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Forest  
Service

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# Environmental Assessment

## Burn and Crystal Springs Allotment Management Plan

**Lookout Mountain Ranger District, Ochoco National Forest  
Crook County, Oregon**  
T. 13 and 14 S., R. 18 and 19 E., multiple sections

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## SUMMARY

The Lookout Mountain Ranger District on the Ochoco National Forest proposes to reauthorize grazing and issue term grazing permits for the Crystal Springs and Burn cattle allotments. The Proposed Action includes an early on/early off, deferred rotation grazing system and active management of livestock to facilitate desired distribution. The project area is located Lookout Mountain Ranger District on the west side of the Ochoco National Forest. It is within the Upper Ochoco Creek and Bridge Creek watersheds. The proposed action is needed because there continues to be a demand for livestock forage in the Crystal Springs and Burn allotments, while at the same time concerns associated with increased water temperature, decreased bank stability and modifications to riparian vegetation need to be addressed in order to meet the Ochoco Forest Plan, as amended.

The proposed action may improve water temperature, bank stability, and riparian vegetation in the Crystal Springs and Burn cattle allotments. The proposed action would not reduce the maximum Animal Unit Months (AUMs) permitted on either allotment, but because of active management requirements and additional maintenance may increase the permittees' administrative costs.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

- Alternative 1 - No action. Grazing would not be reauthorized on either allotment and grazing permits would be terminated after two years.
- Alternative 3 - Grazing would be reauthorized and term grazing permits would be issued under the current criteria. No changes would be made to the current management of the Burn and Crystal Springs allotments. Current conditions, including impacts to riparian vegetation and water quality, would continue.
- Alternative 4 - Grazing would be reauthorized and term grazing permits would be issued. Permits would include an early on/early off, deferred rotation grazing system and active management of livestock to facilitate desired distribution. Crystal Springs allotment would be modified to create two riparian pastures. These riparian pastures would be rested for a minimum of four years and until an upward trend in resource conditions is achieved.

Based on the Purpose and Need and the analysis of effects of each alternative, the deciding official will decide:

- Whether, and under what circumstances, grazing will be reauthorized on the Crystal Springs and Burn allotments.
- Whether, and under what circumstances, grazing permits will be reissued.

In making this decision, the Responsible Official will consider how well the alternatives lead to increasing the amount of stable streambanks, increasing the amount of stream shade, and distributing livestock throughout the allotments. The Responsible Official will also consider comments submitted by the public, including other agencies, individuals, organizations, adjacent landowners, and ranchers.

# CHAPTER 1 - INTRODUCTION AND PURPOSE AND NEED FOR ACTION

## Document Structure

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The Forest Service 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 possible 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 Lookout Mountain Ranger District Office in Prineville, Oregon.

## Background and Project Area Description

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The project area contains two cattle grazing allotments, Burn and Crystal Springs. Together, the allotments total about 11,850 acres; they are located on the west side of the Ochoco National forest in Crook County, Oregon (see Appendix A, Map 1). The allotments are within the Upper Ochoco Creek and Bridge Creek 5<sup>th</sup>-field watersheds. The Burn allotment comprises 1,380 acres of privately owned land and 3,290 acres of National Forest System land, for a total of 4,670 acres. The 7,181-acre Crystal Springs allotment is entirely on National Forest System land. The Burn allotment comprises five pastures and the Crystal Spring allotment contains three (see Table 1).

**Table 1. Crystal Springs and Burn Allotments acres and locations.**

<b>Allotment</b>	<b>Pasture</b>	<b>Acres</b>	<b>Legal Location *</b>
Burn	Hohn Spring	1,027	T13S R19E Sections 31, and 32 T14S R19E Sections 5, 6, and 8
	Homestead (420 acres private)	702	T14S R19E Sections 6-8
	Howard (960 acres private)	1,470	T14S R18E Sections 11-14 T14S R19E Sections 7 and 18
	Marks Creek	908	T14S R18E Sections 1, 11, and 12 T14S R19E Sections 6 and 7
	Wheatgrass	563	T14S R18 E Sections 1, 11 and 12
<b>Burn Total Acres</b>		4,670	
Crystal Springs	Coyle Creek	3,149	T13S R19E Sections 22-27 and 35 T13S R20E Sections 19, 20, and 30
	Crystal Springs	2,038	T13S R20E Sections 4-8
	Middle	1,994	T13S R19E Sections 13 and 24 T13S R20E Sections 7, 8, and 17-20
<b>Crystal Springs Total Acres</b>		7,181	

\* T=Township; R=Range; S=South; E=East

The project area has been grazed by sheep, cattle and horses since the early 1900s. The area was converted to cattle-only in the 1970s. By the late 1980s, 185 cow/calf pairs were permitted to graze the Crystal Springs allotment and 130 cow/calf pairs were permitted on the Burn allotment. Historically, the main objective of permitting grazing was to provide forage for livestock; by the late 1980s, grazing was also used to address the of removing herbaceous vegetation from tree plantations, utilization of introduced grass species, and reduction of fine fuels to help reduce wildfire risk (2210 Range File, Burn Allotment).

There has been a change in the upland forest vegetation within the Burn and Crystal Springs Allotments due to several factors: livestock grazing, fire suppression, introduction of noxious plants, and decrease in timber harvest. Holechek et al (2004) stated that, “Heavy livestock grazing, logging, and fire exclusion associated with Euro-American settlement has brought about substantial changes in forest conditions in western forests.” This has proved evident in the Burn and Crystal Springs Allotments. The combination of disturbance from grazing and timber harvest, and catastrophic fires resulting from fire suppression have allowed for the invasion of noxious plants.

Federal livestock grazing has been altering upland forest vegetation in the project area since the early 1920s. According to Fleischner (1994), “livestock grazing is the most widespread land management practice in the western North America.” Sheep grazed the project area heavily until the late 1970s when livestock was switched from sheep to cattle. Historically, overgrazing occurred through the late 1930s throughout the western United States. In 1934 the Taylor Grazing Act was passed; its purpose was to allocate grazing privileges on unsold governments lands in the West on the basis of the ranchers’ ability to provide water or hay. Range management continued to change and in 1960 the Multiple Use Act was mandated. Now the land would not only be managed for livestock grazing, but for several uses, such as timber, wildlife, and recreation (Holechek et al. 2004).

Due to fire suppression and a decrease in timber harvests there is an evident change in upland forest vegetation. There is now an increase in tree density, which can result in decreased tree vigor (increasing mortality from disease, insect, drought, etc.), herbaceous and shrub production, and aesthetic values (Belsky and Blumenthal 1997). According to the Marks Creek Watershed

Analysis (1998), the pattern of vegetation and fuel loadings and associated fire regimes have been altered from historic conditions, so now there is an increased area susceptible to stand replacement fires and a decrease in understory vegetation. A great deal of the range in the project area is transitory range due to the increase of canopy cover. Transitory range is rangeland that is within the forest and exists for a time period after a disturbance event such as wildfire, then gives way as recolonizing trees become dominant (USDA FS 2007).

The Marks Creek fire of 1968 burned a total of 3,304 acres, in and around the Burn allotment (1,979 acres of the fire were on National Forest system land). Since the fire a successful plantation of started in 1979 which was approximately 900 acres (Wacker, P., pers. comm.). Throughout the Burn Allotment the canopy cover is increasing a great deal with both juniper and ponderosa pine.

According to the Marks Creek Watershed Analysis (1998), there has been a significant increase in noxious plants in the Burn Allotment and Crystal Springs Allotment. Weeds reduce the diversity and abundance of native vegetation and forage. C & T data showed noxious weeds in the monitoring sites, for example Canada thistle was present at a few sites. Noxious weeds also have an effect on the ecological status of an area.

## Purpose and Need for Action

The Ochoco National Forest Land and Resource Management Plan (Forest Plan) allows for and encourages livestock use and recognizes that ranching is an important lifestyle in surrounding communities. It is Forest Service policy to make forage available for livestock grazing on lands that are suitable for grazing and consistent with land and resource management plans (FSM 2203.1 and 36 CFR 222.2). There continues to be a demand for forage from the Ochoco National Forest and its allotments. Current permit holders in the Crystal Springs and Burn range allotments have indicated their interest in continuing to graze livestock on the Ochoco National Forest.

The purpose of this proposal is to authorize livestock grazing in a manner that is consistent with the Ochoco National Forest Plan, as amended. This action is needed because:

- concerns associated with increased water temperature, decreased bank stability and modifications to riparian vegetation need to be addressed within the Burn and Crystal Springs allotments;
- there continues to be a demand for livestock forage in the Crystal Springs and Burn allotments.

This action responds to the goals and objectives outlined in the Ochoco Forest Plan, as amended, and helps move the project area towards desired conditions described in that plan for livestock grazing as well as for resource conditions in the Crystal Springs and Burn allotment areas (USDA Forest Service 1989).

**Bank Stability:** There is a need to alter grazing practices to promote the recovery of deep-rooted vegetation including willows and sedges to protect banks from erosion, capture sediment, and control stream channel pattern, profile and dimension. The desired condition is to have at least 80 percent bank stability (Forest Plan, p. 4-237 and INFISH, p. A-4). Stream survey information from riparian areas in the Crystal Springs allotment indicates that riparian vegetation generally has been impacted and that streambank stability does not meet Forest Plan and INFISH standards.

**Stream Shade:** There is a need to adjust livestock management to promote the recovery of vegetation in riparian areas to increase the amount of stream shade. The desired condition for stream shade is to provide greater than 80 percent shaded surface, or 100 percent of the site

potential (Forest Plan, p. 4-240). In the Crystal Springs allotment, stream shade is less than desired and does not meet Forest Plan standards on portions of Whitney Creek, Coyle Creek, Ahalt Creek, and Crystal Creek. Monitoring has indicated that livestock grazing is a contributing factor.

**Livestock Distribution:** There is a need to develop grazing systems and improvements that will provide for better distribution of livestock to allow recovery of riparian vegetation, greater utilization of forage in uplands throughout the pastures, and maintenance of sufficient forage for wintering big game animals in the project area. Portions of the Burn Allotment are within the general forest winter range management allocation. The Forest Plan (p. 4-85) indicates that management in this allocation should be implemented to recognize big game habitat needs. In portions of the Hohn Spring and Wheatgrass Pastures, livestock have exceeded the maximum allowed use and inadequate forage has been left for wintering big game animals. Observations indicate there is little re-growth of herbaceous vegetation after the grazing season.

## **Proposed Action**

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The action proposed by the Forest Service to meet the purpose and need is to reauthorize grazing and issue term grazing permits for the Crystal Springs and Burn allotments. The actual season for livestock use may be less than permitted in order to meet Forest Plan goals and objectives/desired conditions. The number of days livestock spend on each allotment may be adjusted annually based on variations in weather and range readiness or unpredictable events such as wildfire and drought. The actual season of use may also be adjusted annually based on variations in weather and range readiness. The dates listed in each allotment description are target dates for grazing. The season of use may occur sooner or later than indicated based on annual conditions. The length of grazing also depends on meeting utilization standards.

Allotment specific information is as follows.

### ***Burn Allotment***

The Burn Allotment would remain at 4,670 acres split between 5 pastures. Livestock grazing would be reauthorized. Grazing of 130 cow/calf pairs would be permitted between April 15 and August 14, for a maximum of 698 AUMs. The “turn on” date might be adjusted annually based on range readiness.

The grazing system would be an early on/off, deferred rotation grazing system using five pastures: Howard, Wheatgrass, Marks Creek, Hohn Springs and Homestead. Each pasture would be utilized at a different time each year. The livestock would be actively managed to facilitate distribution. Active management means that the permittee or their representative would be present on the allotment and moving livestock, when needed, to achieve adequate livestock distribution or to prevent excessive forage utilization or streambank alteration. It is anticipated that livestock would be checked a minimum of 2 days per week up until July 1 and then a minimum of every other day after July 1.

The Burn Allotment contains 32 water developments and approximately 20 miles of fence. These existing structural improvements would be reauthorized. Eleven existing troughs would be improved for water holding capacity and to protect springs. Eleven existing ponds would be maintained to improve their water holding capability. A cattle guard would be installed at the 2610-050 road at the fence line between the Marks Creek Pasture of the Burn Allotment and the Pothole Pasture of the Marks Creek Allotment.

## **Crystal Springs Allotment**

The Crystal Springs Allotment would remain at 7,181 acres split between three pastures. Livestock grazing would be reauthorized. Grazing of 185 cow/calf pairs would be permitted between May 17 and August 31, for a total of 871 animal unit months (AUMs). The “turn on” date may be adjusted annually based on range readiness.

The grazing system would be a deferred rotation using three pastures: Coyle Creek, Middle and Crystal Springs. This means that pastures would be utilized at a different time each year. The Allotment would be actively managed to improve distribution. This means that the permittee or their representative would be present on the allotment and moving livestock, when needed, to achieve adequate livestock distribution and to prevent excessive forage utilization or streambank alteration. It is anticipated that livestock would be checked a minimum of 2 days per week up until July 1 and then a minimum of every other day after July 1.

The Crystal Springs Allotment contains 16 water developments and approximately 15.6 miles of fence. These existing structural improvements would be reauthorized. McAllister Spring would be improved to increase water holding capacity to improve distribution. A water gap located on Ochoco Creek would be removed to reduce impacts resulting from livestock in this area. A cattle guard would be installed on the 2630-020 road at the fence line between Crystal Springs Pasture of the Crystal Springs Allotment and Grant Meadows Pasture of the Marks Creek Allotment.

A livestock enclosure fence would be constructed in the Crystal Springs Pasture to reduce livestock grazing around Peck’s mariposa lily. Grazing would be allowed within the enclosure 1 year out of every 4 years. A livestock enclosure fence would also be constructed around Ahalt Creek in the Middle Pasture to protect the riparian area.

## **Forest Plan Direction**

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The Ochoco National Forest Land and Resource Management Plan was approved in 1989, and has since been amended by several decisions. The Forest Plan, as amended, provides guidance for management activities on the Ochoco National Forest. The Forest Plan establishes goals, objectives, and desired future conditions, identifies management areas within the Forest, and provides standards and guidelines for each management area as well as Forest-wide standards and guidelines. In 1995, the Inland Native Fish Strategy (INFISH) Decision Notice amended the Forest Plan. INFISH added goals and objectives for inland native fish habitat condition and function, and identified Riparian Habitat Conservation Areas (RHCAs) where management activities will meet interim standards and guidelines. This proposal is tiered to the Final Environmental Impact Statement (FEIS) for the Forest Plan, as amended. See Appendix A, Map 2 for Forest Plan areas within the management area.

### **Forest Plan Management Areas**

**General Forest (MA-F22)** - The emphasis for this area is to produce timber and forage while meeting the Forest-wide standards and guidelines for all resources. In ponderosa pine stands, management will emphasize production of high-value (quality) timber (Forest Plan, p. 4-86).

Livestock grazing is allowed. Up to 50 percent of the annual forage production is allocated to livestock. Both structural and nonstructural improvements are allowed unless they conflict with the management emphasis for the area.

**General Forest Winter Range (MA-F21)** - The emphasis for this area is to manage for timber production with management activities designed and implemented to recognize big game habitat needs (Forest Plan, p. 4-84).

Livestock grazing is allowed. Up to 50 percent of the annual forage production is allocated to livestock. Fall green-up after the regularly scheduled grazing season is reserved for big game and grazing extensions generally are not permitted. Both structural and nonstructural improvements are allowed unless they conflict with the management emphasis for the area. Use of motorized equipment is restricted to open roads from December 1 to May 1.

**Summit Historic Trail (MA-F7)** - The emphasis for this area is to protect the existing integrity of the Summit Trail. Significant segments of the trail will be enhanced and interpreted for public enjoyment and education. Pristine segments will be managed to protect, interpret, and preserve their historic qualities.

Livestock grazing is allowed. Up to 50 percent of the annual forage production is allocated to livestock. Both structural and nonstructural improvements are allowed unless they conflict with the management emphasis for the area.

**US Highway 96 Visual Corridor (MA-F25)** - The emphasis for this area is to maintain and enhance the scenery for travelers along US Highway 26 (Forest Plan, p. 4-93).

Livestock grazing is allowed. Up to 50 percent of the annual forage production is allocated to livestock. Both structural and nonstructural improvements are allowed unless they conflict with the management emphasis for the area.

**Visual Management Corridors (MA-F26)** - The emphasis in this area is to maintain the natural-appearing character of the forest along major travel routes. Forest Roads 22 and 2210 have been allocated as visual management corridors with a visual quality objective of retention. The outer boundary of this area will generally not exceed 600 feet on each side of the road. Vegetation will be manipulated but will reflect a natural forest setting where stands of trees exist in multiple age classes (Forest Plan, p. 4-95).

Livestock grazing is allowed. Up to 50 percent of the annual forage production is allocated to livestock. Both structural and nonstructural improvements are allowed unless they conflict with the management emphasis for the area.

## **Decision Framework**

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Given the purpose and need, the deciding official reviews the proposed action and the other alternatives in order to make the following decisions:

- Whether, and under what circumstances, grazing will be reauthorized on the Crystal Springs and Burn allotments.
- Whether, and under what circumstances, grazing permits will be reissued.

In making this decision, the Responsible Official will consider how well the alternatives lead to increasing the amount of stable streambanks, increasing the amount of stream shade, and distributing livestock throughout the allotments. The Responsible Official will also consider comments submitted by the public, including other agencies, individuals, organizations, adjacent landowners, and ranchers.

## **Intergovernmental Communication**

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On May 1, 2007, the Confederated Tribes of the Warm Springs, the Confederated Tribes of the Umatilla, the Klamath Tribe and the Burns Paiute Tribe were invited to comment on the Proposed Action for the Burn and Crystal Springs Allotment Management Plan. No comments were received at that time.



On June 19, 2008, the Confederated Tribes of the Warm Springs Cultural and Heritage Committee and several traditional gatherers joined employees of the Lookout Mountain Ranger District on a field trip to the Burn and Crystal Springs allotment area. The alternatives were discussed and several sites were visited.

## Public Involvement

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The proposal was first listed in the Schedule of Proposed Actions on April 1, 2007. The proposal was provided to the public and other agencies for comment during scoping, which began on May 1, 2007. The Forest Service received three comment letters during the scoping period. In addition, the following communication with range permittees occurred:

- Four times between September 15, 2005 and February 15, 2008, Lookout Mountain Ranger District employees, including the District Ranger and Rangeland Management Specialist, met with Tim Messner, Ranch Hand for the Crystal Springs allotment, in the field and office to discuss the allotment, discuss Mr. Messner's proposals to improve cattle management in the allotment, discuss the analysis process, and to update Mr. Messner on changes that have been made based on issues.
- Between October 16, 2006 and January 29, 2007, Lookout Mountain Ranger District employees, including the District Ranger and Rangeland Management Specialist, met with the Burn allotment permittee to discuss ideas to improve cattle management in the allotment and to ensure that permittees were informed and updated throughout the planning process.

Using the comments from the public, the interdisciplinary team developed a list of issues to address.

## Issues

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The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. 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)..."

### **Significant Issue**

The Forest Service identified one significant issue raised during internal and external scoping.

**Issue:** The Proposed Action does not sufficiently address livestock-related impacts to streambanks and riparian vegetation in the Crystal Springs allotment.

The condition of riparian vegetation in the Crystal Springs allotment is not currently consistent with resource objectives. Areas within the Crystal Springs allotment do not meet Forest Plan and INFISH riparian management objectives (RMOs) for stream shade and bank stability; monitoring has indicated that livestock grazing is a contributing factor. The Proposed Action does not go far enough in addressing these concerns.

*Measures:*

- Streambank alteration. Streambank alteration is a surrogate measure for alteration of channel morphology. Changes in width to depth ratio, entrenchment, and sediment yield are indirect effects of streambank alteration.
- Riparian vegetative cover (shade). Stream temperatures will be discussed as an indirect effect of changing riparian vegetative cover.

### ***Non-significant Issues***

Many comments were: (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.

Some commenters suggested that an alternative should be developed that is between the no action alternative and the proposed action, that reduces AUMs. The analysis includes Alternative 4, in which grazing is reduced in one allotment for a minimum of 4 years. Effects of these alternatives are discussed in Chapter 3.

One commenter requested that the EA address the monitoring that the Forest Service will do. The section titled “Monitoring” in Chapter 2 describes monitoring that is part of each action alternative.

One commenter suggested that an environmental assessment (EA) is not a sufficient form of documentation for the analysis. The EA process is designed in part to determine if implementation of the project would result in effects that require disclosure in an environmental impact statement. No such effects were discovered during this analysis.

One commenter was concerned that the project area may not be “suitable for grazing and consistent with land and resource management plans.” The project area is both capable of producing forage and suitable for grazing, as per the Forest Service Manual (FSM) 1905 (see the Range Specialists’ Report in the project file, located at the Lookout Mountain Ranger District). The effects analysis (summarized in Chapter 3 of this EA) determined that the proposed alternatives are consistent with all applicable environmental law.

One commenter suggested that areas that have had “significant harms” should be withdrawn from grazing. Alternative 4 includes development of two riparian pastures in an allotment where riparian objectives have not been met; under Alternative 4 these pastures would be rested for a minimum of 4 years or until an upward trend in resource condition is achieved.

One commenter suggested that “beginning grazing before June 15 will result in significant resource damage.” The commenter did not provide scientific or factual evidence to support this statement. The EA discloses scientific evidence that indicates that an “early on/early off” grazing system would reduce resource damage (also see the Range and Soils Specialists’ Reports in the project file).

One commenter suggested that “impaired water quality resulting from ponds and troughs that reduce instream water, increase water temperatures as sun-warmed trough and pond waters overflow into area streams, and result in increased evaporation reducing available waters, must be addressed and corrected - not augmented, compounded and continued.” Water developments that are currently causing resource concerns would be relocated under Alternatives 2 and 4.

One commenter suggested that enclosure fences be maintained prior to turning livestock out in allotments, and that livestock should be monitored on a daily or every-other-day basis. Fences are not expected to create an impenetrable barrier to livestock. Fences can be and are regularly damaged by a variety of factors such as livestock and other animals, falling trees, snow loading, and humans that leave gates open, cut fences to gain access, or use fence posts for firewood.

While fences are not 100% effective all of the time, they do aid in controlling livestock and in improving resource conditions by reducing livestock use. Maintenance of enclosure fences occurs sporadically and every enclosure is not maintained every year. Alternatives 2 and 4 include active management of livestock, in which the permitte or the permittee's agent would be present on the allotment and moving livestock as necessary; it is anticipated that livestock would be checked a minimum of two days per week until July 1 each year, and a minimum of every other day after July 1.

One commenter indicated that existing resource condition and effects to resources should be disclosed in the EA. Chapter 3 contains existing condition and analysis of effects of each alternative.

## CHAPTER 2 - ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Crystal Springs and Burn Allotment Management Plan project. It includes a description 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.

### Alternatives

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#### Alternative 1 - No Action

Alternative 1 is the no action alternative. Under this alternative, grazing would not be reauthorized and the current permit holders would be notified that their term grazing permits would be cancelled. All Term Grazing Permits would be cancelled after 2 years, pursuant to Forest Service Handbook (FSH) 2209.13 part 16.24, and 36 CFR (Code of Federal Regulations) 222.4(4)(1). The FSH and CFR regulations indicate a 2-year notification is required to cancel a permit, with the exception of emergency situations. This alternative would close two allotments and eliminate livestock grazing from 11,862 acres of Forest Service administered lands in the Marks Creek and Upper Ochoco Creek Watersheds. Permits would not be issued for any of the two affected allotments unless a subsequent NEPA analysis and decision to re-stock the allotments was made.

Maintenance of range developments on the allotments would no longer be the responsibility of the permittees. Developments built to facilitate livestock management, including allotment and pasture fences, enclosure fences to prevent livestock from affecting resources such as aspen stands and springs, and water troughs, would be removed. Stock water ponds built to assist in livestock distribution and management would be abandoned. Permittees who participated in the development of range improvements would be reimbursed for their amortized share, consistent with direction in FSH 2209.13, Chapter 70. Developments built to reduce wildlife effects to resources, such as water developments and big-game enclosures, would remain in place. Maintenance of exterior boundary fences would remain the responsibility of the adjacent permittee or private land owners.

Permittees would no longer be responsible for the maintenance of the following rangeland improvements on National Forest System (NFS) lands. The following structural improvements would be removed.

- Approximately 18 miles of existing, interior pasture fence.
- 41 metal and tire troughs.
- Above ground pipes associated with water developments.

Log troughs would be retained on site. Spring boxes and underground pipes associated with water developments would be abandoned; pipes would be disconnected. If left in place, abandoned pipes would be capped on one or both ends to prevent water flow through the pipe.

## Alternative 2 - The Proposed Action

Alternative 2 is the proposed action. Livestock grazing would be reauthorized and term grazing permits would be issued for two allotments. The actual season for livestock use may be less than permitted in order to meet Forest Plan goals and objectives/desired conditions. The number of days livestock spend on each allotment may be adjusted annually based on variations in weather and range readiness or unpredictable events such as wildfire and drought. The actual season of use may also be adjusted annually based on variations in weather and range readiness. The dates listed in each allotment description are target dates for grazing. The season of use may occur sooner or later than indicated based on annual conditions. The length of grazing also depends on meeting utilization standards.

### **Burn Allotment**

The Burn Allotment would remain at 4,670 acres, which includes 1,380 acres of private land and 3,290 acres of National Forest System land. Livestock grazing would be reauthorized. Grazing of 130 cow/calf pairs would be permitted between April 15 and August 14, for a maximum of 698 AUMs. The “turn on” date might be adjusted annually based on range readiness.

The grazing system would be an early on/off, deferred rotation grazing system using five pastures: Howard, Wheatgrass, Marks Creek, Hohn Springs and Homestead. Each pasture would be utilized at a different time each year. The livestock would be actively managed to facilitate distribution. Active management means that the permittee or their representative would be present on the allotment and moving livestock, when needed, to achieve adequate livestock distribution or to prevent excessive forage utilization or streambank alteration. It is anticipated that livestock would be checked a minimum of 2 days per week up until July 1 and then a minimum of every other day after July 1.

The Burn Allotment contains 32 water developments and approximately 20 miles of fence. These existing structural improvements would be reauthorized. Eleven existing troughs would be improved for water holding capacity and to protect springs. Eleven existing ponds would be maintained to improve their water holding capability. A cattle guard would be installed at the 2610-050 road at the fence line between the Marks Creek Pasture of the Burn Allotment and the Pothole Pasture of the Marks Creek Allotment.

### **Crystal Springs Allotment**

The Crystal Springs Allotment would remain at 7,181 acres split between three pastures. Livestock grazing would be reauthorized. Grazing of 185 cow/calf pairs would be permitted between May 17 and August 31, for a total of 871 animal unit months (AUMs). The “turn on” date may be adjusted annually based on range readiness.

The grazing system would be a deferred rotation using three pastures: Coyle Creek, Middle and Crystal Springs. This means that pastures would be utilized at a different time each year. The Allotment would be actively managed to improve distribution. This means that the permittee or their representative would be present on the allotment and moving livestock, when needed, to achieve adequate livestock distribution and to prevent excessive forage utilization or streambank alteration. It is anticipated that livestock would be checked a minimum of 2 days per week up until July 1 and then a minimum of every other day after July 1.

The Crystal Springs Allotment contains 16 water developments and approximately 15.6 miles of fence. These existing structural improvements would be reauthorized. McAllister Spring would be improved to increase water holding capacity to improve distribution. A water gap located on Ochoco Creek would be removed to reduce impacts resulting from livestock in this area. A cattle

guard would be installed on the 2630-020 road at the fence line between Crystal Springs Pasture of the Crystal Springs Allotment and Grant Meadows Pasture of the Marks Creek Allotment.

A livestock enclosure fence would be constructed in the Crystal Springs Pasture to reduce livestock grazing around Peck's mariposa lily. Grazing would be allowed within the enclosure 1 year out of every 4 years. A livestock enclosure fence would also be constructed around Ahalt Creek in the Middle Pasture to protect the riparian area.

### **Alternative 3**

Alternative 3 would reauthorize grazing on two allotments. Permits would be issued under the same terms and conditions as the existing permits. The permitted season and amount of use would not change. Patterns of utilization would not change. Structural range improvements would be maintained as scheduled or as they cease functioning.

The actual season for livestock use may be less than permitted based on annual variations in weather and range readiness. The length of the grazing season would also depend on meeting utilization standards. The grazing season may be less than permitted, but would not be more without express written permission from the District Ranger. Extensions of the grazing season are rare.

#### **Burn Allotment**

The Burn Allotment would be 4,670 acres split between five pastures. Livestock grazing would be reauthorized. Grazing of 130 cow/calf pairs would be permitted between June 1 and September 30, for a maximum 698 AUMs. The private land permit would continue to authorize 130 cow/calf pairs from June 1 through September 30, for a total of 376 AUMs. The "turn on" date may be adjusted annually based on range readiness.

The grazing system would be a deferred rotation system with five pastures: Howard, Wheatgrass, Marks Creek, Hohn Springs and Homestead.

The Burn Allotment contains 32 water developments and approximately 20 miles of fence. These structural improvements would be reauthorized.

#### **Crystal Springs Allotment**

The Crystal Springs Allotment would remain at 7,181 acres split between three pastures. Livestock grazing would be reauthorized. Grazing of 185 cow/calf pairs would be permitted between June 16 and September 30, for a maximum of 871 AUMs. The "turn on" date may be adjusted annually based on range readiness.

The grazing system would be a deferred rotation system with three pastures: Coyle Creek, Middle and Crystal Springs.

The Crystal Springs Allotment contains 16 water developments and approximately 15.6 miles of fence. These structural improvements would be reauthorized.

### **Alternative 4**

Alternative 4 was developed in response to the issue that was raised during scoping. Specifically, Alternative 4 was developed to more directly address concerns about riparian vegetation, stream shade, and bank stability in Crystal Springs allotment.

Livestock grazing would be reauthorized and term grazing permits would be issued for two allotments. Allotment specific information is contained below.

The actual season for livestock use may be less than permitted in order to meet Forest Plan goals and objectives/desired conditions. The number of days livestock spend on each allotment may be adjusted annually based on variations in weather and range readiness or unpredictable events such as wildfire and drought. The actual season of use may also be adjusted annually based on variations in weather and range readiness. The dates listed in each allotment description are target dates for grazing. The season of use may occur sooner or later than indicated based on annual conditions. The length of grazing also depends on meeting utilization standards.

### **Burn Allotment**

The Burn Allotment would consist of 4,670 acres. Livestock grazing would be reauthorized. Grazing of 130 cow/calf pairs would be permitted between April 15 and August 14, for a maximum of 698 AUMs. The “turn on” date may be adjusted annually based on range readiness.

