence is clear as to what type of negative impacts could occur to wildlife species when grazing has been allowed to denude vast areas of vegetation. The impacts from the type of grazing that occurs within this project area are currently immeasurable at best, and if negative impacts are occurring, they are low. According to monitoring trends, grazing has not caused a decrease in shrubs or grasses and that it may even contribute to annual fuels reduction (which could help decrease the potential for fire and loss of habitat). Proper grazing has also been shown to stimulate new growth on the vegetation in areas where it may become decadent.

Each alternative has negative impacts (determined to be low) and its benefits. Under Alternative 1, the two allotments currently used would continue to be impacted by not increasing pastures to better distribute the cattle. Under alternatives 2 or 4, the Cabin Lake Allotment, which has been vacant for ten years, would be re-opened, opening an additional 21,296 acres to grazing. For this project, there is no alternative that would impact any wildlife species to the extent that it would lead to a downward trend of that species. Forest Plan Standards and Guides are in place to prevent the habitat within the project area from being overgrazed. There is the potential for this to occur, however due to measures

in place, this should be minimal and when observed, immediate action would take place to alleviate the problem.

Noxious Weeds

Noxious weeds have not been found on the CT plots. There are some noxious weed sites in the project area, but they are generally small and being managed by the botany program. The weeds are pulled when possible, though not necessarily on an annual basis. There is also Canada thistle populations present in Coyote Flat, which have received biocontrol agents and have been pulled. The range manager does discuss weed concerns with the permittees at the time of annual operating plan review, and permittees have been given copies of weed maps showing locations of known weed sites. They also receive noxious weed educational pamphlets. The Botany Report documents these sites but those of note are spotted knapweed on Sixteen Butte at the opal mine, spotted knapweed on the top of Quartz Mountain, and Canada thistle near Coyote Flat.

Exotics, mainly cheatgrass do exist throughout most of the project area but are primarily confined to small isolated locations of historic disturbance with the exception being the southern exposure of many the buttes and cinder cones in the Quartz Mountain and some of the Sand Springs Allotment. Buttes and cinder cones such as Long Butte, Sixteen Butte, Quarter Butte, Buzzard Rock, and a number of the smaller unnamed buttes in the Wigtop and Aspen Pasture exhibit populations of cheatgrass.

Summary of Risk Assessment: The Cluster II project poses a high risk of noxious weed introductions or spread in Alternatives 1 and 2. It poses a low risk for Alternative 3. It poses a low risk for Alternative 4, for the first seven years of implementation, then a high risk for the last three years of implementation. See pages 3 and 4 for discussion of the risk ranking and management recommendations.

Forest Service Manual (FSM) direction requires that Noxious Weed Risk Assessments be prepared for all projects involving ground-disturbing activities. For projects that have a moderate to high risk of introducing or spreading noxious weeds, Forest Service policy requires that decision documents must identify noxious weed control measures that will be undertaken during project implementation (FSM 2081.03, November 29, 1995).

This document supports practices that are consistent with direction from the February 3, 1999 Executive Order on Invasive Species (Order #13112). This order requires federal agencies to use relevant programs and authorities to prevent the introduction and spread of invasive species.

Aggressive non-native plants, or noxious weeds, can invade and displace native plant communities causing long-lasting management problems. Noxious weeds can displace native vegetation, increase fire hazards, reduce the quality of recreational experiences, poison livestock, and replace wildlife forage. By simplifying complex plant communities, weeds reduce biological diversity and threaten rare habitats. Potential and known weeds for the Deschutes National Forest are listed in Appendix A.

In addition to noxious weeds, which are designated by the State, there is a group of non-native plants that are also aggressive though are not officially termed “noxious.” These species are also included in this assessment.

The Cluster II project was given a high risk ranking for Alternatives 1, 2, and 4 because there are noxious weeds within the project, and cattle have been shown to be a major factor in increasing the vulnerability of plant communities to weed invasion (Belsky and Gelbard 2000). These authors cite selective grazing (choosing native forage over weeds, thus increasing the weeds), trampling, and hoof action as patterns which exacerbate weed introductions and spread. They cite studies that show that hoof action damages protective soil crusts, creates safe sites for weed seeds, increases soil nitrogen levels, creates competition-free patches of bare ground that are open to invasion, and may play a role

in reducing mycorrhizae numbers in the soil. Cattle have also been shown to create “locally-enriched” areas of high nitrogen which favors weeds such as cheatgrass and medusahead (Belsky and Gelbard 2000).

The good news is that the known noxious weed populations within the project are relatively few, with spotted knapweed and Canada thistle being the main ones. (Cheatgrass is relatively prevalent, though, throughout Sand Springs, Quartz, and Cabin Lake Allotments). The unknown, however, is being able to state exactly how often cattle may come in contact with these known weed populations, which are mainly limited to roadsides, the opal mine at Sixteen Butte, and Coyote Flat. There is also the potential for the cattle to bring in weeds from their previous pasturage.

There is also the potential for cattle trucks, water trucks, OHVs used to tend fences and herd cattle, and other vehicles associated with the cattle operation to bring in weed seeds via tires and undercarriages.

Environmental Consequences

The range program manager is performing annual (if not more) inspections and reports to the noxious weed program manager for inclusion in the database and treatment action. The allotment management plan usually includes the same information as the environmental assessment upon which it is based, which includes noxious weed prevention practices. The annual operating plan includes a provision requiring that all hay or straw used on Forest lands be noxious weed-free (there is currently no certification process in Oregon), as well as a provision to prevent the transport of noxious weeds by vehicles or livestock.

Direct, Indirect and Cumulative Effects

Refer to the noxious weed prevention practices section, page 20 for more information on weeds in the planning area.

Alternative 1

Management would continue essentially as described under the Weed Prevention Practices section, and thus the effects would not change from the current. The risk of weed introduction or spread would continue to be high. These allotments will continue to have a high risk of weed introductions or spread.

Cumulatively, always present is the threat of new introductions or spread of existing weed populations via the road system and forest users’ vehicles.

Alternative 2

Effects would be essentially the same as for Alternative 1.

Alternative 3

The risk of weed introductions or spread would be reduced to low because the cattle vector and associated vehicles would be removed.

Alternative 4

As this alternative is identical to Alternative 2 except for the Sand Springs pasture, the effects would be the same as for that alternative, except for that pasture. In the Sand Springs pasture, the risk of weed introductions and spread by cattle and associated vehicles would be eliminated for the first seven years of implementation, then would return to a high risk once they are returned.

Soils

Forest soils are considered a non-renewable resource, as measured by our life spans, and maintenance or enhancement of soil productivity is an integral part of National Forest management. Therefore, an evaluation of the potential effects of the proposed actions on soil productivity is essential for integrated management of forest resources. Concern Statement: Livestock grazing and range management activities may adversely affect the ability of soils to maintain productivity through physical disturbances to soil properties and reductions in surface organic matter.

A qualitative assessment of soil effects was conducted by comparing existing conditions to the anticipated conditions which would result from implementing the management alternatives. The soil resource may be directly, indirectly, and cumulatively affected within each of the activity areas that comprise the Cluster II project area. For this proposal, activity area boundaries are considered to be the smallest identified area where the potential effects of different management practices would occur. Thus, the discussion of soil effects and soil quality standards will be focused primarily on the grazing areas within each of the four range allotments (Cabin Lake, Crater Buttes, Quartz Mountain and Sand Springs). It will also discuss the transportation system and other management facilities necessary to achieve other multiple use objectives within the larger planning area.

The analysis also considered differences between current and modified management plans to determine how they best meet soil resource objectives through proper timing and utilization of forage that maintains adequate ground cover conditions for protecting the soil surface and recycling nutrients.

The primary objective is to plan and conduct management activities so that on-site loss of soil productivity is minimized on lands which are not officially dedicated to permanent facilities necessary to achieve other land management objectives.

Management Direction

The Deschutes Land and Resource Management Plan (LRMP) specifies that management activities are prescribed to promote maintenance or enhancement of soil productivity by leaving a minimum of 80 percent of an activity area, such as a grazing allotment pasture, in a condition of acceptable productivity potential following land management activities (Forest Plan page 4-70, SL-1 and SL-3). This is accomplished by following Forest-wide standards and guidelines to ensure that soils are managed to provide sustained yields of managed vegetation without impairment of the productivity of the land. Standard and Guideline (SL-4) directs the use of rehabilitation measures when the cumulative impacts of management activities are expected to cause damage exceeding soil quality standards and guidelines on more than 20 percent of an activity area. Standard and Guideline (SL-5) limits the use of mechanical equipment in sensitive soil areas.

Standard and Guideline (SL-6) provides ground cover objectives to minimize soil erosion by water and wind. The planning area contains portions of four management area allocations as designated by the Deschutes National Forest Land and Resource Management Plan (LRMP): MA-7 (Deer Habitat), MA-8 (General Forest), MA-9 (Scenic Views) and MA-15 (Old Growth). None of these LRMP Management Area descriptions contain specific standards and guidelines for the soil resource. Forest-wide standards and guidelines would apply to this project proposal.

The Pacific Northwest Region developed soil quality standards and guidelines that limit detrimental soil disturbances associated with management activities (FSM 2520, R-6 Supplement No. 2500-98-1). This Regional guidance provides policy for planning and implementing management practices and supplements LRMP standards and guidelines that are designed to protect or maintain soil productivity. Emphasis is placed on protection over restoration. When initiating new activities, it requires that:

- Design new activities that do not exceed detrimental soil conditions on more than 20 percent of an activity area, including the permanent transportation system.
- In activity areas where less than 20 percent detrimental soil impacts exist from prior activities, the cumulative amount of detrimentally disturbed soil must not exceed the 20 percent limit following project implementation and restoration.
- In activity areas where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must, at a minimum, not exceed the conditions prior to the planned activity and should move conditions toward a net improvement in soil quality.

Detrimental soil impacts are those that meet the criteria described in the Soil Quality Standards listed below.

- Detrimental Compaction in volcanic ash/pumice soils is an increase in soil bulk density of 20 percent, or more, over the undisturbed level.
- Detrimental Puddling occurs when the depth of ruts or imprints is six inches or more.
- Detrimental Displacement is the removal of more than 50 percent of the A horizon from an area greater than 100 square feet, which is at least 5 feet in width.
- Severely Burned soils are considered to be detrimentally disturbed when the mineral soil surface has been significantly changed in color, oxidized to a reddish color, and the next one-half inch blackened from organic matter charring by heat conducted through the top layer.

This Regional guidance is consistent with LRMP interpretations for standards and guidelines SL-3 and SL-4 that limit the extent of detrimental soil conditions within activity areas (Final Interpretations, Document 96-01, Soil Productivity, Deschutes National Forest Supervisor's Office, 1996).

Target Landscape Condition

The primary goal of soil management is to maintain or enhance soil conditions at acceptable levels without impairment of the productivity of the land. The extent of detrimental soil disturbances is minimized through the application of management requirements and conservation practices designed to meet soil resource objectives. The land effectively takes in and distributes water, and erosion rates are controlled to near-natural levels. The biological productivity of soils is ensured by management prescriptions that retain adequate supplies of surface organic matter and coarse woody debris.

Scope of the Analysis

The soil resource may be directly, indirectly, and cumulatively affected on National Forest System lands within each of the four range allotments (Cabin Lake, Crater Buttes, Quartz Mountain and Sand Springs) that comprise the planning area. An activity area is defined as "the total area of ground impacted activity, and is a feasible unit for sampling and evaluating" (FSM 2520 and Forest Plan, page 4-71). The discussion of soil effects and soil quality standards will be focused primarily on the grazing areas within each of the range allotments (activity areas) that range from approximately 26,192 acres to 55,967 acres in size. The analysis also includes soil resource commitments to the transportation system and other management facilities to provide additional context and intensity within the larger planning area.

Effects upon the soil resource include two primary sources of disturbance:

- 1) The effects of domestic animals as they graze, and
- 2) The effects of the structural improvements needed to manage livestock.

The temporal scope of the analysis is defined as short-term effects being changes to soil properties that would generally revert to pre-existing conditions within five years, and long-term effects as those that would substantially remain for periods of five years or longer.

Landscape Characteristics

The Cluster II planning area is located south and southeast of Newberry Crater in the southeastern portion of the Bend-Fort Rock Ranger District. The area contains approximately 141,144 acres of National Forest System land. All landforms, rocks, and soil are products from volcanic events that occurred over various time periods. The landscape is generally characterized by gentle to moderately sloping lava plains with numerous cinder cones and buttes associated with the Newberry Crater complex. Elevation ranges from approximately 4,500 to 6,120 feet. Approximately 90 percent of the planning area is comprised of gentle plains and uneven lava flows with average slopes ranging from zero (0) to 30 percent. Steeper slopes (25 to 70 percent) are associated with cinder cones and the escarpments of buttes and ridges that account for the remaining 10 percent of the total acreage. Mean annual precipitation varies across the landscape due to changes in elevation, but it generally ranges from about 10 to 20 inches.

Ash and pumice deposits from Mount Mazama (Crater Lake) and Newberry Crater volcanoes have covered most of the planning area, except for some of the youngest lava flows. Mazama ash varies from 12 to 40 inches thick and consists mostly of sand size particles. Soils tend to be non-cohesive (loose) and they have very little structural development due to the young geologic age of the volcanic parent materials. Previously developed soils are buried at average depths that range from 20 to 40 inches. The underlying bedrock is dominated by basalt and andesite lava with inclusions of volcanic tuffs and breccias.

Wind erosion has redistributed much of the volcanic ash on the steeper landforms. It has sorted out different size materials and re-deposited them on the lee sides of some buttes and ridges. This has resulted in localized areas of exposed bedrock and relatively thin layers of volcanic ash, while other areas have deep deposits of these sand-sized materials which are easily displaced by ground-disturbing activities.

Dominant soils are moderately deep (20 to 40 inches) to deep (40 inches or more in depth) with surface and subsoil textures of sands, loamy sands, and sandy loams. These soils are well drained with rapid infiltration rates that drain excess moisture readily over much of the project area. Periods of wetness are generally discontinuous and of short duration. The underlying residual soils and bedrock materials have a moderate to high capacity to store water. Surface runoff generally occurs only on localized areas of shallow and moderately deep soils during high intensity storms or when the ground is frozen.

There are no perennial or intermittent stream channels within the planning area. Existing drainage channels are predominately old ephemeral channels that flow only during high precipitation events or spring snow melt. These short duration flows are discontinuous and they do not merge with water bodies outside of the planning area. There are three small bodies of surface water associated with springs in the Sand Springs allotment, but there are no visible inlets or outlets. The proposed activity would not result in a discharge into navigable waters (DEQ Letter, 1998). Therefore, there would be no effects to Oregon Department of Environmental Quality 303(d) listed water bodies, fish populations or fish habitat (Walker personal communication). There are no Riparian Habitat

Conservation Areas as described in INFISH. There is no proposed critical habitat for bull trout, nor is there any Essential habitat for Chinook salmon.