The grazing system would be an early on/off, deferred rotation grazing system using five pastures: Howard, Wheatgrass, Marks Creek, Hohn Springs and Homestead. Each pasture would be utilized at a different time each year. The livestock would be actively managed to facilitate distribution. Active management means that the permittee or their representative would be present on the allotment and moving livestock, when needed, to achieve adequate livestock distribution or to prevent excessive forage utilization or streambank alteration. It is anticipated that livestock would be checked a minimum of 2 days per week up until July 1 and then a minimum of every other day after July 1.

The Burn Allotment contains 32 water developments and approximately 20 miles of fence. These existing structural improvements would be reauthorized. Eleven existing troughs would be improved for water holding capacity and to protect springs. Eleven existing ponds would be maintained to improve their water holding capability. A cattle guard would be installed at the 2610-050 road at the fence line between the Marks Creek Pasture of the Burn Allotment and the Pothole Pasture of the Marks Creek Allotment.

A headcut located at T14S R18E SW1/4 of Section 12 would be fixed with step pools and a hardened drinking area would be created or water would be piped to a trough for livestock. Small diameter trees (less than 8” dbh) would be felled and used along the entire drainage to help reduce impacts from livestock traveling up and down the draw.

### **Crystal Springs Allotment**

The Crystal Springs Allotment would remain at 7,181 acres, and would be split between five pastures. Two new riparian pastures would be constructed for a total of 1,143 acres: Coyle Creek Riparian, 841 acres, and Middle Riparian, 302 acres. Livestock grazing would be reauthorized. Grazing of 185 cow/calf pairs would be permitted between May 17 and August 31, for a total of 871 animal unit months (AUMs). This is an earlier season of use. The “turn on” date may be adjusted annually based on range readiness.

The grazing system would be a partial-deferred rotation using four of the five pastures: Coyle Creek, Coyle Creek Riparian, Middle and Crystal Springs. The Coyle Creek pasture would be used first every year because it is the lowest elevation pasture and the early season would help improve riparian conditions in Coyle Creek. The Middle Riparian pasture would be used once every 3-4 years. The other three pastures would be utilized at a different time each year. The Allotment would be actively managed to improve distribution. This means that the permittee or their representative would be present on the allotment and moving livestock, when needed, to achieve adequate livestock distribution and to prevent excessive forage utilization or streambank alteration. It is anticipated that livestock would be checked a minimum of 2 days per week up until July 1 and then a minimum of every other day after July 1.

Before grazing is allowed on the new riparian pastures, both pastures would be rested for a minimum of 4 years to allow for recovery of springs, aspen stands, streams, riparian vegetation and upland vegetation. If an upward trend in resource conditions has not been achieved after the 4-year period, the rest period would continue until such time as an upward trend is achieved.

There would be a temporary reduction in AUMs during the period in which the Coyle Creek Riparian Pasture is rested. AUMs would be reduced 138 AUMs for a total of 733 AUMs. This reduction would occur by either a reduction in livestock numbers or time.

The corral in the Middle pasture would be relocated west of the 2210-300 junction down the 300 road and a holding pasture would be constructed adjacent to the new corrals. The holding pasture typically receives 2-3 days of use per year. The new corrals would be constructed before the Middle riparian pasture. Until these new corrals are built, the old corrals would continue to be used in their current location. The old corrals and holding pasture fences would be removed once the new improvements are constructed. Moving the corrals would help improve riparian conditions in Ahalt and Thronson creek.

The Crystal Springs Allotment contains 16 water developments and approximately 15.6 miles of fence. These existing structural improvements would be reauthorized. McAllister Spring would be improved to increase water holding capacity to improve distribution. Bacon Springs would be fixed so that the dam is no longer breached and enclosure would be constructed around the spring and wet meadow above the dam (approximately ¼ acre). Two new water developments would be constructed in the Coyle Creek pasture to improve water availability and facilitate livestock distribution. Approximately 5.3 miles of new fence would be constructed. A water gap located on Ochoco Creek would be removed to reduce impacts resulting from livestock in this area. A cattle guard would be installed on the 2630-020 road at the fence line between Crystal Springs Pasture of the Crystal Springs Allotment and Grant Meadows Pasture of the Marks Creek Allotment.

Three livestock enclosure fences would be constructed to reduce livestock grazing around Peck's mariposa lily: one in the Crystal Springs pasture at Corral Flat and two in the Middle pasture at Coyle Springs and Mud Springs. Grazing would be allowed within the enclosure 1 year out of every 4 years. A livestock enclosure fence would also be constructed around an aspen stand at the headwaters of Thronson Creek.

## **Project Design Features Common to All Alternatives** \_\_\_\_\_

The following design features are incorporated into all action alternatives.

### ***Range Resources***

- Locate salt and protein blocks at least ¼ mile from perennial water sources and at least 500 feet from riparian areas. Desirable places for the location of supplements include benches, knolls, old roads, skid trails, and little-used ridges (Holechek 2004).

### ***Aquatic Resources***

- When relocating or removing water developments within channel diversion points, all water should be returned to the stream. Abandoned water lines that are above ground should be removed. Water lines that are below ground should either be capped at one or both ends of the pipe or removed with archeological clearance. The objective of this design criterion is to make sure water is not withdrawn from the stream if there is no active water development.

### ***Heritage Resources***



- Coordinate with archaeologist during implementation of water developments and spring enclosure fences at Cool Spring and Cool Spring Pond and Mud Springs water development and spring enclosure fence.
- Maintain water to log troughs. Install “Y” in water line if replacing with metal trough. Retain log trough and, or remains of log trough.

### ***Invasive Plants***

- Conduct a weed ID workshop for Forest Service personnel involved in the project.
- Salting locations and protein blocks would be located away from known infestations.
- District weed coordinator would be informed about and involved with project planning and implementation.
- Mineral material (i.e. gravel) used for reinforcement around troughs or ponds would come from weed-free sources.
- Document weed infestations identified during implementation. Maintain an invasive plant inventory and use for project planning and implementation.
- To reduce potential for introduction of noxious weeds, all heavy equipment (such as backhoes) will be cleaned of all soil and plants prior to entering National Forest System lands.

## **Monitoring**

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**Implementation monitoring** will continue to take place twice a year (once mid-season and once post-season). Implementation monitoring includes taking photos and measuring stubble height, bank alteration, and hardwood utilization.

**Effectiveness monitoring** within the Crystal Springs Allotment and the Burn Allotment would aid in determining where, and to what extent, the implementation of the prescribed management direction is meeting or moving toward the desired resource conditions.

Key questions to be answered by effectiveness monitoring are:

- What is the effect of the selected grazing strategy on riparian vegetation species and growth over time?
- What is the effect of the selected grazing strategy on physical stream habitat (e.g., width to depth ratio, entrenchment, and channel type)?

Effectiveness monitoring will occur at minimum at sites along Whitney, Ahalt and Thronson creeks. Monitoring DMAs that are located along Rosgen C- and E-type channels will be preferred, as these types are most sensitive to cattle disturbance (Rosgen 1996). However, B-type channels represent most of the streams in the project area and will be monitored.

Monitoring will occur over 363 feet on the downstream side of the selected DMA stake. Monitoring will include surveying three different permanent cross-sections (at 0, 50, and 100 feet), doing a modified Winward (2000) sampling, and taking photos.

Three permanent cross-sections will be established along three different riffle sections of the stream with a metal rebar stake on each side of the stream. A measuring tape will be stretched across the stream at a width that includes the flood-prone area. A survey rod and level will be used to survey elevations in each cross section. Once surveyed, the cross-section data will reveal maximum bankfull width and depth and flood-prone area, which will allow the calculation of width to depth and entrenchment ratios. These calculations will aid the National Forest in

understanding how and if channel morphology is changing. Over time, the National Forest will be able to identify if the stream channel is narrowing, widening, getting more entrenched, or building a new channel. Permanent cross-sections will be measured at the end of the growing season (September/October), every 3-5 years.

The modified Winward sampling will include three vegetative cross-section compositions, a greenline composition, and woody species regeneration. The vegetative cross-sections will occur at the same locations as the stream cross-sections. Sampling procedures will follow Winward (2000), but will be modified to measure three transects instead of five. These cross-sections will allow the National Forest to measure the amount of change in community type composition over time.

The greenline composition sampling will also measure the amount of change in community type composition and will follow the protocol procedures outlined by Winward (2000). A total of 363 feet of greenline on each side of the stream will be sampled. The greenline sampling will provide a good indication of a streambank’s ability to buffer the hydrologic forces of moving water, depending on the type and successional status of vegetation present (Winward 2000).

Woody species regeneration sampling will follow the protocol outlined by Winward (2000). This will allow the National Forest to quantify the relative amounts of each age class of woody species in the sampling area, and how that may or may not be changing over time. Not all riparian areas will be suited for growing woody species. This is especially true where the complex has a low gradient and a limited amount of natural stream channel movement, and on anaerobic meadow soils that are often saturated to or near the surface during the growing season.

Photo monitoring will occur at the upstream DMA stake and at the 50 and 100 foot cross-sections. Photos will be taken from the left bank (facing downstream) at each of these locations.

**Sensitive Plant Monitoring** - Under Alternatives 2 and 4, grazing could be initiated earlier in the year than has historically occurred, before plants are fully developed and soils are dry. Therefore, *Calochortus longebarbatus* var. *longebarbatus* habitats would be at greater risk of damage from livestock post-holing, pedistalling, trampling, trailing, and pulling and consumption of plants. Such damage could result in damage to sensitive *C. longebarbatus* var. *longebarbatus* plants and habitat, and would be inconsistent with Forest Plan direction for protection of meadow habitat itself (Appendix B, USDA 1989). Scabland habitats associated with *Achnatherum hendersonii* and *A. wallowaensis* could also be affected by early season use if livestock are turned out before soils are sufficiently dry. Therefore, monitoring of *C. longebarbatus* var. *longebarbatus* sites and scabland habitats is recommended under these alternatives to ensure range readiness before livestock are permitted to enter the Forest.

**Invasive Plant Monitoring** - As part of the Ochoco National Forest Integrated Mangement Plan, activity aeras would be surveyed for noxious weeds. Monitoring of the Burn and Crystal Spring allotment area would occur as part of the ongoing noxious weed program. Funding for management of noxious weeds is expected to continue.

## Comparison of Alternatives

Table 2 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 2. Comparison of alternatives.**

	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Current Permits)	Alternative 4

	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Current Permits)	Alternative 4
<b>Burn Allotment</b>				
Season of Use	-	April 15 – Aug 14	June 1 – Sept 30	April 15 – Aug 14
Grazing System & Number of Pastures	-	early on/off, deferred-rotation with 5 pastures	deferred rotation with 5 pastures	early on/off, deferred-rotation with 5 pastures
AUMs	-	698	698	698
Permitted Livestock	-	130	130	130
Acres	-	4,670	4,670	4,670
Water Developments	-	32	32	32
Fences (miles)	-	20	20	20
Active Management	-	All pastures	None	All pastures
Headcut Repair	-	-	-	One headcut would be repaired.
<b>Crystal Springs Allotment</b>				
Season of Use	-	May 17 - Aug 31	June 16 - Sept 30	May 17-Aug 31
Grazing System & Number of Pastures	-	deferred rotation with 3 pastures	deferred rotation with 3 pastures	Partial-deferred rotation with 5 pastures
AUMs	-	871	871	733 for a minimum of 4 years. Return to 871 when resource objectives are met.
Permitted Livestock	-	185	185	185
Acres	-	7,192	7,192	7,192
Water Developments	-	16	16	18
Fences (miles)	-	15.6	15.6	20.9
Active Management	-	All pastures	None	All pastures
<b>How Does Each Alternative Address the Purpose and Need and Issues?</b>				
Continuing to Provide Livestock Forage	Will cease to provide livestock forage after 2 years.	Will continue to provide livestock forage at current levels.	Will continue to provide livestock forage at current levels.	Will provide livestock forage at decreased level for at least for years, but will provide at current levels after sufficient resource recovery.
Streambank Alteration	Will allow streambanks to gradually stabilize over 10-15 years.	Will allow streambanks to gradually stabilize over 30 - 35 years.	Will maintain or increase current levels of streambank alteration.	Will allow streambanks to gradually stabilize over 20 - 25 years.

	<b>Alternative 1 (No Action)</b>	<b>Alternative 2 (Proposed Action)</b>	<b>Alternative 3 (Current Permits)</b>	<b>Alternative 4</b>
<b>Riparian Vegetation</b>	Would allow recovery of riparian recovery over 10 -15 years (longer in sites where capability of supporting vegetation is severely impacted).	Would allow recovery of riparian recovery over 30 -35 years (longer in sites where capability of supporting vegetation is severely impacted).	Will maintain or decrease current levels of riparian vegetation.	Would allow recovery of riparian recovery over 20 -25 years (longer in sites where capability of supporting vegetation is severely impacted).
<b>Measurable improvement in shade and stream morphological features.</b>	20 - 25 years	40 - 45 years	Not expected to result in measurable improvement in shade and stream morphological features.	30 - 35 years
<b>Livestock Distribution</b>	Not applicable; livestock would be removed after two years.	Improved due to active management, maintenance and relocation of water features, and early on/off grazing system.	No expected change in current distribution.	Improved due to active management, maintenance and relocation of water features, and early on/off grazing system.

## CHAPTER 3 - 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.

### Range Resources

The following information is summarized from the Resource Report for Range; the entire report is on file at the Ochoco Ranger District office, Prineville, Oregon.

#### ***Affected Environment***

##### **Grazing Allotments**

The project area is made up of two cattle allotments, the Burn Allotment and Crystal Springs Allotment. Together, the allotments run a total of 1,945 Animal Unit Months (AUMs); 376 AUMs come from a private land permit in conjunction with the Burn Allotment. There are a total of 8 pastures between the two allotments. A deferred rotation grazing system has been used in the Burn allotment and Crystal Springs allotment. In a deferred rotation grazing system each pasture would be deferred from grazing on a rotating basis (Holechek et al. 2004). See Table 3 for allotment information.

**Table 3. Burns and Crystal Springs Allotment information.**

Allotment	Acres	Kind/Class	Permitted Number	Season of Use	AUMs
Burn- F.S. Permit	3,290	Cattle-cow/calf	130	06/01- 09/30	698
Burn- Private Land Permit	1,380	Cattle-cow/calf	70	06/01- 09/30	376
Crystal Springs	7,181	Cattle-cow/calf	185	06/16- 09/30	871

\*Animal Unit Months (AUMs) calculated based on current Animal Unit Equivalent of 1.32.

##### **Burn Allotment**

The Burn allotment has a total of 5 pastures: Hohn Spring, Homestead, Howard, Marks Creek and Wheatgrass. Homestead and Howard pastures are both over two-thirds private land. The Forest Service permit authorizes 130 cow/calf pairs from June 1st through September 30<sup>th</sup>, for a total of 698 AUMs. The Private Land permit authorizes 70 cow/calf pairs from June 1<sup>st</sup> through September 30<sup>th</sup>, for a total of 376 AUMs. A combination of cow/calf pairs, yearlings, and bulls graze the allotment. A deferred rotation grazing system has always been used in the allotment. In the past, actual turn-out dates and permitted numbers have been consistent with the permit; however, the permittee recently has been able to turn cattle out in late April due to mild winters and early springs. Range readiness criteria are always met prior to turn-out. Table 4 summarizes use in Burn Allotment in 2006 and 2007.

**Table 4. Burn Allotment: Use in 2006 and 2007.**

Year	Pasture	Date On	Date Off	Number/Class	Days	AUMs
2007	Hohn Spring	04/15	07/10	50 y	85	99
	Homestead	07/03	08/10	115 c/c & 50 y	36	224
	Howard	04/15	05/24	115 c/c	40	202

	Marks Creek	06/03	07/03	115 c/c & 50 y	30	186
	Wheatgrass	05/24	06/03	115 c/c	10	50
Total AUMs						761
2006	Hohn Spring	04/15	07/10	35 y	87	78
		05/01	07/10	2 bulls	71	7
	Homestead	04/15	05/15	130 c/c	30	171
		05/01	05/15	8 bulls	15	6
	Howard	07/01	08/01	130 c/c & 8 bulls	30	183
		07/11	08/01	35 y & 2 bulls	21	19
	Marks Creek	05/16	06/15	130 c/c & 8 bulls	30	183
	Wheatgrass	06/16	06/30	130 c/c & 8 bulls	15	71
Total AUMs						718
c/c= cow/calf pair; y= yearling						
Animal Unit Months (AUMs) calculated based on current Animal Unit Equivalent of 1.32 for cow/calf pairs; .7 for yearlings and 1.5 for bulls.						
Information for pasture turn on dates, turn off dates and numbers was taken from the 2007 and 2006 Annual Operating Instructions.						

### Crystal Springs Allotment

The Crystal Springs allotment has a total of 3 pastures: Crystal Springs, Coyle Creek, and Middle. The permit authorizes 185 cow/calf pairs from June 16<sup>th</sup> through September 30<sup>th</sup>, for a total of 871 AUMs. A deferred rotation grazing system is described in the Allotment Management Plan, but has not been used in recent years. Typically, cattle start in the Coyle Creek pasture and end in the Crystal Springs pasture. Actual turn-out dates and permitted numbers have been consistent with the permit. Range readiness criteria are always met prior to turn-out. Table 5 summarizes use in Crystal Springs Allotment in 2006 and 2007.

**Table 5. Crystal Springs Allotment: Use in 2006 and 2007.**

Year	Pasture	Date On	Date Off	Number/Class	Days	AUMs
2007	Coyle Creek	06/16	07/20	185 c/c	35	285
	Crystal Springs	08/22	09/30	185 c/c	40	326
	Middle	07/21	08/21	185 c/c	32	260
Total AUMs						871
2006	Coyle Creek	06/16	07/20	185 c/c	35	285
	Crystal Springs	08/22	09/30	185 c/c	40	326
	Middle	07/21	08/21	185 c/c	32	260
Total AUMs						871
c/c= cow/calf pair						
Animal Unit Months (AUMs) calculated based on current Animal Unit Equivalent of 1.32 for cow/calf pairs.						
Information for pasture turn on dates, turn off dates and numbers were taken from the 2007 and 2006 Annual Operating Instructions.						

### **Range Improvements**

Throughout the project area there are several range improvements including fences, water developments and enclosures. Permittees are responsible for pasture fence line, boundary fence line and water developments, and for maintaining fences prior to turn-out every year. There are approximately 35 miles of fence and 17 water developments identified in the existing grazing permits. The Forest Service is primarily responsible for maintenance of the enclosures. Several

water developments currently require maintenance or should be relocated due to resource concerns. See Table 6 for allotment and range improvement details taken from permit files (2230 Range File, Big Summit Prairie; 2230 Range File, Maurer).

**Table 6. Allotment and range improvement details.**

Allotment	Pasture	Acres	Water Improvements
Burn	Hohn Spring	1,027	2 springs, 3 troughs
	Homestead	702	1 trough- on private
	Howard	1,470	1 trough- on private
	Marks Creek	908	1 pond
	Wheatgrass	563	1 trough
<b>Total</b>		<b>4,670</b>	<b>2 springs, 6 troughs, 1 pond</b>
Crystal Springs	Coyle Creek	3,149	2 springs, 2 troughs
	Crystal Springs	2,038	0
	Middle	1,994	4 springs
<b>Total</b>		<b>7,181</b>	<b>6 springs, 2 troughs</b>

### Distribution

Livestock distribution plays a large role in the health of both livestock and rangelands. Several components affect livestock distribution, including topography and distance from food and water. Cattle will naturally congregate around main water and food sources; these areas are typically riparian areas. Cook et al. (1987) notes, “Grazing management is most difficult management challenge in riparian ecosystems because the water, shade, succulent vegetation, and gentle topography typical of many riparian areas makes these sites very attractive to cattle.” Water is limited in the project area and this makes available water sources more vulnerable to over-use by cattle. According to Fleischner (1994), since cattle spend a disproportionate amount of their time in riparian zones, these areas are easily damaged.

In homogeneous ecosystems, off-stream watering sites and salting can be effective in distribution; however the Ochoco National Forest is quite heterogeneous. According to Holechek et al. (2004), if forage is not within 2 miles of a natural water source or water development it is ungrazable. Additional herding and fencing are beneficial in distributing cattle in these landscapes (Fitch and Adams 1998). When salt and other mineral supplements are used they should be at least ¼ mile from perennial water, riparian zones and sensitive plant areas. Areas that are already disturbed make good salting locations.

### Condition and Trend Data

Range and forage condition (USDA FS 1984) is used to interpret livestock grazing impacts on vegetation, and range condition can be used to describe the state of health of the range. Trend and ecological status can also be used to describe overall range health. Trend can be defined as the direction of change in range condition and is generally described as upward (improving), downward (declining), or stable. Five Condition and Trend Sites (C & Ts) were established in the Burn Allotment in 2005 as long term trend studies. One C & T was located and re-read in the Crystal Springs Allotment, which was originally established in 1964. There are four condition classes used to describe range and forage condition: excellent, good, fair, and poor. Excellent falls in the range of 76-100% of climax, good is 50-75% of climax, fair is 26-50% of climax, and poor is 0-25% of climax (Holechek 2004). Maintaining current management is appropriate when ranges are in good or stable condition. However, if ranges show poor or fair condition a change in management may be needed.

Trend could not be established for the Burn Allotment because sites were first established in 2005 and have not been re-read yet; range condition was estimated using other methods. Refer to the Range Report in the project file for more information on survey methods and conclusions. The C

& T in the Crystal Springs allotment was re-read in 2004 and data supported an upward trend and a fair forage rating. Refer to Table 7 for summary of results.

**Table 7. Summary of C & Ts in Burn and Crystal Springs Allotments.**

Allotment	Cluster	Plant Association	Ecological Status	Trend	Forage Condition
Burn	C & T 1	Dry Mountain Meadow	Mid	NA	Fair
	C & T 2	Dry Mountain Meadow	Mid	NA	Fair
	C & T 3	Dry Mountain Meadow	Mid	NA	Fair
	C & T 4	Dry Mountain Meadow	Mid	NA	Fair
	C & T 5	Dry Mountain Meadow	Mid	NA	Fair
Crystal Springs	C & T 1	Dry Mountain Meadow	Mid	Upward	Fair

NA= No trend because site has not been re-read

### Winward Data

There was one Winward Riparian Study established in the Marks Creek pasture of the Burn Allotment in 2005. Three Winward Riparian Studies were established in the Crystal Springs Allotment as well in 2005. One study was placed in each pasture; Coyle Creek, Crystal Springs and Middle pastures. This was the first year studies were read, so there is no trend available. In the Burn Allotment riparian vegetation was in a late seral state and the greenline vegetation was in a mid seral state. Woody species were abundant at this site. Overall in the Crystal Springs Allotment riparian vegetation was in early, mid, and late seral states and the greenline vegetation varied from early to Potential Natural Community (PNC) seral states. Crystal and Middle pasture showed little to no woody species regeneration, while Coyle Creek had good woody representation. Winward Study results are discussed in depth in the Range Resource Report in the project file. Refer to Table 8 for summary of results.

**Table 8. Summary of Winward Riparian Studies in Burn and Crystal Springs Allotments.**

Allotment	Study #	Ecological Status		Woody Species Regeneration			
		Community	Status	Seedling	Young	Mature	Decadent
Burn	Bu-MC-W01	Riparian Vegetation	Late				
		Greenline	Mid	13	59	100	1
Crystal Springs	CS-CS-W01	Riparian Vegetation	Early				
		Greenline	PNC	0	26	72	0
	CS-MP-W02	Riparian Vegetation	Late				
		Greenline	PNC	0	0	0	0
CS-CC-W03		Riparian Vegetation	Mid				
		Greenline	Early	25	206	70	0

No dead woody species were recorded in any transects.

### Forage Production and Stocking Rates

Forage production and stocking rate are directly related. Knowing the forage production on a site will help managers set a stocking rate. Forage production is the amount of palatable vegetation available for forage and can be determined by looking at both plant communities and species on the landscape. Stocking rate is the number of animals on a piece of land for a specified period of



time. Soil and climate characteristics can alter forage production, which will directly alter stocking rates. An appropriate stocking rate would ensure that grazing would not impair the ability of plant recovery and that there is sufficient ground cover for soil health (Launchbaugh, K. pers. comm.). Forage production can be determined by several methods, including data collection and Geospatial Information System (GIS) mapping. For this analysis a spreadsheet was created based on the most current GIS layers and a conservative forage production estimate was calculated. Table 9 gives a summary of forage production and stocking rates by allotment and pastures.

**Table 9. Forage production and stocking rates.**

Allotment	Pasture	Useable Forage (lbs.)	Calculated AUMs	Permitted AUMs
Burn	Hohn Spring	137,945	177	
	Homestead	32,048	41	
	Howard	104,930	135	
	Marks Creek	94,517	121	
	Wheatgrass	64,243	82	
		Total		556
Crystal Springs	Coyle Creek	376,525	483	
	Crystal	310,022	397	
	Middle	274,389	352	
		Total	1,232	871

Stocking rates are below what is permitted in the Burn Allotment. One explanation might be that cattle have turned out early in this allotment several years, which range readiness has permitted. In 2007 and 2006, livestock was turned out on April 15<sup>th</sup> due to an early spring, and in turn all livestock were cleaned off the forest by August 10<sup>th</sup>, which is approximately one and half months early. This provided a large time during the re-growth season for plants to recover and 4 out of 5 pastures met end of season standards both years. As explained previously, there is an appropriate stocking if grazing does not impair the ability of plant recovery and there is sufficient ground cover for soil health. C & T data shows that in the Burn Allotment that almost 100% of ground cover is either plants or litter. Plants hits varied from 43 to 76 and litter hits varied from 24 to 49. This supports that there is good vegetative growth in the allotment, which is good for forage production and soil condition. In the Crystal Springs Allotment plant hits decreased from 41 to 27 and litter hits were 39. This provides less vegetative ground cover then the Burn Allotment, yet stocking rates in Crystal Springs are above what is permitted. The Burn Allotment has a Non-forest category of 18% and Crystal Springs Allotment has a Non-forest Category of 6%. The Non-forest category is difficult to determine an appropriate production rate based on GIS data, so the lowest rate for that plant association was used to maintain a conservative estimate. It is typical for the Non-forest category to be the most productive because there is no tree canopy. With no tree canopy layer more sunlight and moisture can reach the ground, which allows for understory vegetation to be very productive. The lowest rate for each plant association was used, but the actual forage production could be much more. It can be assumed that the overall forage production is greater in the Burn Allotment then the Crystal Springs Allotment.

**Utilization**

The Forest Service monitors vegetation utilization and residual stubble height based on criteria prescribed by the Ochoco Forest Plan (USDA FS 1989) and the Implementation Monitoring Program for Pacfish, Infish and the 1998 Biological Opinions for Salmon, Steelhead and Bull

Trout Program Manual, August, 2006 (UDSA FS 2006). See Tables 10 and 11 for a brief summary of requirements.

**Table 10. Minimum stubble height for riparian plant communities at Ochoco National Forest (Implementation Monitoring Program, 2003).**

Plant Community	Minimum Stubble Height	Key Species
Riparian Terrace/Dry Meadow	2-inches	Kentucky Bluegrass
Riparian Terrace/Dry Meadow	3-inches through 6/30 4-inches after 6/30	Grasses
Moist/Wet Meadow	4-inches	Grasses
Moist/Wet Meadow	6-inches	Sedges and Rushes
Greenline	4-inches	Grasses
Greenline	6-inches	Sedges and Rushes

**Table 11. Ochoco National Forest allowable use of forage by percent weight removed (Forest Plan 1989).**

Plant Community	Sub-type	Range Condition	
		Satisfactory	Unsatisfactory
Riparian	Grassland	0-50%	0-40%
	Shrubland	0-50%	0-35%
Non-riparian	Grassland	0-55%	0-40%
	Shrubland	0-50%	0-35%
	Forestland	0-50%	0-40%

The Burn and Crystal Springs Allotments are managed as a Level D (Kurtz, T. pers. comm.) Range Resource Management (USDA FS 1989).

Utilization is an estimate of the current year’s biomass removed from key forage species in Designated Monitoring Areas (DMAs). Utilization can be correlated directly with stubble height. Since 1999, Lookout Mountain Ranger District has measured stubble height in the DMAs. DMAs were placed in areas that most likely would receive the highest grazing pressure, meaning the entirety of the pasture would show the same stubble heights, or would be of a greater value.

Allowable use based on the Forest Plan is 50% (USDA FS 1989). Satisfactory condition is defined as on suitable range, forage condition is at least fair, with stable trend, and allotment is not classified as PC (basic resource damage) or PD (other resource damage) (USDA FS 1989). Satisfactory condition was determined based on Condition and Trend (C & T) surveys and Winward Studies (refer to allotment C & T files and Winward files, located at the Lookout Mountain Ranger District). The C & Ts in the project area rate fair forage value and the Crystal Springs Allotment showed an upward trend. There is one Winward established in the Burn Allotment, which rates at a mid to late serial community type. There are three Winwards in the Crystal Springs Allotment, which range from early to late serial community types (only one is rated early, the remaining two rate mid to late). Refer to Tables 12 & 13 for summary of utilization standards and stubble height standards achieved for the 2 allotments.

**Table 12. Utilization and stubble height standard achievement for Burn Allotment.**

Pasture	Utilization and Stubble Height	Year								
		1999	2000	2001	2002	2003	2004	2005	2006	2007
Hohn Spring	Utilization	NM	N	N	N	NM	NM	N	N	N
	Stubble Height	Y	Y	N	N	NM	NM	Y	Y	N
Homestead	Utilization	NM	NM	NM	Y	NM	NM	REST	Y	Y

	Stubble Height	Y	NM	NM	Y	NM	NM	REST	Y	Y
Howard	Utilization	NM	Y	N	Y	NM	NM	Y	Y	Y
	Stubble Height	N	Y	N	Y	NM	NM	Y	Y	Y
Marks Creek	Utilization	NM	N	N	Y	NM	N	N	Y	N
	Stubble Height	Y	Y	Y	Y	NM	Y	Y	Y	Y
Wheatgrass	Utilization	NM	N	N	N	NM	NM	N	N	N
	Stubble Height	Y	Y	N	Y	NM	NM	Y	N	Y

Y=standards met; N=standards not met; REST=pasture was not used that year; NM=pasture not measured

**Table 13. Utilization and Stubble height standard achievement for Crystal Springs Allotment.**

Pasture/DMA	Utilization and Stubble Height	Year								
		1999	2000	2001	2002	2003	2004	2005	2006	2007
Coyle Creek/ DMA 1	Utilization	NM	NM	NM	NM	NM	Y	Y	Y	Y
	Stubble Height	NA	NA	NA	Y	NM	Y	Y	Y	N
Coyle Creek/ DMA 2	Utilization	NM	NM	NM	NM	NM	N	N	N	N
	Stubble Height	NA	NA	NA	N	NM	N	Y	N	N
Crystal Springs/ DMA 3	Utilization	NM	NM	NM	NM	NM	Y	Y	Y	Y
	Stubble Height	NA	NA	NA	Y	NM	Y	Y	Y	N
Crystal Springs/ DMA 4	Utilization	NM	NM	NM	NM	NM	Y	Y	Y	Y
	Stubble Height	NA	NA	NA	Y	NM	Y	Y	Y	Y
Middle/ DMA 1	Utilization	NM	NM	N	NM	NM	Y	Y	Y	Y
	Stubble Height	NM	NM	N	Y	NM	Y	Y	Y	Y
Middle/ DMA 3	Utilization	NM	NM	N	Y	NM	Y	Y	Y	Y
	Stubble Height	Y	NM	Y	N	NM	Y	Y	Y	Y

Y=standards were met; N=standards were not met; REST=pasture was not used that year; NM=pasture not measured; NA=DMA did not exist

## Environmental Consequences

### Alternative 1 - No Action

Alternative 1 is the no action alternative. Under this alternative, grazing would not be reauthorized and the current permit holders would be notified that their term grazing permits would be cancelled. All Term Grazing Permits would be cancelled after 2 years, pursuant to Forest Service Handbook (FSH) 2209.13 part 16.24, and 36 CFR (Code of Federal Regulations) 222.4(4)(1). The FSH and CFR regulations indicate a 2-year notification is required to cancel a permit, with the exception of emergency situations. This alternative would close two allotments, eliminating livestock grazing from 11,862 acres of Forest Service administered lands in the Marks Creek and Upper Ochoco Creek Watersheds. Permits would not be issued for any of the two affected allotments unless a subsequent NEPA analysis and decision to re-stock the allotments was made.

Maintenance of range developments on the allotments would no longer be the responsibility of the permittees. Developments built to facilitate livestock management, including allotment and pasture fences, enclosure fences to prevent livestock from affecting resources such as aspen stands and springs, and water troughs would be removed. Stock water ponds built to assist in livestock distribution and management would be abandoned. Permittees who participated in the

development of range improvements would be reimbursed for their amortized share, consistent with direction in FSH 2209.13, Chapter 70. Developments built to reduce wildlife effects to resources, such as water developments and big-game exclosures, would remain in place. Maintenance of exterior boundary fences would remain the responsibility of the adjacent permittee or private land owners.

Log troughs would be retained on site. Spring boxes and underground pipes associated with water developments would be abandoned; pipes would be disconnected. If left in place, abandoned pipes would be capped on one or both ends to prevent water flow through the pipe.

Vegetation that is not grazed by livestock or wildlife increases in both ground cover and plant frequency. With the removal of disturbance from livestock, and provided that no other disturbance factor, such as wildfire, is present, plants in the allotments would be capable of completing a full lifecycle from seeding to reproduction. Through the process of succession early seral species would eventually be out-competed by late seral species, and plant communities would reach their climax plant community or potential plant community. Utilization of key forage species would no longer be an issue. Refer to the section titled “Soils, Water Quality, Riparian Function and Aquatic Habitat” in this EA for more discussion on the effects of this alternative on vegetation.

With the lack of grazing, species diversity and habitat diversity could decrease. Grazing promotes the establishment of secondary species by inhibiting dominant plant species in an ecosystem (Comis 1999). This can result in increased species diversity but primarily among early seral species. Grazing also creates patchiness in a landscape, which creates a variety of habitats and increases habitat diversity. A study done in the northwest showed that moderately grazed landscapes supported a more diverse flora while areas not grazed had a more simplified flora (Laycock 1994). Species diversity and habitat diversity is important to the overall health of the landscape for all flora and fauna species. With no grazing the benefit of livestock-related nutrient cycling would be lost. Nitrogen, a key nutrient for plant production, is left behind by livestock in the form of fertilization. Studies show that the addition of nitrogen to the soil increases plant productivity (Siemann 1998).

Removing grazing from the landscape may decrease species diversity but overall would improve the health and function of riparian areas throughout the project area (see section titled “Soils, Water Quality, Riparian Function and Aquatic Habitat” in this EA).

### **Alternative 2-Proposed Action**

Alternative 2 is the proposed action. Livestock grazing would be reauthorized and term grazing permits would be issued for two allotments. The proposed action addresses the improvement of distribution of cattle and riparian areas. Livestock would be turned on earlier in the grazing season based on range readiness. A deferred rotation grazing system would be used to allow for deferment of each pasture throughout the growing season. Water improvements would be maintained, which would make water available to livestock in areas away from the riparian area. This would help meet utilization standards and decrease streambank alteration.

### ***Effects to Both Allotments***

Under this alternative an earlier grazing season would be used. An earlier grazing season would increase cattle distribution throughout the allotments, especially in the uplands. Riparian areas would also receive less grazing pressure; woody shrubs and bank stability would not be adversely affected. “Early summer grazing of riparian areas may be less detrimental to riparian areas because of improved livestock distribution and more uniform vegetation use” (Parsons et al. 2003). A study done in the Wallowa Mountains by Parsons et al. (2003) showed that early season grazing of riparian areas altered cattle distribution and forage utilization patterns compared to a

later grazing season. The early season grazing showed evenly-distributed livestock patterns and more uniform utilization patterns. Late season grazing showed less uniform utilization patterns and livestock distance from streams decreased. According to Parsons et al. (2003), "During early summer, cattle were consistently observed further from the stream at any given hour than during late summer."

Earlier season grazing would allow for cattle to be removed from the allotment earlier in the grazing season. This would allow for a complete re-growth cycle in both the uplands and riparian areas. Particularly in arid areas, early grazing is less harmful because ample soil moisture is available for plant re-growth. As the grazing season progresses water developments and mineral supplements also contribute to cattle dispersion.

The provision of water and salt, and protein blocks in the uplands would improve the distribution of cattle and minimize negative effects of cattle grazing in riparian areas. Supplements should be placed at least a ¼ mile from perennial water sources and at least 500 feet from riparian areas. Desirable areas for the location of supplement ground include benches, knolls, old roads, skid trails, and little-used ridges (Holechek 2004).

Livestock would be actively managed to facilitate distribution in the Burn Allotment and Crystal Springs Allotment. The permittee or the permittee's representative would increase cattle distribution throughout individual pastures and the entirety of the allotment. If cattle are concentrating in particular areas for extended periods of time the active management would ensure cattle movement more frequently throughout the grazing season. This would promote uniform utilization.

The combination of early season grazing, water developments, supplements, and active management would increase cattle distribution and make utilization more uniform. Early season grazing would keep cattle out of the riparian areas for a longer period of time, which would improve woody shrubs and bank stability. Water developments and supplements would relieve pressure from perennial water sources and riparian areas. Active management would increase distribution throughout the allotment to allow for utilization throughout the uplands. Utilization and stubble height standards would be met more readily.

#### Effects of Deferred Rotation

Burn Allotment and Crystal Springs Allotment would continue to be in a deferred rotation system. A deferred rotation grazing system would periodically defer each pasture in the rotation, so that each pasture would be allowed to rest at a different time each year. According to Howery et al. (2001), deferred rotation is applicable when there are distribution problems where animals overuse convenience areas such as riparian areas, or where there are multiple use objectives. A deferred rotation grazing system would help to sustain riparian species in wetland areas by switching grazing and browsing pressure on herbaceous and woody plants between grazing years (Howery et al. 2001).

Deferred rotation would contribute to meeting utilization standards in the allotments. Deferring pastures would allow for plants to be rested every year for a different stage in the growing season (Holechek 2004). It allows for forage plants in high use areas to store carbohydrates and set seed at least every other year. This would allow for higher forage production throughout the Burn and Crystal Springs Allotments. Riparian areas would not be grazed at the same time every year, which would improve riparian vegetation and streambank condition.

### **Summary of Effects of Alt. 2 - Burn Allotment**

The combination of earlier season grazing, improving upland water improvements and daily management would improve cattle distribution throughout the Burn Allotment. Livestock would

be off the allotment by August 14. The early removal of cattle would reduce streambank alteration and grazing in the riparian areas. Woody shrubs would not be browsed as heavily and there would be a longer period of time allowed for herbaceous re-growth.

There is not a lot of perennial water in the Burn Allotment; the improvement of eleven troughs and eleven ponds would make more water available to cattle in the uplands. Distribution would increase and utilization would be more uniform throughout the allotment. Active management would be required in all five pastures and this would keep cattle distributed in the uplands and relieve grazing pressure in the riparian areas. Hohn Springs and Wheatgrass pastures in particular have not always met utilization standards in past grazing seasons. Earlier season grazing, improved water developments and active management would make it so utilization and stubble height standards can be met.

## **Summary of Effects of Alt. 2 - Crystal Springs Allotment**

The combination of earlier season grazing, improving upland water improvements and active management would improve cattle distribution throughout the Crystal Springs Allotment. Livestock would be off the allotment by August 31, which is 30 days earlier than current management. The early removal of cattle would reduce streambank alteration and grazing in the riparian areas. Woody shrubs would not be browsed as heavily and there would be a longer period of time allowed for herbaceous re-growth.

The improvement of McAllister Spring would increase the water holding capacity and draw cattle away from riparian areas. Distribution would increase and utilization would be more uniform throughout the allotment. Active management would be required in all three pastures and this would keep cattle distributed in the uplands and relieve grazing pressure in the riparian areas. The removal of the water gap on Ochoco Creek would reduce grazing impacts on the adjacent riparian area and streambank alteration would be minimized.

Coyle Creek pasture has not met utilization standards in the past four grazing seasons. Woody shrubs are also lacking in the pasture. Earlier season grazing, existing water developments and active management would make it so utilization and stubble height standards can be met.

Certain areas that are Peck's mariposa lily (*Calochortus longebarbatus var. peckii*) habitat get heavily grazed by cattle and the enclosure would limit grazing pressure. The enclosure would be grazed once out of every four years, which would help remove excess plant biomass. The livestock enclosure around Ahalt Creek would reduce grazing impacts in the riparian area. Woody shrubs would increase in frequency and streambank alteration would be reduced.

## **Alternative 3-Current Management.**

This is the current grazing management alternative. Under this alternative, two allotments would exist and be re-authorized for grazing under the current Animal Unit Months (AUMs) and grazing season. The grazing season usually starts later in the spring and extends later into the summer. A deferred rotation grazing system is used in the Burn Allotment and Crystal Springs Allotment.

## **Effects to Both Allotments**

A deferred rotation grazing system would continue to be used in the Burn Allotment and Crystal Springs Allotment. See the Effects of Deferred Grazing discussion under Alternative 2.

Supplements, such as salt and protein blocks, would continue to be utilized to encourage distribution throughout the allotments. See the Effects to Both Allotments under Alternative 2 for discussion on the effects of supplements.

Existing water developments would not be improved and new water developments would not be constructed. Without improved water developments livestock distribution would not improve and

cattle would continue to utilize the same foraging areas. Riparian areas would not improve because cattle would continue to use these areas for water and shade. There would be a greater potential for streambank alteration and a decrease in woody vegetation. The later grazing season would also have a negative impact on the riparian areas. Cattle would utilize riparian areas later in the summer.

### **Summary of Effects of Alt. 3 - Burn Allotment**

The current condition would be continued.

As summer temperatures rise, cattle would begin the day away from streams, but would move quickly to riparian areas during the late morning hours (Parsons et al. 2003). According to a study done by Parsons et al. (2003), later season grazing showed disproportionate riparian utilization and upland utilization in comparison to early season grazing. With the later season grazing there would be greater impacts to the riparian areas. Ecological trend in the Burn Allotment would most likely remain static, and not move into an upward trend. The ecological status on the greenline in the Marks Creek pasture is rated as mid seral, and would not move toward later seral with a later season grazing. In previous years the stubble height standards were not always met in several pastures when they turned out in early June. However, in years when range readiness permitted, cattle were turned out earlier in the grazing season and stubble standards were more easily met.

### **Summary of Effects of Alt. 3 - Crystal Springs Allotment**

See the Effects for the Burn Allotment under Alternative 3, which discusses effects of later season grazing.

Ecological trend in the Crystal Springs Allotment would most likely remain static, and not move into an upward trend. In previous years the stubble height standards were not always met in the three pastures when they turned out in early June. It has been difficult to meet stubble height standards in Coyle Creek pasture. This pasture has limited water and cattle spend a majority of their time in the riparian area as temperatures rise. The ecological status for greenline in the Coyle Creek pasture is currently rated as early seral and would not move towards later seral with a later season grazing plan. Coyle Creek pasture would especially benefit from earlier season grazing to relieve pressure in the riparian areas.

## **Alternative 4**

### **Effects to Both Allotments**

See the Effects of Deferred Grazing discussion under Alternative 2.

See the Effects Common to all Allotments under Alternative 2 for discussion on the effects of supplements.

See the Effects Common to all Allotments under Alternative 2 for discussion on the effects of maintaining water improvements.

### **Burn Allotment**

Early season grazing, deferred rotation grazing system, active management, and water development maintenance have all been discussed in Alternative 2 under Effects Common to all Allotments and under the Burn Allotment discussion. Please refer to Alternative 2 to see discussion in relation to these management practices.

A head-cut located at T14S R18E SW1/4 of Section 12 would be fixed with step pools and a hardened drinking area would be created or water would be piped to a trough for livestock. This would provide an additional watering area for both livestock and wildlife. Providing a trough or

a hardened drinking area would reduce impacts to the adjacent riparian area. Riparian vegetation above and below the watering area would improve and streambank stability would increase. The additional watering area would help with distribution throughout the pasture. Small diameter trees (less than 8"DBH) would be felled and used along the entire drainage to help protect impacts from livestock traveling up and down the draw.

## **Crystal Springs Allotment**

Early season grazing, deferred rotation grazing system, and active management, have all been discussed in Alternative 2 under Effects to both Allotments and under the Burn Allotment discussion. Please refer to Alternative 2 to see discussion in relation to these management practices.

Two new riparian pastures would be constructed for a total of 1,143 acres: Coyle Creek Riparian, 841 acres, and Middle Riparian, 302 acres. The Coyle Creek Riparian Pasture and Middle Riparian Pasture would be rested for a minimum of 4 years and trend switches to an upward trend towards the Desired Future Condition (DFC). This time would allow for recovery of springs, aspen stands, streams, riparian vegetation and upland vegetation. With the combination of resting and using a deferred rotation system it would be easier to meet stubble standards and utilization standards. C & T data showed that woody shrubs were lacking throughout the allotment in the riparian areas. Woody shrubs and deep rooted riparian vegetation would increase with a four year rest. The Middle Riparian pasture would be grazed only once out of every three to four years, which would allow for the Peck's mariposa lily population to not be adversely affected by grazing.

There would be a temporary reduction in AUMs during the period the Coyle Creek Riparian Pasture is rested. AUMs would be reduced by 138 AUMs to a total of 733 AUMs. This reduction would occur by either a reduction in livestock numbers or time. The reduction of AUMs is necessary because there is a total of 1,143 acres that would be rested and this would be a significant loss of available forage. Following the resting period, AUMs would be returned to a total of 871.

The corral in the Middle pasture would be relocated west of the 2210-300 junction down the 300 road and a holding pasture would be constructed adjacent to the new corrals. The holding pasture typically receives 2-3 days of use per year. The new corrals would be constructed before the Middle riparian pasture. Until these new corrals are built, the old corrals would continue to be used. The old corrals and holding pasture fences would be removed once the new improvements are constructed. Moving the corrals would help improve riparian conditions in Ahalt and Thronson creek. Woody shrubs and deep rooted vegetation would increase in frequency. Streambank stabilization would increase and erosion would be minimized.

Water development maintenance has been discussed in Alternative 2 under Effects Common to all Allotments and under the Burn Allotment discussion. The effects of removing the water gap on Ochoco Creek have been discussed in Alternative 2 under Effects in Crystal Springs Allotment. Please refer to Alternative 2 to see discussion in relation to these management practices.

Three livestock enclosure fences would be constructed to reduce livestock grazing around Peck's mariposa lily, one in the Crystal Springs pasture at Corral Flat and two in the Middle pasture at Coyle Springs and Mud Springs. Grazing would be allowed within the enclosure 1 year out of every 4 years. Peck's mariposa lily populations can be adversely affected by cattle grazing if grazed every year. Grazing impacts such as the removal of leaves results in the depletion of carbohydrate reserves, and causes a reduction of size and reproduction (Oregon Natural Heritage Program, 1996). Resting the enclosure three out of four years would allow for full reproductive



cycles to take place. A livestock enclosure fence would also be constructed around an aspen stand at the headwaters of Thronson Creek. All four proposed enclosures are small in size and the reduction in available forage is not significant. The AUMs would not have to be adjusted.

### **Cumulative Effects**

Within the project area there are several past actions that have affected current range condition and vegetation. Past activities and events include: historic livestock grazing, timber harvest fire suppression, and wildfire. Covington et al. (1994) stated that, "Heavy livestock grazing, logging, and fire exclusion associated with Euro-American settlement has brought about substantial changes in forest conditions in western forests." The effects of these practices have been identified and discussed as part of the current condition.

Another past activity that occurred in the Coyle Creek pasture was planting of riparian vegetation along Coyle Creek. A total of .625 miles of stream were planted. This helped with bank stability, a decrease in erosion, and increased plant diversity.

Present activities with the Burn Allotment and Crystal Springs Allotment include the Spears Vegetation Management Project. This project includes commercial and non commercial thinning, fuels treatments, road management, and aspen treatments. The Spears Vegetation Management Project includes 82 acres of commercial harvest (Halfway and Rush Timber Sales) in the Burn and Crystal Springs Allotment with about a third of an acre in the outer Riparian Habitat Conservation Area (RHCA) on Crystal Creek. In addition, 981 acres of pre-commercial thinning, 1,479 acres of fuels treatments (including 94 acres of grapple piling), and 57 acres of aspen treatments are proposed in the project area. The Rush Timber Sale would require about a third of a mile of light reconstruction on the 2610056 road and temporarily reopening a short section of the 2610057 road to access harvest units in the Marks Creek pasture of the Burn Allotment. Altogether, the Halfway and Rush Timber Sales would harvest 2,377 acres in the Marks Creek Sub-watersheds with about 39 acres in RHCAs. Aspen treatments would promote healthier vegetative conditions within riparian areas by reducing vegetative competition (Seymour, 2008.). Current activities would improve understory vegetation, enhance transitory range and encourage livestock to move into the uplands. Thinning and burning would promote understory grasses, forbs and shrubs.

Reasonably foreseeable projects include The Ochoco Valley Fuels Project would accomplish under-burning and non-commercial thinning in combination with under-burning on 2700 acres within the Duncan Creek and Headwaters Ochoco Creek Sub-watersheds. About 145 acres would be under-burned and 26 acres under-burned with non-commercial thinning in the Coyle Creek Pasture of the Crystal Springs Allotment (Seymour, 2008). Foreseeable activities would also improve understory vegetation, enhance transitory range and encourage livestock to move into the uplands. Thinning and burning would promote understory grasses, forbs and shrubs in the project area.

### **Alternative 1-No Action Alternative**

Cumulative effects of the past, present, and reasonably foreseeable activities in combination of livestock removal would improve understory and riparian vegetation abundance and condition.

### **Alternatives 2 and 4**

Early season deferred grazing in the Burn Allotment and Crystal Springs Allotment in conjunction with the Spears Vegetation Management Project and the Ochoco Valley Fuels Project would help improve range condition, including transitory range conditions. Upland vegetative species would increase in richness and frequency. Early season grazing would allow for a complete re-growth cycle in both the uplands and riparian areas. The Spears Vegetation

Management Project and Ochoco Valley Fuels Project would open up the tree canopy and allow for improvement of understory vegetation. The increase in transitory range would encourage cattle to utilize the uplands more. Distribution would also improve throughout the project area. Distribution would also improve with active management. Active management would occur in the Burn Allotment and Crystal Springs Allotment.

Water developments would provide additional watering sites for cattle in the uplands. This would minimize cattle impacts in the riparian areas. Forage condition would improve in riparian areas on Coyle Creek from a past planting. This helped with bank stability, a decrease in erosion, and increased plant diversity. Improvement in riparian area would benefit livestock, wildlife, and aquatic life.

There are no expected adverse effects to range condition in the uplands and riparian areas. The cumulative effect of the past, present, and reasonably foreseeable projects combined with early season grazing, new water developments, and active management would improve range condition. Livestock distribution would also improve throughout the project area. Utilization standards and stubble height standards would be easier to meet due to the increase in forage and distribution. The increased use of uplands would minimize the use in riparian areas; which would improve streambank stability and woody regeneration.

### **Alternative 3-Current Management**

Deferred grazing in the Burn Allotment and Crystal Springs Allotment in conjunction with the Spears Vegetation Management Project and the Ochoco Valley Fuels Project would help improve range condition, including transitory range conditions. Upland vegetative species would increase in richness and frequency. The Spears Vegetation Management Project and Ochoco Valley Fuels Project would open up the tree canopy and allow for improvement of understory vegetation. The increase in transitory range would encourage cattle to utilize the uplands more. Distribution would also improve throughout the project area.

Existing water developments would provide additional watering sites for cattle in the uplands. This would minimize cattle impacts in the riparian areas. Forage condition would improve in riparian areas on Coyle Creek from a past planting. This helped with bank stability, a decrease in erosion, and increased plant diversity. Improvement in riparian area would benefit livestock, wildlife, and aquatic life.

## **Soils, Water Quality, Riparian Function and Aquatic Habitat**

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Separate analyses of effects to soils, water quality, and aquatic habitat were prepared for this Environmental Assessment. For the purposes of this document, effects to these resources are disclosed together, as these resources are closely related. The following discussion is summarized from the Soils, Hydrology, and Aquatic Species Specialists' Reports, which are located in the project file on the Lookout Mountain Ranger District.

### **Desired Condition**

Desired condition for soil, water, riparian function and aquatic habitats is derived from the Ochoco National Forest Land and Resource Management Plan (LRMP 1989), the Inland Native Fish Strategy (INFISH 1995), General Water Quality Best Management Practices (1988), the Clean Water Act (1972), and Executive Orders 11988, 11990, and 12088. Additional guidance is provided in the Ochoco Creek Watershed Assessment (2004), the Marks Creek Watershed Analysis (1998) and the Joint Aquatic and Terrestrial Programmatic Biological Assessment (2006-2009). Descriptions of all the applicable management direction for soil, water quality,

riparian function and aquatic habitats can be found in the Soils, Hydrology and Aquatic Species Specialists' Reports in the project file on the Lookout Mountain Ranger District.

The following terminology will be used in this discussion.

**Cutbank:** An actively eroding streambank surface that is greater than 6 inches in height, with an angle greater than 45 degrees. Percentage of cutbank along a stream is a long-term indicator of bank stability (see the Ochoco National Forest Bottom Line Survey protocol, project file, Lookout Mountain Ranger District). The assumption is that cutbank results in unacceptable levels of sediment delivery into the stream. I

**Streambank Alteration:** For the purposes of this analysis, streambank alteration is defined as a change to a streambank that is specifically tied to the presence of livestock. Studies have indicated that streambank retreat is statistically greater in grazed than in ungrazed areas (Kauffman et al, 1983, Buckhouse and Bohn 1987.) Contributors to streambank alteration include hoof shear, trampling, stream crossings, bare soils or exposed vegetation roots that result from hoof action, trampling of pioneer vegetation, pedestalling, streambank cutouts or scallops, tension cracks, increase of bankfull stream width, and stream entrenchment. Streambank alteration may be short-term, as in hoofprints or shallow postholing that will revegetate in the same year it occurred, or long-term, as in deep postholing, pedestalling, and bank shearing that will not revegetate in the same year. Streambank alteration may result in increased sediment delivery to streams (Skovlin 1984). Streambank alteration may result in reduced riparian vegetation; riparian vegetation is an important component in proper riparian function, as it stabilizes streambanks, maintains proper bank morphology, provides resistance to erosive flows, and provides shade (Platts 1979, Swanson et al. 1982, Platts and Nelson 1985, Beschta and Platts 1986).

**Unstable Bank:** An unstable streambank is an actively eroding streambank. Bank instability can be caused by a number of factors, including (but not limited to) livestock presence. The assumption is that unstable banks result in unacceptable sediment delivery into the stream. A cutbank is one type of unstable bank. Streambank alteration may lead to bank instability.

**Headcut:** A gully that forms due to bank instability and/or cattle trailing that, without active management to correct it, can continuously expand upstream. A headcut can carry water at high rates of speed and deliver unacceptable amounts of sediment into the stream.

**Shade:** Shade provided to a stream by hardwoods, sedges, grasses and trees is an important component of aquatic habitat. Streambank alteration and browsing of riparian vegetation may lead to reduced riparian vegetation and thus reduced shade. Shade helps maintain water temperatures within ranges that are suitable to support the life cycles of aquatic species.

**Riparian Habitat Conservation Area (RHCA):** This term refers to buffers around streams within which are particular management direction (LRMP as amended by INFISH). RHCA's vary in width dependent upon the type of stream. The following stream classes are present in the project area.

**Class I Stream:** Perennial or intermittent streams with a high density/number of spawning and/or rearing fish. If no fish are present, then the stream provides a potable water source for an existing residence on private land and/or Forest Service facilities. RHCA extends 300 feet slope distance on either side of the stream channel (total of 600 feet).

**Class II Stream:** Perennial or intermittent streams with moderate density/number of spawning and/or rearing fish. If no fish are present, then the stream provides high quality water for a Class I stream. RHCA extends 300 feet slope distance on either side of the stream channel (total of 600 feet).

**Class III Stream:** Perennial, spring-fed stream or stream with length greater than 1 ¼ miles or ponds, lakes, reservoirs and wetlands greater than 1 acre. No fish are present due to steep gradient or physical/biological barriers. RHCA extends 150 feet slope distance on either side of the stream channel (total of 300 feet) or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest.

**Class IV Stream:** Seasonally flowing or intermittent streams with a defined channel present that is less than 1 ¼ miles in length. RHCA extends 50 feet slope distance from the stream channel (total of 100 feet).

**Compaction:** Compaction is defined as a decrease in soil bulk density; it can be caused by various activities that reduce surface soil porosity. This causes reductions in water infiltration, percolation and air exchange in the soil. There is also an increase in resistance to root growth. Detrimental compaction is defined as a 15 percent increase in soil bulk density for residual soils and a 20 percent increase in bulk density for ash soils. As discussed below this effect is largely seasonal. These effects do have short term impacts on overland flow especially for summer thunderstorms. This may increase the runoff peak and cause more surface and bank erosion than on ungrazed soils.

**Roughness:** For this analysis, “roughness” refers to the soil’s ability to withstand erosive events. Vegetation roots help provide roughness. Forage utilization standards that guide stubble height (see section titled “Range Resources” in this EA and the Range Specialists’ Report in the project file on the Lookout Mountain Ranger District) help maintain soil roughness in the project area. Stubble height is used as a surrogate for hydraulic roughness to ensure that adequate protection exists for these small intermittent streams. (Clary and Webster 1989) If the pasture is meeting stubble heights in general then it is viewed as meeting basic resource protection measures for a particular pasture.

The desired condition for soil, water quality, riparian function and aquatic habitats is summarized in Table 14. The effects of the alternatives will be compared against this desired condition and discussed under Environmental Consequences.

**Table 14. Desired condition for soil, water quality, riparian function and aquatic habitats.**

Resource Component or Concern	Desired Condition	Source of Management Direction
Soil	Detrimental soil conditions must not exceed 20% in an activity area.	LRMP
Streambank Alteration	No greater than 10% alteration on a given streambank.	Joint Aquatic and Terrestrial Programmatic BA, Project Design Criteria for Columbia spotted frog.
Cutbank	No greater than 20% of a given streambank has cutbank. ~~~~ Less than 10% of a given streambank has cutbank <sup>1</sup> .	LRMP ~~~~ Ochoco and Marks Creek Watershed Analyses
Bank Stability	At least 80% of stream bank is stable.	LRMP
Shade	At least 80% of stream surface is shaded, or 100% of potential when 80% can't be achieved.	LRMP
Water Temperature	No measurable increase in maximum water temperature (7-day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period). ~~~~	LRMP as amended by INFISH ~~~~

	Maximum 7-day average temperature of 64.4°.	State of Oregon Water Quality Standard
<sup>1</sup> Less than 10% cutbank is not a standard or guideline, but is a management objective identified through watershed analysis.		

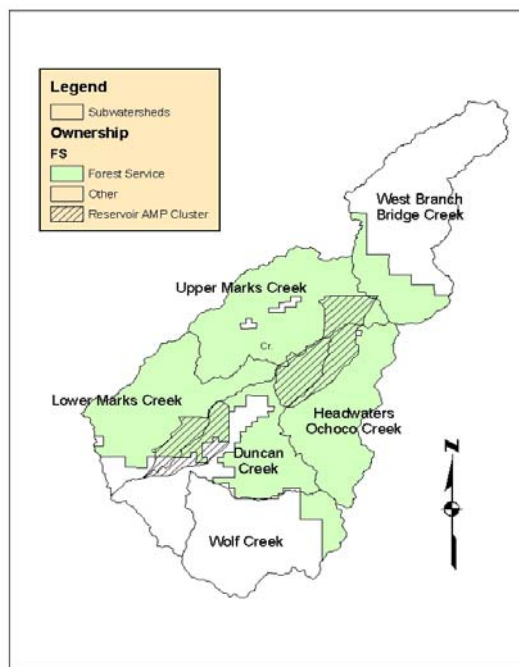
**Affected Environment**

The project area encompasses the area between Marks Creek and Ochoco Creek on the Ochoco National Forest, in the northeastern quarter of the Lower Crooked River Sub-Basin in the Deschutes Basin; 24 acres of the project area lie in the John Day Basin. Elevation ranges from approximately 3,600 feet in the southwestern corner of the Burn Allotment above the junction of US Highway 26 and County Road 23 to 5,560 feet at Coyle Butte. The project area lies within two 5<sup>th</sup>-Field Watersheds and five 6<sup>th</sup>-Field Subwatersheds (see Table 15 and Figure 1).

**Table 15. Watersheds and subwatersheds that overlap the Crystal Springs and Burn Range AMP Project Area.**

5 <sup>th</sup> - Field Watershed	6 <sup>th</sup> - Field Subwatershed	Total Acres in 6 <sup>th</sup> -Field*	Allotment Acres within 6 <sup>th</sup> -Field		Percent Allotments in 6 <sup>th</sup> -Field
			FS	PVT	
Upper Ochoco Creek (96,015 acres)	Duncan Creek	22,507	4,443	1,170	25
	Hdwtrs. Ochoco Creek	16,121	2,209	1	14
	Lower Marks Creek	18,234	1,555	325	10
	Upper Marks Creek	20,557	2,122	0	10
Bridge Creek (172,340 acres)	West Branch Bridge Creek	25,392	24	0	<1

Acres include all National Forest System, Private, and other agency lands.



**Figure 1. Subwatersheds that overlap the Crystal Springs and Burn AMP Project.**

The project area’s climate is characterized by relatively low precipitation and humidity, large daily temperature fluctuations throughout the year, and high evapotranspiration rates. Summers are typically hot and dry and winters are cool and moist. The average annual air temperature is 43°F based on long term records from the Ochoco Ranger Station. The coldest and warmest months are January and July with mean monthly temperatures of 24°F and 61°F, respectively. Temperatures in the winter can go below 0°F and occasionally can exceed 100°F in the summer. Freezing can occur in any month of the year. Maximum and minimum daily temperature differences of over 60°F have been recorded.