The planning area contains 41 Soil Resource Inventory (SRI) landtype units based on similarities in landforms, geology, and climatic conditions that influence defined patterns of soil and vegetation (Larsen 1976). Topography affects climate by creating a moisture gradient of lower precipitation along the desert fringe that increases with elevation towards the Newberry National Volcanic Monument. Topography also affects climate where cold air drainages influence cooler soil temperatures that reflect differences in vegetation. The biophysical characteristics of these landtype units can be interpreted to identify hazards and suitabilities for natural resource planning and management.

Tables 30 through 33 display selected interpretations of the dominant landtypes for range management planning within each of the four range allotments of the Cluster II planning area.

Table 29. Soil Interpretations for Cabin Lake Allotment (26,192 acres) (Larsen 1976)

SRI Landtype Unit Symbol	Acres / Percent of Allotment	Slope Range (Percent)	**Limitations for Domestic Livestock	Surface Erosion Potential	Susceptibility to Soil Compaction	Susceptibility to Soil Displacement
48	147 acres < 1 %	0 to 20% Mean: 5%	Droughty soils	Low	Low to Moderate	Low
63	810 acres 3 %	0 to 10% Mean: 7%	No Limitations	Low	Low to Moderate	Low
64	1,949 acres 7 %	0 to 30% Mean: 15%	Coarse soils	Low to Moderate	Low	Moderate
68	315 acres 1 %	30 to 60% Mean: 40%	Coarse soils, steep slopes	Moderate	Low	High
70	235 acres 1 %	0 to 30% Mean: 6%	Coarse soils	Low	Low to Moderate	Low to Moderate
72	5,738 acres 22 %	0 to 20% Mean: 8%	Coarse soils, droughty soils	Low	Low to Moderate	Low to Moderate
91	109 acres <1 %	25 to 60 % Mean: 40%	Steep slopes	Moderate to High	Low	Moderate to High
6A	11,375 acres 43 %	0 to 30% Mean: 8%	No Limitations	Low	Low to Moderate	Low to Moderate
6B	3,254 acres 12 %	0 to 30% Mean: 10%	Coarse soils, sparse forage	Low	Low	Moderate
LD	778 acres 3 %	0 to 30 % Mean: 10 %	Rough land, Sparse forage	Low	Low	Low

SRI Landtype Unit Symbol	Acres / Percent of Allotment	Slope Range (Percent)	**Limitations for Domestic Livestock	Surface Erosion Potential	Susceptibility to Soil Compaction	Susceptibility to Soil Displacement
LU	333 acres 1 %	0 to 30 % Mean: 10 %	Rough, rocky land; droughty	Low	Low to Moderate	Low to Moderate
XN	903 acres 3 %	0 to 20 % Mean: 5 %	Coarse soils, Droughty	Low	Low to Moderate	Low to Moderate
Landtypes of limited extent: 01, 11, 14, 15, 66, 81, LK, LX and XK	246 total acres 1 %	Various	Various	Various	Various	Various

Table 30. Soil Interpretations for Crater Buttes Allotment (26,416 acres)

SRI Landtype Unit Symbol	Acres / Percent of Allotment	Slope Range (Percent)	**Limitations for Domestic Livestock	Surface Erosion Potential	Susceptibility to Soil Compaction	Susceptibility to Soil Displacement
64	257 acres 1 %	0 to 30% Mean: 15%	Coarse soils	Low to Moderate	Low	Moderate
66	471 acres 2 %	0 to 30% Mean: 15%	No Limitations	Low to Moderate	Low	Moderate
68	838 acres 3 %	30 to 60% Mean: 40%	Coarse soils, steep slopes	Moderate	Low	High
70	4,617 acres	0 to 30% Mean: 6%	Coarse soils	Low	Low to Moderate	Low to Moderate
76	1,172 acres 4 %	0 to 30% Mean: 10%	Rough rocky land	Low	Low	Low
81	147 acres <1 %	25 to 70% Mean: 40%	Steep slopes, coarse soils	Moderate	Low	High
6B	18,054 acres 68 %	0 to 30% Mean: 10%	Coarse soils, sparse forage	Low	Low	Moderate
LK	200 acres <1 %	0 to 60 % Mean: 30 %	Steep slopes, coarse soils	Low to Moderate	Low	Moderate to High
LP	504 acres 2 %	0 to 30 % Mean: 8 %	Coarse soils, Sparse forage	Low	Low to Moderate	Low to Moderate
Landtypes of limited extent: 09, 14, 6A, 7E, XM and XP	156 total acres <1 %	Various	Various	Various	Various	Various

Table 31. Soil Interpretations for Quartz Mountain Allotment (34,087 acres)

SRI Landtype Unit Symbol	Acres / Percent of Allotment	Slope Range (Percent)	**Limitations for Domestic Livestock	Surface Erosion Potential	Susceptibility to Soil Compaction	Susceptibility to Soil Displacement
48	1,400 acres 4 %	0 to 20% Mean: 5%	Droughty soils	Low	Low to Moderate	Low
60	14,975 acres 44 %	0 to 30% Mean: 10%	No limitations	Low to Moderate	Low to Moderate	Low
63	469 acres 1 %	0 to 10% Mean: 7%	No Limitations	Low	Low to Moderate	Low
64	680 acres 2 %	0 to 30% Mean: 15%	Coarse soils	Low to Moderate	Low	Moderate
66	217 acres 1 %	0 to 30% Mean: 15%	No Limitations	Low to Moderate	Low	Moderate
68	516 acres 2 %	30 to 60% Mean: 40%	Coarse soils, steep slopes	Moderate	Low	High
72	4,323 acres 13 %	0 to 20% Mean: 8%	Coarse soils, droughty soils	Low	Low to Moderate	Low to Moderate
78	474 acres 1 %	30 to 60% Mean: 40%	Steep slopes	Moderate	Low	Moderate
80	1,191 acres 3 %	25 to 70% Mean: 40%	Steep slopes, Droughty	Moderate	Low	High
6A	2,728 acres 8 %	0 to 30% Mean: 8%	No Limitations	Low	Low to Moderate	Low to Moderate
6C	612 acres 2 %	0 to 30% Mean: 10%	Droughty soils	Low to Moderate	Moderate	Low
7K	1,216 acres 4 %	30 to 70% Mean: 40%	Steep slopes	Moderate	Low	Moderate to High
LD	1,165 acres 3 %	0 to 30 % Mean: 10 %	Rough land, Sparse forage	Low	Low	Low
LK	233 acres 1 %	0 to 60 % Mean: 30 %	Steep slopes, coarse soils	Low to Moderate	Low	Moderate to High
RC	829 acres 2 %	0 to 70 % Mean: 30 %	Steep slopes	Low to Moderate	Low to Moderate	Moderate to High
RE	553 acres 2 %	0 to 70 % Mean: 30 %	Steep slopes, Droughty	Low to Moderate	Low to Moderate	Moderate to High
XN	2,181 acres 6 %	0 to 20 % Mean: 5 %	Coarse soils, Droughty	Low	Low to Moderate	Low to Moderate

Landtypes of limited extent: 01, 14, 6B, 81	325 total acres 1 %	Various	Various	Various	Various	Various
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Table 32. Soil Interpretations for Sand Springs Allotment (55,967 acres)

SRI Landtype Unit Symbol	Acres / Percent of Allotment	Slope Range (Percent)	**Limitations for Domestic Livestock	Surface Erosion Potential	Susceptibility to Soil Compaction	Susceptibility to Soil Displacement
07	3,269 acres 6 %	0 to 10% Mean: 5%	Coarse soils, Lack of forage	Low	Low	Moderate
15	474 acres 1 %	0 to 10% Mean: 5%	Lack of forage	Low	Low to Moderate	Low to Moderate
48	3,069 acres 5 %	0 to 20% Mean: 5%	Droughty soils	Low	Low to Moderate	Low
60	7,845 acres 14 %	0 to 30% Mean: 10%	No limitations	Low to Moderate	Low to Moderate	Low
63	5,352 acres 10 %	0 to 10% Mean: 7%	No Limitations	Low	Low to Moderate	Low
64	1,936 acres 3 %	0 to 30% Mean: 15%	Coarse soils	Low to Moderate	Low	Moderate
66	3,218 acres 6 %	0 to 30% Mean: 15%	No Limitations	Low to Moderate	Low	Moderate
68	2,074 acres 4 %	30 to 60% Mean: 40%	Coarse soils, steep slopes	Moderate	Low	High
72	12,461 acres 22 %	0 to 20% Mean: 8%	Coarse soils, droughty soils	Low	Low to Moderate	Low to Moderate
81	701 acres 1 %	25 to 70% Mean: 40%	Steep slopes, coarse soils	Moderate	Low	High
6B	1,375 acres 2 %	0 to 30% Mean: 10%	Coarse soils, sparse forage	Low	Low	Moderate
6C	401 acres 1 %	0 to 30% Mean: 10%	Droughty soils	Low to Moderate	Moderate	Low
7C	4,578 acres	0 to 30% Mean: 10%	Rocky land, coarse soils	Low	Low	High
7J	1,717 acres 3 %	0 to 10% Mean: 5%	Coarse soils, Sparse forage	Low	Low	Low to Moderate

SRI Landtype Unit Symbol	Acres / Percent of Allotment	Slope Range (Percent)	**Limitations for Domestic Livestock	Surface Erosion Potential	Susceptibility to Soil Compaction	Susceptibility to Soil Displacement
7K	491 acres 1 %	30 to 70% Mean: 40%	Steep slopes	Moderate	Low	Moderate to High
9V	2,758 acres	0 to 30% Mean: 10%	Rough, rocky land	Low	Low	Moderate
LK	529 acres 1 %	0 to 60 % Mean: 30	Steep slopes, coarse soils	Low to Moderate	Low	Moderate to High
NB	270 acres <1 %	0 to 30% Mean: 10%	Rough rocky soils; coarse pumice soils	Low	Low	Moderate to High
RC	424 acres 1 %	0 to 70% Mean: 30%	Steep slopes	Low to Moderate	Low to Moderate	Moderate to High
XK	890 acres 2 %	0 to 10% Mean: 5%	Sparse forage	Low	Low to Moderate	Low to Moderate
Landtypes of limited extent: 11, 78, 80, 6A, LD, LG, LU, and NA	2,135 total acres 4 %	Various	Various	Various	Various	Various

**Footnote: The interpretation “Limitations for Domestic Livestock” indicates topographic and site limitations on SRI landtype units that would hinder use by livestock. Available forage or the potential for establishing good forage is not considered in this interpretation.

Naturally occurring plant communities within the planning area are described in *Plant Associations of the Central Oregon Pumice Zone* (Volland, 1982). Based on inventoried acres of dominant plant associations on National Forest System lands, approximately 54,408 acres are considered excellent range potential for livestock, 43,572 acres are considered moderate, 32,943 are considered to have low range potential, 5,244 acres are considered as very poor, and 4,273 acres are classified as non-range lands. Approximately 704 acres occur on other land ownerships or are not classified using the plant association guide (see Range Section).

Sensitive Soil Types

Criteria for identifying sensitive soils to management are listed in the (Deschutes LRMP, Appendix 14, Objective 5). These criteria include slopes over 30%, frost pockets, seasonal or year-long high water tables, extremely rocky areas, and soils that have high or extreme erosion hazard ratings.

Sensitive soils within the planning area include:

- Soils on slopes greater than 30 percent,
- Soils that occur in localized areas of rocky lava flows, and
- Soils with a high hazard rating for surface erosion.

There are no potentially wet soils with high water tables.

Approximately 26 percent (22,836 acres) of National Forest System lands contain landtypes with sensitive soils in localized areas of mapped delineations (Soil Resource Inventory (SRI), Deschutes National Forest, 1976). Table 33 displays the soil resource inventory (SRI) unit(s), total acres within each range allotment, and the type(s) of management concern associated with these landtype(s).

Table 33, SRI Landtypes that contain Sensitive Soil Areas within the Cluster II Allotments

Allotment / SRI Map Unit Symbol	Geomorphology (Representative landforms)	Type of Concern**	Landtype Acres
<i>Cabin Lake</i>			
01, 11, LD	Rough, uneven lava flows	2	863
14	Edges of lava flows with steep uneven slopes	1,2	15
68, 81, LK	Steep slopes on buttes, ridges, and cinder cones	1	378
91	Steep slopes of volcanic mountains	1, 3	109
<i>Crater Buttes</i>			
76	Rough, uneven lava flows	2	1,172
14	Edges of lava flows with steep uneven slopes	1, 2	13
09, 68, 81, LK, XP	Steep slopes on buttes, ridges, and cinder cones	1	1,226
<i>Quartz Mountain</i>			
01, LD	Rough, uneven lava flows	2	1,307
14	Edges of lava flows with steep uneven slopes	1, 2	14
68, 78, 80, 81, 7K, LK, RC, RE	Steep slopes on buttes, ridges, and cinder cones	1	5,083
<i>Sand Springs</i>			
7C, LG, NA, NB	Rough, uneven lava flows	2	4,919
68, 78, 80, 81, 7K, LK, RC	Steep slopes on buttes, ridges, and cinder cones	1	4,306

**Management Concerns

- (1) On slopes greater than 30 percent, loose sandy soils are susceptible to soil displacement.
- (2) Sensitive soils with variable depths in pockets and cracks of rocky, uneven lava flows.
- (3) Sensitive soils with a high hazard for surface erosion.

The sensitive soil areas listed above are considered to be unsuited or marginally suitable for grazing use due to rough, rocky land with sparse forage and/or steep slopes that limit accessibility to domestic livestock. It should be emphasized that only portions of these SRI landtype units contain sensitive soil areas. Only about 10 percent of the planning area is comprised of moderately steep to steep landforms (25 to 70 percent slopes) that limit suitability for rangeland management. Approximately 6 percent of the total landtype acreage contains localized areas of rocky lava flows with less available forage.

Livestock tend to focus more on certain areas and to minimize or exclude use in other areas. In order to conserve energy, cattle generally select available forage on flat to gently sloping ground first. After forage has been moderately utilized in a given area, cattle tend to cover more ground in search of high quality food. Approximately 90 percent of the planning area is comprised of nearly level to gently sloping landforms (0 to 30 percent slopes) which are conducive to livestock movement. Cattle generally do not graze the steeper land excessively, unless forced to do so. Cattle tend to avoid the cinder cones, rough lava flows, rocky escarpments, and coarse pumice flats because these rocky sites typically have sparse forage and accessibility is more difficult. Surface rock fragments and exposed outcroppings also irritate animal's hooves and can cause injury.