Average annual precipitation within the project area ranges from 15 inches in the lower elevations of the Burn Allotment to 27 inches in the headwaters of Coyle and Thronson Creeks on the Crystal Springs Allotment. About 90 percent of the precipitation occurs between October and June. Snow accounts for about 50 percent of the annual precipitation.

Hydrology within the project area is primarily snow-melt driven with low base flows. Flows follow a snowmelt hydrograph about 70% of the time with the primary peak in April or May, a secondary peak March or April, and base flows in September. About 30% of the time, runoff follows a rain-on-snow hydrograph with peak flows occurring in February or January. The warmer winters that the area has been experiencing may be responsible for the increased incidence of rain-on-snow events and has probably moved the peak snowmelt runoff earlier in the spring.

The Burn and Crystal Springs Allotments are comprised of one main Level 4 Ecoregion. The ecoregion name and number is Major Land Resource Area E-43 (Blue Mountains). The Level 5 ecoregion name (at the 1/100,000 scale) is called South Slope Ochoco Mountains. This area

contains a wide variety of soils and landtypes. Parent materials are largely Clarno basalts, tuffs and andesites (Paulson et al. 1977).

The major landtypes for the project area (other than the privately owned acreage ) are the T (75%), B (17%), and M2 (2%) landtypes. Additional minor landtypes are the A\*\* (0.6%). An acreage summary by major landtype is displayed in Table 16.

**Table 16. Burn and Crystal Springs landtype acreage and parent material.**

Landtype Group	Acreage	Percent of Burn and Crystal Spring AMP Area	Parent Material
T Landtypes	8160	75	Clarno Tuffs and Basalts-mixed
B Landtypes	1799	17	Clarno Basalts
M2 Landtype	198	2	Alluvium
A12 Landtype	102	1	Mixed Alluvium
L26 Landtype	64	0.6	Landslide Debris

**ASH SURFACE SOILS:** The Burn and Crystal Springs Allotment Area contains approximately 1,948 acres of ash soils having at least 7 inches of surface ash. The deepest ash soils occur on the northwest and eastern aspects. The south eastern and western aspects have the least amount of ash deposits. Landtypes in the Burn and Crystal Springs Area that have large percentages of ash soils are the T2, T2M and T2B landtypes. The thickest ash banks are along streams with NW and E aspects.

**CLAY SURFACE SOILS:** These are soils with little or no ash capping. Landtypes in the Burn and Crystal Springs area that have shallow ash caps and clay closer to the surface are T3 and T3B landtypes.

**RIPARIAN SOILS:** The zone most affected by cattle and large ungulate hoof action in terms of erosion and delivered sediment is viewed as the 20 foot zone (10 feet each side) of an average class II and III stream. This is based partly on a Montana study which showed that 94 to 99 percent of sediment was retained in 6 meter (ca. 20 feet) wide buffer regardless of vegetation type or slope (Hook 2003). This is viewed as the zone most likely to be affected by cattle and other large ungulates (such as elk).

**Description of Watersheds, Subwatersheds, and Streams**

There are approximately 10.4 miles of named streams and 27 miles of unnamed streams mapped within the project area. About 60% of project area streams are intermittent. Overall stream conditions within the project area are variable. Based on professional judgment, most streams within the project area appear to have physical stream and vegetative conditions that are in a static trend condition with some reaches improving but more reaches degrading (see Hydrology and Aquatic Species Reports in the project file).

Streams in the project area are as follows:

Class I: About 100 feet of Ochoco Creek is in the project area; this portion of the creek is in a water gap.

Class II: About 5.6 miles.

Class III: About 10.3 miles

Class IV: About 17.9 miles.

In addition there are about 3 miles of stream that are mapped as unclassified and appear to be Class IV.

### **Upper Ochoco Creek Watershed**

The Upper Ochoco Creek Watershed drains the west central part of the Ochoco Mountains. Approximately 12% of this watershed contains a portion of the project area and approximately 87% of the project area in the watershed is on Forest Service administered lands. This watershed contains four subwatersheds that overlap with the Burn and Crystal Springs Project Area.

***Upper Marks Creek Subwatershed:*** The project area overlaps approximately 10% of this subwatershed. This subwatershed contains Crystal Creek and numerous intermittent and ephemeral unnamed drainages. There are approximately 7.76 miles of stream in the Burn Allotment Area and 15.66 miles of stream in the Crystal Springs Allotment Area. Tables 17 and 18 display the miles of streams within this subwatershed, by existing allotment and pasture. Table 19 displays the miles of streams in Crystal Springs Allotment by Alternative 4 pastures.

***Lower Marks Creek Subwatershed:*** The project area overlaps approximately 10% of this subwatershed. This subwatershed has several perennial and intermittent unnamed drainages in the planning but does not have any named streams.

***Duncan Creek Subwatershed:*** The project area overlaps approximately 25% of this subwatershed. Named streams within this subwatershed include Coyle, Willow, and Whitney Creeks.

***Headwaters Ochoco Creek Subwatershed:*** The project area overlaps with approximately 14% of this subwatershed. Streams in this subwatershed drain the area above the Ochoco Ranger station. Named streams that are within the project area include Ochoco, McAllister, Ahalt, and Thronson Creek.



**Bridge Creek Watershed**

The Bridge Creek Watershed drains the north slope of the middle part of the Ochoco Mountains into the John Day River. Only 24 acres in the Crystal Springs Pasture of the Crystal Springs Allotment is in the watershed. This watershed contains one subwatershed that overlaps with the AMP Project Area, which is described below.

**West Branch Bridge Creek Subwatershed:** The project area overlaps less than 1% of this subwatershed, and does not encompass any streams or Riparian Habitat Conservation Areas (RHCAs).

**Table 17. Total Stream Miles within the Burn AMP Project Area, by Subwatershed, Allotment, Stream, and Pasture.**

Stream	Hohn Spr.	Homestead	Howard	Marks Cr.	Wheat Grass
<b>Lower Marks Cr. Subwatershed</b>					
Unn. Perennial			0.37	0.16	0.62
Unn. Intermittent			0.75	2.25	0.43
<b>Duncan Cr. Subwatershed</b>					
Unn. Perennial	0.44				
Unn. Intermittent	2.40	0.35			

**Table 18. Total stream miles within the Crystal Springs AMP Project Area Alt. # 1-3, by subwatershed, allotment, stream, and pasture.**

Stream	Coyle Cr.	Crystal Spr.	Middle
<b>Upper Marks Cr. Subwatershed</b>			
Crystal		2.59	
Unn. Perennial		4.51	
Unn. Intermittent		2.67	0.03
<b>Duncan Cr. Subwatershed</b>			
Coyle Creek	3.05		0.93
Whitney Creek	0.47		0.09
Willow Creek	0.32		
Unn. Perennial	1.34		
Unn. Intermittent	3.34		0.67
<b>Hdwatrs. Ochoco Cr. Subwatershed</b>			
Ahalt			0.60
McAllistrer	0.37		0.38
Thronson			1.41
Unn. Perennial	0.50		
Unn. Intermittent	1.06		0.99

**Table 19. Total Stream Miles within the Crystal Springs AMP Project Area Alt. #4, by Subwatershed, Allotment, Stream, and Pasture.**

Stream	Coyle Cr.	Coyle Cr. Rip.	Crystal Spr.	Middle	Middle Rip.
<b>Upper Marks Cr. Subwatershed</b>					
Crystal			2.59		
Unn. Perennial			4.51		
Unn. Intermittent			2.97	0.03	
<b>Duncan Cr. Subwatershed</b>					
Coyle Creek	1.70	1.35		0.93	
Whitney Creek		0.47		0.09	
Willow Creek	1.19	0.05			
Unn. Perennial	1.34				

Unn. Intermittent	1.99	1.34		0.67	
<b>Hdwatrs. Ochoco Cr. Subwatershed</b>					
Ahalt					0.60
McAllistrer	0.37			0.38	
Thronson				0.66	0.75
Unn. Perennial	0.50				
Unn. Intermittent	1.06			0.99	

## Current Condition

### DATA SOURCES

**Upland Soils:** The current condition of upland soils was assessed using Parker 3-Step Condition and Trend transects (Parker 1951) established in the 1950s and 1960s, and Terrestrial Ecological Unit Inventory data).

**Riparian Status:** Riparian status was assessed using the following: (1) US Forest Service Region Six Bottom Line Survey method, (2) the protocol in Monitoring the Vegetation Resources in Riparian Areas, commonly known as the Winward method (Winward 2000), (3) Area 4 Riparian Monitoring or (“Riegel”) plots (USDA/USDI 1996).

The current condition in the project area is a result of environmental factors (as described above) combined with past and present management activities. These activities include the following.

- Trapping and removal of beaver in the early to mid 1800s. This resulted in the loss of beaver dams that stored water and delayed runoff. Loss of beaver dams likely decreased the zone of saturation within riparian zones and reduced the complexity of wet meadows. These reductions have altered the lateral extent and composition of riparian vegetation to dry meadows or sage brush. The loss of beaver dams may have also resulted in head cuts that subsequently would have resulted in channel down cutting, lowered water tables, and changes in vegetative composition to drier species such as sagebrush.
- The introduction of large numbers of domestic livestock, both cattle and sheep, started in the late 1800s. Intense domestic livestock use resulted in the reduction of riparian vegetation. This loss of riparian vegetation resulted in stream channel instability, changes in channel morphology, and water quality. Consequently, changes in channel morphology (especially downcutting) have led to lowered water tables and changes in vegetative conditions to drier species.
- Fire suppression by settlers coupled with the removal of use of fire by Native Americans, has resulted in changes in vegetation including juniper expansion and conifer encroachment. The expansion of juniper and encroachment of conifers into meadows has led to the decline of historic shrub-steppe and meadow communities.
- Timber harvest and associated road and skid trail systems, initiated in the 1900s, have reduced stream shade, captured and concentrated flow (resulting in increases in peak stream flows), and reduced late season flows. With the increasing use of caterpillar type tractors and eventually rubber tired skidders, much of the acreage below 30-40 percent slope was tractor logged with a cumulative forestwide average from multiple entries and mechanized fuels treatment of 10-40 percent of the commercial forest acreage being in a detrimentally compacted or displaced condition.

- **Harvest Impacts: Determination of existing detrimental soil condition estimate**

$$\begin{array}{r} \text{Total Area} = 10,823 \text{ acres in Project Area} \\ - \underline{819} \text{ (Juniper and nonforest.)} \\ 10,004 \text{ acres} \\ \underline{\times .85} \text{ (assume 85\% of the FS land was at least lightly harvested in the past)} \\ 8503 \text{ acres (total past FS harvest estimate)} \\ - 200 \text{ (past regeneration harvest)} \\ - \underline{3000} \text{ (past overstory removal harvest)} \\ 5303 \text{ acres (estimate of total past selective harvest)} \end{array}$$

2000 acres of tractor regeneration harvest at 25% damage rate	500 acres
3000 acres of overstory removal harvest at 15% damage rate	450 acres
3500 acres of selective harvest at 10% damage rate	<u>350</u> acres

Estimate of existing detrimental soil conditions related to past harvest on FS lands = **1300 acres \* or approximately 12 percent of the total 10,823 acres**

\*(these acre estimates include roads, landings and skid trails)

- Roads cover about 108 miles in the project area (108 miles @ 1.82 acres/mile for an average road width of 15 feet = approx. 197 acres).
- Past and present recreational use, especially OHV use and dispersed camping in riparian areas has reduced riparian plant composition and vigor making streambanks more susceptible to erosion. Illegal special use activities, such as cutting firewood within riparian areas, have altered the dynamics of floodplain interaction.

The collective effects of these historic activities have produced much of the current condition in the project area. This condition includes:

- reduced riparian plant composition and vigor,
- downcut and degraded stream channels,
- changes in upland vegetation,
- altered stream flows.

The Ochoco National Forest currently measures the percent of cutbank on selected streams on the forest each year using the Bottom Line Survey (BLS) and Level II Survey (protocols for both surveys are in the project file on the Lookout Mountain Ranger District). See Table 20 for average cutbank values, by stream, from the most recent survey in the project area. Protocol states that a cutbank is an actively eroding surface that is greater than 6 inches in height, with an angle greater than 45 degrees (Platts et al. 1987, Saltzman 1979). This protocol is designed to address the Water Standard and Guideline that stream channel cutbanks should not exceed an average of 20% for any given stream drainage. However this protocol does not necessarily incorporate hoof action unless it meets the stated criterion. Based on the Bottom Line Surveys (BLS), approximately 0.9 mile or 11% of the surveyed stream miles had cutbank values that were greater than 20%, while approximately 1.4 miles or 18% of the surveyed stream miles had cutbank composition between 10 and 20%. The other 5.6 miles or 71% of the surveyed stream miles had cutbank values less than 10%.

**Table 20. Percent cutbank by stream in the project area.**

Stream	Cutbank			Survey
	Average Percent Cutbank over Entire Surveyed Area	Percentage of Surveyed Stream Miles with >20% Cutbank	Percentage of Surveyed Stream Miles with 11-20% Cutbank	
Coyle Creek	6.6	9	18	1993 BLS
Willow Creek	5.2	10	13	1993 BLS
Whitney Creek	15.5	31	28	1993 BLS
Ahalt Creek	6.2	10	10	1993 BLS
Thronson Creek	9.2	10	19	1993 BLS
Crystal Creek	5.4	6	8	2003 Level II
McAllister	4.9	11	5	2005 AI/AB

Streambank alteration is measured annually at Designated Monitoring Areas (DMAs) by range employees and sometimes with the active permittee. This method incorporates a paced assessment over approximately 100 feet of stream length, which measures hoof action alteration on streambanks among other things (for a description of DMA protocol, see Range Report in the project file). Table 21 has a summary of measured bank alteration by allotment.

**Table 21. DMA bank alteration measurements by allotment.**

Allotment	DMA # and Stream	Number of Measurements where Bank Alteration exceeded 10%
Burn	Marks #1 - Unnamed tributary above 057 Rd	0/9 (0%)
	Hohn Spring #1	1/5 (20%)
Crystal Spr.	Coyle Cr. #1 - below Willow Crk.	0/10 (0%)
	Coyle Cr. #2 -Whitney Crk.	4/10 (40%)
	Middle #3 - Unnamed tributary Thronson Crk.	0/10 (0%)
	Crystal Springs #2 - above Corral Flat	4/10 (40%)
	Crystal Springs #3 - Unnamed tributary Corral Flat	1/6 (17%)
	Crystal Springs #3	0/5 (0%)
		Livestock switched preference to woody in two surveys

Within the project area approximately 1.6 miles of stream or 20% of surveyed stream miles have average vegetative cover (shade) values that are greater than 80%. About 1.3 miles or 16% of the stream miles surveyed have shade values that range from 60 to 80% and about 1.3 miles or 16% have shade values that range from 40 to 59%. The remaining 3.7 miles or 47% have shade values less than 40%. Shade values are summarized in Table 22.

**Table 22. Percent shade by stream in the project area.**

Stream	Reach	Shade		Survey
		Avg. (%)	% > 80%	
Coyle Creek	All	49.7	19	1993 BLS
	1	50.2	19	
	2	58.0	27	
	3	37.7	7	
Willow Creek	1	53.8	25	1993 BLS
Whitney Creek	1	56.9	38	1993 BLS

<b>McAllister</b>	1	57.2	21	2005 AI/AB
<b>Ahalt Creek</b>	1	39.9	7	1993 BLS
<b>Thronson Creek</b>	All	40.9	8	1993 BLS
	1	29.7	5	
	2	46.5	10	
<b>Crystal Creek</b>	All	40.9	--	2003 Level II
	1	44.7	12	
	2	38.3	--	

Temperature data have been collected at various sites using Oregon DEQ protocols. Stream temperature data within the project area are summarized in Table 23. Ochoco Creek and Marks Creek are on the Oregon 303(d) list of impaired water quality for elevated water temperatures; these are just outside the project area. Except for approximately 100 feet of Ochoco Creek that is currently incorporated into the Crystal Springs allotment because it's in a water gap, there are no streams in the project area that are on the Oregon 303(d) list.

**Table 23. Stream temperature monitoring data within the Crystal Springs and Burn AMP Project Area.**

Stream	Location	Maximum 7-day Average of Daily Maximum Stream Temperatures (°F)												
		1994	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>Crystal Springs Allotment</b>														
Crystal Cr.	0.2 mi. abv mouth	---	73.8	70.9	68.4	---	---	---	---	71.7	73.0	---	---	---
*Ochoco Cr.	Blw Coyle	---	---	---	---	---	---	---	---	---	---	70.1	---	---
*Ochoco Cr.	Abv Coyle	---	67.9	68.3	68.5	---	---	---	---	---	---	---	---	---
*Ochoco Cr.	Abv Canyon	68.9	---	---	---	---	71.6	68.6	---	73.3	67.9	69.4	71.0	70.1
*Ochoco Cr.	Blw Fisher	---	---	64.8	---	---	---	---	---	---	---	---	---	---
*Ochoco Cr.	Blw McAllister	---	66.5	---	---	---	---	---	---	---	---	---	---	---
*Ochoco Cr.	Abv Ahalt	---	---	---	---	60.4	---	---	---	---	60.0	60.8	---	---
Coyle Cr	Abv Willow	64.1	---	---	---	63.1	---	---	---	---	66.2	---	---	---
<b>Burn Allotment</b>														
*Marks Cr	FS Bdry	---	73.6	72.9	72.5	70.1	73.0	72.5	73.7	74.2	72.1	---	---	---
* Streams that are currently on the Oregon 303(d) List of impaired waters for temperature. --- No data.														

Crystal Creek, a tributary of Marks Creek, is within the Crystal Springs Pasture of the Crystal Springs Allotment. The most recent survey (2003 Level II) indicates an average shade reading of 40.9% and average cutbank value of 5.4%. DMA data on Crystal Creek above Corral Flat showed that over a third of the observations over 5 years had bank alteration that exceeded 10%. The site on Crystal Creek above the 300 road crossing did not show any observations above 10% but did report livestock switching their preference to woody species. Monitoring of stream temperatures in Crystal Creek shows maximum summer water temperatures exceed the state threshold of 64.4°F.

Coyle Creek, a tributary of Ochoco Creek, is located mostly within the Coyle Creek Pasture of the Crystal Springs Allotment with about a quarter in the Middle Pasture. The most recent survey (1993) indicates an average shade of 49.7% and average cutbank value of approximately 6.6%. DMA data did not show any years where bank alteration exceeded 10%. Three years of stream

temperature monitoring reveal that Coyle Creek met the temperature standard 2 out of 3 years. A headcut has been identified just above the confluence of Willow Creek.

Willow Creek, a tributary of Coyle Creek, is located in the Coyle Creek Pastures of the Crystal Springs Allotment. A 1993 survey of Willow Creek revealed shade was approximately 53.8% and cutbank composition was 5.2%. No stream temperature monitoring has occurred here.

Whitney Creek, a tributary of Coyle Creek, is located mostly in the Coyle Creek Pasture of the Crystal Springs Allotment with about 15% in the Middle Pasture. DMA data on Whitney Creek showed that over a third of the observations over 5 years had bank alteration that exceeded 10%. There is a high incidence of post holing and problems associated with hoof action on lower Whitney Creek. Survey data from 1993 reported that average shade was 56.9% with 15.5% cutbank values. No stream temperature monitoring has occurred here. Deciduous riparian shade is low.

Ochoco Creek The only portion of Ochoco Creek located within the planning area is a water gap in the Coyle Creek Pasture of the Crystal Springs Allotment near Judy Creek. Activities within the allotment would not affect shade or cutbanks on Ochoco Creek but flow from tributaries within the allotment could affect water temperatures. Ochoco Creek is currently on the 303(d) list for stream temperature.

McAllister Creek, a tributary of Ochoco Creek (headwaters), is located in the Middle Pasture and Coyle Creek Pasture of the Crystal Springs Allotment. Survey data from 1979 reported that average shade at that time was 16% with very low cutbank values (none to 5%).

Ahalt Creek, a tributary of Ochoco Creek (headwaters), is located in the Middle Pasture of the Crystal Springs Allotment. Survey data from 1993 revealed that average shade in the project area was 39.9% with 6.2% cutbank values.

Thronson Creek, a tributary of Ahalt Creek, is located in the Middle Pasture of the Crystal Springs Allotment. There is a high incidence of post holing and hoof action problems between Bacon Spring and Bacon Spring reservoir. A 3 to 4 foot headcut was identified on the North Fork of Thronson Creek and the dam on Bacon Spring Reservoir is lower than the spillway and at risk of breaching. Survey data from 1993 revealed that average shade was 40.9% with 9.2% cutbank values.

### ***Environmental Consequences***

The following disclosures include these assumptions:

- Recovery of riparian vegetation in heavily grazed riparian areas occurs in three to eight years following removal of cattle (Skovlin 1984).
- Return to pre-European conditions would be extremely slow or not possible on some sites (Laycock 1989, Winward 1991).

### **Alternative 1 - No action**

Under this alternative cattle presence would continue in the project area for two more years and would then be discontinued. The following effects would be expected:

- Soil compaction would not increase over current conditions (see Table 25).
- Streambank alteration would cease after two years. Streambanks would stabilize with vegetation over the next 10 - 15 years following removal of cattle.

- Sites that currently lack a riparian vegetation component may take more than 15 years to recover vegetation, or may not be capable of recovering vegetation without active management.
- Cutbanks would take several decades to adjust bank slopes and stabilize with vegetation.
- Measurable improvement in shade and stream morphological features affecting water temperature would lag behind bank stabilization by at least a decade.

Overall, this alternative would have the least impacts to streambanks across all allotments and pastures. Following sufficient recovery time, allotments that have been exceeding 10% bank alteration would be expected to have bank alteration values that are less than 10%. With less bank alteration it is expected that there would be less cutbank development and less alteration of channel morphology. Sediment yield would continue to exist, but would decline as streambanks adjust slope and become vegetated.

Implementation of this alternative would provide for the greatest improvements to streambank alteration and vegetative conditions within the shortest time frame. There would be no direct effects from livestock grazing, trampling, or trailing that would occur on an annual basis. There would be no direct impact to streambanks in those areas accessible to livestock. There would be no further effects to width to depth ratio, entrenchment, or sediment yield than what currently exist.

The removal of livestock under this alternative would result in increased growth, vigor, and expansion of willow, alder, sedges, rushes and other riparian obligate vegetation in wetlands and floodplains. In the long-term (15+ years) desirable riparian vegetation, such as riparian grasses, sedges, rushes, and woody species, would out-compete and replace undesirable species, such as shallow rooted annuals. Recovery of hardwoods in areas with conifer encroachment would be dependant upon active vegetative management (i.e. burning or thinning) within RHCA's.

Woody species would benefit in both the short (0-15 years) and long-terms (15+ years) from less browsing pressure and would likely expand their canopy cover providing more stream shade. In areas capable of supporting woody species such as willows and alders, increased amounts and age classes of these deeply rooted plants would help stabilize streambanks, catch large woody debris, and filter sediment, all helping to improve water quality. It is expected that increases in the numbers, age classes, and distribution of woody species would only occur in areas with suitable site conditions.

Most stream types, associated wetlands, and floodplain would benefit immediately from the removal of livestock grazing and a reduced browsing pressure on riparian vegetation. Some streams (Rosegen types D, F and G - see Hydrology Specialists' Report, project file, Lookout Mountain Ranger District) would re-achieve equilibrium over a longer period of time through the redevelopment of a pattern, profile and dimension that is capable of transporting its flow and sediment. Morphologic recovery of these stream types is not likely to occur within a 15 year timeframe.

Where riparian vegetation is present, vegetative cover is expected to show measureable increases in 3-8 years. Where riparian vegetation is not present, but once was, it may or may not re-establish itself. Re-establishment would depend on local factors such as site capability (soil type and availability of water), departure from historic means, elevation, and aspect. It is expected that re-establishment with some riparian shade would be noticeable after 15 years. In entrenched systems (G and F-type channels) recovery of riparian vegetation is expected to take decades to recover, if at all. Some of these entrenched systems may need some sort of active restoration to have vegetative recovery. Recovery of vegetation is expected to be at a lower elevation, as the water table generally lowers with entrenchment.

As vegetative recovery occurs plants should expand and vegetative cover conditions, and thus stream temperatures, would improve. Streams currently on the 303(d) list are expected to have localized cooling below the inflow from perennial streams originating in the allotments due to lower stream temperatures resulting from increased vegetative cover, with the exception of creekse that are entrenched in gullies. No measurable decrease in water temperatures in Ochoco Creek would be expected to result from removing the water gap due to the aspect and the small area of the creek affected.

Headcuts have been identified where an unnamed tributary of Marks Creek crosses the 2600057 road, where an unnamed tributary of Marks Creek Crosses the 2600050 road, on Coyle Creek above Willow Creek, and on the north fork of Thronson Creek. The headcut on the stream crossing the 057 road is currently being stopped by the culvert at the road crossing; any others would be expected to continue upstream migration where streambanks are poorly vegetated.

Alternative 1 is consistent with Forest and Regional standards and guidelines for soils. Alternative 1 is consistent with the water goals, including maintaining cutbank levels to below 20% and improving upon existing conditions to move toward meeting the Standard and Guideline of maintaining 80% shade (or 100% of the potential shade) as outlined in the LRMP. This alternative is consistent with the Riparian Management Goals outlined in INFISH and with the RMOs of maintaining bank stability greater than 80% and no measurable increase in stream temperatures. This alternative would protect designated beneficial uses and would move 303(d) listed streams toward compliance with the Clean Water Act. This alternative is consistent with Executive Orders 11988, 11990, and 12088.

### **Effects Common To All Grazing Alternatives (Alts 2, 3 And 4)**

Effects common from livestock grazing to Alternatives 2, 3, and 4 to the soil, water quality, riparian function and water quality resources include:

**Post-holing, plugging and pedestalling via hoof action.** Hooves shear the protective sod mats and create holes and mixing throughout which induces a condition which is susceptible to rill and gully formation. Commonly these areas appear hummocky and show signs of erosion in between the hummocks. This can be particularly damaging around wet meadows, springs, seeps and streams. The term hummock and pedestal are used interchangeably.

**Streambank erosion due to sloughing caused hoof action.** Hoof action, rubbing and wallowing commonly cause bank failure on streams with banks composed of fine alluvium such as sand, silt, clay and gravels. Cattle can increase erosion by removing protective vegetation and loosening soil. This results in more sediment delivery to the stream especially during high flow events. Potential impacts may occur along all stream classes in the project area, including Class IV drainways that have a defined channel but do not have live water or riparian vegetation (Platts and Nelson, et al).

**Mixing and incorporation of organic matter into surface horizon.** This has both positive and negative effects. Mixing helps incorporate and conserve organic matter. It also reduces the mulching effect of organic matter which may leave the soil somewhat less protected from wind and water erosion (Schuman et al. 1998, Potter et al. 2000).

**Effects to Microbiotic and Vesicular 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 a “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 the establishment of invasive plants including cheatgrass (USDI 2001).

Arid soils (such as on scablands, south facing shrub steppe, juniper steppe, juniper woodland and dry pine plant association groups) appear particularly vulnerable especially in regards to microbiotic crusts. These crusts are easily disturbed by livestock hoof action, which breaks up the crust, causes dessication and increases susceptibility to wind and water erosion. (Harper and Marble, et al).

**Nutrient cycling.** Grazing animal behavior influences the distribution of nutrients to various landscape positions. Animals may graze in one area and move to another area to rest or drink. Dung and urine may thus be more plentiful in the resting area and around a watering place than in the grazing area, resulting in a net transfer of nutrients from the grazed area to the resting and watering areas that can affect the soil fertility of both areas,.

Grazing promotes nutrient cycling through rapid breakdown of organic matter into smaller particles in the system, so organic matter is available more readily for soil microorganisms such as soil bacteria and fungi. Microorganisms use the organic matter as an energy source and can release nutrients back into the soil for plant uptake. Thus, grazing may increase the rate at which nutrients cycle through an ecosystem. It may be argued that if nutrients are not bound up in soil or organic matter, then they are more vulnerable to being lost to the system (Krueger et al. 2002).

**Effects to soil microorganisms.** The diversity and abundance of soil organisms is influenced not only by available food resources, but by changes to physical and chemical properties of the soil, and may be affected by livestock presence. Studies in southern British Columbia have shown significant differences in prostigmatid mite populations (a common mite in tundra, desert and tropical grassland habitats) in grazed and ungrazed sites. There were significant effects on mite populations due to season, depth and grazing as well as a significant season by grazing interaction. The significance of this difference in mite populations to soil function has yet to be determined (Battigelli and McIntyre 1999).

**Effects to Mycorrhizal Associations.** Only three genera of vesicular-arbuscular mycorrhizae (VAM) fungi are known to form associations with plants in the shrub-steppe habitat of southwestern Idaho and Eastern Oregon. These genera are: *Glomus* Tul. And C. Tul., *Gigaspora* Gerdemann and Trappe and *Acaulospora* Gerdeman and Trappe. In arid soils; shrubs establish themselves in patches or clumps and form “fertility islands.” These islands are also sites of highest VAM activity. The effect of short term dry season grazing on forest mycorrhizal associations is unknown and is assumed to be not measurable based on ease of conifer establishment especially under uneven aged management.

**Effects to soil carbon cycling and sequestration.** The large areas occupied by grazing lands, the diversity of their climates and soils, and the potential to improve their use and productivity all contribute to the great importance of grazing lands in sequestering carbon and mitigating the greenhouse effect and other aspects of global climate change (Follett, Kimble and Lal 2001). Productive, sustainable grazing lands provide high-quality vegetation and soils, which lead to high rates of carbon sequestration and low levels of carbon dioxide (CO<sub>2</sub>) emissions (Krueger et al. 2002).

## Effects Common to Alternatives 2 and 4

Alternatives 2 and 4 would incorporate earlier season grazing typically starting in April on the Burn Allotment and May on the Crystal Springs Allotment. Early season grazing that begins upon identification of range readiness has been shown to minimize effects on riparian vegetation (Platts and Nelson 1985). Elmore and Beschta (1987) state that spring grazing may be preferred in many situations to maintain proper streambank structure and function. Grazing riparian areas

in the spring allows the remainder of the growing season for plants to regrow. This helps provide vegetative cover for streambank protection during the following winter and early spring high streamflow periods.

Marlow and others (1989) found little difference in streambank stability among four grazing strategies in southwest Montana, but also found that decreasing the length of time cattle have access to a stream reach and adjusting the grazing period to coincide with low streambank moisture levels (could be early or late season grazing) shows promise of the improvement of riparian zone condition.

Both allotments would incorporate active management of cattle and maintenance of water structures, which are both expected to facilitate desired cattle distribution.