Operating plans need to consider management practices that maintain adequate ground cover protection in areas with sensitive soils. Livestock impacts to soils occur mainly in localized areas of concentrated use. The locations of watering facilities and the use of salt licks can help facilitate the distribution of livestock in portions of the allotments that contain sensitive soils.

Existing Condition of the Soil Resource

The current condition of soils is directly related to soil porosity and the quantity and quality of surface organic matter. A combination of natural events and management-related disturbances have influenced existing soil conditions within the Cluster II planning area. Natural disturbance patterns, such as precipitation events, droughts, insect and disease epidemics, and wildfires, continue to influence the growth of vegetation and natural erosion rates. Ground-disturbing management activities (i.e., timber harvest, road building, recreation use and livestock grazing) have caused some long-term impacts to site productivity, especially where mechanical disturbances removed vegetative cover, displaced organic surface layers, compacted soils, and accelerated erosion rates above natural levels. When soil degradation occurs in semiarid, high desert regions, natural processes are slow to return site productivity.

Natural Disturbances

The effects of fire on forest and rangeland soils are directly related to the intensity and duration of soil heating. The degree of soil heating depends on fuel density, soil moisture, and the type of fuel (such as grass, brush, trees). Grass and brush fires are fast moving, and ground-level heating is usually not elevated long enough to detrimentally alter soil properties. In forested areas with a large amount of down woody debris, wildfires can produce extreme soil temperatures for long duration. Severely burned soils are commonly found in localized areas beneath downed logs, stumps, or around the root crowns of individual trees. On the eastside of this forest, even large-diameter down logs (greater than 12 inches) are typically consumed by wild land fires during the dry summer months.

Fire history data indicates that wildfires (greater than 100 acres in size) burned vegetation and natural fuels on portions of the planning area. Many of the larger fires occurred in the early 1900s. The 1959 Aspen Flat Fire (15,577 acres) burned eastern portions of the Quartz Mountain and Sand Springs Allotments adjacent to the forest boundary. The 1977 Buttereen Butte Fire (1,751 acres) occurred in the northwestern portion of the Crater Buttes Allotment. Much of the affected areas was transitional range with forested vegetation, and tree seedlings were planted to re-establish forest conditions. The scarcity of coarse woody fuels on these sites greatly reduced or eliminated the potential for excessive soil heating. Enough time has passed that the recovery of native vegetation and other sources of ground cover protection have effectively returned surface erosion rates to natural levels. There is currently no evidence of severely burned soil and accelerated surface erosion from past wildfires.

Mass movements, or landslides, occur when earthen materials become unstable and slide down-slope in response to gravity. There are no natural or management-related landslides known to exist within the Cluster II planning area. The high permeability of the coarse textured soils generally precludes the buildup of hydraulic pressures that could trigger landslides. There are no seeps or springs on steep slopes and dominant landforms do not meet criteria for landslide prone terrain. Consequently, there is low risk for the proposed actions to cause soil mass wasting.

Management-related Disturbances

Land uses that have committed the soil resource to a non-productive condition include roads, logging facilities, OHV trails, developed campgrounds, cinder/rock pits, and livestock water developments. Soils dedicated to management facilities are considered an irretrievable loss of soil productivity until their functions have been served and disturbed sites are returned back to a productive capacity. Surface erosion on these sites will continue to exceed the natural rates of undisturbed soils for as long as bare surface soils are exposed to the elements of erosion.

Roads and Logging Facilities

The primary sources of detrimental soil conditions from past management are associated with existing roads and ground-based logging facilities which were used for timber management activities. Ground-based railroad logging during the 1930's removed most of the large-diameter ponderosa pine and left a scattered overstory of seed trees for natural regeneration. Most logging disturbances occurred on and adjacent to heavy-use areas, primarily roads and main skid trails, where surface soils were displaced and multiple equipment passes caused detrimental soil compaction. Visual evidence of old logging facilities is very difficult to observe due to the abundance of ground cover vegetation and forest litter. Over the past 60 to 70 years, it is expected that natural processes have restored soil quality over time. Natural processes such as root penetration, frost heave, rodent activity, freeze-thaw and wetting-drying cycles have slowly restored soil porosity in compacted areas. Areas of topsoil displacement have improved through the re-establishment of native vegetation and the accumulation of organic matter.

Between 1963 and 2002, various silvicultural treatments have been used to treat approximately 44,860 acres within the Cluster II planning area. Past treatments ranged from commercial thinning to regeneration harvest (shelterwood, overstory removal for example). Temporary roads, log landings, and primary skid trails were constructed and used to access individual harvest units of past timber sales. Research studies and local soil monitoring have shown that soil compaction and soil displacement account for the majority of detrimental soil conditions resulting from ground-based logging operations (Deschutes N.F., Soil Monitoring Reports; Page-Dumroese, 1993; Geist, 1989; Powers, 1999).

The extent of detrimentally disturbed soil is dependent on a number of variables including the types of silvicultural prescriptions, the intensity of equipment use, and the spacing distances between main skid trails. Local monitoring results on similar landtypes and soils have shown that 15 to 30 percent of the unit area can be detrimentally disturbed by ground-based harvest systems depending on harvest prescriptions and soil conditions at the time of harvest (Deschutes Soil Monitoring Reports 1995, 1996, 1997, and 1999). Most project-related impacts to soils occurred on and adjacent to heavy-use areas such as skid trail systems, log landings, and existing roads. Subsoiling treatments have rehabilitated disturbed soil in portions of some previously managed areas. The conservative estimates used for this analysis assume that soil restoration treatments (subsoiling) have improved soil physical properties on about 10 percent of the acreage treated with regeneration harvest prescriptions. Much of the random disturbance between main skid trails and away from landings has decreased naturally over time. Research has shown that the detrimental effects of soil compaction generally require more than 3 to 5 passes over the same piece of ground (McNabb, Froehlich, 1983). It is expected that natural processes such as frost heaving, freeze-thaw and wetting-drying cycles have gradually restored soil porosity in areas with slight to moderately compacted layers near the ground surface. Due to the lack of cohesion and plasticity, the dominant sandy-textured soils within the planning area are not subject to puddling damage. The establishment of ground cover vegetation and accumulation of organic matter has been improving areas of past soil displacement. There is no evidence that post-harvest, broadcast burn treatments caused any severely burned soil in random locations off designated logging facilities in previously managed areas.

Based on harvest history, research studies and local soil monitoring on similar landtypes, it is estimated that the existing amount of detrimental soil conditions associated with past logging facilities is approximately 11,750 acres or 8 percent of the planning area. Disturbed area estimates and distribution by range allotment is as follows: 1,923 acres in Cabin Lake, 3,957 acres in Crater Buttes, 1,431 in Quartz Mountain, and 4,436 acres in Sand Springs. The estimated amount of detrimentally disturbed soil associated with existing logging facilities is included for each of the range allotments in Table 36.

The planning area contains approximately 932 miles of system roads which equates to approximately 1,477 acres or 1.0 percent of the planning area. This includes about 22 miles (33 acres) of closed

roads where detrimental soil conditions still occur on existing road prisms. Disturbed area estimates and distribution by range allotment is as follows: Cabin Lake = 194 miles (307.2 acres), Crater Buttes = 199 miles (315.6 acres), Quartz Mountain = 183 miles (290.7 acres) and Sand Springs = 356 miles (563.4 acres). The area of system roads within each of the range allotments is included in the estimate of detrimentally disturbed soil displayed in Table 36.

The planning area contains a total of 10 cinder or rock pits that average approximately one (1) acre in size. Disturbed area estimates and distribution by range allotment is as follows: one (1) cinder/rock pit (1.0 acres) in Cabin Lake, two (2) cinder/rock pits (2.0 acres) in Crater Buttes, three (3) cinder/rock pits (3.0 acres) in Quartz Mountain, and four (4) cinder/rock pits (4.0 acres) in Sand Springs. Soil resource commitment is estimated to be about 2.0 acres for the Sixteen Butte Opal Mine in the Quartz Mountain allotment (Carlson, personal communication). Disturbed acres associated with cinder/rock pits are included with system roads for each of the range allotments in Table 36. Due to the relatively small amount of surface area and the size of the allotments, these special use facilities do not increase the percentages of existing detrimental soil conditions within any of the range allotments.

Recreation Activities

The concentration of human activity in and around developed and dispersed recreation sites has caused soil resource damage in localized portions of the planning area. Soil disturbances from recreation use are generally confined to small concentration areas and the extent of detrimental soil conditions is relatively minor in comparison to disturbed areas associated with the transportation system and logging facilities. Current recreational activities include developed and dispersed camping, hiking, mountain biking, horseback riding, and off-highway vehicle (OHV) use. Campfires usually consume available sources of down woody debris around recreation sites.

The estimated amount of disturbed soil associated with two developed campgrounds, an interpretative site, and approximately 44 miles of system OHV trails (exclusive of roads) is included by range allotment in Table 36. This equates to approximately 41 acres or 0.03 percent of the planning area. Based on personal communications with recreation specialists, the average disturbed width of OHV system trails is 6 feet or approximately 0.7 acres per mile of trail. Disturbed area estimates and distribution by range allotment is as follows: Cabin Lake: Cabin Lake Campground (7.0 acres), South Ice Cave interpretative site (0.3 acres), and 7.7 miles (5.4 acres) of OHV trails; Quartz Mountain: 0.6 miles (0.4 acres) of OHV trails; and Sand Springs: Sand Springs Campground (2.7 acres), and 36.1 miles (25.3 acres) of OHV trails. There are no developed recreation facilities in the Crater Buttes range allotment. The Forest Service conducts annual maintenance of developed recreation sites to prevent serious erosion problems and impacts to other resource values.

Soil impacts from dispersed recreation activities are usually found along existing roads and trails. Heavy use of popular recreation sites typically shows substantial resource damage given a combination of overuse, improper camping techniques and insufficient control and maintenance. Water developments (water sets) that are no longer needed for future range management often become dispersed campsites because they are on relatively level ground and shrubs and other vegetation have already been cleared. Although the total number and locations of dispersed campsites have not been inventoried within the planning area, these sites usually average about 1/8 acre (0.125) in size. Due to the size of the range allotments, the minor amount of detrimental soil conditions associated with these sites is not expected to result in a measurable increase above the existing amounts displayed in Table 35.

User-created trails also occur where vegetation has been cleared on or adjacent to existing roads and old skid trail networks of past harvest areas. Conservative estimates were used to account for soil disturbances associated with existing logging facilities, and the extent of these impacts is likely included in the estimates of detrimental soil conditions (Table 35). Therefore, the minor amount of

detrimental soil conditions from dispersed recreational activities has a negligible effect on overall site productivity within the larger range allotments.

Livestock Grazing

The grazing effects of domestic animals are not evenly distributed across the landscape. Topography and the quantity and quality of available forage have a strong influence on the amount of grazing use within a range allotment. The random effects of detrimental compaction, soil displacement, and loss of vegetative cover are difficult to identify in site-specific locations. Livestock tend to focus more on certain areas and to minimize or exclude use in other areas. Forested areas are generally considered transitional range where grazing use is substantially less than primary rangeland that supports grasses and shrubs. Livestock have not caused substantial reductions in surface organic matter and coarse woody debris within the planning area.

Livestock impacts to the soil resource are found mainly in localized areas of concentrated use, such as around water developments, salt licks, bedding areas, and major travel routes. Within the Cluster II planning area, the majority of detrimental soil conditions are confined to relatively small areas around water developments needed to manage livestock. Salt licks are commonly placed in the immediate vicinity of water sets and water troughs. These sites are commonly used as bedding areas, especially where scattered trees exist to provide shade. There are no established water developments or other structural improvements located within transitional range areas designated as old growth timber.

The compacted area around a typical water development is estimated to be approximately one acre of soil disturbance (see Range Section). There are 53 water sets, 32 water troughs, and 2 trick tanks within three of the range allotments. This equates to approximately 87 acres or 0.06 percent of the planning area. Disturbed area estimates and distribution by range allotment is as follows: Cabin Lake: 22 water sets (22 acres); Quartz Mountain: 21 water sets (21 acres) and two water troughs (2 acres), and 2 trick tanks (2 acres); and Sand Springs: 10 water sets (10 acres) and 30 water troughs (30 acres). The extent of detrimental soil conditions from these structural improvements is less than 0.1 percent for each of the three range allotments (Table 36). The Crater Buttes Allotment is currently vacant; there are no established water developments or other structural improvements at this time. In the past, temporary watering facilities were usually placed on existing facilities (previously disturbed sites) to provide water for sheep.

Existing cattleguards on system roads and OHV trails are located on a portion of the disturbed road or trail prism where soils have already been impacted by the construction and use of these facilities. Therefore, it is expected that the area of disturbed soil committed to cattleguards is included in the conservative estimates used to account for roads and recreation facilities in Table 6.

Structural improvements also include fence lines, water pipelines and associated facilities such as valves and storage tanks. Fence lines have local, site-specific effects on soils, but they are not considered to be structures that convert the soil to a non-productive condition. It is assumed that a backhoe with a bucket no wider than 36 inches was used to install approximately 2 miles of water line in the Quartz Mountain allotment and 33 miles of water line in the Sand Springs allotment. The limited amount of ground disturbance from installation activities did not result in a measurable increase in detrimental soil conditions. The effects of a single pass with a backhoe did not cause detrimental soil compaction. Since the disturbed area is less than the defined criteria of at least 5 feet (FSM 2520), small areas of soil displacement or the mixing of soil and surface organic matter does not qualify as a detrimental soil condition. The Cabin Lake and Quartz Mountain allotments each contain one water storage tank and there are two storage tanks in the Sand Springs allotment. Due to the size of the range allotments and the relatively minor amount of surface area dedicated to these tanks (approximately 100 to 300 square feet), these sites do not increase the existing percentages of detrimental soil conditions within either of these allotments (Table 35).

There are no site-specific areas where livestock movement and grazing effects have caused unsatisfactory range conditions over continuous areas of land. The loss of vegetative cover on livestock trails creates bare soil areas in localized areas, but the mixing of soil and surface organic matter does not constitute detrimental soil displacement. Soil compaction caused by livestock trailing does not appear to curtail the growth of grasses and other forage plants the way it does in frequently used areas, such as around water developments. Research has shown that soil compaction by livestock is most severe in the upper 2 inches of mineral soil, but it can extend as deep as 12 inches (Council for Agricultural Science and Technology, 2002). The direct effects of shallow compaction (2 to 4 inches) from grazing animals are expected to recover through natural means (i.e., frost heave, freeze-thaw, and wet-dry cycles) in a much shorter timeframe than deep compaction damage caused by equipment traffic. Temporary exposure of mineral soil generally does not result in accelerated erosion damage.