The water gap on Ochoco Creek would be removed on Ochoco Creek in the Coyle Creek Pasture on the Crystal Springs Allotment to improve channel condition.

It is expected that early season grazing in this project would result in less cattle use in riparian areas and more use in the uplands. Streamside vegetation would be expected to experience less cattle disturbance, hence provide more vegetative cover for shade and cooler stream temperatures.

## **Alternative 2 - Proposed Action**

The following effects would be expected:

- Soil compaction would not increase over current conditions (see Table 25).
- Streambank alteration would be reduced due to improved cattle distribution. Streambanks would stabilize with vegetation over the next 30 - 35 years following implementation of active cattle management.
- Sites that currently lack a riparian vegetation component may take more than 35 years to recover vegetation, or may not be capable of recovering vegetation without active restoration management.
- Cutbanks would take several decades to adjust bank slopes and stabilize with vegetation.
- Measurable improvement in shade and stream morphological features affecting water temperature would lag behind bank stabilization by at least a decade.

The combination of earlier season grazing, improving upland water improvements, livestock exclosures and daily management would improve cattle distribution throughout the Burn and Crystal Springs Allotments. Early removal of cattle would lead to improvement in streambank alteration and there may be less grazing in the riparian areas. As well, effective ground cover would increase. Proposed activities in this alternative would facilitate meeting utilization and stubble height standards.

The removal of the water gap on Ochoco Creek would reduce grazing impacts on the adjacent riparian area and streambank alteration would be minimized.

Streambank alteration and cutbank composition is expected to improve over the existing condition; however, streambanks would not recover as fast as in Alternatives 1 or 4. With approximately 10-20 years of maintaining bank alteration to 10% or less over all allotments, those streambanks that are not entrenched would be expected to stabilize with vegetation. Although there are existing streambanks that are unvegetated and unstable from past activities (which are contributing fine sediment to streams),

Under this alternative cattle are still expected to be responsible for a certain level of bank alteration; however this alternative was developed in part to minimize bank alteration and

cutbank development to a level at which sediment yield would remain low enough to minimize potential effects to water quality and aquatic organisms. Existing streambanks that are highly altered would continue to add sediment to adjacent streams.

*Burn Allotment* - The combination of early season grazing and active management are expected to reduce bank alteration and the development of cutbanks within this allotment. Currently low streambank alteration levels are expected to decrease further, which would result in less development of cutbanks. Sediment yield levels are expected to decrease. Width to depth ratios are expected to decrease with vegetative recovery. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth are expected to recover slowly over many decades, if they improve at all without active restoration. Headcuts have been identified where unnamed tributaries of Marks Creek cross the 2600057 and 2600050 roads. The headcut on the stream crossing the 057 road is currently being stopped by the culvert at the road crossing; any others would be expected to continue upstream migration where streambanks are poorly vegetated.

Riparian vegetative cover within this allotment is expected to increase over time. Early season grazing would allow vegetative regrowth toward the end of the growing season. Active management is expected to improve cattle distribution and allow for better vegetative growth and shade in riparian areas. Increased water holding capacity in water developments and ponds are projected to reduce riparian use by cattle. There are no streams in the Burn Allotment on the State 303(d) List and none of the perennial non-fishbearing streams have been monitored. Marks Creek and Ochoco Creek, which are just below the allotment, are on the 303(d) list and may see slight improvements in stream temperatures from inflow from streams with increased shading in the planning area, but the difference in flows is so great that changes in temperature in the listed streams probably would not be measurable other than right at the confluence.

*Crystal Springs Allotment* - The combination of early season grazing and active management is expected to reduce bank alteration and the development of cutbanks within this allotment. Streambank alteration levels are expected to be less than 10%, which would result in less development of cutbanks. Sediment yield levels are expected to decrease. Width to depth ratios are expected to decrease with vegetative recovery. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth are expected to recover slowly over many decades, if they improve at all without active restoration. Known headcuts in Coyle and the north fork of Thronson Creeks would be expected to continue upstream migration where streambanks are poorly vegetated.

Improvements in channel condition are dependent on the implementation of an earlier grazing season. This should not be a problem when the Coyle Creek Pasture is the first in rotation. However, when one of the higher elevation pastures is first in rotation, range readiness may delay the starting date which would shift use of the other pastures back into later in the season. This would increase use in riparian areas in the late season pastures and retard recovery. Also, no rest is given to reinvigorate heavily browsed palatable woody riparian vegetation which provides root strength.

Riparian vegetative cover within this allotment is expected to increase over time. Early season grazing would allow vegetative regrowth toward the end of the growing season. Active management is expected to improve cattle distribution and allow for better vegetative growth and shade in riparian areas. Increased water holding capacity in water developments and ponds are projected to reduce riparian use by cattle. Crystal Creek is not on the 303(d) list; however, it has water temperatures that are at or above the state threshold. Increases in vegetative cover would potentially reduce stream temperatures, but may not prevent 303(d) listing. Marks Creek and Ochoco Creek, which are just below the allotment, are expected to see slight improvements in

stream temperatures as shade increases on affected tributaries. These improvements are dependent on the implementation of an earlier grazing season. This should be no problem when the Coyle Creek Pasture is the first in rotation. However when one of the higher elevation pastures is first in rotation, range readiness may delay the starting date which would shift use of the other pastures back into later in the season. This would increase browse on riparian vegetation in the late season pasture and retard recovery. No rest is given to reinvigorate heavily browsed palatable woody riparian vegetation in problem areas in this alternative.

As vegetative recovery occurs plants should expand and vegetative cover conditions, and thus stream temperatures, would improve. Streams currently over the state water temperature threshold are expected to have higher vegetative cover values and lower stream temperatures, with the exception those that are entrenched in gullies.

Alternative 2 is consistent with Forest and Regional standards and guidelines for soils. Alternative 2 is consistent with the water goals, including maintaining cutbank levels to below 20% and improving upon existing conditions to move toward meeting the Standard and Guideline of maintaining 80% shade (or 100% of the potential shade) as outlined in the LRMP. This alternative is consistent with the Riparian Management Goals outlined in INFISH and with the RMOs of maintaining bank stability greater than 80% and no measurable increase in stream temperatures. This alternative would protect designated beneficial uses and would move 303(d) listed streams toward compliance with the Clean Water Act. This alternative is consistent with Executive Orders 11988, 11990, and 12088.

### **Alternative 3**

This alternative would reauthorize grazing in the project area and reissue permits with no changes to existing requirements. The following effects would be expected:

- Soil compaction would not increase over current conditions (see Table 25).
- Streambank alteration would continue. Streambanks would not be expected to stabilize with vegetation.
- Sites that currently lack a riparian vegetation component would continue to lack this component; riparian vegetation would not recover.
- Cutbanks would not adjust bank slopes and stabilize with vegetation; no reduction in existing cutbank would be expected. Percent cutbank would likely increase.
- Measurable improvement in shade and stream morphological features affecting water temperature would lag behind bank stabilization by at least a decade.

Under this alternative, cattle distribution would remain poor, with cattle concentrating in known riparian areas. Cattle would not be actively managed and no structural water improvements would be made other than those already scheduled to be maintained. Grazing that occurs later in the summer, as in this alternative, would maintain current distribution problems with limited off-site watering. Streambank alteration and cutbank composition are expected to remain at levels that lead to sediment input into adjacent streams.

Under this alternative, streambank alteration values are expected to remain static or increase and cutbanks are expected to develop in new areas. Streambank conditions are not expected to improve. This alternative would result in streambanks that are less stable than either Alternatives 1, 2 or 4. This would result in additional sediment yield to streams, which may lead to deposition (aggradation) in lower gradient streams/stream reaches such as the Ochoco Creek. Stream bank and in channel erosion are the primary cause for excess sediment in the drainages. The majority

of the sediment yield from bank erosion would occur during early winter rain on snow events, between April and May (during springflow) and during high intensity summer thunderstorms. The duration of higher sediment yields would correlate with the duration of high flow which would typically be short (a few days). However, several high flow events could occur between April and May, hence several erosional events could occur between April and May. Effects from this alternative, combined with existing effects, extend into Ochoco and Marks Creeks.

Riparian vegetative cover would be expected to remain at the current condition or decline, resulting in poor shading conditions, especially in meadows. Streams that have relatively high temperatures would not be expected to improve. Under this alternative, these streams would have the potential to be put on the 303(d) list. The 303(d) listed streams downstream from the allotments (Marks Creek and Ochoco Creek) would not be expected to improve.

*Burn Allotment* - Bank alteration currently is low to moderate. Streambank alteration, cutbank composition, and sediment yield within these areas are projected to remain static or increase. Width to depth ratios are expected to remain static or increase depending on streambank alteration and the presence or absence of deep rooted stream bank vegetation. Entrenchment ratios are expected to remain static or decrease (i.e. become more downcut). Headcuts have been identified where unnamed tributaries of Marks Creek cross the 2600057 and 2600050 roads. The headcut on the stream crossing the 057 road is currently being stopped by the culvert at the road crossing; any others would be expected to continue upstream migration where streambanks are poorly vegetated.

Riparian vegetation disturbance currently is excessive and resulting in poor shading conditions, especially in meadows. Riparian vegetation and stream shade on perennial streams within these areas are projected to remain static or decline in condition.

*Crystal Springs Allotment* - Bank alteration currently is moderate. Streambank alteration, cutbank composition, and sediment yield within these areas are projected to remain static or increase. Width to depth ratios are expected to remain static or increase as streambank alteration remains relatively high on lower Whitney Creek moderate in the Middle & Crystal Springs pastures. Entrenchment ratios are expected to remain static or decrease (i.e. become more downcut). Known headcuts in Coyle and the north fork of Thronson Creeks would be expected to continue upstream migration where streambanks are poorly vegetated.

Riparian vegetation and stream shade would remain static or decline in condition. Perennial streams in the Middle Pasture and Crystal Springs Pasture are not expected to have increases in shade. Crystal Creek would have the potential to be put on the 303(d) list.

Alternative 3 is consistent with Forest and Regional standards and guidelines for soils. Alternative 3 is not consistent with the water goals; it would not maintain cutbank levels to below 20% nor move toward meeting the Standard and Guideline of maintaining 80% shade or 100% of potential as outlined in the LRMP. This alternative is not consistent with the Riparian Management Goals outlined in INFISH as it would not meet the RMOs of maintaining bank stability greater than 80% or no measurable increase in stream temperatures. This alternative would not move towards protecting the designated beneficial uses of the downstream waters and would not move towards the delisting of 303(d) listed streams (not compliant with the Clean Water Act). This alternative would not be consistent with Executive Orders 11988, 11990, and 12088.

## **Alternative 4**

The following effects would be expected:

- Soil compaction would not increase over current conditions (see Table 25).
- Streambank alteration would be reduced due to improved cattle distribution. Streambanks would stabilize with vegetation over the next 20 - 25 years following implementation of active cattle management.
- Resting the riparian pastures for at least 4 years would provide the opportunity for riparian vegetation to achieve an upward trend; however, in some areas recovery of riparian vegetation may not be possible without addition active management. Recovery is expected to take at least 25 years.
- Cutbanks would take several decades to adjust bank slopes and stabilize with vegetation.
- Measurable improvement in shade and stream morphological features affecting water temperature would lag behind bank stabilization by at least a decade.

The combination of two new riparian pastures, relocation of a corral and holding pasture, earlier season grazing, improving upland water improvements, livestock exclosures and daily management would improve cattle distribution throughout the Burn and Crystal Springs Allotments. Livestock would be off the allotment by August 31, which is 30 days earlier than current management. The early removal of cattle should show improvement in streambank alteration and there may be less grazing in the riparian areas. Resting the two new riparian pastures for a minimum of 4 years and associated temporary reduction in AUMs would allow for recovery of springs, aspen stands, streams, riparian vegetation and upland vegetation. Relocation of Middle pasture's corral and holding pasture would help improve riparian conditions in Ahalt and Thronson creek. The effect of helping to reduce the overall streambank alteration will help reduce the bank erosion component which is where the highest percent of delivered sediment originates. This will help reduce the level of bank sloughing, post holing and pedestalling along stream channels which contribute to bank erosion. As well, effective ground cover would increase. Proposed activities in this alternative would facilitate meeting utilization and stubble height standards.

The removal of the water gap on Ochoco Creek would reduce grazing impacts on the adjacent riparian area and streambank alteration would be minimized.

Range readiness criteria were originally developed to avoid permanent damage to soil and vegetation. Range readiness criteria for Alternatives 4 specify that "Soils would be moist, but not wet enough that livestock would cause aeration, displacement or infiltration effects to soils that are not relieved by the overwintering (freeze/ thaw) process." The traditional range readiness definitions pertaining to seed head development would not apply for early season use; therefore, when it is determined that soil is capable of supporting cattle and there is enough forage for livestock, turn-out would begin. The grazing proposed in this seasonal grazing proposal is short duration and during the dry period and therefore less apt to cause detrimental soil conditions.

Streambank alteration and cutbank composition is expected to improve over the existing condition; however, streambanks would not recover as fast as in Alternative 1. With approximately 10-20 years of maintaining bank alteration to 10% or less over all allotments, those streambanks that are not entrenched would be expected to stabilize with vegetation. Although there are existing streambanks that are unvegetated and unstable from past activities (which are contributing fine sediment to streams), this alternative would result in streambank alteration/cutbank levels that would contribute no additional sediment input to streams. Sediment

delivery to adjacent streams, due to existing bank alteration, would be expected to decrease over time.

Under this alternative cattle are still expected to be responsible for a certain level of bank alteration; however this alternative was developed in part to minimize bank alteration to a level that protects aquatic resources. Existing streambanks that are highly altered would continue to add sediment to adjacent streams, due to past activities.

Overall, this alternative would benefit streambanks across all allotments and pastures, as long as active management is performed as outlined and water developments are constructed as planned. Streams in allotments that have been exceeding 10% bank alteration would be expected to have bank alteration values that are 10% or less. With less bank alteration it is expected that there would be less cutbank development, alteration of channel morphology through changes in width to depth ratios, entrenchment, and sediment yield. Areas that are currently entrenched (Rosgen G and F-type channels; see Hydrology Specialists' report) will continue to adjust and may take several decades to become stable with vegetation. Sediment yield from these entrenched systems would continue to exist, but would decline as streambanks adjust slope and become vegetated.

Alternative 4 would increase the number of water developments in the Crystal Springs Allotment over the number in Alternatives 2 and 3. Water developments are expected to improve water availability away from streams, in effect improving cattle distribution and minimizing bank disturbance due to hoof action. Less bank alteration would result in lower potential for alterations in width to depth ratios, entrenchment (cutbanks) and sediment yield

*Burn Allotment* - Proposed activities are the same as in Alternative 2, except that in Alternative 4, a headcut in Burn Allotment would be repaired. Expected effects would be the same in the Burn Allotment, except that headcut repair would prevent this headcut from migrating upstream.

*Crystal Springs Allotment* - The combination of creating two new riparian pastures, allowing these pastures to rest for at least 4 years, early season grazing and active management is expected to reduce bank alteration and the development of cutbanks in this alternative. The two new water developments and the improvement of one in the Coyle Creek Pasture would be expected to improve cattle distribution and decrease streambank alteration and cutbank development. Streambank alteration, cutbank composition, and sediment yield levels within this allotment and alternative are expected to be less than Alternatives 2 and 3, and greater than Alternative 1. Width to depth ratios and entrenchment are expected to improve more than Alternative 2 and 3 and less than Alternative 1. Known headcuts in Coyle above Willow Creek and on the north fork of Thronson Creeks would be expected to continue upstream migration where streambanks are poorly vegetated.

The Coyle Creek Pasture will always be grazed first in this alternative with the new Middle Riparian Pasture grazed every 3 to 4 years. The other three pastures would be grazed at a different time every year. The two new riparian pastures would be rested for a minimum of four years and until trend switches to upward and Forest standards are met. This will allow palatable woody riparian vegetation, which has been severely suppressed, to reestablish (Skovlin, 1984). This alternative would incorporate an early on/off deferred rotation using five pastures, with the season of use being approximately 1 month earlier than the current permit (so long as range readiness is met). Earlier season grazing, active management, the use of riparian pastures and exclosures, and moving the corral in the Middle Pasture are expected to reduce riparian use and to allow for riparian vegetative recovery in this allotment. In addition, the earlier season grazing would allow vegetative regrowth later in the growing season. As in Alternative 2, one water development would be improved. In addition two new water developments would be constructed in the Coyle Creek Pasture to improved livestock distribution. Water developments and relocations would be expected to improve cattle distribution and reduce riparian use. Because of

aspect, the removal of the water gap on Ochoco Creek is not expected to affect either shade or water temperature. Permitted AUMs would remain the same as currently permitted but would be temporarily reduced for the initial riparian pasture rest period as indicated above.

Marks Creek and Ochoco Creek, which are just below the allotment, are on the 303(d) list and may see slight improvements in stream temperatures but the differences in flows are so great that changes in temperature probably would not be measurable other than right at the confluence. Although Crystal Creek is not on the 303(d) list, stream temperatures are relatively warm and exceed listing threshold (see Table 7). Conditions in this drainage are expected to improve, however at a slower rate than in Alternative 1.

As vegetative recovery occurs plants should expand and vegetative cover conditions, and thus stream temperatures, would improve. Streams currently over the state water temperature threshold are expected to have higher vegetative cover values and lower stream temperatures, with the exception those that are entrenched in gullies.

Table 24 summarizes the expected effects of the alternatives on resource conditions in the project area. Expected trends are tied to specific anticipated timeframes; these are discussed under the effects of each alternative.

**Table 24. Relative recovery trends for streambank alteration, cutbank composition, and riparian vegetative cover by allotment and alternative.**

Allotment	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Burn	↑	↗	↘	↗
Crystal Springs	↑	→ to ↗	↘	↗

Symbols: ↑: Upward trend ↗: Slightly upward →: No change ↘: Slightly downward N/A: Not Applicable  
 # Streambank alteration is the primary measure which determines the changes that may occur in sediment yield, width/depth ratio and entrenchment.  
 # Riparian vegetative cover is the primary measure which determines the changes that may occur in stream temperatures.



**Table 25. Detrimental soil conditions by alternative and by allotment.**

Assumptions:								
<ul style="list-style-type: none"> <li>Structures: ponds, springs and troughs = approximately 1 acre per site.</li> <li>Fences: = approximately 1.2 acre/ mile (both vehicle and cattle trailing impacts)</li> <li>Stream Miles/Acres grazed: Assume a 20 foot (2.42 acres/mile) influence zone with 10 percent of the acres in a detrimental soil condition = (0.10 x 2.42 ac/mi= 0.242 ac/mile average).</li> <li>Salting and Supplementing: assume 100 sq. ft (= 0.0023 acres) per salt site with 1 to 5 sites per pasture.</li> </ul>								
All of these allotments meet Forest and Regional Standards and Guides for detrimental soil conditions with the average contribution due to grazing and grazing improvements ranging from 0.5 to 1.8 percent.								
ALTERNATIVE	ALLOTMENT and PASTURE	Ac. Grazed	Class 1-3 Stream miles/ac Grazed-10% detrimental	Structures with acres	Fence Miles/Ac	Salting/Mineral supplement sites	Logging and Roading Acres	Total acres/% of detrimental soil conditions by allmt
ALT 1	All Allotments	0	0	Ponds only, 41 metal and tire troughs removed	Border fence W/L fences only. 18 mi. removed	0	1408 ac	Meets S/Gs
ALTERNATIVE 2	Burn Allmt	Total =3143 ac FS, 4,670 total	Total= 2.6 mi= 6.3 ac, 10% = 0.63 ac	11 st. ponds, 11 troughs plus 9 springs = 32 acres	20 mi x 1.2 ac/mi= 24 acres	12 sites= 0.028 ac acres	377 ac	433 ac = 9 % Meets S/Gs
	Hohn Spring Pasture	1002	0.4 mi=0.1ac	6 st. ponds plus 7 springs = 13 acres	5.4 mi x 1.2 ac/mi= 6.5 ac	3 sites = 0.007 ac	120 ac	140 ac = 14 % Meets S/Gs
	Homestead Pasture	219	0.8 mi=0.2 ac	2 st. ponds = 2 acres	5.1 mi = 6.1 ac	2 sites = 0.005 ac	26 ac	34 ac = 15.5 % Meets S/Gs
	Howard Pasture	451	0.4 mi= 0.01 acres	1 spg = 1 acre	5.6 mi = 6.7 ac	2 sites = 0.005 ac	54 ac	62 ac = 14 % Meets S/Gs

<b>ALTERNATIVE 3</b>	Marks Ck Pasture	908	0.2 mi=0.5 ac	1 pond, 1 spg, 1 trough= 3 acres	4.4 mi = 5.3 ac	3 sites = 0.007 ac	109 ac	118 ac = 13 % Meets S/Gs
	Wheatgrass Pasture	563	0.8 mi=1.9 ac	2 st. ponds = 2 acres	4.5 mi = 5.4 ac	2 sites = 0.005 ac	68 ac	77 ac = 14 % Meets S/Gs
	<b>Crystal Springs Allotment</b>	Total = 7181 ac	Total= 14.1 mi= 34 ac, 10% = 3.4 ac	6 springs 10 trough = 16 acres	15.6 mi x 1.2 ac/mi= 18.7 ac	14 sites = 0.032 ac.	862 ac	891 ac =12.5 % Meets S/Gs
	Coyle Creek Pasture	3149	6.6 mi= 1.6 ac det,	1 trough = 1 ac 1 spg = 1 ac	7.7 mi = 9.2 ac	6 sites = 0.014 ac	378 ac	391 ac = 12 % Meets S/Gs
	Crystal Springs Pasture	2038	7.1mi=1.7 ac det.	0	5.8 mi = 7.0 ac	4 sites = 0.009 ac	245 ac	254 ac = 12 % Meets S/Gs
	Middle Pasture	1994	0.4mi= 0.1 ac det.	5 spgs = 5 ac	9.1 mi = 10.9 ac	4 sites = 0.009 ac	239 ac	255 ac = 13% Meets S/Gs
	<b>Burn Allmt</b>	Total =3143 ac FS, 4,670 total	Total= 2.6 mi= 6.3 ac, 10% = 0.63 ac	11 st. ponds, 11 trough plus 9 springs = 32 acres	20 mi x 1.2 ac/mi= 24 acres	12 sites= 0.028 ac acres	377 ac	433 ac = 9 % Meets S/Gs
	Hohn Spring Pasture	1002	0.4 mi=0.1ac	6 st. ponds plus 7 springs = 13 acres	5.4 mi x 1.2 ac/mi= 6.5 ac	3 sites = 0.007 ac	120 ac	140 ac = 14 % Meets S/Gs
	Homestead Pasture	219	0.8 mi=0.2 ac	2 st. ponds = 2 acres	5.1 mi = 6.1 ac	2 sites = 0.005 ac	26 ac	34 ac = 15.5 % Meets S/Gs
	Howard Pasture	451	0.4 mi= 0.01 acres	1 spg = 1 acre	5.6 mi = 6.7 ac	2 sites = 0.005 ac	54 ac	62 ac = 14 % Meets S/Gs
	Marks Ck Pasture	908	0.2 mi=0.5 ac	1 pond, 1 spg, 1 trough= 3 acres	4.4 mi = 5.3 ac	3 sites = 0.007 ac	109 ac	118 ac = 13 % Meets S/Gs
	Wheatgrass Pasture	563	0.8 mi=1.9 ac	2 st. ponds = 2 acres	4.5 mi = 5.4 ac	2 sites = 0.005 ac	68 ac	77 ac = 14 % Meets S/Gs

	<b>Crystal Springs Allotment</b>	Total = 7181 ac	Total= 14.1 mi= 34 ac, 10% = 3.4 ac	6 springs 1 trough = 7 acres	15.6 mi x 1.2 ac/mi= 18.7 ac	14 sites = 0.032 ac.	862 ac	891 ac =12.4 % Meets S/Gs
	Coyle Creek Pasture	3149	6.6 mi= 1.6 ac det,	1 trough = 1 ac 1 spg = 1 ac	7.7 mi = 9.2 ac	6 sites = 0.014 ac	378 ac	391 ac = 12 % Meets S/Gs
	Crystal Springs Pasture	2038	7.1mi=1.7 ac det.	2	5.8 mi = 7.0 ac	4 sites = 0.009 ac	245 ac	254 ac = 12 % Meets S/Gs
	Middle Pasture	1994	0.4mi= 0.1 ac det.	5 spgs = 5 ac	9.1 mi = 10.9 ac	4 sites = 0.009 ac	239 ac	255 ac = 13% Meets S/Gs
<b>ALTERNATIVE 4</b>	<b>Burn Allmt</b>	Total =3143 ac FS, 4,670 total	Total= 2.6 mi= 6.3 ac, 10% = 0.63 ac	11 st. ponds, 11 trough plus 9 springs = 32 acres	20 mi x 1.2 ac/mi= 24 acres	12 sites= 0.028 ac acres	377 ac	433 ac = 9 % Meets S/Gs
	Hohn Spring Pasture	1002	0.4 mi=0.1ac	6 st. ponds plus 7 springs = 13 acres	5.4 mi x 1.2 ac/mi= 6.5 ac	3 sites = 0.007 ac	120 ac	140 ac = 14 % Meets S/Gs
	Homestead Pasture	219	0.8 mi=0.2 ac	2 st. ponds = 2 acres	5.1 mi = 6.1 ac	2 sites = 0.005 ac	26 ac	34 ac = 15.5 % Meets S/Gs
	Howard Pasture	451	0.4 mi= 0.01 acres	1 spg = 1 acre	5.6 mi = 6.7 ac	2 sites = 0.005 ac	54 ac	62 ac = 14 % Meets S/Gs
	Marks Ck Pasture	908	0.2 mi=0.5 ac	1 pond, 1 spg, 1 trough= 3 acres	4.4 mi = 5.3 ac	3 sites = 0.007 ac	109 ac	118 ac = 13 % Meets S/Gs
	Wheatgrass Pasture	563	0.8 mi=1.9 ac	2 st. ponds = 2 acres	4.5 mi = 5.4 ac	2 sites = 0.005 ac	68 ac	77 ac = 14 % Meets S/Gs
	<b>Crystal Springs Allotment</b>	Total = 7181 ac	Total= 14.1 mi= 34 ac, 10% = 3.4 ac	6 springs 1 trough = 7 acres	20.9 mi x 1.2 ac/mi= 25 ac	14 sites = 0.032 ac.	862 ac	897 ac =12.5 % Meets S/Gs
	Coyle Creek Pasture	2308	6.6 mi= 1.6 ac det,	1 trough = 1 ac 1 spg = 1 ac	7.7 mi = 9.2 ac	6 sites = 0.014 ac	378 ac	391 ac = 12 % Meets S/Gs

	Coyle Creek Riparian	841						Meets S/Gs
	Crystal Springs Pasture	2038	7.1mi=1.7 ac det.	2	5.8 mi = 7.0 ac	4 sites = 0.009 ac	245 ac	254 ac = 12 % Meets S/Gs
	Middle Pasture	1692	2.05mi= 0.5 ac det.	5 spgs = 5 ac	9.1 mi = 10.9 ac	4 sites = 0.009 ac	239 ac	255 ac = 13% Meets S/Gs
	Middle Riparian	302	1.35mi = 0.33 ac det.					Meets S/Gs

## Cumulative Effects

The effects of past activities to the soil, water quality, riparian function and aquatic habitat resources were incorporated into the existing condition.

Present activities within the project area include the Spears Vegetation Management Project which includes commercial and non commercial thinning, fuels treatments, road management, and aspen treatments. The Spears Vegetation Management Project includes 82 acres of commercial harvest (Halfway and Rush Timber Sales) in the Burn and Crystal Springs Allotment planning pastures with about a third of an acre in the outer Riparian Habitat Conservation Area (RHCA) on Crystal Creek. In addition, 981 acres of pre-commercial thinning, 1,479 acres of fuels treatments (including 94 acres of grapple piling), and 57 acres of aspen treatments are proposed in the planning area. The Rush Timber Sale will require about a third of a mile of light reconstruction on the 2610056 road and temporarily reopening a short section of the 2610057 road to access harvest units in the Marks Creek Pasture of the Burn Allotment. Altogether, the Halfway and Rush Timber Sales will harvest 2,377 acres in the Marks Creek Subwatersheds with about 39 acres in RHCAs. An additional 200 to 300 acres of commercial harvest in the Spears Planning Area is to be offered under the stewardship program but the acres in RHCAs is not known at this time. Design criteria are expected to mitigate potential adverse effects to streambanks and water quality. Aspen treatments are also not expected to alter streambanks, but instead promote healthier vegetative conditions within riparian areas by reducing vegetative competition. Including all treatments, the Equivalent Harvest Area (EHA) model indicated that neither the Marks Creek Watershed nor the two subwatersheds exceeded the 30 percent threshold in the Forest Plan and guidelines. The EHA also would not exceed the 25 percent threshold recommended in the Watershed Analysis because of watershed condition and sensitivity.

The Mayflower/Ochoco Mine Complex Reclamation Project will be completed in the upper Ochoco Creek drainage across from the Coyle Creek Pasture of the Crystal Springs Allotment in 2008. It includes the use of a repository for mine tailings in an old rock pit in the Coyle Creek Pasture. The repository, which is over 200 feet from the nearest intermittent stream, will be capped and revegetated and should not affect water quality.

Other activities in the watershed that are currently on-going and expected to continue into the future include grazing on other cattle allotments (Marks, Wildcat and Snowshoe), grazing on sheep allotments (Reservoir and Canyon), road maintenance, noxious weed treatments, and recreational use. With the exception of Off Highway Vehicles (OHV) that are driven in sensitive areas and dispersed camping that occurs along and on streambanks, these activities are not expected to have adverse effects to streambank alteration.

Reasonably foreseeable projects: The Ochoco Valley Fuels Project would accomplish underburning and non-commercial thinning in combination with underburning on 2700 acres within the Duncan Creek and Headwaters Ochoco Creek Subwatersheds. About 145 acres would be underburned and 26 acres underburned with non-commercial thinning in the Coyle Creek Pasture of the Crystal Springs Allotment. Design criteria are expected to mitigate potential adverse effects to streambanks and water quality. The Crooked River Watershed Council is also in consultation for stream restoration work on Ochoco Creek on private lands below the Forest Boundary.

## Threatened, Endangered and Sensitive Aquatic Species

The following section summarizes the Aquatic Report, which can be found in the project file.

There are no threatened or endangered aquatic species or habitat in the project area. No further evaluation of threatened and endangered aquatic species will be discussed.

The Burn and Crystal Springs Allotment area contains populations of the following sensitive aquatic species: redband trout and Columbia spotted frog.

### **Determination for Redband trout**

Determination for Alternative 1 is NI, no impact to redband trout as there are no proposed vegetative or fuels projects.

Determination for Alternatives 2, 3, and 4 is MIIH, may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species.

- Alternative 1, 2, and 4 would meet RMOs for INFISH.
- Alternative 3 fish habitat is in a downward trend.
- Shade and cut bank would be met in a shorter amount of time in Alternative 1 than in Alternative 2, 3, and 4.

### **Determination for Columbia spotted frog**

Determination for Alternative 1 is NI, no impact to Columbia spotted frogs as there are no proposed activities.

Determination for Alternatives 2, 3, and 4 is MIIH, may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species.

Alternative 3 is MIIH, however, if the allotments continue in a downward trend for frog habitat this could lead to a change in the determination in the future.

### ***Affected Environment***

Specific discussion of the habitat requirements of redband trout and Columbia spotted frogs can be found in the Aquatic Species report in the project file on the Lookout Mountain Ranger District.

#### **Redband trout**

The Crystal and Burn planning area contains populations of redband trout in Ochoco Creek, Class I stream, that only has a portion of the stream (less than 100 feet) used as a water gap within the project area, and approximately 5.6 miles of Class II streams, Crystal and Coyle Creeks. Redband trout (*Oncorhynchus mykiss*) is the only salmonid species known to occur within the project area. Modification to and loss of fish habitat have had an effect on redband trout density and condition within the project area.

The redband is a stream spawner, normally spawning in the spring (March through June). The eggs usually hatch in four to seven weeks and alevins (pre-emerging fish) take an additional three to seven days to absorb the yolk before becoming free-swimming. The average age at first spawning is two to three years, but some wild populations do not spawn until they are age five. Gravel embeddedness of less than 20 percent is essential to maintain healthy salmonid population, especially in those areas identified as potential or existing spawning areas (Bjorn and Reiser 1991).

Redband trout populations are currently depressed reflecting degraded habitat conditions within the Crystal and Burn project area. However, existing populations are generally in fair condition, based on age distribution and condition factor (ODFW 1991). The combination of habitat modification, low summer flows, high summer stream temperatures, lack of suitable riparian vegetation (due to livestock and agricultural activities), and increase in sediment (due to roads built within RHCAs) has affected on the redband trout populations. Sediment has been found to fill spawning gravels resulting in lower numbers of fry emergence, lower oxygen levels, and change in food sources and habitat features (see p. 12, Gravel Embeddedness discussion).

No newer fish population sampling to estimate numbers or condition of redband have been completed since 1991 (ODFW personal communication 2008). Redband trout are noted in stream surveys to determine the uppermost reach of fish presence (USDA 1993, 2001, 2003, and 2005). If streams are noted in a downward or static condition for cut bank and shade, fish populations are likely in a downward or static condition.

Habitat features for redband trout include pools, water temperature, bank stability, and width-to-depth ratio that could be affected by proposed treatments. Large woody debris (LWD) is not removed by livestock grazing and will not be discussed further.

### **Columbia spotted frog**

The Crystal and Burn project area contains populations of Columbia spotted frogs such as in Crystal and Coyle Creeks. Additional habitat exists although formal surveys have not been completed. Spotted frog habitat will be protected in Alternatives 2, 3, and 4 through Riparian Management Objectives determined for RHCAs for redband trout and the project design criteria (PDCs) in the Programmatic Biological Assessment (USDA/USDI August 2006-August 2009).

Columbia spotted frogs (*Rana luteiventris*) inhabit a variety of vegetation communities, including coniferous or mixed forests, grasslands, and riparian areas of sage-juniper brushlands. Historically, Columbia spotted frogs were found at elevations ranging from near sea level to 7,370 feet.

Dumas (1966) reported that relative humidity of less than 65% is lethal to adult spotted frogs in approximately 2 hours, a factor which would restrict spotted frogs to higher elevations or moist riparian zones in arid western landscapes. Because both breeding and over-wintering occur at aquatic sites, populations are located in the general vicinity of ponds, lakes, springs, and/or streams. A study in arid southwestern Idaho (Munger et al. 1998) found adult spotted frogs were associated with palustrine, shrub-scrib, seasonally flooded sites, or with intermittent riverine, streambed, seasonally flooded sites. Frogs were also associated with vegetation indicating permanent water sources (i.e., willows and submerged aquatic plants rather than with emergent vegetation such as sedges) and vegetation providing hiding and thermal cover (e.g., willows). Spotted frogs are located in similar habitats in the Burn and Crystal Springs Planning Area.

Three main components must meet necessary criteria for adequate breeding and larval habitat: water bodies, vegetation, and temperature.

Water bodies should include stagnant or slow-moving water, with shallow areas. Breeding and egg deposition take place in ponds, marshes, stream oxbows, small springs, and along the margins of lakes and slow-flowing streams. Permanent, temporary (seasonal), and man-made water bodies (Monello and Wright 1999) all may serve as breeding sites. Eggs are deposited in shallow water, reported as usually no more than 10-20 cm (3.9-7.9 in) deep by Reaser and Pilliod (2005).

Egg deposition occurs soon after snowmelt and prior to significant seasonal growth by most emergent and aquatic vegetation. Breeding activities and egg deposition usually occur in the portion of the water body with high exposure to morning sunlight (Morris and Tanner 1969), or on the north side, where snow melts most quickly in spring. However, oviposition (egg laying) locations are variable and depend on inlets, outlets, surrounding tree heights, and surrounding horizon. Eggs are normally deposited in water at temperatures of approximately 57.2 degrees F.

Summer foraging may occur at the same water body used for breeding and over wintering, but in many cases frogs move to other areas. Spotted frogs move to other sites in summer for a variety of reasons including predator avoidance and the attractions of more abundant food and less competition (Bull and Hays 2001). Foraging sites include ephemeral pools in forests and meadows, streams (permanent and intermittent) and river edges, riparian zones, temporary and permanent ponds, lake margins, and marshes.

Sites used for foraging only may be shallower, less vegetated, and more ephemeral than breeding sites. Sites used for summer foraging only (as opposed to breeding-and-summer or winter-only sites) in the Idaho mountains included all types of wetland habitats and were on average smaller and shallower than wetlands used for breeding and wintering, with less forest or shrub cover along shorelines (Pilliod et al. 2002). Patla (1997) found that “spotted frogs demonstrate considerable plasticity in summer foraging habitat, making use of small wet or damp areas in forest and meadows, including water-filled tire tracks, stream edges, and marshes”. Water bodies that provide year-round habitat have diverse habitat features.

Wintering habitat may include ponds, streams, under stream banks, springs, beaver dams, and underground areas (associated with water bodies), but all such sites must have above freezing temperatures, be moist or wet, and be well oxygenated. Columbia spotted frogs winter in or immediately adjacent to aquatic sites, where they can avoid the threat of freezing or oxygen depletion (Bull and Hayes 2002).

### ***Environmental Consequences***

Platts and Raleigh (1984) summarized direct effects of livestock grazing on streams:

1. higher stream temperatures from lack of sufficient woody streamside cover.
2. excessive sediment in the channel from bank and upland erosion.
3. high coliform bacteria counts from upper watershed sources.
4. channel widening from hoof-caused bank sloughing and later erosion by water.
5. change in the form of the water column and the channel it flows in.
6. change, reduction, or elimination of vegetation.
7. elimination of riparian areas by channel degradation and lowering of the water table.
8. gradual stream channel trenching or braiding depending on soils and substrate composition with concurrent replacement of riparian vegetation with more xeric plant species.

Effects of the proposed alternatives to aquatic habitats are discussed in the preceding section, titled “Soils, Water Quality, Riparian Function and Aquatic Habitat.” The determinations for effects to redband trout and Columbia spotted frog are based on the habitat effects disclosed in that section of this EA. For a more in-depth discussion of effects to these species, please refer to the Aquatic Species report in the project file, Lookout Mountain Ranger District.

Table 26 summarizes the effects of the proposed alternatives in terms of INFISH standards and guidelines. Table 27 summarizes effects of the proposed alternatives in terms of project design criteria for the Columbia spotted frog identified in the 2006 - 2009 Joint Programmatic Biological Assessment.



**Table 26. Comparison of how each Alternative would meet INFISH Standards and Guidelines.**

Standards and Guidelines	Alternative 1	Alternative 2 Proposed action	Alternative 3	Alternative 4
GM-1 Modify grazing practices (e.g., accessibility of riparian areas to livestock, length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of Riparian Management Objectives or are likely to adversely affect inland native fish. Suspend grazing if adjusting practices is not effective in meeting Riparian Management Objectives.	No livestock grazing <i>Meets S&amp;G</i>	Whitney, Willow, McAllister, Coyle, Thronson, Crystal Creeks in a downward trend (USDA 1993, 2001, 2003, 2005) <i>Early on/off deferred should allow for improved riparian vegetation; Crystal Spng 3 pastures; use of protein blocks; active management; exclosure fence in Crystal Spr. Pasture; improve McAlister Spring; remove water gap Meets S&amp;G</i>	Whitney, Willow, McAllister, Coyle, Thronson, Crystal Creeks in a downward trend (USDA 1993, 2001, 2003, 2005) <i>Currently in a downward trend; does not meet S&amp;G for Crystal Springs Allotment</i>	Whitney, Willow, McAllister, Coyle, Thronson, Crystal Creeks in a downward trend (USDA 1993, 2001, 2003, 2005) <i>Early on/off deferred should allow for improved riparian vegetation; Crystal Spng 5 pastures; active management, headcut repair; temp reduction in AUMs when Coyle Creek rip pasture is rested; water gap removed Meets S&amp;G</i>
GM-2 Locate new livestock handling and/or management facilities outside of Riparian Habitat Conservation Areas. For existing livestock handling facilities inside of Riparian Habitat Conservation Areas, assure that facilities do not prevent attainment of Riparian Management Objectives. Relocate or close facilities where these objectives cannot be met.	No livestock grazing <i>Meets S&amp;G</i>	<i>Meets S&amp;G</i>	<i>Meets S&amp;G</i>	<i>Meets S&amp;G</i>
GM-3 Limit livestock trailing, bedding, watering, salting, loading, and other handling efforts to those areas and times that would not retard or prevent attainment of Riparian Management Objectives or adversely affect inland native fish.	No livestock grazing <i>Meets S&amp;G</i>	Water and salt in uplands minimize grazing in riparian areas & use of protein blocks ¼ mi from stream <i>Meets S&amp;G</i>	Water and salt in uplands minimize grazing in riparian areas <i>Meets S&amp;G</i>	Water and salt in uplands minimize grazing in riparian areas & use of protein blocks ¼ mi from stream <i>Meets S&amp;G</i>

**Table 27. Comparison of the Alternatives in meeting Columbia spotted frog Project Design Criteria.**

Project Design Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
A. Do not fragment or convert wetland habitat to upland habitat through management activities including, but not limited to, water diversions, road construction, maintenance, or recreational facilities expansion. Where possible restore wetlands.	NA	NA	NA	NA
B. Do not degrade wetland habitat or water quality. 1. In channel, lake, or shoreline digging would be for restoration only. 2. Comply with the following Bull Trout, Steelhead Trout, and Chinook Salmon EFH PDC: (c) Sediment and Substrate 1, 2, 3, 6, 7, 8, 9, and 10. (d) Bank Stability 1 and 2.	1. NA 2. NA	1. NA 2. moving towards reducing cut bank and increase shade/riparian vegetation <i>meets</i>	1. NA 2. excessive cut bank and loss of shade; downward trend <i>does not meet</i>	1. NA 2. moving towards reducing cut bank and increase shade/riparian vegetation <i>meets</i>
C. Changes in hydrology of a stream, spring, lake, or wetland should be for restoration purposes only. 1. In reservoir situations, where possible, allow maintenance or development of shallow water habitat with emergent vegetation through July to provide egg laying and development. 2. When removing or modifying stream barriers to allow for fish passage, do not risk the introduction of non-native species.	1. NA 2. NA	1. NA 2. NA	1. NA 2. NA	1. NA NA
D. Limit activities within the channel migration zone or 100-year floodplain to those that have either a neutral or beneficial effect on floodplain functions. Timing of those activities will be outside egg laying/hatching for that area. If not known, restrict activities from March 1 to May 31.	Removal of livestock; removes impact to egg laying/hatching <i>meets</i>	Upland early season grazing and rotation improves egg laying/hatching success; reduces trampling <i>meets</i>	Habitat in downward trend; existing trampling removing vegetation needed for temperature, cover <i>Does not meet</i>	Upland early season grazing and rotation improves egg laying/hatching success; reduces trampling <i>meets</i>
E. Connectivity will be maintained through properly functioning streams, marsh, in stream, and floodplain vegetation. Restore native sedges, rushes, and willows where possible and appropriate.	Removal of livestock; riparian woody vegetation improves <i>meets</i>	Upland early season grazing and rotation improves riparian woody vegetation; reduces trampling <i>meets</i>	Habitat in downward trend; existing trampling removing vegetation needed for temperature, cover <i>Does not meet</i>	Upland early season grazing and rotation improves riparian woody vegetation; reduces trampling <i>meets</i>

USDA USDI 2006-2009 pp. 105-105.

### Cumulative Effects

Cumulative effects would be as discussed in the “Soils, Water Quality, Riparian Function and Aquatic Habitat” section.

### Essential Fish Habitat

The Pacific Fishery Management Council designated EFH (Essential Fish Habitat) for chinook salmon on September 27, 2000. This designation included current and some historic habitat in the Deschutes Basin. Historical habitat above Pelton Round Butte Dam was included. For the Ochoco National Forest, EFH is not included above Ochoco Reservoir Dam that is a channel barrier. Crystal and Burn project area is located above Ochoco Reservoir. The project is consistent with the Magunson-Stevens Fishery Conservation and Management Act. No further evaluation of EFH will be discussed.

## Management Indicator Species

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### Primary Cavity Excavators Including the Common Flicker

Primary cavity excavators including the northern flicker and pileated woodpecker are Management Indicator Species (MIS) for wildlife habitat. They are a group of species primarily dependent on dead wood habitat. The pileated woodpecker is a habitat specialist and is an indicator for late and old fir dominated forest structure. The common flicker represents species that utilize old growth juniper habitats. The flicker is also considered a habitat generalist and can occur in a variety of habitats as long as snags or hollow trees of appropriate dimensions are present. The white headed woodpecker is a habitat specialist that prefers areas with an open over story of large ponderosa pine and snags (Frenzel, R.W., 2001). The white headed woodpecker feeds primarily on live tree insects and utilizes pine seeds. The white headed woodpecker is infrequently observed in the analysis area. Snags, including snag densities, decay class, and diameters are one of the best indicators of habitat quality and population viability for primary cavity excavators. Tree species and forest structure is also important in evaluating habitat quality. In general, livestock grazing does not create or destroy snags and as a result there would be no direct, indirect, or cumulative effects to species or habitat for a large number of primary cavity excavators, including the pileated, white headed and common flicker.

Additional primary cavity excavators, including the downy woodpecker, red-napped sapsucker, and Lewis woodpecker can be associated with hardwood habitats, primarily aspen and cottonwood. Cattle grazing can have an effect on the amount and distribution of hardwood habitats and as a result there can be affects to the population viability of species that utilize them. The effects of cattle grazing will focus on primary cavity excavators that use hardwood habitats. Representative primary cavity excavators are the downy woodpecker and red-napped sapsucker.

#### ***Affected Environment***

The red-naped sapsucker's preferred habitat is riparian, with a preference for aspen, as well as cottonwoods, alder, pine forests, and less frequently mixed conifer forests (Marshall et al. 2003). Marshall et al. (2003) also states a relatively stable population of red-naped sapsuckers in Oregon, although Dobkin et al. 1995 reports the widespread degradation of aspen through intensive grazing and fire suppression as a threat to the red-naped sapsucker. The Partners In Flight - Northern Rocky Mountains Bird Conservation Plan identifies the red-naped sapsucker as a focal species for aspen habitats. The conservation plan identifies livestock grazing and fire suppression as a conservation issue for the lack of recruitment of young aspen. The conservation plan also identifies the encroachment of conifer trees into aspen stands as a conservation issue. Red-naped woodpecker populations appear to be statistically stable across their range based upon North American Breeding Bird Survey information (Sauer et. al. 2007). There are two survey routes close to the project area. Survey information was collected between 1966 and 2006. The Ochoco survey route (#69212) shows an increasing trend for the Red-naped sapsucker (3.90) and the Summit Pr route (#69136) shows a decreasing trend (-6.89) for the Red-naped sapsucker. The decreasing trend is not considered significant ( $P > 0.5$ ) but the increasing trend would be considered significant. There are no district sightings for the red-naped sapsucker within the project area.

The downy woodpecker also prefers riparian deciduous forests, or mixed deciduous/coniferous forests (Marshall et al. 2003). Marshall et al. 2003 indicates in a review of literature the downy woodpecker in eastern Oregon is most often found in deciduous stands, especially riparian, composed of alder, cottonwood, willow, and aspen. It is less common in mixed conifer and ponderosa pine forests. Marshall et al. (2003) also notes that the species in Oregon appears to be stable or on a slight declining trend, but that replacement of hardwood habitats with conifers and grazing in riparian habitats appear to pose the greatest risk for this species in eastern Oregon. There are no sightings for the downy woodpecker within the project area although they are believed to occur there. The downy woodpecker populations appear to be declining across their range for the past 26 years based upon North American Breeding Bird Survey

information (Sauer et. al. 2007). The Summit Pr route (#69136) shows a significant decrease (-2.79) for the downy woodpecker. No downy woodpecker information is available for the Ochoco survey route (#69212).

Hardwood communities in the project area were likely much more abundant historically than what is found today. There are no numerical data for the historical distribution of hardwood communities, although abandoned beaver dams that are still visible within the project area likely supported more extensive hardwood communities than what exist today. Evidence from decadent aspen clones also indicate aspen were more numerous than what exists today. The potential that currently exists for supporting riparian hardwood communities and shrubs is much different today than the historical potential. Stream channel degradation has occurred throughout the project area and has reduced the potential to support riparian hardwoods in many areas when compared to historical amounts. Even though the potential has been decreased compared to the historical potential you could still expect to see an increase in the amount and distribution of hardwood communities compared with what currently exists.

There are 15 individual aspen sites located within the Project Area. The majority are located within the Crystal Springs allotment although one isolated clone remains within the Burn allotment. Most aspen are located in small patches of less than ¼ acre. Aspen are generally mature or over mature trees and the majority of suckering that exists is heavily browsed. There are likely more aspen clones located within the project area. The Ochoco Watershed Analysis (2004) identified aspen within the Willow Creek and McAllister Creek drainages, although locations have not been mapped. Suitable nesting habitat is present but use has not been documented. Aspen clones likely do not provide suitable habitat alone because of the small size of the existing clones. The remaining clones still provide habitat in combination with surrounding conifer habitat. Hardwood communities dominated by willow, alder, birch, and red-osier dogwood are scattered along perennial streams throughout the analysis area. Although, they only occur as remnant stands or scattered individuals. Wild horses are frequently located within the project area and are likely impacting aspen and other hardwood communities. There is no indication that cottonwood trees ever provided a significant habitat component within the analysis area. A variety of activities, including historic grazing, timber harvest, loss of beaver, road building, fire suppression and climate change have reduced the size and distribution of hardwood habitats.

## ***Environmental Effects***

### **Alternative 1**

Alternative 1 would not result in direct effects to hardwood habitats and associated primary cavity excavators as a result of cattle grazing. The absence of livestock grazing would eliminate livestock browsing on riparian hardwood species. Browsing from mule deer and elk would be expected to continue. The number of wild horses that frequent the project area is expected to decline because the project area is located outside the wild horse management area. Horses that continue to remain outside the wild horse management area are typically removed. Wild horses are expected to continue to be present within the project area in the future. The number of horses and the impacts they will have on hardwood communities is difficult to predict. As previously mentioned, cottonwoods do not make up a significant habitat component unless efforts are made to expand the current distribution. Species like Lewis's woodpecker would be expected to remain uncommon because of the lack of gallery cottonwood or other hardwood forests. Lewis woodpecker is also highly associated with open ponderosa pine habitats as well as post fire conditions. Both habitat conditions are underrepresented within the project area. Fires that would improve habitat conditions for Lewis woodpecker are not predictable. Without grazing, regeneration of existing aspen clones is expected to slowly increase in the short term (10-15 years or longer; see section titled "Soil, Water Quality, Riparian Function and Aquatic Habitat" in this EA). There are numerous studies that indicate aspen will not successfully regenerate with high populations of deer or elk (Kay and Bartos 2000). Smith et al. (1972) reported deer alone had little effect on the development of

aspen reproduction, but with cattle and deer aspen regeneration was eliminated. Current elk and deer populations within the project area are not considered to be high.

Observations of exclosures across the district indicate that total exclusion of all herbivores is the most effective way of ensuring regeneration, although successful regeneration has occurred in exclosures that only eliminated cattle use. With time, the recovery and expansion of riparian associated species across the project area including aspen, alder, willow, dogwood, and birch, is expected. The extent of recovery is difficult to predict because of the amount of channel degradation that has occurred in the past and the difficulty in evaluating the site potential for any particular location. The amount of recovery will also be affected by the way natural disturbance regimes, such as fire, is returned to the forests. With the expansion of hardwood species across the project area, browsing by deer and elk would be expected to become less evident at any one location. Complete recovery to historical distributions in many areas is likely not possible because of channel down-cutting which has lowered the water table and decreased the site potential for supporting riparian associated species (see section titled “Soil, Water Quality, Riparian Function and Aquatic Habitat” in this EA). Primary cavity excavators associated with aspen including the downy woodpecker and red-napped sapsucker would likely benefit from the increase in habitat associated with the implementation of Alternative 1.

### **Alternative 2 (Proposed Action)**

There would be no direct effects to riparian associated primary cavity excavators under Alternative 2. Indirect effects would result from the continued browsing of aspen suckers and other riparian associated hardwoods by cattle resulting in a decline of aspen clones and limited growth on riparian hardwoods. Activities proposed under Alternative 2 are intended to improve the distribution of cattle and reduce use on riparian associated hardwoods and include an earlier season of use, additional water developments primarily within the Burn Allotment, and the active management of cattle. These activities are expected to show a slight decrease in the overall browsing that would be expected to occur on hardwood species from cattle. Cattle typically will browse less on hardwood species when other succulent grass species are available. An earlier season of use will provide green forage for a longer period of time while cattle are present. Additional water developments within the burn allotment will improve the distribution of cattle within the burn allotment. The active management of cattle may help to limit cattle concentrating in riparian areas.

Riparian associated hardwood habitats including aspen, alder, dogwood, and willow are expected to show a slight improvement in growth over 30 - 35 years following project implementation (see section titled “Soil, Water Quality, Riparian Function and Aquatic Habitat” in this EA). The distribution and amount is not expected to change significantly compared to what currently exists. The amount and extent of the recovery of hardwood habitats is difficult to predict because many locations likely will not support hardwood communities because of past degradation or soil and moisture conditions. Browsing by cattle is expected to continue. Browsing by wild horses and big game is expected to continue. Active management and a potential earlier turn on date, depending on range readiness guidelines, may result in an overall improvement in the distribution of cattle within a pasture, although because of the scattered distribution of hardwood communities that currently exist and the continued browsing pressure that is expected, there is not expected to be much improvement over the current conditions in the short term 10-20 years. In the short term 10-20 years the majority of the successful regeneration of aspen is expected to primarily occur within exclosures. Because of the small size of the existing aspen clones and the poor distribution of riparian hardwoods across the project area herbivory is expected to be significant in the short term. Although, over the long term, aspen suckers and other riparian hardwoods are expected to escape browse pressure and expand in amount and distribution. With an increase in the successful regeneration of aspen, potential nesting habitat for species that utilize aspen and riparian hardwood habitats like the downy woodpecker and red-napped sapsucker would slowly increase.

Alternative 2 is expected to result in more improvements to hardwood habitats when compared to Alternative 3 but less than Alternative 4.

### **Alternative 3**

Under Alternative 3, the current conditions and trends associated with hardwood habitats would continue. In general, aspen clones are expected to continue to decline in health. Hardwoods including alder, dogwood, willow, and birch are expected to show minimal improvements over existing conditions. Under Alternative 3 the grazing season would extend later in the season for the Burn and Crystal Springs Allotments. Cattle typically concentrate in riparian areas when grazing occurs later in the season, primarily being attracted to the cooler temperatures and greener vegetation. Water becomes limited which further concentrates cattle in riparian areas. The concentration of use later in the season can result in the increased browsing on hardwood species. Observations have indicated that late season browsing of aspen and other hardwood species by wild ungulates appears to increase in pastures where riparian use appears high. A later season of use also decreases the amount of re-growth that can occur on grazed plants. Studies at Starkey have shown that elk can shift preference from grasses and sedges to shrubs when pastures were heavily grazed by cattle. As a result, cattle may affect the distribution of wild ungulates, especially elk, with the result being increased use of hardwood species. Poor cattle distribution has been documented within the Crystal Spring Allotment with heavy utilization occurring in riparian areas. The current trend of declining aspen is expected to continue under Alternative 3. The active management of cattle will not be required under Alternative 3 for the Burn and Crystal Spring allotments. The active management of cattle can reduce the amount of time cattle spend in riparian areas. Use in the uplands would remain low and riparian use would remain high. Under Alternative 3, hardwood habitats would remain poor throughout the project area. Potential nesting habitat for species like the downy woodpecker and red napped sapsucker would continue to decline as the result of the decline in aspen. Alternative 3 would have the highest potential for reducing hardwood habitats and species that are associated with them.

### **Alternative 4**

Alternative 4 would result in the same effects as Alternative 2 for the Burn Allotment. Under Alternative 4, the Crystal Spring Allotment would be divided into five pastures and would be managed as a partial-deferred rotation using four pastures: Coyle Creek, Coyle Creek Riparian, Middle and Crystal Springs. The Middle Riparian pasture would be used once every 3-4 years. The two riparian pastures would initially be rested for a minimum of four years. Following the four year rest period grazing would be permitted once an upward trend in riparian vegetation conditions are established within the pasture. Existing water developments would be improved and two new developments would be constructed in the Coyle Creek pasture. The corral in the Middle pasture would be relocated west of the 2210-300 junction down the 300 road and a holding pasture would be constructed adjacent to the new corrals.

Under Alternative 4 the browsing of aspen and riparian shrub species is expected to decrease. Aspen and riparian shrubs are expected to increase within the riparian pastures over 20 - 25 years following project implementation (see section titled "Soil, Water Quality, Riparian Function and Aquatic Habitat" in this EA). It takes approximately 8-10 years for aspen to achieve a height where continued browse would not affect growth. As a result, aspen exclosures may be necessary to permit continued growth if cattle are returned to the riparian exclosures before 8 years. Outside the riparian pastures increases in aspen and riparian shrubs would be slower. Improvements in water developments and active management would help to improve cattle distribution within the allotment. As a result aspen and other riparian shrub species would slowly increase outside the riparian pastures. Additional fences may help to limit the movements of wild horses that continue to impact vegetation within the allotments. Moving the existing corrals would help to improve riparian conditions in Ahalt and Thronson creek. Habitat for species such as the downy woodpecker and red-naped sapsucker would show the most improvement under alternative 4 when compared to the other action alternatives.

### **Cumulative Effects**

Historical livestock grazing, the loss of beaver, and the resulting degradation of the majority of stream channels within the project area has affected the function and potential for many riparian areas to support hardwoods. Ungulate herbivory and conifer encroachment has led to the suppression of hardwood regeneration and development. Fire suppression has eliminated a primary disturbance agent for regenerating aspen. All of the above activities have contributed to the decline of hardwood habitats within the project area.

Projects have been implemented in the project area in the past or are planned in the future to improve riparian conditions and associated hardwood habitats. Riparian planting has occurred on .6 mi. of Coyle Creek. Two aspen clones have been protected. One riparian exclosure was constructed at Hohn Spring to protect riparian vegetation. The Spears Vegetation Management Project proposed 57 acres of aspen treatments.

Alternative 1 would not contribute to the cumulative effects of other actions that have and will continue to affect hardwood habitats, and thus habitat for hardwood-dependent cavity excavators. In absence of livestock herbivory through this alternative, an increasing trend in hardwood habitats would be anticipated across the project area. Because of the degradation in stream channels and associated riparian areas that has occurred, there are locations where complete recovery is not possible. Populations of wild ungulates can fluctuate within the project area, and high population levels could affect improvements from the termination of grazing in the project area. Currently, the population trends for wild ungulates are down and should not have a large impact on improvements made from removing livestock grazing.

Alternative 2 would continue to contribute to the cumulative effects through continued herbivory on hardwood communities and their ability to expand and regenerate. The effects of Alternative 2 would contribute less cumulative effects, as changes in season of use and active management will provide for the improved distribution of cattle and reduce use within riparian areas. The result will be reduced herbivory on hardwood species including aspen, alder, willow, and dogwood. Aspen treatments are expected to continue and will help to decrease the cumulative effects. Habitat for species associated with hardwood habitats is expected to slowly increase over time.

Alternative 3 would maintain the existing level of cumulative effects on hardwood communities. Actions that would improve the distribution of livestock including; an earlier season of use, and the active management of cattle would not occur. Higher use would continue in the riparian areas and lower use would occur in the uplands. The overall trend of improvement would be static or downward. Aspen treatments associated with the Spears Vegetation Management project will help to improve aspen conditions but are not expected to change the current static or downward trends overall.

The cumulative effects associated with Alternative 4 for the Crystal Spring Allotment would result in slow improvement from current conditions. Browsing of aspen and riparian shrubs is expected to continue although the effects are expected to be reduced. Aspen treatments associated with the Spears Vegetation Management project and reduced browsing associated with alternative 4 is expected to result in an improvement in habitat for species such as the re-naped sapsucker and downy woodpecker.

### **Forest Plan Standards**

The Forest Plan identifies maintaining viable population levels of primary cavity excavating species at the 40% population level (USDA Forest Service 1989). Current habitat conditions likely meet this standard based upon field knowledge of the project area. There are, however, concerns over the continued maintenance of those habitats, as described above in the direct, indirect, and cumulative effects discussions for the three action alternatives.

Of particular concern are aspen habitats, which are declining across the project area and forest. Alternative 1, with no livestock grazing, aspen are expected to slowly improve across the project area.

The recovery of aspen would partially depend on ungulate populations within the project area. With high wild ungulate populations the recovery would be slower or possibly not at all. Currently there is not a high wild ungulate population within the project area based on personal knowledge of the area and populations relative to management objectives. Aspen would likely never reach historical levels because of the degradation of stream channels and the lowering of water tables that have occurred in many areas. Alternatives 2 and 4 would likely result in a slow recovery of aspen habitats which is limited by the current site potential in many locations (see section titled “Soil, Water Quality, Riparian Function and Aquatic Habitat” in this EA). Alternative 3 would maintain the current overall declining trend in aspen.

Alder, willow, and dogwood communities would likely expand with Alternatives 1, 2 and 4 and continue to decrease with Alternative 3. The primary difference in the alternatives would be in the rate of expansion or improving trend (see section titled “Soil, Water Quality, Riparian Function and Aquatic Habitat” in this EA). Although riparian hardwood communities provide the basis for the preferred habitats of the red-naped sapsucker and downy and Lewis’ woodpecker, mixed conifer and ponderosa pine communities do provide a secondary habitat type that would not be affected by livestock. This would help maintain at least a minimum 40% potential population level in the project area.