Current range records for representative analysis plots indicate that forage conditions are generally good, and the vegetative trend is stable within the Quartz Mountain and Sand Springs allotments. Forage conditions are considered to be fair to good and the vegetative trend is stable within the Cabin Lake Allotment. Many areas within the Crater Buttes Allotment have experienced a reduction in understory vegetation due to the encroachment of coniferous trees and brush competition. Analysis plots indicate poor forage conditions within the Crater Buttes Allotment. All four of the range allotments are classified as transitional range due to the overstory of trees and shrubs that shade herbaceous vegetation and out-compete grass and forb species for available soil moisture and nutrients. However, upland range sites are currently providing adequate ground cover protection to meet soil resource objectives. There are no riparian reserves (Riparian Habitat Conservation Areas) within any of these allotments. Surface erosion by water or wind is not a major concern within the planning area because the landscape is dominated by gentle to moderately steep landtypes with low to moderate erosion hazard ratings (Tables 30 to 33).

Microbiotic crusts (i.e., algae, fungi, lichens, and moss) grow directly on the soil surface and provide some stabilization on the loose, non-cohesive soils within the planning area. These fragile crusts are found mainly in small protected areas beneath shrubs (see Botany Section).

Table 34 displays specific land-use sources and the estimated extent of detrimental soil conditions in acres and percentages for each of the range allotments within the planning area. Based on the disturbed area estimates (above), past management activities and specific land uses have converted about 13,364 acres of the soil resource to a non-productive condition. This equates to approximately 9.5 percent of the planning area. None of the four range allotments currently exceed Regional policy or the LRMP standard of 20 percent detrimental soil conditions.

Table 34. Current Sources and Extent of Detrimental Soil Conditions within each Range Allotment of the Cluster II Project Area

Activity Area	Land Use Disturbed Acres				Existing Detrimental Soil Conditions
	Logging Facilities	Roads & Rock Pits	Recreation Facilities	Livestock Watering Facilities	Total Acres/ Percent of Activity Area
Cabin Lake 26,192	1,923	308	12.7	22	9 %
Crater Buttes 26,416	3,957	318	0.0	0	16 %
Quartz Mountain 34,087	1,431	294	0.4	25	5 %
Sand Springs 55,967	4,436	567	28	42	9 %

Environmental Effects

The potential for detrimental changes to soil physical properties was quantitatively analyzed by the extent (surface area) of structural improvements that would be needed to facilitate the distribution of livestock. Changes in allotment and pasture boundaries have a direct influence on the number and location of range management facilities. Soils dedicated to water developments, the transportation system and cattleguards typically have disturbed properties that remove land from production for as long as the facility remains in use. The best available information about the proposed actions was used in conjunction with the location of activities to analyze the potential effects on the soil resource.

Direct effects occur at essentially the same time and place as the actions that cause soil disturbance, such as soil displacement and compaction caused by concentrated hoof action from livestock. Indirect effects occur sometime after or some distance away from the initial disturbance, such as increased runoff and down-slope erosion from previously compacted areas. Cumulative effects include all past, present, and reasonably foreseeable actions that cause soil disturbance within the same activity areas (range allotments).

Direct and Indirect Effects

Alternative 1 (Current Management)

Alternative 1 would maintain current management within the four range allotments that comprise the planning area. There would be no changes in allotment boundaries and the number of existing pastures. No new structural improvements would be developed in any of the allotments. Stocking levels and the types and number of structural improvements would remain the same within the Quartz Mountain and Sand Springs allotments. Adequate forage is currently available and livestock allocations would remain less than the stocking potential for available forage. The locations of new soil disturbance may vary, but the nature of livestock grazing effects would not change the overall soil conditions within these two allotments. The Cabin Lake and Crater Buttes allotments would remain vacant, and soil conditions on disturbed sites would recover naturally over time. Soil productivity would not change appreciably unless catastrophic wildfires consume surface organic matter and accelerate erosion in forested, transitional range areas of these allotments.

On the Quartz Mountain and Sand Springs allotments, the direct and indirect effects to the soil resource would be essentially the same as those previously described for existing conditions. Livestock impacts to soils would be confined to relatively small concentration areas, such as around water developments. Field visits to the project area identified little or no evidence of degraded range conditions and bare surface soils on upland sites of these allotments. Forage resources would continue to be managed for long-term sustained productivity through attainment of upward or stable vegetative trends (LRMP, page 4-49). Forage utilization would remain at or below the 1990 LRMP allocations. Current range records indicate that forage conditions are generally good with a vegetative trend that is stable. This alternative would be expected to achieve similar results that meet soil resource objectives. Therefore, the extent of detrimental soil conditions would remain within allowable LRMP limits for maintaining soil productivity within each of the allotments.

Alternative 2 (Proposed Action)

Alternative 2 proposes to authorize livestock grazing on the Cabin Lake, Quartz Mountain, and Sand Springs allotments under 10-year grazing permits. The Crater Buttes allotment would be closed to livestock use. The Cabin Lake and Quartz Mountain allotments would be grazed using a rest rotation

system, whereas the Sand Springs Allotment would be managed with a deferred rest-rotation system to protect a sensitive plant species in the Sand Springs Pasture. The proposed action would authorize the construction, maintenance or improvement to structures that facilitate management and distribution of livestock. Livestock numbers and the length of grazing seasons would be based on range conditions specified in the Annual Operating Plan. The forage vegetation and soil resource would be managed in accordance with all applicable Forest Plan standards and guidelines to ensure that long-term sustained productivity will not be impaired by range management practices.

The direct and indirect effects to the soil resource would be similar to those described for Alternative 1 (Current Management). The primary difference is grazing would resume in the Cabin Lake allotment and livestock use would be limited in the Sand Springs Pasture to minimize potential impacts on populations of pumice grape fern. Locations of new soil disturbance would vary due to adjustments in allotment and pasture boundaries, the number of pastures, and structural improvements that would be necessary to implement the proposed action. Livestock impacts to soils would continue to be confined to relatively small concentration areas around structural improvements such as water developments. Detrimental soil disturbances would not be widespread and they are not expected to change the overall soil conditions within the allotments. Implementation of mitigation measures to meet other resource objectives would have no effect on the soil resource. Soil productivity would not change appreciably unless catastrophic wildfires consume surface organic matter and accelerate erosion in forested, transitional range areas.

Under Alternative 2, the proposed range improvements include new fence construction, the development of additional water sets and cattleguards, a new well, and waterline extensions or relocations. None of the proposed locations for new structural facilities occur within old-growth stands of timber. There would be no mechanical disturbances or extraordinary circumstances associated with sensitive soil areas. The subsequent changes in the number and locations of additional facilities would have a negligible effect on overall site productivity within the range allotments.

The installation of new cattleguards in the Cabin Lake allotment would likely disturb a minor amount of soil on or adjacent to existing road beds or OHV trails where soils have been previously impacted by their construction and use. Two (2) new OHV cattleguards and three (3) road cattleguards, including two (2) new ones and one (1) being relocated, would occupy similar areas within currently disturbed portions of existing roads and OHV system trails. One (1) road cattleguard would be installed on an existing road prism within the Sand Springs Allotment. No additional cattleguards would be required to provide access through existing or proposed fence lines in the Quartz Mountain Allotment.

The proposed range improvements for the Quartz Mountain Allotment include six (6) additional water sets and one (1) water trough with a well and storage tank. Range improvements proposed for the Sand Springs Allotment consist of three (3) additional water troughs. No additional watering sites are proposed within the Cabin Lake Allotment. An average of one (1) acre of compacted soil typically occurs in the immediate vicinity of a watering site (see Range Section). Consequently, detrimental soil conditions in the Quartz Mountain Allotment would increase by approximately seven (7) acres, including the small amount of surface area associated with the well and storage tank. Three new water troughs in the Sand Springs Allotment would result in approximately three (3) acres of additional soil impacts. Due to the size of the allotments, the relatively small amount of land dedicated to these water developments is not enough to increase the percentages of detrimental soil conditions above the existing levels for either the Quartz Mountain or Sand Springs allotments, as displayed in Table 35.

New waterline extensions and relocations are proposed in two of the range allotments. In the Sand Springs Allotment, approximately 0.3 miles (0.1 acres) of new pipeline would be installed and about one (1) mile of existing waterline would be moved within the disturbed portion of an existing roadway. Approximately two (2) miles (0.7 acres) of additional pipeline would be installed in the Quartz Mountain Allotment. It is assumed that either a trenching machine or a backhoe with a bucket

no wider than 36 inches would be used to install the new waterline. The effects of only a few equipment passes are not expected to cause detrimental soil compaction. Small areas of soil movement (less than 5 feet wide) or the mixing of soil and surface organic matter does not qualify as detrimental soil displacement (FSM 2520). It is expected that incidental disturbances from equipment maneuvering would be less than 10 feet in width. Due to the size of the allotments, the total amount of ground disturbance from even with a disturbed width of 10 feet would not be enough to increase the percentages of detrimental soil conditions above existing levels for either of these allotments. The relocation of existing waterline would not cause additional soil impacts.

Fence construction and/or reconstruction activities would not be expected to detrimentally disturb the soil. Fence lines have local, site-specific effects on soils, but they are not considered structures that convert the soil to a non-productive condition. Mowing would likely be required to install new fence lines. Mowing activities have been monitored in the past, and results show that increases in soil displacement and compaction are inconsequential (Soil Monitoring Report, 1997). The primary factors that limit soil compaction are the low ground pressure of the tractor and mowing heads, the limited amount of traffic (one equipment pass), and the cushioning effect of surface organic matter. There would be no mechanical disturbance on steep slopes (over 30 percent) or other sensitive soil areas.

The establishment of new study plots within the Cabin Lake, Quartz Mountain, and Sand Springs allotments would not require mechanical disturbance that would increase current levels of detrimental soil conditions.

Based on disturbed area estimates for structural improvements combined with the existing land uses displayed in Table 35, Alternative 2 would not increase the percentages of detrimental soil conditions above existing levels within any of the three allotments proposed for range management activities. The cumulative amount of detrimentally disturbed soil from all management facilities would remain well within the allowable LRMP limit for maintaining soil productivity.

The direct and indirect effects of livestock movement and grazing in random locations are not expected to create unsatisfactory range conditions over extensive areas of these allotments. The effects of shallow compaction caused by livestock treading does not inhibit the growth of grasses and other forage plants because it generally recovers through natural means, such as from frost heave, freeze-thaw and wet-dry cycles.

Appropriate stocking levels, rotation of grazing use, and periodic rest of pastures would ensure adequate ground cover protection in all three range allotments proposed for livestock grazing. Forage resources would be managed for long-term sustained productivity through attainment of upward or stable vegetative trends (LRMP, page 4-49). Current range records indicate that forage conditions are generally good with a vegetative trend that is stable within the Quartz Mountain and Sand Springs allotments. Forage conditions are considered to be fair to good with a stable vegetative trend within the Cabin Lake Allotment. The proposed management for this alternative is expected to achieve similar results because forage utilization would remain at or below the 1990 LRMP allocations. Proper implementation of these management requirements would maintain acceptable soil productivity within each of the allotments. Herbaceous and woody plant materials combined with litter and surface rock fragments would effectively minimize the potential for surface erosion by water or wind.

Alternative 3 (No Grazing)

Alternative 3 would terminate the allotment management plans for the Quartz Mountain and Sand Springs allotments. The Cabin Lake and Crater Buttes allotments would remain vacant. Future grazing by livestock would be discontinued within all four range allotments.

Detrimental soil conditions from range management activities would not increase because no additional land would be removed from production to build structural improvements within the allotments. Existing facilities would be removed, but it is unlikely that reclamation treatments (i.e., soil tillage) would be accomplished around unneeded water developments. Some of these sites would likely become dispersed campsites due to existing access roads. Therefore, the detrimental effects of soil compaction and accelerated surface erosion would remain unchanged for an extended period of time.

On upland sites not associated with livestock concentration areas, the localized effects of soil displacement, loss of vegetative cover, and shallow compaction from livestock treading would be expected to recover through natural processes over time. Surface erosion would decrease as vegetation becomes established on disturbed sites.

In the short term, the amount of surface organic matter and coarse woody debris would gradually increase or remain the same. In the long term, fuel accumulations would increase the risk for intense wild land fires and adverse effects to soil productivity. The forested, transitional range sites would be the most vulnerable due to the type and amount of fuels. Severely burned soils would most likely occur where fire consumes thick brush or dense stands of trees. Surface soils and their nutrient reserves could be lost through accelerated erosion rates as a result of lost surface cover and reduced infiltration rates on water repellent soils. There is low risk of soil mass failures (landslides) within these allotments due to the stability of representative landtypes and absence of wet soils on steep slopes.

Alternative 4 (No Grazing within Sand Springs Pasture)

Alternative 4 is essentially the same as the proposed actions previously described for Alternative 2 (above). The primary difference is livestock grazing would be deferred in the Sand Springs Pasture for a seven year period (2007 through 2013) to monitor population trends of a sensitive plant species, pumice grape fern. Livestock management on the remainder of the Sand Springs Allotment and within the Cabin Lake, Quartz Mountain, and Crater Buttes allotments would follow the proposed action specified under Alternative 2. Livestock grazing on the Cabin Lake, Quartz Mountain, and the four (4) remaining pastures of the Sand Springs allotments would be authorized under a rest-rotation grazing system for a 10 year period. The Crater Buttes allotment would be closed to livestock use. It would authorize the construction, maintenance or improvement to structures that facilitate management and distribution of livestock within each of the pastures where grazing is allowed during the permit period. No changes in existing structural improvements would occur in the Sand Springs Pasture until a decision is made in 2016 regarding the future of grazing within this pasture. Existing structural improvements would remain in place during the seven-year monitoring period. Livestock numbers and the length of grazing seasons would be based on range conditions specified in the Annual Operating Plan. The forage vegetation and soil resource would be managed in accordance with all applicable Forest Plan standards and guidelines to ensure that long-term sustained productivity will not be impaired by range management practices. Forage utilization would remain below the 1990 LRMP allocations.

Six (6) monitoring plots, including three (3) control plots, would be established to monitor the effects of grazing on pumice grape fern. Although some of these plots would be fenced to exclude cattle, the minor amount of ground disturbance around individual fence posts would not result in a measurable increase in detrimental soil conditions. Following the initial seven-year monitoring period in the Sand Springs Pasture, this alternative may include the placement of two (2) additional water sets for monitoring the effects of cattle use in grape fern population areas. Following the placement of these water sets, approximately two (2) acres of additional soil impacts would occur within the Sand Springs Allotment. Due to the size of this allotment, this relatively small amount of disturbance is not enough to increase the percentage of detrimental soil conditions above the existing level displayed in Table 34.