## **Proposed, Endangered, Threatened and Sensitive Wildlife Species**

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Management activities considered in this Environmental Analysis require a Biological Evaluation to be completed (FSM 2670.1,2671.44). The biological evaluation process (FSM 2672.43) is intended to conduct and document activities necessary to ensure proposed management actions would not likely jeopardize the continued existence or cause adverse modification of habitat for:

- A. Species listed as Endangered (E) or Threatened (T), or proposed (P) to be listed by the USDI Fish and Wildlife Service. This includes the northern bald eagle and Canada lynx.
- B. Species listed as Sensitive (S) by the USDA Forest Service Region 6 that are suspected or documented on the Ochoco National Forest (USDA Forest Service, 2000). This includes the bufflehead, tricolored blackbird, upland sandpiper, western sage grouse, American peregrine falcon, pygmy rabbit, California wolverine, and the gray flycatcher.

**Pre-field review** of existing information. A pre-field review consists of a check of the following sources:

- Current Federally Listed species.
- Regional Forester's (R-6) Sensitive species list.
- Aerial photos.
- Wildlife sighting records.
- Other references such as research papers, publications and reports.

If through the pre-field review for the project area, it is determined that either the species or its habitat is not present, there is no need for a field reconnaissance or analysis of the project effects on species viability.

### **SPECIES ADDRESSED FOR THE PROJECT AREA**

Threatened, Endangered, and Sensitive (TES) species that are documented or suspected to occur on Ochoco National Forest are listed in Table 28.



**Table 28. List of Threatened, Endangered, and Sensitive Species, their Status, Presence, and Determination.**

Species	Listing	Presence	Determination for Action Alternatives <sup>1</sup>
Northern Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	Sensitive	Confirmed (documented within project area)	No Impact
California Wolverine ( <i>Gulo gulo</i> )	Sensitive	Suspected (documented on the Ochoco National Forest, unconfirmed sightings in the project area)	May Impact Individuals or Habitat, not likely to contribute to a trend toward federal listing
Pygmy Rabbit ( <i>Sylvilagus idahoensis</i> )	Sensitive	Not Present (suspected on the Ochoco National Forest)	No Impact
Peregrine Falcon ( <i>Falco peregrinus anatum</i> )	Sensitive	Not Present (suitable habitat does not occur within the project area)	No Impact
Greater Sage-Grouse ( <i>Centrocercus urophasianus</i> )	Sensitive	Not Present (suitable habitat does not occur within the project area)	No Impact
Bufflehead ( <i>Bucephala albeola</i> )	Sensitive	Unconfirmed (no suitable nesting habitat, seasonal migrant)	No Impact
Upland Sandpiper ( <i>Bartramia longicauda</i> )	Sensitive	Unconfirmed (suspected on the Ochoco National Forest)	No Impact
Gray Flycatcher ( <i>Empidonax wrightii</i> )	Sensitive	Suspected (unconfirmed in the project area)	May Impact Individuals or Habitat, not likely to contribute to a trend toward federal listing
Tri-Colored Blackbird ( <i>Agelaius tricolor</i> )	Sensitive	Not Present (suitable habitat not available in the project area)	No Impact

<sup>1</sup>Determination for all species for the No Action alternative (Alt. 1) is No Impact.

There are no endangered or threatened species known or expected to occur on the Ochoco National Forest. The Northern bald eagle was delisted in 2006 and is now addressed as a sensitive species on Ochoco National Forest. The Ochoco National Forest is also within the listing range for the Canada lynx (*Lynx canadensis*), but has been determined to have insufficient primary habitat to warrant management of Lynx Analysis Units (per direction in the amended Lynx Conservation Assessment and Strategy, 2000). Canada lynx habitat was remapped in 2001, in accordance with the 2000 Lynx Conservation Assessment and Strategy (LCAS). As a result, due to insufficient quantities of primary habitat, Key Linkage Areas (KLA) and Lynx Analysis Units (LAU) are not mapped on Ochoco National Forest in the 2001 map revision. In addition, The Deschutes and Ochoco National Forests requested informal consultation (March 30, 2001) on continued implementation of their respective Land and Resource Management Plans (LRMPs) with LAUs mapped in accordance with the 2000 LCAS (non on Ochoco National Forest). The U.S. Fish and Wildlife Service (USFWS) gave concurrence that the mapping was consistent with the current mapping direction, and that implementing Forest Plans using the current mapping would result in “may affect, but not likely to adversely affect” (NLAA) conflict determinations (May 24, 2001). For these reasons the determination of effect for this species is NLAA and this species will not be discussed further in this document.

All species on the Region 6 Regional Forester’s Sensitive species list that have potential habitat within or near the project area were considered. Of the eight species of terrestrial animal species on the Regional Forester’s list, documented or suspected to occur on the Ochoco National Forest, three sensitive species appear to have potential or suitable habitat, within the area of influence for the project. These species are:

- *Haliaeetus leucocephalus* (bald eagle)
- *Gulo gulo* (California wolverine)
- *Empidonax wrightii* (gray flycatcher)

The other five sensitive species do not have potential habitat within the area of influence for this project, and will not be discussed further in this document. For a brief habitat description, see the Wildlife Specialists' Report in the project file, Lookout Mountain Ranger District. They are:

- Bufflehead (*Bucephala albeola*)
- peregrine falcon (*Falco peregrinus anatum*)
- upland sandpiper (*Bartramia longicauda*)
- tricolored blackbird (*Agelaius tricolor*)
- pygmy rabbit (*Brachylagus idahoensis*)
- western sage grouse (*Centrocercus urophasianus*)

**Field reconnaissance** is normally used to determine the presence of species or habitat, if the species or habitat is suspected to be present, or if their occurrence is unknown. Field reconnaissance is also used to gather information relative to potential effects of the proposed project. If species occurrence or habitat is known and the project impacts can be sufficiently mitigated, field reconnaissance will not be done and the process goes to the risk assessment phase.

**Risk Assessment** All terrestrial wildlife TES with potential habitat present or sighting reports for the project area are assessed below. Aquatic and botanical species are addressed in separate Biological Evaluations.

## Northern Bald Eagle

### ***Affected Environment***

Bald eagles are usually associated with rivers, lakes and marshes where an abundant food source is available. They require nearby tall trees or cliffs for nesting (Csuti et al., 1997); 84% of Oregon nests were located within 1 mi. of water (Isaacs and Anthony 2001). The nearest known bald eagle nest is approximately 5 miles east of this project area near Shady Creek Reservoir. Another nest is located approximately 7 miles southwest of the project area at Ochoco Reservoir. There are no Bald Eagle Management Areas (BEMA) or winter roosts within the project area. There have been occasional bald eagle sightings adjacent to the project area along the Ochoco Creek valley, primarily on private land that borders the project area. These sightings are likely associated with foraging Bald Eagles that nest outside the project area. The project area does provide suitable nesting trees within close proximity to Ochoco Creek. Suitable nesting habitat was reduced by the Marks Creek fire that occurred in 1976. Incidental foraging likely occurs within the project area where eagles take advantage of carrion, when available, and small mammals.

### ***Environmental Effects***

#### **Direct and Indirect Effects All Alternatives**

There would be no direct or indirect effects to reproductive habitat or winter roost sites by implementing the no action or any of the action alternatives. Cattle grazing does not affect the establishment or development of large diameter trees that would be suitable for nesting or roosting within the project area.

There are no known nests sites or winter roosts sites within or adjacent to the project area. As a result the potential for disturbing nesting or roosting bald eagles does not exist.

Foraging activities primarily occurs on private land adjacent to the project area. Any foraging activities that may occur within the project area would be incidental to primary use areas. As a result the determination is **No Impact (NI)** for all action alternatives and the no action alternative.

## Cumulative Effects

The three action alternatives would not result in cumulative effects to bald eagles due to the lack of effects to suitable habitat and the lack of presence of individuals or breeding pairs in the project area.

## **Gray Flycatcher**

### ***Affected Environment***

The grey flycatcher prefers relatively open juniper and pine woodlands with understories of sagebrush, bitterbrush, and mountain mahogany communities (Marshall et. al. 2003). Nesting occurs relatively low to the ground. The species migrates well south every winter, returning late April/early May (Marshall et al. 2003). The grey flycatcher feeds exclusively on insects in flight, from the ground, or from plants (Sterling 1999). Such habitats are primarily located on the southern end of the project area within the Burn Allotment. Approximately 1,100 acres of potential habitat is identified within the Burn Allotment. Only a small amount of potential habitat occurs within the Crystal Springs Allotment. Currently the potential habitat is represented by isolated patches of bitterbrush and sagebrush. Bitterbrush and sagebrush is present throughout the burn allotment, although in most areas it is not present as a continuous shrub layer but as scattered individuals. Prior to the 1968 Marks Creek fire conditions were likely more suited for the Gray Flycatcher with open pine stands with understories of bitterbrush being more represented throughout the burn allotment. Juniper has likely expanded following the Marks Creek fire and species like ceanothus and rabbit brush are present in higher densities. The Marks Creek burn was also heavily seeded with cultivars and machine planted with conifers which has also affected the vegetation that currently exists. No sightings of this species have been recorded in the project area, but they are expected to occur there. The species appears relatively common in the west. The North American Breeding Bird Survey (BBS) shows a survey wide upward trend for the years (1966-2004).

Grazing strategies that could cause a decline in preferred shrub species could potentially effect this species. This species is not a ground nester, preferring small trees and shrubs for nesting within six feet of the ground. Cattle grazing could have a small but insignificant effect on nesting individuals because of nesting occurring in shrubs and small trees relatively close to the ground.

### ***Environmental Effects***

#### **Alternative 1**

Under the no action alternative cattle grazing would not occur. There would be no risk of nest disturbance. Shrub species that would potentially be affected by grazing would benefit. Bitterbrush may show some increase in growth and distribution in the short term with less browse pressure either directly from cattle or indirectly from the effects of cattle grazing on shrub utilization by wild ungulates. Sagebrush species may show some increase in growth and distribution when compared to the action alternatives. In Nevada Robertson (1971) noted increases in all vegetation in areas rested from livestock grazing. Anderson and Holt (1981) found after 25 years of no livestock grazing in southeast Idaho, sagebrush canopy increased 154%. The determination for the no action alternative is **No impact (NI)**.

#### **Alternatives 2, 3, and 4**

Cattle typically do not utilize sagebrush species, although cattle may utilize bitterbrush when grass species begin to dry out. Bitterbrush and sagebrush are currently in relatively good condition where they exist within the burn allotment. Bitterbrush would continue to be present in isolated clumps and scattered individuals. Activities associated with the three action alternatives is not expected to have a positive or negative effect on the current bitterbrush and sagebrush habitats located within the project area. Mountain Mahogany occurs as tall shrubs in small isolated clumps on ridge tops and would be unaffected by cattle grazing. The continued expansion and growth of juniper within the burn allotment may pose the biggest threat to bitterbrush, sagebrush and other shrub dominated understories within the project area.

Because this species often nests below 6 feet in shrubs or small trees there is a small potential for nest disturbance to occur when cattle are grazing in suitable habitat. This effect is expected to be minimal and is not expected to have a significant effect on nesting success in the project area. The determination for all action alternatives is **May Impact Individuals or Habitat, not likely to contribute to a trend toward federal listing (MIIH)** for all action alternatives.

### **Cumulative Effects**

The Marks Creek fire and subsequent seeding and reforestation efforts is in part responsible for the lack of a well developed bitterbrush and sagebrush shrub layer in many areas. Juniper continues to expand within the burn allotment as well as other areas across the district which may actually be improving habitat for the gray flycatcher in the short term although in the long term reductions in understory shrub species may limit available habitat. There is not expected to be any additional cumulative effects associated with the implementation of any of the alternatives.

## **California Wolverine**

### ***Affected Environment***

In Oregon, the wolverine is typically found in open forests at higher elevations (Csuti et al., 1997). In Montana, wolverines tended to use large areas of medium or scattered mature timber. Grand fir forest types were selectively used year-round, and some preference was shown for lodgepole pine and western larch. Wolverine tend to avoid dense young timber, clear cut openings and burned over areas. In Idaho wolverines preferred subalpine cirque areas in large boulder talus on north facing slopes for denning sites (Copeland and Harris 1994). Critical components to wolverine habitat seem to be an absence of human activity, ample big game and low road densities (Butts, 1992). Wolverine are opportunistic foragers feeding on small to medium sized rodents, hares, and carrion. Wolverine cover large areas in their scavenging lifestyle, with home ranges exceeding 100 square miles. In the last century, the distribution of this species has contracted considerably and they no longer occur throughout much of their historic range in the western United States. Habitat loss through timber harvest, increased roading of forests, and general sensitivity to human disturbance has been implicated in their decline (Banci, 1994). Hornocker and Hash found that wolverine seasonal movements effectively separated them from human activity, and believed that wilderness or remote country with limited human activity was necessary for the maintenance of viable wolverine populations.

There have been unconfirmed sightings of wolverine within the project area. Habitat within the project area would not be considered high quality because of the relatively high density of roads, low elevation, and the presence of high levels of human activity. The burn allotment would still be considered relatively open habitat, although the northern end of the allotment was not burned in the Marks Creek fire and is still timbered. No reproductive habitat exists within the project area. Reproductive habitat is defined as large structure moist grand fir plant associations or boulder fields at high elevations. Because wolverine home ranges often exceed 100 square miles, the project area does not have sufficient habitat to be used as a reproductive home range. It is believed that past sightings are associated with foraging activities within a portion of an individual's home range or dispersal of individuals.

### ***Environmental Effects***

#### **Alternative 1**

The determination for the no action alternative is No impact (NI) as there would be no effect to habitat. There would be a small decrease in the potential for disturbance from activities associated with grazing such as fence maintenance and the movement of cattle. The removal of vegetation by cattle would not occur and overall riparian and upland vegetation conditions would improve within the project area. Potential prey species for the wolverine would benefit more under alternative 1 when compared to the other action alternatives.

### Alternatives 2, 3, and 4

There would be no effect to potential denning habitat within the project area by implementing any of the action alternatives. Cattle grazing would not affect boulder fields or large wood accumulations within the project area. There is the potential of effecting vegetation within the project area which could effect prey habitat and the abundance of prey for foraging wolverines. The forest plan utilization standards were designed to provide adequate forage for both cattle and wild ungulates and the assumption is made that all action alternatives would meet the forest plan utilization standards. All action alternatives would result in a slight increase in human disturbance associated with fence maintenance and the movement of cattle within the allotments. There is a low potential for wolverines occupying habitat within the project area because of the relatively high road densities that exist and the high levels of recreation use that also occurs in the project area. The increase in activity associated with the action alternatives would not have a significant effect on the presense or absence of wolverines within the project area because wolverines would be able to easily avoid these types of activities. For these reasons, the determination is **May Impact Individuals or Habitat, not likely to contribute to a trend toward federal listing (MIIH) for all action alternatives.**

### Cumulative Effects

Management activities and uses that have occurred in the past have influenced the availability and quality of habitat for Wolverines. Removal of large trees, snags and down wood through timber harvest have altered the availability of potential denning sites for wolverine and road construction and development of recreation sites have increased the level of human activity throughout the project area, increasing the potential for disturbance to wolverines. Prescribed burning within the project area has reduced canopy structure and consumed some downed wood and snags potentially affecting the quality of wolverine habitat. However, there has been recruitment of additional down wood and snags in the areas that have been burned, and negative effects of the fire may be offset by the increase in big game carrying capacity due to increased forage production for big game. The action alternatives would not result in measurable or significant cumulative effects to wolverine or wolverine habitat. Combination of poorer quality existing habitat and the lack of direct and indirect effects to wolverine and wolverine habitat would not result in additional effects to this species.

## **Neotropical Migratory Birds**

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This section discusses Neotropical migratory birds described in the Partners In Flight - Northern Rocky Mountains Bird Conservation Plan. Partners In Flight (PIF) is a cooperative effort involving partnerships among federal, state and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community and private individuals. PIF lead the effort to complete a series of Bird Conservation Plans for the entire continental United States. PIF Landbird Conservation Planning provides the framework to develop and implement landbird conservation strategies by recommending conservation actions on the ground that may prevent the need for future listings. These plans included priority setting, establishment of objectives, necessary conservation actions and evaluation criteria necessary for bird conservation in the western hemisphere.

The PIF Bird Conservation Plan is being used to address the requirements contained in Executive Order (EO) 13186, January 10, 2001, Responsibilities of Federal Agencies to Protect Migratory Birds. Under Section 3(E)(6), though NEPA, the EO requires that agencies evaluate the effects of proposed actions on migratory birds, especially on species of concern. The PIF plans allow the analysis of proposed projects upon neotropical migratory birds through the use of guidelines for priority habitats and bird species by subprovince. The conservation strategy does not directly address all landbird species, but instead uses numerous "focal species" as indicators to describe the conservation objectives and measures project affects in different priority habitats for the avian community found there. This conservation plan identifies priority habitats and focal species by subprovince. The Ochoco National Forest is within the

Blue Mountains subprovince. The following table lists the habitats and species listed for the Blue Mts. Subprovince.

The conservation strategy identifies four priority habitat types:

1. Dry Forest (primarily ponderosa pine).
2. Mesic Mixed Conifer (primarily late-successional).
3. Riparian Woodland and Shrub.
4. Unique habitats including (subalpine forest, montane meadows (wet and dry), steppe shrubland, aspen, and alpine habitats).

There are no alpine or subalpine habitats that occur within the project area.

**Dry Forest:**

Landbird conservation emphasizes maintaining healthy ecosystems through representative focal species for four habitat conditions in the dry forest habitats (Table 29).

**Table 29. Landbird Conservation Strategy focal species in dry forest.**

Priority Habitats	Focal Species	Habitat Attribute
Dry Forest	Lewis’ woodpecker	Patches of burned forest
Dry Forest	White-headed woodpecker	Large patches old forest, large trees and snags
Dry Forest	Flammulated owl	Old Forest, low canopy closure, grassy openings, dense thickets.
Dry Forest	Chipping sparrow	Open forest with small patches seedling/saplings or shrubs.

Habitat for Lewis’ woodpecker is limited because of the lack of cottonwood galleries and burned forest. White-headed woodpeckers preference for open mature pine habitats would not be affected by cattle grazing. The flammulated owl nests in cavities in older ponderosa pine with an open understory. Patches of saplings or open areas of shrubs is important for roosting. Cattle grazing would not have an effect on nesting habitat for the flammulated owl. Cattle grazing may effect shrub development which could affect potential roost sites. The chipping sparrow Prefers open coniferous forests or stands of trees interspersed with grassy openings and patches of shrubs and or seedling/sapling trees, especially pines (Marshall 2003). The chipping sparrow is also associated with juniper woodlands and mountain-mahogany stands. The chipping sparrow Forages on the ground and in trees. Nesting occurs between April 15 – July 15) on ground or in shrub species, currant not sagebrush. The dry and moist forest ponderosa pine plant association and juniper woodlands represents approximately 2,700 acres of habitat, the majority of which is located within the Burn allotment. Mountain-mahogany is scattered primarily on ridge tops and represents a small habitat component. The majority of the habitat within the Burn allotment is open forest with scattered shrubs. Habitat is well represented for the chipping sparrow within the Burn allotment. The conservation strategy identifies potential effects of grazing in the dry forest habitat types:

**Specific to the chipping sparrow:** intensive grazing may reduce adequate herbaceous cover for foraging and inhibit development of regenerating seedlings of pine for recruitment trees and nesting habitat for chipping sparrow.

A large number of birds forage on insects. The conservation strategy identifies grazing as potentially limiting understory growth and herbaceous cover which may affect insect productivity.

**Mesic Mixed Conifer:**

The desired condition in Mesic Mixed Conifer (Late-Successional) forest is a multi-layered old forest with a diversity of structural elements (e.g., snags, dense shrub patches, high canopy closure in patches

across the landscape. Landbird conservation emphasizes maintaining healthy ecosystems through representative focal species for five habitat conditions. (Table 30).

**Table 30. Landbird Conservation Strategy focal species in mesic mixed conifer.**

Mesic Mixed Conifer	Varied thrush	Structurally diverse; multilayered
Mesic Mixed Conifer	Olive-sided flycatcher	Edges and openings created by wildfire.
Mesic Mixed Conifer	MacGuillivary's warbler	Dense shrub layer, openings or understory. Regenerating forests
Mesic Mixed Conifer	Vaux's swift	Large snags. Late-successional forest
Mesic Mixed Conifer	Townsend's warbler	Dense overstory canopy closure

The olive-sided flycatcher prefers edges and openings created by fire in mixed conifer forests containing highly fragmented late-seral forest with a lot of edge habitat. The olive-sided flycatcher nests in grand fir and Douglas-fir. Snags are important for foraging perches and singing perches (Marshall 2003). Habitat for the olive-sided flycatcher is limited in the project area because of the small amount of late-seral moist grand fir plant association that occurs in the project area. Edge habitat associated with fragmented stands and clearcuts is abundant on the north slopes at higher elevations, although low numbers of snags associated with preferred habitat is likely limiting habitat suitability. The olive-sided flycatcher is an aerial forager and activities that effect insect productivity could potentially affect this species. The Conservation Strategy identifies grazing as a conservation issue potentially limiting understory growth, which provides insect productivity.

Vaux's Swift is associated with late seral coniferous forests (Marshall). The Vaux's swift uses hollow trees for nesting. Large diameter grand fir that is susceptible to heartrot is likely important to this species. Forages over the canopy and in openings on insects and can also skim aquatic insects over water. Habitat is limited in the project area because of the lack of late seral grand fir stands. The loss of large snags is the conservation issue identified in the conservation strategy for this habitat type. Cattle grazing does not have an effect on snags but heavy grazing may have an effect on insect productivity.

The habitat focus for MacGuillivary's warbler is a dense understory shrub layer (includes shrubs, seedlings, and saplings). East of the cascades MacGuillivary's warbler is associated with dense willow thickets around springs and stream bottoms. Forages close to the ground and nests in thickets of small trees or shrubs. The loss of riparian habitat is a conservation issue identified in the conservation strategy. Habitat is very limited within the project area.

Townsend's warbler breeds in a range of coniferous forests, true fir, Douglas fir mixed conifer, and lodgepole pine. Nests in conifer branches and feeds primarily on insects. In the Blue Mts. Townsend's warbler preferred grand fir and larch with a dense grand fir understory (Marshall 2003). This species has likely benefited from fire suppression activities and the abundance of dense forested conditions. Habitat is present primarily at higher elevations on the north and west portions of the Crystal Spring allotment. Cattle grazing would not directly or indirectly affect this species or habitat.

The varied Thrush is most common in dense older coniferous forests (Csuti). This species is locally common in wet sites throughout the Blue Mtns. Above 4,265ft (Marshall 2003). This species is believed to be uncommon within the project area because of the lack of suitable old growth Douglas-fir forest habitat. The conservation strategy focus is on maintaining structurally diverse multilayered conditions. Cattle grazing would not effect structural development. The varied Thrush does rely on a well developed organic layer for foraging on a variety of invertebrates. Reduction in understory vegetation can effect the development of the oranic layer.

In summary, the conservation strategy for the mesic mixed conifer habitats focuses on a maintaining a variety of seral and structural conditions within the mixed conifer forest types. Generally cattle grazing does not effect the development of various structural conditions within conifer forests. One issue within the conservation strategy is grazing can effect the recruitment of conifer seedlings. Within the project

area conifer seedling recruitment is not a problem, in fact high stem densities have been identified as a potential problem limiting understory vegetation production throughout the project area. The other three issues within the conservation strategy in relation to cattle grazing is the loss of riparian habitat that is important to species like MacGuillivary’s warbler that depends on dense riparian vegetation. Additionally, the conservation strategy identifies the loss of understory vegetation resulting from intensive grazing and the potential for a reduction in insect productivity as a conservation issue. The effects discussion will focus on the potential for reducing insect productivity and the potential for nest disturbance for those species that nest on the ground or in low shrubs.

Landbird conservation emphasizes maintaining healthy ecosystems through representative focal species for four habitat conditions (Table 31).

**Table 31. Landbird Conservation Strategy focal species in riparian habitats.**

Riparian Woodland	veery	Dense shrub understory
Riparian Woodland	Red-eyed vireo	Deciduous forest high canopy closure
Riparian Woodland	Lewis’ woodpecker	Large snags in Riparian woodland
Riparian Shrub	Willow flycatcher	Dense shrub patches.

Riparian woodlands was discussed for the red-napped sapsucker, and downy woodpecker under the management indicator species. Riparian Woodland Habitat represented by deciduous forests with high canopy closure is not present within the project area. Habitat that would be considered suitable for the Red-eyed Vireo and Veery is currently not present. Alder is scattered as isolated individuals and a few clumps and would not be considered a significant habitat component. Dense shrub patches that would provide habitat for species represented by the Willow flycatcher does not exist in the project area. Willows occur primarily as scattered individuals and rarely occurs in significant patches. Deciduous riparian forest with a dense shrub understory characteristic of habitat for species like the veery is also not present. Riparian Woodland and Riparian shrub habitat and effects are described and considered under the management indicator section for primary cavity excavators.

Cattle grazing is addressed within the conservation strategy with potential effects to those species that prefer riparian deciduous forest with high canopy closure, riparian deciduous forest with dense shrub understory, and riparian shrub patches interspersed with openings. Effects of cattle grazing within the conservation plan which are specific to focal species within the Riparian shrub habitat are:

- Excessive and or improper grazing resulting in poor recruitment of shrub layer vegetation.
- Loss and degradation of riparian shrub habitat from altered hydrological regimes.

**Unique habitats**

Landbird conservation emphasizes maintaining healthy ecosystems through representative focal species for five habitat conditions. (Table 32).

**Table 32. Landbird Conservation Strategy focal species in unique habitats.**

Subalpine Forest	Hermit thrush	Dense coniferous forests
Montane Meadows	Upland sandpiper	Grasslands, Prairie, meadows
Steppe Shrublands	Vesper sparrow	Bunchgrass/sagebrush few trees
Aspen	Red-naped sapsucker	Aspen
Alpine	Gray-crowned rosy finch	Alpine habitats

There are no Alpine or Subalpine forests within the project area. Aspen habitats are described under the management indicator section under primary cavity excavators.



## **Aspen**

Landbird conservation issues with respect to cattle grazing are:

The lack of recruitment of young aspen due to livestock grazing and fire suppression.

The focal species for Aspen is the Red-naped Sapsucker. The Red-naped sapsucker was discussed under “Forest Plan Management Indicator Species - Primary Cavity Excavators.”

The Ochoco National Forest Management Plan directions are to identify and protect unique ecological situations with aspen clones being one example.

The Landbird conservation plan makes the following recommendation for cattle grazing:

Eliminate or modify livestock grazing to ensure succession and recruitment of young aspen.

## **Montane Meadows:**

The focal species for montane meadows is the Upland sandpiper. This species prefers large prairie-grassland habitats. There are no large prairie or grasslands habitat within the project area. Small upland wet and dry meadows occur throughout the project area. These relatively small meadows are important to a variety of bird species including the Savannah sparrow and Common snipe that are ground nesters in this habitat type. Meadow systems and riparian habitats within the project area receive the highest use by cattle of any habitat type. Early season grazing during the nesting season may result in nest trampling or the reduction of cover surrounding the nest making them more vulnerable to predation.

## **Steppe Shrublands:**

The focal species for Steppe Shrublands is the Brewer’s sparrow and the vesper sparrow. The Brewer’s Sparrow is strongly associated with big sagebrush shrub-steppe habitats, but to a lesser extent bitterbrush, ceanothus, and large big sage brush dominated openings in juniper. Preferred big sagebrush cover ranges from 10%-30% and .4 to 1.5meters in height. There is approximately 60 acres of mountain big sagebrush habitat that exists in the project area, although it is all associated with ponderosa pine and juniper communities, which decreases the suitability of the habitat. There are also scattered patches of bitterbrush and ceanothus mixed in with the mountain big sagebrush. There are no large contiguous sagebrush habitats within the project area. This habitat condition is not suitable for the Brewer’s sparrow, which selects for open, pure sagebrush shrub-steppe habitats.

The vesper Sparrow occurs in a wide variety of open habitat types including grassland, sagebrush, montane meadows, juniper steppe, and openings in forested habitats. The vesper sparrow is most abundant in habitats characterized by bunchgrasses and short, stiff sage. There are no low or stiff sage communities within the project area. The scattered big sagebrush, bitterbrush, and ceanothus habitats that are located within the Burn Allotment are in fairly good condition and would provide limited habitat for the vesper Sparrow, although they do not include large areas. There are approximately 210 acres of wet and dry meadow habitats scattered across the Crystal Spring Allotment that provides minimal habitat for the vesper Sparrow.

## **Environmental Effects**

### **Alternative 1**

This alternative would not result in direct or indirect effects to landbirds and neotropical migrants. Habitat would not be affected by livestock grazing. There would be no potential for nest trampling from cattle. Improvements could be expected in riparian woodland habitats including aspen and alder. Improvements could also be expected with the distribution and densities of riparian shrubs including willow, dogwood, cherry. Recovery of hardwood communities is expected to be slow because many of the remnant populations are scattered and re-colonization over long segments of streams would be slow. There is also expected to be continued browsing by both deer and elk in the short term, although as

recovery continues use by deer and elk would be spread over much larger areas and is expected to be less evident. Wild horses are also expected to continue to affect the recovery of riparian woodland habitats. Complete recovery to historical levels is not expected because of the amount of channel degradation that has occurred throughout the project area. Hardwood habitats are expected to expand although large continuous hardwood stands are not expected because of channel conditions as well as other factors like conifer overstory that may limit the potential for expansion. The recovery of hardwood communities that is expected in the next 50 years is not expected to result in significant population changes for species that depend on them.

Dry forest habitats likewise would not be affected. Their existing condition would be maintained with this alternative. With the lack of livestock grazing, foraging habitat in the dry forest habitats may improve with the increase in herbaceous and shrub layer resulting in an increase in insects. Seed production should also increase with more of the grasses developing to seed.

#### **Alternative 2, 3 and 4**

Direct effects of nest disturbance and loss with livestock grazing may occur, although the effect is expected to be small and not measurable. Indirect effects to vegetation conditions could occur with all action alternatives as a result of the reduction in herbaceous vegetation and the potential to effect insect productivity. The season of use could also effect the availability of seed for foraging activities. The following effects are anticipated for each of the vegetation communities reviewed:

##### **Dry Forest:**

The action alternatives would result in indirect effects upon the dry forest habitats utilized by the chipping sparrow. Effects would be to foraging habitat. The level of effect would depend upon the level utilization and season of use that occurs in any one pasture and/or allotment. Early season grazing, at utilization levels identified in each alternative, would reduce ground cover that may affect the quality of foraging habitat for this species. Reductions in ground cover may result in lower insect abundance. Early season grazing may also affect seed production and seed availability as forage. Late season grazing would result in much less adverse effects, as utilization of these habitats falls off substantially later in the season. Grasses and forbs have generally desiccated and are not very palatable to livestock.