The direct and indirect effects to the soil resource would be the same as those previously described for Alternative 2. Livestock movement and grazing effects in random locations are not expected to create unsatisfactory range conditions over extensive areas of the Cabin Lake, Quartz Mountain, and specific pastures of the Sand Springs allotments. Most detrimental soil conditions from range management activities are associated with the structural improvements needed to facilitate the distribution of livestock. As previously described under Alternative 2, range improvements for the Sand Springs Allotment include three new water troughs and approximately one (1) mile of water line extension. Under Alternative 4, approximately one-quarter (0.25) mile of water line extension and one of the water troughs would not be placed until a decision is made in 2016 to either close or continue grazing in the Sand Springs Pasture. No structural improvements (including fences, water sets, cattleguards, gates, and water troughs) would be removed or rehabilitated until a subsequent analysis and decision is made in 2016. Under Alternative 4, the cumulative amount of detrimentally disturbed soil from all management facilities and current activities would remain well within the allowable LRMP limit for maintaining soil productivity within each of the range allotments authorized for livestock grazing.

Soil Restoration Opportunities

Soils dedicated to areas around water developments and other range improvements sets are considered an irretrievable loss of soil productivity until their functions have been served and disturbed sites are returned back to a productive capacity. Where existing watering sites are no longer needed to meet management needs, options for rehabilitating disturbed sites include soil tillage (subsoiling) treatments to loosen compacted soils or allowing natural processes to reestablish native vegetation over time.

Although restoration treatments are not required mitigation for this project, these activities would stabilize detrimentally disturbed soils and reduce the risk of accelerated erosion much more rapidly than waiting on natural processes. When soil degradation occurs in semiarid, high desert regions, natural processes are slow to return site productivity (USDI, Southeastern Oregon Resource Management Plan, 2001).

Where reclamation treatments are the preferred option on these disturbed sites, plans should include the use of soil tillage to loosen compacted soils around abandoned watering sites. Seeding and/or mulching may also be necessary to achieve a minimum of 20 to 30 percent ground cover within the first year following treatment (LRMP SL-6, page 4-70 and 4-71).

Cumulative Effects

Cumulative effects on the soil resource include all past, present, and reasonably foreseeable actions that cause soil disturbance within the same activity areas (Cabin Lake, Crater Buttes, Quartz Mountain, and Sand Springs range allotments) on National Forest System lands. LRMP standards and guidelines for soil productivity are not intended for private land and Bureau of Land Management (BLM) lands.

Current disturbances associated with past management activities and specific land uses were previously described under Existing Condition of the Soil Resource. Table 36 displays specific land-use sources and the estimated extent of detrimental soil conditions in acres and percentages for each of the range allotments within the planning area. None of the four range allotments currently exceed Regional policy or the LRMP standard of 20 percent detrimental soil conditions.

The combined effects of current disturbances and the proposed management for each of the alternatives were previously addressed under direct and indirect effects. Under Alternative 1 (Current Management), the environmental effects to soils would be essentially the same as those previously described for existing conditions. Stocking levels and the types and number of structural improvements would remain the same within the Quartz Mountain and Sand Springs allotments.

Appropriate stocking levels, rotation of grazing use, and periodic rest of pastures would continue to ensure adequate ground cover that effectively minimizes erosion and maintains acceptable soil productivity within these active range allotments. The Cabin Lake and Crater Buttes allotments would remain vacant, and soil conditions on disturbed sites would recover naturally over time. The cumulative amount of detrimentally disturbed soil from range structural improvements and all other management facilities would remain well within the allowable LRMP limit for maintaining soil productivity within each of the range allotments.

Alternative 2 (Proposed Action) would authorize livestock grazing on the Cabin Lake, Quartz Mountain, and Sand Springs allotments. The Crater Buttes allotment would be closed to livestock use.

The forage vegetation and soil resource would continue to be managed in accordance with all applicable LRMP standards and guidelines to ensure that long-term sustained productivity will not be impaired by range management practices. Based on disturbed area estimates for new structural improvements combined with all the other management facilities within the allotments, the cumulative amount of detrimentally disturbed soil would not increase above the existing percentages (Table 35).

Alternative 3 (No Grazing) This alternative would terminate the allotment management plans for the Quartz Mountain and Sand Springs allotments. The Cabin Lake and Crater Buttes allotments would remain vacant. Future grazing by livestock would be discontinued within all four range allotments. The extent of detrimental soil conditions would not increase above existing levels because no additional land would be removed from production to build structural improvements. Existing range facilities would be removed from the allotments. Compacted soils around existing water developments would either be reclaimed by soil tillage (subsoiling) treatments or through natural processes depending on funding availability. Although subsoiling treatments would provide immediate benefits to soil quality, it is expected that current soil impacts would remain unchanged for an extended period of time. Therefore, there would be no measurable change from the existing amount of detrimentally disturbed soil displayed for each of the allotments in Table 35.

The localized effects of livestock treading, away from concentration areas, would be expected to recover naturally in the short term. There are no site-specific areas where livestock movement and grazing effects have caused unsatisfactory range conditions. Upland range sites are currently providing adequate sources of surface cover that meet soil resource objectives. Livestock have not removed existing sources of coarse woody debris.

Foreseeable Actions Common to All Alternatives

Future management activities are assumed to occur as planned in the schedule of projects for the Deschutes National Forest. Foreseeable actions include silvicultural and fuel reduction treatments, continued recreation use, standard road maintenance, and prescribed maintenance burning to reduce hazardous fuels and the risk for intense wild land fires.

The proposed actions for the Opine Vegetation Management project include the use of ground-based equipment to reduce stand densities on approximately 1,827 acres within the Sand Springs Allotment. The development and use of temporary roads, log landings, and skid trail systems would cause cumulative increases in the amount of detrimentally disturbed soil on portions of this allotment. There would be no new construction of temporary roads or logging facilities on slopes greater than 30 percent or sensitive soils with high erosion hazards. No new roads would be retained as part of the transportation system. It is predicted that the proposed harvest and yarding activities would result in a total increase of approximately 289 acres of additional soil impacts within the Sand Springs Allotment. The overall effects of the proposed range management activities combined with these foreseeable actions would increase the percentage of detrimental soil conditions from the existing 9 percent to approximately 10 percent of acreage within the Sand Springs Allotment. Table 35 displays specific land-use sources and the estimated extent of cumulative soil impacts in acres and percentages for each of the range allotments within the planning area.

The Opine project also proposes hand felling trees with chainsaws, mechanical and hand piling fuel accumulations, mowing brush, and the use of prescribed fire in activity areas encompassed by the Sand Springs Allotment. Some of the non-commercial trees, including juniper removal, would be hand-felled and retained on site within activity areas proposed for enhancement of range conditions and/or sage grouse habitat. These non-mechanical treatments would not cause additional soil impacts. The felled trees would provide surface cover and a source of nutrients as these organic materials gradually decompose. Most of the slash generated from harvest activities would be machine piled and burned on log landings and main skid trails. Pile burning on these sites would not cause additional soil impacts because the effects would occur on previously disturbed soils. Non-mechanical slash treatments would not cause soil displacement or compaction damage and burning small concentrations of slash would not elevate surface temperatures long enough to cause severely burned soils. The effects of mowing activities have been monitored in the past and results show no measurable increases in soil displacement or compaction (Soil Monitoring Report, 1997). Planned ignitions for prescribed underburns are timed for periods of higher fuel moistures resulting in low-to-moderate intensity burns that do not cause detrimental changes to soil properties. Therefore, the minor extent of incidental soil disturbances associated with all of the management activities listed above are not expected to cause measurable increases in the percentages of detrimental soil conditions shown in Table 36.

The Clunker timber sale is currently implementing commercial thinning treatments on forested, transitional range sites of two allotments. The proposed harvest and yarding activities include the use of ground-based equipment on portions of approximately 654 harvest unit acres within the Cabin Lake Allotment and 460 acres within the Crater Buttes Allotment. There would be no new construction of temporary roads or logging facilities on slopes greater than 30 percent or sensitive soils with high erosion hazards. It is predicted that the development and use of temporary roads and logging facilities will result in a total increase of approximately 85 acres of detrimentally disturbed soil within the Cabin Lake Allotment. About 60 acres of additional soil impacts will likely occur within the Crater Buttes Allotment. Most of the slash generated from harvest activities would be machine piled and burned on log landings and main skid trails. Non-mechanical treatments, including the use of prescribed fire, are not expected to cause measurable increases in the percentages of detrimental soil conditions in other portions of planned activity areas. Table 36 displays the estimated extent of cumulative soil impacts in acres and percentages for each of these range allotments.

The Electra timber sale would use ground-based equipment to reduce stand densities on approximately 105 acres within the Cabin Lake Allotment. There would be no new construction of temporary roads or logging facilities on slopes greater than 30 percent or sensitive soils with high erosion hazards. It is predicted that logging facilities for the proposed harvest and yarding activities would result in a total increase of approximately 14 acres of additional soil impacts. Slash generated from harvest activities would be machine piled and burned on log landings and main skid trails. The minor extent of incidental soil disturbances associated with other fuel reduction treatments are not expected to cause detrimental soil conditions. The estimated extent of cumulative soil impacts within the Cabin Lake Allotment is included in Table 36.

The Aspen Vegetation Management project would authorize vegetation management and fuel reduction treatments to enhance and protect winter range habitat for mule deer. The planning area overlaps with the southeastern portions of the Quartz Mountain and Sand Springs allotments. The proposed actions include hand felling trees, juniper removal (hand felling), mechanical fuel treatments (i.e., piling, mulching), mowing brush, prescribed underburning, and road decommissioning treatments. There would be no commercial timber harvest. Hand felling trees would not cause additional soil impacts. The use of specialized equipment to treat fuel accumulations would only be used where machine piling could not be employed on previously disturbed sites such as roads or skid trail systems. There would be no mechanical disturbance on sensitive soils and slopes greater than 30 percent. Project design elements would be implemented to avoid or minimize mechanical impacts to the soil in random locations of activity areas. There would be no additional soil compaction from

mechanical fuel treatments because machinery would only be allowed to make no more than two passes on any site-specific area. Planned ignitions for prescribed underburns are timed for periods of higher fuel moistures resulting in low-to-moderate intensity burns that do not cause detrimental changes to soil properties. Therefore, the minor extent of incidental soil disturbances from fuel reduction treatments would not result in cumulative long-term changes to soil properties in any of the activity areas. Approximately 4.0 miles (6.0 acres) of existing road are proposed for decommissioning treatments that would include subsoiling to reduce the amount of detrimentally compacted soil. Due to the size of the range allotments and the limited amount of surface area associated with these road segments, the percentages of detrimental soil conditions would remain at current levels following decommissioning treatments. Therefore, the Aspen project would have no measurable increases or decreases in the extent of detrimental soil conditions shown in Table 36.

Table 35. Estimated Extent of Cumulative Soil Impacts within each of the Range Allotments of the Cluster II Project Area

Activity Area	Land Use Disturbed Acres				Existing Detrimental Soil Conditions
Allotment Name/ Allotment Acres	Logging Facilities	Roads & Rock Pits	Recreation Facilities	Livestock Watering Facilities	Total Acres/ Percent of Activity Area
Cabin Lake 26,192	2,022	308	12.7	22	9 %
Crater Buttes 26,416	4,017	318	0.0	0.0	16 %
Quartz Mountain 34,087	1,431	294	0.4	32	5 %
Sand Springs 55,967	4,725	567	28.0	45	10 %

Estimates of existing and cumulative amounts of detrimental soil conditions are displayed in Table 35 and Table 36 respectively. Based on disturbed area estimates and the size of the activity areas (range allotments), it was determined that the percentages of detrimental soil conditions would remain at current levels following the development of future facilities within the Cabin Lake, Crater Buttes, and Quartz Mountain allotments. Future harvest and yarding activities would result in a total increase of approximately 289 acres or 0.5 percent of additional soil impacts within the Sand Springs Allotment. Rounding increases the percentage of detrimental soil conditions from 9 percent to 10 percent within this allotment. Therefore, the overall effects of the proposed range management activities combined with all reasonably foreseeable actions would still remain within the LRMP standard of 20 percent for all four range allotments within the planning area.

The LRMP (SL-4, page 4-70) directs the use of rehabilitation measures when the cumulative impacts of management activities are expected to cause detrimental soil conditions that exceed more than 20 percent of an activity area. This type of mitigation is included in project plans for all current and reasonably foreseeable harvest activities. Soil restoration treatments (subsoiling) would improve the hydrologic function and productivity on disturbed soils by fracturing compacted soil layers and increasing porosity within soil profiles. Subsequently, this would contribute to increased water infiltration and enhanced vegetative root development. The extent of soil impacts from past harvest and similar foreseeable actions occur in smaller portions of the much larger range allotments. Therefore, the cumulative amount of detrimentally disturbed soil within each of the range allotments would remain within allowable LRMP limits for maintaining soil productivity.

The effects of other foreseeable management activities are relatively minor in comparison to soil impacts associated with the transportation system and ground-based logging facilities. Soil

disturbances from future recreation use would continue to be confined to small sites that have a minor effect on overall site productivity within the range allotments. The current amount of soil dedicated to developed recreation facilities is approximately 41 acres or 0.03 percent of the planning area. Future upgrades to existing OHV facilities (i.e., trails, trailheads, staging areas, play areas) would mainly use previously disturbed sites such as existing roads, skid trails and cinder/rock pits to limit the amount of new soil disturbance. Impacts from dispersed recreation use are expected to occur in similar locations associated with existing roads, old skid trail networks, and around water sets. Much of the soil on and adjacent to these sites has already been disturbed by previous development and use. Conservative estimates were used to account for existing logging facilities and the extent of user-created trails is likely included in these estimates. Dispersed recreation activities would not add appreciable amounts of soil damage above existing levels. Therefore, the cumulative amount of detrimental soil conditions from current and future dispersed recreation use is not expected to have a measurable effect on overall site productivity within any of the range allotments.

Road condition surveys will continue to be performed at regular intervals to prioritize where maintenance activities are needed to improve the tread surface and maintain erosion-control drainage structures on existing roads. Road maintenance activities do not cause additional soil impacts because equipment operations occur on previously disturbed roadbeds that already have detrimental soil conditions. There are no soil-related concerns associated with these current and future activities because road maintenance reduces the potential for indirect effects to soils in areas adjacent to roadways.

The effects of prescribed maintenance burning would be similar to those described for the fuel reduction treatments proposed with the Opine and Aspen vegetation management projects. These activities would be conducted at times and under conditions that maximize benefits while reducing the risk of resource damage. Fuel reductions achieved through planned ignitions usually burn with low-to-moderate intensities that do not cause detrimental changes in soil properties. There are no soil-related concerns associated with the combined effects of future fuel-reduction activities. Beneficial effects include a reduction of fuel loadings and wildfire potential as well as nutrient releases that benefit site productivity in burned areas.

Under all alternatives, the overall effects of the proposed range management combined with all past, present, and foreseeable management activities would be within allowable limits set by Regional policy (FSM 2520, R-6 Supplement) and LRMP standards and guidelines for maintaining soil productivity.

Forest Plan Consistency

Under all alternatives, the minor amount of soil dedicated to structural improvements (i.e., water developments, pipelines, and cattleguards) would be less than 0.1 percent for each of the four range allotments (activity areas) within the planning area. Fence lines are not considered structures that convert the soil to a non-productive condition. Mowing activities for fence construction would not cause mechanical disturbance on sensitive soil areas. The cumulative amount of detrimentally disturbed soil from range structural improvements and all other management facilities would remain well within allowable limits set by LRMP standards and guidelines for maintaining soil productivity within each of the allotments.

Under all alternatives, the proposed management would maintain a stable vegetative trend and acceptable soil productivity within each range allotment. The localized effects of soil disturbance caused livestock treading in random locations would be expected to recover in the short-term through natural processes. Livestock grazing does not remove existing sources of coarse woody debris. The forage resource would continue to be managed for long-term sustained productivity that meets soil resource objectives.

Biological Soil Crusts

Biological soil crusts, also known as microbiotic crusts, cryptogamic crusts, or cryptobiotic crusts, are an important part of the arid and semi-arid ecosystems of the intermountain west. These crusts are composed of lichens, mosses, microfungi, bacteria, and green algae that grow on top of the soil in a rough, uneven carpet, in the interspaces between shrubs and grasses. They function as “biological mulch,” helping to reduce wind and water erosion, fix atmospheric nitrogen, contribute to soil organic matter, retain soil moisture, enhance vascular plant regeneration, and help prevent noxious weed establishment, including cheatgrass (U.S. Department of the Interior Technical Report 1730-2, *Biological Soil Crusts: Ecology and Management*, 2001).

Existing Condition

Most of the project area can be considered potential crust habitat. Currently, soil crusts within the project area are patchy at best. In most places, the crust does not exist except under shrubs, where they have been protected from the hoof action of livestock, deer, and elk. In the mid-1990s, in an informal survey, district botany personnel collected crust specimens from places adjacent to the project area, and while no rare species were located, they found that crust development was more continuous and the species diversity within them was higher in long-term exclosures (30 years) than in crusts found outside the exclosures (Internal summary, Joslin ca 1995).

In September 2004, Jennifer Hutchinson, a botanist with a master’s degree in lichens, spent a few days looking at the crusts in the project. She did not find any rare or sensitive-list species in the specimens she took. After identifying some of the specimens, it was determined that the area survey only had common species and a low potential for rare or sensitive species.

Environmental Effects

Alternative 1 – No Change, Current Management

Direct, Indirect, and Cumulative Effects: Many studies have shown that livestock grazing is detrimental to crust cover and crust species richness (USDI 2001, page 50). Although no baseline data are available from the time prior to livestock grazing, it is likely that the use of sheep and cattle within the project area has almost certainly reduced the amount and coverage of crusts.

Past wildfire activity occurred on the order of 10 to 40 years or so across the breadth of the allotments. Hot fires will generally kill biological crusts (USDI 2001) but historic fires in the area (pre-suppression) are thought to have been of low-intensity. A crust’s structural matrix is generally left intact by low-intensity fire (USDI 2001) and unburned patches act as refugia to provide propagules to colonize burned areas. This scenario can be assumed up to the time of the first grazing by sheep and cattle in the area, which occurred sometime in the 1920s or 1930s (Don Sargent, pers. comm. Fall 2004). After this time, it can be assumed that intense hoof action broke down the integrity of the crusts.

Sometime in the past century, cheatgrass (*Bromus tectorum*) entered the project area and has never left. This species is an annual exotic grass and as such can pose a long-term threat to biological soil crusts (USDI 2001). Such invasions have been shown to inhibit crust development (USDI 2001). There are places within the project area that are dominated or co-dominated by cheatgrass, such as at water sets and hunter camps. In these sites, continued disruption of the soil is also a crust inhibitor.

Prescribed burning is proposed in the Flattop and Aspen environmental assessments. This will kill what crusts exist in those areas because the treatments will occur within areas containing older shrubs, areas which have not had fire in many years. This means the burns will likely be hotter and more destructive to soil crusts than what typically occurred historically. (There will not be prescribed

burning within areas that have been treated within the past 15 years, which would be more tolerable to whatever crusts might be present because of the expected lower intensity of the burn.). This, combined with wildfire, grazing, future prescribed burning, and cheatgrass, suggests that biological soil crusts will continue to have a difficult time becoming established and diverse.

Crater Buttes Allotment: This allotment has not had cattle grazing for many years. A positive effect - crusts returning to the interspaces between shrubs and species richness within the crusts -- can be expected from this allotment remaining inactive, although it will take many more years for the crusts to reach their full potential.

All other allotments:

There are exclosures of various sizes and in various locations within the pastures of the Cluster II project. In these exclosures there would be an expected rise in crust health and development, especially if they are also deer-proof.

The crusts in these allotments would not be expected to recuperate, as grazing and deer and elk use will continue there under this alternative. What crusts exist are likely to remain under the shrubs, until such time as a wildfire takes them out completely.

Alternative 2: Proposed Action

Those effects discussed under the Alternative 1 also apply here to Alternative 2.

Alternative 3: No Grazing

With livestock grazing halted, over time, but in concert with fires (prescribed and wild), concentrated deer and elk use, and other uses of the forest, crusts can be expected to eventually return but would experience cycles of expansion and contraction into areas previously devoid of crusts or of having a minor representation of crusts.

Alternative 4

Effects are the same as for Alternative 2 in all allotments and pastures except for the Sand Springs pasture. In the Sand Springs pasture, there would be little noticeable change in crusts for the first seven years of no-grazing, although like Alternative 3, crust cover would be expected to incrementally increase during this time. When the cattle are allowed to graze once again in this pasture, the shift toward increasing crust cover would be halted.

Heritage Resources

The management direction for cultural resources is found in the Deschutes National Forest Resource Management Plan, in the Forest Service Manual section 2360, in federal regulations 36CFR64 and 36CFR800 (amended May 1999), and in various federal laws including the National Historic Preservation Act of 1966 (as amended), the National Environmental Policy Act, and the National Forest Management Act, and the Programmatic Agreement of 1995 Among the USDA, Forest Service, Pacific Northwest Region (Region 6).

In general, the existing management direction asks the Forest to consider the effects on cultural resources when considering projects that fall within the Forest's jurisdiction. Further direction indicates that the Forest will determine what cultural resources are present on the forest, evaluate each resource for eligibility to the National Register of Historic Places (Register) and protect or mitigate effects to resources that are eligible (CR-1, CR-2, CR-3, and CR-4).

Relevant Forest Plan Standards and guides include:

CR-1 states that in compliance with applicable Federal historic preservation legislation (National Historic Preservation Act, Executive Order 11593), a professionally supervised cultural resource inventory program will be conducted on both a Forest-wide and project specific level. The surveys will be conducted according to an inventory plan and research design agreed to by the Forest Service and the Historic Preservation Office (SHPO).

CR-2 states that cultural resource properties located during inventory will be evaluated for eligibility to the Register.

CR3 states that in concert with inventories and evaluations the Forest will develop thematic Register nominations and management plans for various classes of cultural resources.

CR4 indicates that project level inventories or the intent to conduct such shall be documented through environmental analysis for the project.

Desired Condition

The desired condition is not clearly stated in the Forest Plan but can be derived from the implied goals of the Standards and Guides and the Monitoring Plan. It would be desired to know the location and extent of all cultural resources, have evaluated each one for eligibility to the Register, and have developed management plans for eligible properties that would provide protection or mitigate effects that will occur to the resource.

Existing Condition

In accordance with the Standards and Guidelines (CR-1) a professionally-supervised cultural resource inventory program has been developed for the Forest and District level projects. In the early 1990s a Geographic Information Systems (GIS) database was developed to summarize and compile known and newly recorded cultural resource information identified through surveys. Surveys are conducted using 30 meter spaced pedestrian transects and designed on probability models for high or low occurrence of historic properties. Survey standards meet the inventory plan and research design agreed to by the Forest Service and the Oregon Historic Preservation Office (OSHPO).

A GIS analysis for the total number of previous surveys and sites was made for the Cluster II Planning Area. The analysis shows 43,497 acres or 30% has been previously surveyed. A total of 324 sites have so far been recorded, 243 point sites (2 acres or less), 68 polygon sites (over 2 acres) and 13 line sites (linear features of any length). A total of 324 sites have been recorded. Ninety-nine sites have been determined to be eligible for the National Register of Historic Places (NRHP); 45 sites have been

determined ineligible; and the remaining 180 sites have not been evaluated and are potentially eligible for the NHRP. There are four sites lying adjacent to a proposed fence line in Township 22 South, Range 16 East, Section 33. The sites have not been evaluated and are potentially eligible. Monitoring will be necessary to ensure the sites are avoided at the time of fence construction.

The District cultural resources files contain records of past Range Allotment Plans occurring in the area since the early 1930s. In an overview of cultural resources of the Deschutes National Forest Goddard and Bryant (1979) discuss livestock grazing as being on the Forest as early as the 1880s with the cattle grazing allotment system created by the Forest Service in 1906. Sheep were the major livestock that were grazed on the southern end of the District until the 1960s when cattle replaced much of the sheep herds. Evidence for grazing can still be seen as stock driveways and an occasional metal sign proclaiming that the route is a stock driveway. As today, sources for water were not present in the Cluster II Allotment analysis area, water was hauled in by the permittee from wells or improvements such as – water sets, waterlines, and water troughs.

The Programmatic Agreement of 2004 Among the United States Forest Service, Pacific Northwest Region, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Office regarding cultural resource management on National Forests in the State of Oregon, has streamlined procedures, for some undertakings. Certain activities are identified in the Programmatic Agreement that are excluded from case-by-case review for compliance with Section 106 of the National Historic Preservation Act because they have little or no potential to effect cultural resources. A determination by the Cultural Resource Specialist may require inspection or monitoring of the undertaking.

Some of the range improvements proposed in the Action Alternatives are exempt from Section 106 compliance review. These include:

- Fence construction and maintenance that does not require blading of the fence line and that does not disturb rock cairns or channel animals in transportation corridors through archaeological sites.
- Cattle guard installation and other such road facilities within the road prism.
- New construction of above-ground water holding tanks and lines with no new ground disturbance.
- Removing and replacing non-historic culverts that are located entirely within the road prism.
- Construction of corrals and other fence structures that lead to the concentration of livestock in a confined area.
- Range improvements or/maintenance (e.g., pipelines and reservoirs).
- Replacement of non-historic watering troughs with no new ground disturbance.
- Establishment of long-term study plots for botanical research projects; botanical re-introduction studies which may involve driving stakes (i.e., rebar or angle iron) in the ground several feet, to serve as reference points.

Effects Determination

Alternative 1 (Current Management)

Since this alternative would authorize existing activities that are exempt under the Forest Service PA and would occur in existing or already disturbed areas there would be no direct, indirect, or cumulative effects on cultural resources.

The District records contain information of past use within allotments, they discuss early history of use including improvements such as fences and water sets and seasons animals were grazed, and type and numbers of animal grazed. Because monitoring for effects of dispersed grazing on the Forest has not

been conducted, levels for definable damage to cultural resources are not known; however, grazing is recognized as having effects on the surface component of a cultural site. Although discussion for effects from grazing has not been documented it could be assumed that disturbance to surface site manifestations are directly proportional to the number of animals grazed. The buried component of a site, generally anything below 30 centimeters (approximately 12 inches), does not appear to be affected under normal grazing practices.

In a protocol implementing the BLM national cultural resources Programmatic Agreement (PA) in Oregon and agreed upon by the Oregon State Historic Preservation Office of Oregon (OSHPO) grazing is regarded as having a low potential to impact cultural resource values, concerns arise for cultural resources in areas where specific land disturbing developments or activities are initiated. Such activities could include where animals tend to congregate, such as around water sets and salt licks; new fence construction; and the rehabilitation of water sets. These actions could expose sites currently below the ground surface, displace artifacts within sites, and could lead to breakage of some artifacts. Disturbance to unknown sites could lead to a loss of information regarding the activities that took place at these sites, when they occurred and for how long.

From the standpoint of cultural resources the potential for the most impact would be associated where cattle tend to congregate; for instance around water set and salt licks, which are usually placed near the water source. Even if water set locations had been previously surveyed, there is still the possibility for the presence of buried cultural deposits at these locations as well as proposed new locations. At this time water sets are not located in areas of known sites however it would be necessary to monitor during subsoiling activities to ensure that potentially unknown buried deposits of cultural resources are not disturbed.

Alternative 2 (Proposed Action)

In Alternative 2 proposed actions are exempt under the Programmatic Agreement of 2004. There would be a total of 19.5 miles of new fencing constructed. New fence construction requires vegetation to be mowed to a minimum height of 6-8 inches with a strip width of 8 feet. This would be accomplished by using a wheeled farm tractor with an attached mower. Metal fence posts would be hammered into the ground using a post driver. Although mowing is exempt under the 2004 PA, there is a potential for impacting sites in areas where the topography is uneven and the mowing machine may hit the surface causing disturbance to the ground surface therefore monitoring for mowing in areas of known cultural sites would be required to ensure cultural resources are not impacted. Six new road cattleguards and 2 new OHV cattleguards would be constructed; one cattleguard in the Cabin Lake Allotment would be removed and relocated. All cattleguard placements, removals, and relocations would occur within the existing road prism. These undertakings are also exempt.

Water holding tanks and lines are exempt under the 2004 PA. In the Quartz Mountain Allotment an above ground metal storage tank of five thousand gallons would be placed on the surface at the junction of Road 2268/280. In the Sand Spring Allotment approximately 1.25 miles of waterline extensions from existing waterlines, and 2 miles of new waterline in the Quartz Mountain Allotment would be constructed for a total of 3.25 miles. The ditch for the waterlines would be constructed using a backhoe with a bucket width of 24 inches or less or by using a "ditch witch" or comparable equipment to a depth of approximately 18 inches. Overall disturbance would be less than 2 acres. The installation of pipelines is exempt; however, there is a potential for impacting buried sites. Therefore monitoring would be required during the digging phase of this activity. A total of two new wells would be drilled. Monitoring at the time of drilling would be required to ensure buried cultural deposits are not impacted.

Placements of water troughs and water sets are exempt under the 2004 PA. Water troughs are not moved after the season, but water sets are removed after each season. Two new water troughs and six new water sets would be established by setting them on the ground. A total of six new condition and

trend study plots would be established, all exempt under the 2004 PA because there is no potential to impact cultural resources. One trickle tank located in T23S R15E Section 3 that has not been maintained for the past 13 years and one water set in T23S R15E Section 10 would be decommissioned by abandonment and no longer used because of the disturbance that maintenance would create traveling to it. Decommissioning the trickle tank and water set would have no potential to impact cultural properties and is therefore exempt under the PA.

Through surface surveys and probability models the occurrence of surface manifestations for sites can be determined; however, the buried component cannot be known without testing and therefore there is the potential to impact unknown sites during construction of water lines. Installation of water lines at the depth of approximately 18 inches exceeds the approximately 12 inches recognized as the depth for buried components of a site, it could expose unknown sites currently below the ground surface, damage site matrices, and could break some artifacts. Disturbance to unknown sites could lead to a loss of information regarding the activities that took place at these sites, when they occurred, and for how long and therefore could have direct, indirect, or cumulative effects on cultural resources. Monitoring for subsoiling below 12 inches in waterline extensions would be required to ensure known or unknown cultural resources are not impacted.

The same discussions regarding the impacts of grazing under Alternative 1, apply to this alternative.

Alternative 3

The Crater Buttes Allotment would have no improvements. There is approximately 6.5 miles of allotment boundary fence associated with Gebhardt Well Allotment to the south located along the southeast boundary of the allotment. This fence would remain as long as grazing continued in the Gebhardt Well allotment and that allotment remained open.

The removal of fences, road cattleguards and OHV cattleguards, water troughs, trick tanks, and abandonment of water lines are exempt under conditions of the Programmatic Agreement of 2004 because they have little or no potential to affect historic properties as stated in Appendix A or if the proposed actions would require inspection or monitoring as stated in Appendix B. Throughout the analysis area there are fifty-three (53) water sets, twenty-one (21) in the Sand Springs Allotment; ten (10) water sets, in the Quartz Mountain Allotment; and twenty-two (22) water sets in the Cabin Lake Allotment. The Crater Butte Allotment does not have water sets because there is no grazing. Water sets are approximately one acre in size, for a total of approximately 53 acres in this project that would be rehabilitated by subsoiling if time, money, and personnel permit. Rehabilitation would involve subsoiling to a depth of up to approximately 30 inches using a winged subsoiler pulled behind a

Alternative 4

Constructing exclosures for the test plots are exempt under Appendix C because this undertaking does not have the potential to cause effects on historic properties. The remaining proposed actions for Alternative 4 proposed actions are exempt under the Programmatic Agreement of 2004. There would be a total of 19.5 miles of new fencing constructed. New fence construction requires vegetation to be mowed to a minimum height of 6-8 inches with a strip width of 8 feet. This would be accomplished by using a wheeled farm tractor with an attached mower. Metal fence posts would be hammered into the ground using a post driver. Although mowing is exempt under Appendix A, #1 of the 2004 PA there is a potential for impacting sites in areas where the topography is uneven and the mowing machine may hit the surface causing disturbance to the ground surface therefore monitoring for mowing in areas of known cultural sites would be required to ensure cultural resources are not impacted. Six new road cattleguards and 2 new OHV cattleguards would be constructed; one cattleguard in the Cabin Lake Allotment would be removed and relocated. All cattleguard placements, removals, and relocations would occur within the existing road prism. These undertakings are exempt under the 2004 PA.

Water holding tanks and lines are exempt under the PA. In the Quartz Mountain Allotment an above ground metal storage tank of five thousand gallons would be placed on the surface at the junction of Road 2268/280. In the Sand Spring Allotment approximately 1.0 miles of waterline extensions from existing waterlines, and 2 miles of new waterline in the Quartz Mountain Allotment would be constructed for a total of 3.0 miles. The ditch for the waterlines would be constructed using a backhoe with a bucket width of 24 inches or less or by using a “ditch witch” or comparable equipment to a depth of approximately 18 inches. Overall disturbance would be less than 2 acres. The installation of pipelines is exempt; however, there is a potential for impacting buried sites therefore monitoring would be required during the digging phase of this activity. A total of two new wells would be drilled. Monitoring at the time of drilling would be required to ensure buried cultural deposits are not impacted.

Two new water troughs and six new water sets would be established by setting them on the ground. A total of six new condition and trend study plots would be established, all exempt under Appendix C because there is no potential to impact cultural resources. One trickle tank located in T23S R15E Section 3 that has not been maintained for the past 13 years and one water set in T23S R15E Section 10 would be decommissioned by abandonment and no longer used because of the disturbance that maintenance would create traveling to it. Decommissioning the trickle tank and water set would have no potential to impact cultural properties and is therefore exempt under Appendix C.

Through surface surveys and probability models the occurrence of surface manifestations for sites can be determined; however, the buried component cannot be known without testing and therefore there is the potential to impact unknown sites during construction of water lines. Installation of water lines at the depth of approximately 18 inches exceeds the approximately 12 inches recognized as the depth for buried components of a site, it could expose unknown sites currently below the ground surface, damage site matrices, and could break some artifacts. Disturbance to unknown sites could lead to a loss of information regarding the activities that took place at these sites, when they occurred, and for how long and therefore could have direct, indirect, or cumulative effects on cultural resources. Monitoring for subsoiling below 12 inches in waterline extensions would be required to ensure known or unknown cultural resources are not impacted.

The same discussions regarding the impacts of grazing under Alternative 1, apply to this alternative.

Cumulative Effects

Future management activities will occur as planned across the Cluster II Project Area. These include silvicultural and fuel reduction treatments, continued recreation use, standard road maintenance, and prescribed burning. Currently, there are four vegetation projects within the Cluster II project area: Buick, Flat Top, Aspen, and Opine; and future upgrades to existing OHV facilities through the Opine Access EA are planned. These actions are not likely to have direct, indirect or cumulative effects on cultural resources. The continuation of grazing in the Sand Springs, Quartz Mountain, and Cabin Lake Allotments will not cumulatively add impacts to cultural resources at significant level.

Other Effects

Wetlands & Floodplains

Executive Orders 11988 and 11990 direct federal agencies to avoid to the extent possible adverse impacts associated with the modifications of floodplains and wetlands. The planning area does not contain any floodplains or wetlands. Springs in the planning area are fenced and will not be impacted by any project activities.

Prime Farmland, Rangeland, and Forestland

There are no lands within the planning area that are classified as prime farm or rangelands. Prime forestland is not applicable to lands within the National Forest System.

Civil Rights and Environmental Justice

Civil Rights legislation and Executive Order 12898 direct an analysis of the proposed alternatives as they relate to specific subsets of the American population. The subsets of the general population include ethnic minorities, people with disabilities, and low-income groups. The planning area is not located in a minority community and would not affect residents of low or moderate income. The alternatives would not pose a disproportionately high or adverse effect to those populations. The effects of the proposal on the social context of the protected groups are within those described in the Deschutes National Forest Plan. The benefits and risks associated with implementation of the alternatives are provided to all members of the public. The action alternatives provide opportunities for local ranchers, and ultimately, to all groups, regardless of racial and economic composition.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right of way or road.

The action alternatives would not be expected to create any impacts that would cause irreversible damage to soil productivity. There is low risk for the proposed actions to cause soil mass failures (landslides) due to the inherent stability of dominant landtypes and the lack of seasonally wet soils on steep slopes. The planned locations for structural developments do not meet criteria for landslide prone terrain.

Soils dedicated to management facilities, such as water developments, the transportation system and cattleguards, are considered an irretrievable loss of soil productivity until their functions have been served and disturbed sites are returned back to a productive capacity. Under the action alternatives, the amount of land dedicated to structural improvements would be limited to the minimum necessary for management needs. Under all alternatives, the cumulative amount of detrimentally disturbed soil from all management facilities would remain well within allowable LRMP standards and guidelines.

Inventoried Roadless Areas and Wilderness

The project area does not contain any Inventoried Roadless Areas or Wilderness. There will be no impacts from any alternative to those land allocations.

CONSULTATION AND COORDINATION

Interdisciplinary Team Members _____

The following Forest Service individuals were involved in the preparation of this Environmental Assessment.

Don Sargent:	ID Team Leader, Range Specialist
John Davis & Beth Peer:	Writer/Editors
Monty Gregg:	Wildlife Biologist
Shelly Borchert:	Wildlife Biologist
Lucy Hamilton:	Cultural Resource Specialist
Charmane Powers:	Botanist
Rob Evans:	Silviculturist
Rod Jorgensen:	Soils Scientist
Dick Dufourd:	OHV Specialist
John Erwert:	Fuels Specialist
Gini Stoddard:	Geographic Information Systems
Steve Bigby:	District Road Manager
Bill Peterson:	Natural Resource Team Leader – Project Oversight

Public Involvement

Initial Public Scoping

Table 36 lists the people, organizations, and agencies that were sent notification of the proposed action. The Forest Service also consulted with the Oregon Department of Fish and Wildlife and the U.S. Fish and Wildlife Service during project development.

Table 36. Bend-Ft. Rock District Scoping List

Fara Ann Currim, Confederated Tribes of Warm Springs	Action For Animals, Helen Lovell
Clay Penhollow, Confederated Tribes of Warm Springs	E. Oregon Forest Protection Organization
Mr. Elwood Miller, Director, The Klamath Tribe	Stuart G. Garrett, MD
Beth Coahran, Burns Paiutes Tribe	Scott Silver
Albert Teeman, Chairperson, Burns Paiutes Tribe	Paul Dewey
Amos Firstraisted, Burns Paiutes Tribe	Robert P. Davison, Wildlife Management Institute
ODF&W, Steve George	Oregon Natural Desert Association
ODF&W, Glen Ardt	Karen Coulter
ODF&W, Steve Marx	John Muir Project
DEQ - Regional Office	Josh Laughlin, Cascadia Wildlands Project
State of Oregon Water Resources Department	Randy Moorman, Earthjustice Legal Defense Fund
Kyle Gorman, Regional Manager, Water Resources Department	Susan Jane M. Brown
Bob Brown, Division of State Lands	PG &E National Energy Group
US Fish & Wildlife Service, Jeff Dillon	Gas Transmission NW, John Cassaday
US Fish & Wildlife Service, Jennifer O'Reilly	PG & E Gas Transmission NW, Gary Spicer
Barron Bail, Bureau of Land Management	Midstate Electric Cooperative, Inc., Darwin Thurston
John Swanson, Bureau of Land Management	American Forest Resource Council, Chuck Burley
Bonneville Power Administration, Libby Johnson	John Jackson, Unit Forester, Central Oregon District
Steve Ellis, Lakeview BLM	Stuart Otto, Service Forester, Central Oregon District
Theresa Romasko, Lakeview BLM	High Desert Museum, David Dona
The Bulletin	OMSI Science Camps, Joseph Jones
Lakeview County Examiner	Bend Metro Parks and Recreation, Julie Cavanaugh
KTVZ	Central Oregon Community College, Ruth Wolfe
Oregon Natural Resources Council, Doug Heiken/Leeanne Siart	Duncan Wilson, Department of Forest Resources, Oregon State University
Oregon Natural Resources Council, Tim Lillebo	Steve Fitzgerald, Area Extension Forester, Oregon State University
The Wilderness Society, NW Regional Office	Wanderlust Tours, Inc., David Nissen
George Wilson, Sierra Club - Juniper Group	Sun Country Tours, Dennis Oliphant
Marilyn Miller, Sierra Club - Juniper Group	Northwest Land Management, Eric Mart
Dave Jarske, OHA - Bend Chapter	Bend Fire Department, Don Jensen
Forest Conservation Council, Western Regional Office	Bend Fire Department, Pete Ribble
NEDC, Lauren Rule	Joani Dufourd

COMAC Motorcycle Club
Ian Caldwell, ATV Program Coordinator,
Central and Eastern Oregon
Pat Harris, ATV Committee Chair
Cody Vavra, BLM OHV Coordinator
James D. Noteboom
Bruce McCullough
David H. Tjomsland
John Dotson
Tom Sedgwick
Gordon K. Baker
Harriet Heisey
The Seidenverg Family
Sam Dinsdale
Terry Cutsforth
Dave Duncombe
Paul Rueter
Doug Houston

Randy Fenimore
Travis Singhouse
Hay Creek Ranch
C.L. Hoffman Inc.
Iva Langer and Ben Struble
Michael Fisher
Tim Deboodt, Crook County Extension Office
Wade Flegal
Oliver Wentz
Steve Payer
Keith & Janet Nash
William R. Tye, Tye Cattle Company
Dick Nelson
Stephen Roth
Dave & Janette Roth
Kenneth Burbank
Jim & Judith Knapp
Gilbert Ticoulat

In response to the scoping notification, four written comments were received. Comments were used to help develop issues, alternatives, and project design criteria.

Those who contacted us include:

League of Wilderness Defenders – Blue Mountains Biodiversity Project
Oregon Natural Resource Council
Dick Nelson
Oregon Department of Fish and Wildlife

Comment Period

This Environmental Assessment is being made available for public comment pursuant to 36 CFR 215.5. The responsible official will consider all substantive comments timely submitted that comply with the requirements at 36 CFR 215.6 (a)(3). After the comment period ends, a final version of the Environmental Assessment incorporating response to comments and any changes prompted by the comments will be issued.

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GLOSSARY OF ACRONYMS AND TERMS

AMP – Allotment Management Plan

AOI – Annual Operating Instructions

AUM - Animal unit month; based on the amount of forage required by an animal unit (one cow) for one month (26 pounds dry matter per day, LRMP).

BA - Biological Assessment

BE – Biological Evaluation

BLM -Bureau of Land Management

BMP - Best Management Practices

C&H – Cattle and Horse

CFR – Code of Federal Regulations

CT – Condition and Trend

FS - Forest Service

FSH - Forest Service Handbook

FSM - Forest Service Manual

HUC - Hydrologic Unit Code, as defined by the U.S. EPA.

ICBEMP – Interior Columbia Basin Ecosystem Management Project.

IDT - Interdisciplinary Team.

LRMP – Land and Resource Management Plan

MA – Management Area

MIS - Management Indicator Species

NEPA - see National Environment Policy Act

NLAA - Not Likely to Adversely Affect

NRHP – National Register of Historic Places

ODEQ - Oregon Department of Environment Quality

ODFW - Oregon Department of Fish & Wildlife

OHV – Off Highway Vehicle

PDC - Project Design Criteria.

USDA - United States Department of Agriculture.

USDI - United States Department of Interior.

USFWS - United States Fish & Wildlife Service

Allotment – A rangeland and/or forestland area designated for use by a prescribed number and kind of livestock under one plan of management.

Animal Month (AM) – One month's use and occupancy of the range by one animal. This phrase is synonymous with Head Month, which is used for billing purposes.

Allotment Management Plan - A livestock grazing management plan dealing with a specific unit of rangeland and base

Annual Operating Instructions (AOI) - Document that specifies the current year's grazing program, including livestock numbers, season of use, pasture rotation, utilization standards, monitoring and specific instructions to the permittee.

Annual Plant - A plant that completes its life cycle and dies in one year or less.

Available Forage - Forage that can be grazed and still allow sustained forage production on rangeland. Available forage may or may not be authorized for grazing.

Best Management Practices (BMPs) - Practices designed to prevent or reduce water pollution, including sedimentation.

BO - Biological Opinion

Canopy - In a forest, the branches from the uppermost layer of trees; in a shrub or grassland, the uppermost layer of shrubs; in a riparian area, the layers of vegetation that project over the stream.

Canopy Cover - The areas of the ground covered by a vertical projection of the canopy. Used to describe how open or dense a stand of trees is, often expressed in 10 percent increments.

Category 1 Pasture - Pasture that has streams which have or have the potential to support populations of bull trout or steelhead.

Compaction - Packing together soil particles by exerting force at the soil surface and increasing soil density. Making soil hard and dense, decreasing its ability to support vegetation because the soil can hold less water and air and because roots have trouble penetrating the soil.

Condition and Trend Studies (C&T) - Monitoring sites with permanent transect lines, which can be analyzed and compared to previous years to detect changes in range condition over time.

Connectivity - The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation (the opposite of fragmentation).

Cover - (1) Trees, shrubs, rocks, or other landscape features that allow an animal to partly or fully conceal itself. (2) The area of ground covered by plants, litter, and coarse fragments, including tree crowns and shrubs that are in direct contact with the ground.

Cumulative Effects - Impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively major actions taking place over a period of time.

CWE - Cumulative Watershed Effects; substantial, adverse influences on water quality and biological resources that arise from the way watersheds function, and particularly from the ways that disturbances within a watershed can be transmitted and magnified within channels and riparian habitats downstream of disturbed areas.

Defoliation – The removal of vegetation as by herbivore consumption, clipping, and trampling.

Design Elements - measures taken to reduce the potential for negative impacts on a resource from a project activity.

Detrimental Soil Conditions - There are four categories describing detrimental soil conditions: compaction, displacement, puddling and severely burned soil or charring. Compaction is defined as an increase in soil bulk density of 20% or more from the undisturbed level for volcanic ash soils and 15%

or more for residual soils. Displacement is often described as the removal or mixture of topsoil or humus from the A-horizon. Puddling is the breakdown of soil structure under wet conditions. Severely burned soil or charring can be described as having the top layer of mineral soil greatly changed in color, usually to red, and the next one-half inch blackened from organic matter charring by heat conducted through the top layer.

Dimension - Physical characteristics of a stream when a channel is viewed in cross-section.

Direct Effects - Impacts on the environment that are caused by an action and occur at the same time and place.

Diversity - The distribution and abundance of different plant and animal communities and species within an area.

Early Season Grazing - Early season grazing is defined in the terms of the phenology of the vegetation, and is limited to that period where upland vegetation is green but not drying.

Ecosystem - A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

Effectiveness Monitoring - Measures whether progress is being made toward achieving a defined management objective generally over the long term (3-7 years).

Endangered Species - A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a major portion of its range.

Endangered Species Act (ESA) - An act, passed by Congress in 1973 that directed all Federal departments and agencies to seek to conserve endangered and threatened species. Actions authorized, funded, or carried out by Federal departments and agencies should not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat. The act also mandates conferencing with the appropriate agencies.

Environment - The combination of external physical, biological, social, and cultural conditions affecting the growth and development of organisms and the nature of an individual or community.

Environmental Consequences - Effects as a result of an action. Included are direct effects, which are caused by the action and occur at the same time and place; indirect effects, which are caused by the action and are later in time or further, removed in distance but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and the related effects on air, water, and other natural systems, including ecosystems. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if, on balance, the agency believes the effects will be beneficial.

Ephemeral Stream - A stream that flows only in direct response to heavy precipitation or snowmelt runoff, often appears as a depression or swale that exhibits no continuous scour channel.

Erosion - The detachment and removal of soil material from its original location.

Exclosure - A structure, generally a fence that prohibits cattle and/or wildlife from a designated area.

Exotic Species - A species that is not native to the area where it is found.

Forest Plan (Land and Resource Management Plan) - A document that guides natural resource management and establishes standards and guidelines for a National Forest; required by the National Forest Management Act.

Fragmentation (habitat) - The breakup of a large land area (such as a forest) into smaller patches isolated by areas converted to a different land type (the opposite of connectivity).

Fuels - Includes living plants, dead, woody vegetative materials, materials capable of burning.

Functional Class - Condition class assigned to a management area based on the current condition of the natural resources.

General Forest Management Area - see Management Area.

Grass-like - A plant of the Cyperaceae or Juncaceae families which vegetatively resembles a true grass of the Poaceae family.

Grass - Members of the plant family Poaceae. **Grazing Permit** - A document authorizing livestock to use National Forest System or other lands under Forest Service control for the purpose of livestock production.

Greenline - The first perennial vegetation from the water's edge.

Ground Cover - Perennial vegetation plus litter and coarse fragments (greater than 2 mm in size), including tree crowns and shrubs, that are in direct contact with the ground. Based on the erosion hazard class, effective ground cover is between 20% and 75% of ground covered the first year after management activities.

Growing Season - In temperate climates, that portion of the year when temperature and moisture permit plant growth. In tropical climates, it is determined by availability of moisture.

Gully - An erosional term used to describe concentrated erosion in the vertical direction. Gullies are generally deeper than they are wide. Streams that are "gullied" can be classified as Rosgen "G-type" channels.

Habitat - A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

Head Month - Syn. Animal Month (AM).

Height-Weight Curve - Relationship of distribution of a plants weight with respect to its height which is used to estimate forage production or utilization of herbaceous species.

Herbaceous Species - Non-woody plant growth.

Implementation Monitoring - Determines whether the management direction is being accurately interpreted and followed generally in the short term (i.e. annually).

Indirect Effects - Impacts on the environment that are caused by an action and are later in time or removed in distance.

INFISH - Interim Inland Native Fish Strategy for the Intermountain, Northern, and Pacific Northwest Regions (Forest Service). A strategy intended to provide interim direction to protect habitat and populations of resident fish outside of anadromous fish habitat in eastern Oregon, eastern Washington, Idaho, western Montana, and portions of Nevada. The Decision Notice/Finding of No Significant Impact for this strategy was signed July 28, 1995.

Interdisciplinary Team (IDT) - A team of people that collectively represent several disciplines and whose duty it is to coordinate and integrate the planning process.

Intermittent Stream - A stream that flows only at certain times of the year when it receives water from other streams or from surface sources such as melting snow; usually exhibits a continuous scour channel.

Irretrievable - A category of impacts that applies to losses of production or commitment of renewable resources. For example, while a linear piece of land is being used as a road, some or all of the timber production there is "irretrievably lost." If the road was rehabilitated after use and soil compaction was reduced, timber production could resume; therefore, the loss of timber production during the time the road was in use is irretrievable but not irreversible, because it is possible for timber production to resume if the piece of land is no longer used as a road.

Irreversible - A category of impacts that applies to non-renewable resources, such as minerals and archaeological sites. Losses of these resources cannot be reversed. Irreversible effects can also refer to effects of actions on resources that can be renewed only after a very long period, such as the loss of soil productivity.

Issue - A matter of controversy, dispute, or general concern over resource management activities or land uses. To be considered a "major " or "key" issue, it must be well defined, relevant to the proposed action, and within the ability of the agency to address through alternative management strategies.

Key Area - A portion of range, which because of its location, grazing or browsing value contains impacts that result principally from livestock grazing and has the potential to respond to and measure changes in grazing management.

Landscape Appearance Method - ocular method for estimating forage utilization based on the general appearance of the rangeland.

Landtype - An inventory map unit with relatively uniform potential for a defined set of land uses. Properties of soils, landform, natural vegetation, and bedrock are commonly components of Landtype delineation used to evaluate potentials and limitations for land use.

Listed Species - A fish, wildlife, or plant species listed under the authorization of the Endangered Species Act as threatened or endangered.

Listed (Streams) – Streams contained on the 303(d) List by Oregon Department of Environmental Quality (ODEQ) as water quality limited. Data shows that these streams do not currently meet their designated beneficial use criteria.

Management Area (MA) - A unit of land allocated to emphasize a particular resource, based on the capability of the area.

Management Direction - A statement of goals and objectives, management prescriptions, and associated standards and guidelines for attaining them.

Management Indicator Species (MIS) - Vertebrate species whose population changes are believed to best serve as an index of a biological community's response to the effects of land management activities or are important for fishing, hunting and trapping.

Mitigation - Measures designed to counteract environmental impacts or to make impacts less severe.

National Environmental Policy Act (NEPA) - An act, passed by Congress in 1969 that declared a national policy to encourage productive harmony between humans and their environment. This act requires the preparation of environmental impact statements for Federal actions that are determined to be of major significance (see 40 CFR [Code of Federal Regulations] 1500-1508 for implementing regulations. See also FSH [Forest Service Handbook] 1909.15, the FS Environmental Policy and Procedures Handbook.)

No Action Alternative - The most likely condition expected to exist in the future if the project were not to occur.

Non-forest Land - Lands that have never had or that are incapable of having 10% or more of the area occupied by forest trees or lands previously having such cover and currently developed for non-forested use.

Noxious weed - A plant that interferes with management objectives for a given area of land at a given point in time.

Outstanding Remarkable Values - Term used in the National Wild and scenic Rivers Act of 1968 to describe a characteristic of a wild and scenic river that has been identified to be unique, significant, and/or rare.

Overstory - The upper canopy layer of trees.

PACFISH - Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (commonly referred to as PACFISH). The Decision Notice/Finding of No Significant Impact for this strategy was signed July 28, 1995.

Pasture - A grazing area enclosed and separated from other areas by fencing or other barriers; the management unit for grazing land.

Pattern - Physical characteristics of a stream when viewed longitudinally; also referred-to as the plan-view (from above) of a stream (i.e., meander pattern).

Perennial - A plant that lives for three or more years.

Perennial Stream - A stream that flows year-round or past August 1 st on an average water year.

Plant Associations - Climax plant community type.

Plant Association Group (PAG) - A group of plant associations that share similar productivities, disturbance regimes, and responses to disturbance. Eight major plant association groups have been described on the Ochoco National Forest.

Plant Communities - A homogeneous unit in respect to the number and relationship of plants in tree, shrub, and ground cover strata.

Prescribed Fire - A wildland fire burning under specified conditions that will accomplish certain planned objectives. The fire may result from either planned or natural ignitions. The Regional Forester must approve proposals for use of natural ignitions for this purpose.

Post-holing - A term used to describe soil disturbance from wildlife and livestock that results in “post-hole like” depressions.

Proposed Action - A proposal made by the Forest Service to authorize, recommend, or implement an action on National Forest System lands to meet a specific purpose and need.

Puddling - A term used to describe standing water on the soil surface resulting from platiness or lack of structure.

Range Improvement - Any activity or program on or relating to the public lands that is designed to improve production of forage, change vegetation composition, control patterns of use, provide water, stabilize soil and water conditions, or provide habitat for livestock and wildlife. Range improvements may be structural or nonstructural.

Reference Site - A portion of a pasture, which because of its location, grazing or browsing value, and/or use, serves as an indicative sample of current resource conditions, trend, or degree of use seasonally. This site will be monitored to determine if current management practices are leading to the achievement of the desired conditions.

Residual Vegetation/Stubble Height - Residual vegetation/stubble height is that stubble height remaining at the end of the growing season just prior to winter dormancy.

RHCA - Riparian Habitat Conservation Area

Riparian Area - An area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

Riparian Habitat Conservation Area (RHCA) - A portion of a watershed where riparian-dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems by (1) influencing the delivery of coarse

sediment, organic matter, and woody debris to streams, (2) providing root strength for channel stability, (3) shading the stream, and (4) protecting water quality.

Scabland - Area having very shallow soils which are subject to severe water saturation and frost heaving during the winter, thus making revegetation virtually impossible.

Scoping - The early stages of preparation of an environmental assessment or environmental impact statement used to solicit public opinion, receive comments and suggestions, and determine the issues to be considered in the development and analysis of a range of alternatives. Scoping may involve public meetings, telephone conversations, mailings, letters, and other contacts.

Season of Use - The time during which livestock grazing is permitted on a given range area, as specified in the grazing permit.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation - The action or process of depositing sediments.

Sediment Yield - Sediment that is eroded from adjacent land into a body of water.

Sensitive Species - Species identified by a Regional Forester for which population viability is a concern because (a) of substantial current or predicted downward trends in population numbers or density, or, (b) of substantial current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Seral Stage - A plant or animal community that is transitional in stage of succession, being either short- or long-term. If left alone, the seral stage will pass and another plant or animal community will replace it.

Short-Term Effects - For timber management planning, those effects which will not be substantial beyond the RPA planning horizon of 50 years. For DEQ water quality, short-term effects are defined as two days or less. Generally, short-term effects are within the planning period.

Soil Disturbance - Soil disturbance by livestock includes soil compaction, displacement, and potholing. Soil disturbance usually occurs when the soils are moist or wet. Soil disturbance may increase soil erosion, reduce productivity and contribute to changes in vegetation composition, stream function, and water quality (FSH 2209.21, R6 Amendment).

Subwatershed - An area mostly bounded by ridges or other similar topographic features contributing water, organic matter, dissolved nutrients, and sediments to a lake or stream. One or more subwatersheds make up one watershed. Also known as a 6th field (HUC).

Succession - A series of dynamic changes by which one group of organisms succeeds another through stages leading to potential natural community or climax. An example is the development or series of plant communities (called seral stages) following a major disturbance.

Term Grazing Permit - A document authorizing grazing for a stated number of years (usually 10).

Threatened Species - Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a major portion of their range.

Understory - May include grass, forbs, shrubs, small trees (such as seedlings and saplings), and other plants found beneath the overstory tree canopy.

Upland Site - Referring to non-riparian sites.

Utilization Standards - The prescribed level of grazing by livestock, which will achieve specific objectives including maintenance of vegetation and soil condition. Expressed as the percent of the annual herbaceous production removed by grazing.