Alternatives 2 and 4 would likely result in lower levels of effects, based upon the adaptive management strategy and the reduced levels of forage utilization anticipated for each of the allotments. Forage habitat for chipping sparrows should be better with this alternative.

The action alternatives would result in indirect effects upon the dry forest habitats utilized by the chipping sparrow. Effects would be on foraging habitat. Nesting season occurs between April 15 and July 15. Early season grazing could be expected to decrease available forage both by decreasing insect productivity during the nesting season as well as effecting seed availability. Alternative 2 and 4 for the Burn Allotment could be expected to result in slightly higher effects based on the earlier season of use. Alternative 2 and 4 is expected to result in an increase in uplands use with active management and an earlier season of use. Under Alternative 3 cattle may be unevenly distributed across the allotment as the result of no active management. This may result in areas with relatively high utilization and areas with relatively low utilization. Upland sites would likely receive less use in Alternative 3 when compared to drainages and lower elevation areas. Alternative 3 may result in slightly lower effects because of the later season of use.

##### **Mesic Mixed Conifer and Riparian Woodland and Riparian Shrub**

The effects to habitat in the Mesic Mixed Conifer habitat types is focused on Riparian shrub communities within this habitat type. As a result effects will be considered together for all three habitat types. Small indirect adverse effects would be expected to continue with all action alternatives with continued browsing from both livestock and wild ungulates. Currently poorly or non-functioning habitats would not

improve dramatically with Alternative 2 and 3. Even though continued adverse effects are expected as the result of browsing, riparian hardwood and shrub habitats are expected to slowly improve under Alternatives 4. An Earlier season of use, riparian pastures, the active management of livestock, and deferred rotation, is expected to decrease use within riparian areas and distribute use more evenly throughout pastures the. There is a greater potential for improvement to occur within the Crystal Spring Allotment because of more available water in streams throughout the year. Habitat is not expected to improve over a large enough area to effect populations that utilize these habitats because the potential no longer exists for extensive riparian hardwood or riparian shrub communities to exist within the project area primarily because of the extensive stream channel degradation that has occurred in the past and the amount of conifer cover that exists in certain locations. Aspen, alder, dogwood, willow species are expected to increase in distribution and density and species that utilize these habitats would benefit.

### **Steppe Shrublands:**

There are no shrub steppe habitats within the project area. Following the marks Creek fire shrub habitats were created within the burn allotment that could provide minimal habitat for the Vesper sparrow. These habitats are in relatively good condition with the Allotment. All action alternatives have the potential for nest disturbance or trampling to occur. Alternative 2 and 4 propose an earlier season of use and shrub species are typically browsed less when palatable grass species are available. Alternative 3 proposes a later season of use. Grass species dry out later in the season and use on bitterbrush can increase. Big sagebrush is not affected by use levels that typically occur. Because the big sagebrush and bitterbrush habitats occupy a relatively small area and would decrease over time following the Marks Creek fire there are no measurable effects expected with any of the action alternatives.

### **Cumulative Effects**

A variety of actions and activities have affected the habitats described above over time. Ungulate grazing, fire suppression, timber harvest and thinning, trapping of beaver and road construction are likely the most significant actions that have affected these habitats. These activities have altered riparian and upland habitat that has affected the species identified in this assessment.

Livestock grazing has modified vegetation communities in the riparian and upland areas. In riparian areas, historic livestock grazing has contributed to the decline of hardwood communities, changes in meadow habitat through the down cutting of stream channels and lowering of water tables and changes in species composition. Alterations to riparian habitat have occurred within the majority of riparian areas in the project area. This has resulted in a decrease in distribution and density of riparian hardwood and riparian shrub communities as well as species that are associated with them. Livestock grazing has also affected upland areas as well. Species composition, particularly in regards to bunch grass and some forb communities were altered in part by livestock grazing.

Past vegetation management activities have resulted in major changes to forest structure and associated habitats. Much of the timber harvest prior to the 1990s focused on the removal of large diameter fir and Pine. The result was a reduction of multistoried large structure mixed conifer habitats as well as a reduction of open large diameter Ponderosa pine habitats. Species that prefer large structure were affected by this activity and species that prefer fragmented habitats and dense forest structure likely benefited. The ground disturbance associated with harvest activities also had an impact on understory vegetation which was further reduced by grazing activities. Since the early 1990s the Forest's emphasis has shifted from removal of large pine to re-establishment of large pine and larch, and other single-strata LOS stands. Large single storied ponderosa pine dominated stands are believed to be the predominant conditions historically within the majority of the project area. Species that prefer open large single storied stands would see an increase in habitat in the future. Species that prefer dense forest canopy would experience a decrease in habitat in the future, although this type of habitat would exist across the landscape. The Marks Creek fire that occurred in July of 1976 and post fire seeding and planting played a large part in the vegetation conditions that currently exist within the Burn Allotment. The Marks Creek

fire was reported as an extremely hot fire that resulted in changes to soil characteristics that made reforestation efforts difficult. A large portion of the Burn was seeded to non-native grasses. Juniper has expanded in many areas of the burn.

Grazing practices have changed over the years and stocking rates have decreased to adhere to the Forest Plan standards. Grazing management in the project area has gone from season long grazing to deferred grazing. This has helped to reduce impacts to both riparian vegetation and upland vegetation.

Fire suppression and the resulting changes in forest structure and species composition have affected land bird habitat as well. Combined with timber harvest, and interactions with historic livestock grazing, fire suppression has, in general, allowed the development of denser stands with compositions leaning towards shade tolerant, fire intolerant tree species. Fire suppression has affected forest structure conditions within the Crystal Spring Allotment more than the Burn Allotment. For land bird species that select for those habitats, habitat quality and quantity increased. Species that select for more open, early seral mature habitats, habitat quality and distribution declined. Fire can have a positive affect on many species including aspen, willow, alder, and many of the upland shrub species. The lack of fire and the resulting increases in conifer densities are partially responsible for the current lack of aspen and other hardwood species. The amount of conifer canopy that is present in many riparian areas and the lack of fire may have affected the ability of riparian areas to support hardwood and riparian shrub communities.

Projects have been implemented in the project area in the past or are planned in the future to improve riparian conditions and associated hardwood habitats. Riparian planting has occurred on .6 mi. of Coyle Creek. Two aspen clones have been protected. One riparian exclosure was constructed at Hohn Spring to protect riparian vegetation. The Spears Vegetation Management Project proposed 57 acres of aspen treatments. Conifer encroachment is one of the factors responsible for the decline of aspen.

**Dry Forest:** The action alternatives would result in cumulative effects to the dry forest habitat conditions described in this analysis. Livestock grazing would not contribute to changes in species composition or structural changes in conifer species. Livestock grazing would continue to affect understory development and composition in the herbaceous plant component. This would continue to affect the quality of foraging habitat for some land birds, and the quality of nesting habitat for others. These effects would be cumulative to past livestock grazing, fire suppression and past timber management actions in the project area. The level of cumulative effects would be less with Alternative 4 with slightly lower stocking rates and with rest being provided for a minimum of four years within the riparian pastures.

**Mesic Mixed Conifer/Riparian Woodland and Shrub Riparian Woodland and Shrub:** The action alternatives would result in cumulative effects to habitat for land birds in the Mesic Mixed Conifer and riparian shrub and woodland habitats. The presence of livestock grazing would continue to suppress hardwood habitat development, and contribute to the cumulative effects under all alternatives. There would be no additional contributions to the cumulative effects related to the various structural stages present in conifer forests. Alternative 4 with slightly less stocking rates, resting riparian pastures for a minimum of four years, earlier season of use, and active management is expected to result in less use of riparian associated hardwoods which would reduce the level of the cumulative effects to hardwood associated habitats. Alternative 2 and 3 would continue the current trend with isolated locations showing improvement in riparian hardwood and shrubs. The trend in overall riparian conditions is expected to remain static or downward with the implementation of alternative 2 and 3. Continued implementation of restoration projects and the implementation of the Spears Vegetation treatment will help to improve these habitats.

**Steppe Shrubland:** There are no Steppe Shrub habitats within the project area. Alternatives 2, 3 and 4 would continue to contribute to the cumulative effects of other activities on the big sagebrush and bitterbrush communities although these effects are expected to be small. Alternatives 2 and 4 would not contribute to the cumulative effects within the East Maury Allotment for the next ten years because this allotment would be rested. The East Maury Allotment has the largest most contiguous sagebrush habitats

within the project area. There could be slightly higher cumulative effects associated with alternatives 2 and 4 for other allotments as a result of expected improvements in livestock distribution and increased upland utilization.

**Forest Plan Standards**

No Forest Plan standards exist pertaining to land birds, including Neotropical migrant species, other than those covered under the Region 6 Sensitive Species List or are management indicator species. See the discussions for those species and their compliance with the Forest Plan. All four alternatives would comply with the Migratory Bird Treaty Act.

**Rocky Mountain Elk and Mule Deer** \_\_\_\_\_

**Affected Environment**

Rocky Mountain elk and mule deer are common large ungulate species in the Project area, as well as throughout the Lookout Mountain Ranger District and Ochoco National Forest. The project area is within the Ochoco Wildlife Management Unit managed by the Oregon Department of Fish and Wildlife (ODFW). Current population levels and the management objectives for deer and elk populations are listed in Table 33.

**Table 33. Management Unit Objectives and Current Populations for Rocky Mountain Elk and Mule Deer in the Ochoco Management Unit, 2004.**

Species	Management Unit Objective	Population (2008)
Rocky Mountain Elk	2,600 elk	4,300 elk
Mule Deer	20,500 deer	15,700 deer

Rocky Mountain elk populations currently exceed the management unit objective by 1,700 animals. The ODFW is currently reviewing big game management plans, and may propose an increase in the elk management objective for the Ochoco unit. The management objective may increase to 4,500 elk for the unit. Elk populations have been as high as 5,200 animals in 2001. Mule deer populations are 4,800 animals below management objectives. Distribution across the management unit and the project area is spotty and dependent upon habitat quality and disturbance factors. The Ochoco National Forest Land and Resource Management Plan (LRMP) contains standards and guidelines for managing habitats for both Rocky Mountain elk and mule deer. These standards and guidelines prescribe acceptable road densities, cover quantity and quality, and also provide for sufficient forage to meet ODFW management objectives for Rocky Mountain elk and mule deer. Since none of the alternatives affect cover quantity or road density, these habitat components will not be further discussed. Forage reservations were also decided in the LRMP to meet the state big game standard. The specific use levels by livestock in order to reserve forage for mule deer and Rocky Mountain Elk are located in the Ochoco National Forest Land and Resource Management Plan, utilization tables have been developed for “Primary Range” (Table 4-30) and “Riparian” (Table 4-31) (Forage and Livestock: Forest-Wide Standards and Guidelines, pp. 4-139 to 4-141). In addition, special seasonal restrictions (for fall green-up) have been directed for individual management areas. See Management Area Standards and Guidelines for detailed information.

**Environmental Consequences**

Alternatives 1, 2 and 4 either meet LRMP forage reservation standards, or exceed standards as in Alternatives 1. Alternative 3 does not meet forage reservation standards based on range utilization monitoring (Range Specialist Report, Tables 6,7). Additionally, current Rocky Mountain elk populations exceed ODFW management objectives and mule deer populations are very near that objective and it is highly likely that forage availability is not limiting population size. Over-winter survival of young mule

deer is very low in this unit and winter habitat on adjacent private lands, hunting effects, and mortality due to predation are probably more important factors determining present mule deer populations.

In the Ochoco National Forest Land and Resource Management Plan, utilization tables have been developed for “Primary Range” (Table 4-30) and “Riparian” (Table 4-31) (Forage and Livestock: Forest-Wide Standards and Guidelines, pp. 4-139 to 4-141). In addition, special seasonal restrictions (for fall green-up) have been directed for individual management areas. See Management Area Standards and Guidelines for detailed information.

## Sensitive Plant Species

This environmental analysis process included the preparation of a botanical biological evaluation (BE). The purpose of this BE is to determine the effects of the alternatives on plant species: (1) listed or proposed for listing by the USDI, US Fish and Wildlife Service (USFWS) as Endangered or Threatened (USFWS 2004, USDA 2008); and (2) designated by the Pacific Northwest Regional Forester as Sensitive (USDA 2004a). This BE is consistent with the requirements of the Endangered Species Act (ESA) of 1973, Forest Service Manual (FSM, USDA 1995a) 2630.3, FSM 2670.22, FSM 2670.32, FSM 2672.4, FSM 2672.41, FSM 2672.42, and R-6 Supplement 2600-95-3 (6/29/95) and the Ochoco National Forest Land and Resource Management Plan (USDA 1989). The intent of these requirements is to ensure that management activities will not likely jeopardize the continued existence of proposed, endangered, or threatened species, or adversely modify critical habitat, and for sensitive species, determine if the alternatives would result in a trend toward Federal listing.

This section primarily discusses the more immediate, short-term (<10 years) effects of the proposed action and alternatives. Long-term (>10 years) effects are included where trends and other information is available and discussion is not speculative.

### **Affected Environment**

The most common upland plant associations include ponderosa pine (*Pinus ponderosa* Dougl.)/ pinegrass (*Calamagrostis rubescens* Buckl.), Douglas-fir (*Pseudotsuga menziesii* (Mirbel) Franco)/pinegrass, and grand fir (*Abies grandis* (Dougl. ex D. Don) Lindl.)/pinegrass, with upland non-forest communities comprised primarily of western juniper (*Juniperus occidentalis* Hook.). Riparian vegetation includes a variety of sedges (*Carex spp.* L.), rushes (*Juncus spp.* L.), along with native and introduced grasses such as hairgrass (*Deschampsia* Beauv.) and reedtop (*Agrostis alba* L. var. *stolonifera* (L.) Sm.). Riparian shrubs most commonly include willow (*Salix spp.* L.) and alder (*Alnus incana* (L.) Moench) (Franklin and Dyrness 1988, Johnson and Clausnitzer 1991, USDA 2001).

The current vegetation is the result of natural processes occurring over the last few thousand years, including such influences as the ice age and volcanic eruptions. However, the vegetation has also been influenced by human activities and associated changes within the last one hundred and fifty years. Most notable changes include:

- Altered hydrology due to road construction, logging, livestock grazing, loss of beaver, fire exclusion, and other influences that resulted in eroded stream channels and reduced area of meadow and riparian habitat due to lower water tables on sites formerly dominated by willow, alder, and other deciduous vegetation (USDA Forest Service, 1998a, 2004c);
- Increased density of fire-intolerant conifers and reduced density of understory vegetation (grasses and shrubs) due to fire exclusion and grazing (Miller and Rose 1999, USDA Forest Service 1998a, 1999, 2004c, Arno 2000, Agee 1993);
- Altered species composition resulting from the introduction of non-native plants, including both introduced perennial grasses and noxious weeds (USDA Forest Service, 1998a, 2004c).

Conditions in the analysis area generally reflect that described in the Interior Columbia Basin Draft Supplemental Environmental Impact Statement (USDA/USDI 1997, 2000). As a result of human influences, conditions include decline in species diversity and biomass of available forage, increased threats from non-native noxious weeds, and decline in overall landscape health.

### **Pre-field Review**

The pre-field review consisted of checking existing records for documented occurrences, determining probability of additional occurrences for any proposed, endangered, threatened, or sensitive species, and if additional surveys are needed. The pre-field review incorporated the following:

- USFWS list of Proposed, Endangered and Threatened Plant Species (USFWS 2004, USDA 2008);
- Regional Forester's (R-6) Sensitive Plant Species List (USDA Forest Service 2004a);
- Oregon Natural Heritage Information Center (formerly Oregon Natural Heritage Program) Rare, Threatened and Endangered Species List (ONHP 2001, ORNHIC 2004, 2007);
- Plant surveys for Marks Cr., Claypool and other projects for which surveys were conducted in the early 1990's for species on the R-6 Sensitive Species List. Additional field review was completed in 2004 and 2005 for this and other projects in the analysis area (USDA 1990-2005).
- Other literature and information (Hall 1973, Hitchcock and Cronquist 1973, Hopkins and Garrett 1990, Meineke 1995, Brounstein 1996, Ianni et al 1996, Croft et al 1997, BLM 1999, Halvorson 2000, and Helliwell, personal communication, Yates, personal communication, Wooley 2002, USDA Forest Service 2002, Dollhausen, personal communication, Dewey 2007, 2008, Wood, personal communication).

No USFWS proposed, endangered or threatened plant species are known or expected to occur on the Ochoco National Forest. Critical habitat is not present (USFWS 2004). Therefore, for all alternatives, no effect to proposed, endangered, or threatened plant species, or critical habitat, is expected. These species will not be discussed further.

Of the 28 sensitive plant species documented or suspected on the Ochoco National Forest and the Crooked River National Grassland, 13 have been documented in or near the analysis area, or have potential habitat that has not been surveyed. Resources used to identify potential sensitive plant habitat were aerial photographs, vegetation maps, as well as personal knowledge of the analysis area.

These species, information about their habitat, and populations in or near the analysis area are discussed in the next section of this report.

Table 34 summarizes information for the R-6 sensitive plant species documented or suspected to occur on the Ochoco National Forest with potential habitat in the project area.

**Table 34. Summary of sensitive plants with potential habitat in the Burn and Crystal Springs Allotments.**

Species	Habitat	Probability of Occurrence
<i>Achnatherum hendersonii</i> (Vasey) Bark. Henderson's needlegrass	Sagebrush scablands	MODERATE
<i>Achnatherum wallowaensis</i> Maze & K.A. Robson Wallowa needlegrass	Sagebrush scablands	MODERATE
<i>Botrychium ascendens</i> W.H. Wagner ascending moonwort	Wet meadows, springs, seeps	MODERATE
<i>Botrychium crenulatum</i> W.H. Wagner Crenulate moonwort	Wet meadows, springs, seeps	MODERATE
<i>Botrychium minganense</i> Vict. Mingan's moonwort	Wet meadows, springs, seeps	MODERATE
<i>Botrychium montanum</i> W.H. Wagner Mountain moonwort	Wet meadows, springs, seeps	MODERATE
<i>Botrychium paradoxum</i> W.H. Wagner twin-spike moonwort	Wet meadows, springs, seeps	MODERATE
<i>Botrychium pinnatum</i> St. John pinnate moonwort	Wet meadows, springs, seeps	MODERATE
<i>Calochortus longebarbatus</i> Wats. var. <i>peckii</i> Ownbey Peck's mariposa lily	Vernally moist mdws,streambanks	DOCUMENTED
<i>Carex hystericina</i> Muhl. ex Willd. Porcupine sedge	Riparian	LOW
<i>Carex interior</i> Bailey interior sedge	Wet mdws, spgs seeps, streams	MODERATE
<i>Dermatocarpon luridum</i> (With.) Laundon ( <i>Dermatocarpon meiophyllizum</i> Vain.) silverskin lichen	Rocks inundated at least most of the year	MODERATE
<i>Scouleria marginata</i> Britt. Margined streamside moss	Emergent/seasonally submerged rocks	LOW

The pre-field review determined that for the other 15 sensitive species documented or suspected on the Ochoco NF and Crooked River National Grassland, no potential habitat occurs in the analysis area (Table 35). The rationale for determination of no habitat is that these species are: 1) associated with low elevation, sagebrush habitats outside the “forest zone” and more closely associated with the Crooked River National Grassland; 2) the particular plant community type associated with the species is not present; or 3) their documented species range is outside of the analysis area. Because habitat is not present, all alternatives are expected to result in no impact to these species, and they will not be discussed further.



**Table 35. Summary of sensitive plants with NO potential habitat in the Burn and Crystal Springs Allotments.**

Species	Habitat	Rationale
<i>Artemisia ludoviciana</i> Nutt. ssp. <i>estesii</i> Chambers Estes wormwood	Riparian – River floodplains	No Habitat
<i>Astragalus diaphanus</i> Doug. var. <i>diurnus</i> (S. Wats.) Barneby ex. S. Fork John Day milkvetch	Sagebrush scablands	Outside Doc. range
<i>Astragalus peckii</i> Piper Peck's milkvetch	Sandy and pumice soils	Outside Doc. range
<i>Astragalus tegetarioides</i> M.E. Jones Deschutes milkvetch	Sage steppe/ponderosa pine forest	Outside Doc. range
<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i> S. Wats. long-bearded mariposa lily	Ephemeral wet meadows and streambanks	Outside Doc. range
<i>Camissonia pygmaea</i> (Dougl. ex Lehm) Raven dwarf suncup	Low elevation drainages	No Habitat
<i>Carex backii</i> Boott ( <i>Carex cordillerana</i> (Saarela and B.A. Ford) Back's sedge (Cordilleran sedge)	Wet mdws, riparian, moist conifer forest	Outside Doc. Range
<i>Carex stenophylla</i> auct. non Wahl. ( <i>C. eleocharis</i> L.H. Bailey) Narrow-leaved sedge	Open, dry to moist grassy plains	Outside Doc. Range*
<i>Cypripedium parviflorum</i> Salisb. yellow lady's-slipper orchid	Moist forest/riparian	Outside Doc. Range*
<i>Lomatium ochocense</i> Helliwell & Constance sp. Nov. Ochoco lomatium	Sagebrush scablands	Outside Doc. range
<i>Mimulus evanescens</i> Meinke disappearing monkeyflower	Ephemeral streambanks	No Habitat
<i>Penstemon peckii</i> Pennell Peck's penstemon	Stream banks Disturbed areas	Outside Doc. range
<i>Rorippa columbiae</i> Suksdorf Columbia cress	Wet meadows, moist plains, streams	No Habitat
<i>Thelypodium eucosmum</i> B.L. Robins. arrow-leaf thelypody	Dry slopes in vernal drainages	Outside Doc. range
<i>Thelypodium howellii</i> S. Wats Howell's thelypody	River valleys and moist plains	Outside Doc. range

\*Now considered extinct in Oregon (ORNHIC 2007)

## Field Review and Surveys

The earliest, most complete sensitive plant surveys in the Burn and Crystal Springs Project Area were conducted by Ochoco NF and contracted botanists and trained assistants in the early 1990s. Most of these surveys were completed using an intuitive control survey method and in areas with highest potential for *Calochortus longebarbatus* var. *peckii* and *Oryzopsis hendersonii* Vasey. *O. hendersonii* has since been split taxonomically into the two sensitive *Achnatherum* species (Maze and Robson, 1996). Undocumented re-visits of some *C. longebarbatus* var. *peckii* sites were completed in 2006 and 2007. Surveys records can be found at the Lookout Mt. District Office.

Earlier and recent surveys did not target all sensitive plant habitats. Though there is potential for the six *Botrychium* spp., *Carex hystericina* and *Carex interior*, the particular riparian habitat (sedge and forb communities) associated with these species is generally avoided in vegetation management proposals that initiated the first surveys. “Scabland” habitat associated with *Achnatherum hendersonii* and *A. wallowaensis* is also generally avoided during ground-disturbing activities. Because these habitats are

normally avoided, surveys of all potential habitats have not been completed. However, personal knowledge of the analysis area is sufficient to make effects determinations for this project.

## Species Information and Effects

The 13 sensitive plant species known to occur or have potential habitat within the analysis area are grouped where they occupy similar habitats. Effects are determined for each of three habitat groups. The groups and species include the following:

### Riparian species

*Calochortus longebarbatus* var. *peckii*  
*Botrychium ascendens*  
*Botrychium crenulatum*  
*Botrychium minganense*  
*Botrychium montanum*  
*Botrychium paradoxum*  
*Botrychium pinnatum*  
*Carex hystericina*  
*Carex interior*  
*Dermatocarpon luridum*  
*Scouleria marginata*

### Scabland species

*Achnatherum hendersonii*  
*Achnatherum wallowaensis*

### **Species Information - Species Associated with Riparian Habitats (including wet meadows, seeps, springs, and aquatic habitats)**

PECK'S MARIPOSA LILY (*Calochortus longebarbatus* Wats. var. *peckii* Ownbey)

*Calochortus longebarbatus* var. *peckii* is a local endemic, known only from the Ochoco Mountains of Central and Eastern Oregon. Most populations occur along drainages associated with Big Summit Prairie and Little Summit Prairie, with other populations recorded on McKay Cr., Marks Cr., and the drainages of the Maury Mountains and Snow Mountain. It is currently on the Oregon Natural Heritage Information Center (ORNHIC 2007) List 1, meaning this species is considered by the ORNHIC to be threatened with extinction throughout its range.

*Calochortus longebarbatus* var. *peckii* occurs in vernal moist areas, low gradient draws and streambeds, especially intermittent drainages, and along meadow margins. Habitat for this species can be described as "transitional riparian" as this species occupies the edge of riparian habitat. The Draft Species Management Guide for *Calochortus longebarbatus* Wats. var. *peckii* Ownbey (Kagan 1996) indicates this species may benefit from changes to riparian habitat that result in increased amounts of transitional habitat. It also indicates that in some areas of the Ochoco NF, habitat for this species has also been eliminated due to human influences. Road construction, grazing, timber harvest, and other impacts have resulted in hydrological changes, especially stream downcutting, that has lowered water tables and resulted in loss of riparian and transitional habitat along portions of stream and meadow systems in the Burn and Crystal Springs Project Area (USDA Forest Service 1998a, 2004c).

This plant is a sterile triploid, reproducing asexually through the production of bulblets in the axil of its single leaf or flower bracts. Bulblet dispersal mechanisms are unclear, though rodents are suspected. Rodents also appear to be significant consumers of bulbs. Bulblets appear to survive only in areas with open, bare soil. Bulbs are embedded a few inches deep in the soil, and above ground structures are absent in drier years. It appears that winter and spring moisture levels determine the level of flowering within

the population, with spring moisture the more critical. Even in wet years, only a portion of the population may flower. Therefore, completing accurate counts of plants in a population is difficult (Fredericks 1989, Kagan 1996).

Within the analysis area, populations are primarily in the central and eastern portion, along meadows and drainages in the lower elevations. Approximately 3 “populations,” defined by drainage boundaries, have been documented, ranging from a few to nearly three hundred flowering individuals. Given the fluctuations in numbers of flowering individuals from year to year, actual populations are likely to be larger than the number of flowering individuals (Fredericks 1989, Kagan 1996). Compared with other portions of the Ochoco NF, the Burn and Crystal Springs Project Area contains a moderate amount of habitat and populations.

On the National Forest portion of the analysis area, the majority of potential *Calochortus longebarbatus* var. *peckii* habitat has been surveyed. No new major populations are expected to occur. Populations (named by drainage) and their relationship to pastures are listed in Table 36.

**Table 36. Distribution of *Calochortus longebarbatus* var. *peckii* (CALOP) in the Burn and Crystal Springs Allotment areas.**

Allotment	Pasture	CALOP present (population name)
Burn	Howard	None documented
	Homestead	None documented
	Wheatgrass	None documented
	Marks Cr.	None documented
	Hohn Spring	None documented
Crystal Springs	Coyle Cr.	Coyle Cr. (Downs Spring)
	Middle	Coyle Cr. and Mud Springs
	Crystal Springs	Grant Meadows

Monitoring indicates where livestock have been fenced out of *Calochortus longebarbatus* var. *peckii* habitat, densities of this species appear to be decreasing due to buildup of biomass from grasses and other vegetation (Halvorson, personal communication).

Informal monitoring (Lesko, personal observation) also indicates populations of this species presently appear stable, though some populations, such as Mud Springs, occur in proximity to active stream downcutting, indicating risk of habitat loss.

The human-induced factors described above (hydrological changes, fire exclusion, and introduction of invasive plants) over the last 150 years have likely contributed to loss of *Calochortus longebarbatus* var. *peckii* habitat and corresponding reductions in populations. Among these, the primary factor for decline in habitat associated with this species appears to be hydrological changes (lower water tables due to stream downcutting) that have reduced meadow and riparian habitat.

Besides indirectly contributing to the factors that result in hydrological changes by causing soil compaction and damaging streambanks and riparian vegetation, livestock grazing within *Calochortus longebarbatus* var. *peckii* populations can also directly kill or damage plants because livestock often concentrate in riparian areas, including *C. longebarbatus* var. *peckii* habitat. Repeated grazing of the basal leaf can shorten the life of the plant by limiting the amount of photosynthate available for reproduction by bulb renewal (Fiedler 1987). Soil disturbance (trampling) by livestock can adversely affect individual plants because of their shallow root system. Grazing later in the season, such as after July 15th, when plants generally become dormant, can reduce these impacts (Kagan 1996). Other measures, such as water developments that result in a more even distribution of livestock use, can also reduce impacts.

Livestock can also increase risk for introduction and spread of non-native invasive plants (noxious weeds) that could displace *Calochortus longebarbatus* var. *peckii*. Non-native invasive plants can increase due to selection by livestock. Spiny broadleaf species, such as Canada thistle (*Cirsium arvense* (L.) Scop.), tend to be avoided by livestock. This can favor a rapid shift in the dominant species within these communities (Callihan and Evans 1991).

Although invasive plant infestations are often associated with soil disturbance caused by human activities, livestock trampling can also result in exposed soils that can increase potential for invasion by invasive plants (Lacey et al 1990).

Livestock can also serve as a vector for introduction and spread noxious weeds over a wide range when seeds become attached to hair or when they remain intact after passing through the digestive system (DeClerk 1997, DiTomaso 1997, Miller et al 1998, Zimmerman et al 2002).

Informal monitoring (Lesko, personal observation) indicates non-native invasive plants, notably teasel (*Dipsacus* L.) and Canada thistle, are expanding in this and in other areas of the Ochoco National Forest, and have begun to dominate some areas of suitable habitat for this sensitive species, including one historic *Calochortus longebarbatus* var. *peckii* sub-population (in the Marks Cr. watershed) that has not been re-located. It appears teasel invasion into *C. longebarbatus* var. *peckii* habitat has resulted in extirpation of this sub-population (Helliwell 1993). Canada thistle is much more widespread in the analysis area. Overall, it presently occupies relatively very little *C. longebarbatus* var. *peckii* habitat, but appears to be expanding in both upland and riparian sites. These non-native invasive plants do not appear to pose an immediate threat, but could pose a long-term (>10 years) threat to the viability of this sensitive species. Additional discussion of noxious weeds is included later in this report.

Other non-native plants may have contributed to a decline in *Calochortus longebarbatus* var. *peckii*. Sensitive plant site records indicate non-native grasses such as timothy (*Phleum pratense* L.) and Kentucky bluegrass (*Poa pratensis* L.) are common in riparian and other moist habitats, including *C. longebarbatus* var. *peckii* sites. Though some decline of *C. longebarbatus* var. *peckii* may be attributed to these non-native grasses, they have been present for several decades, and currently do not appear to threaten viability of *C. longebarbatus* var. *peckii*.

Construction of livestock improvements, such as spring developments, can also damage plants or habitat. Fencing can result in livestock “trailing” along fence lines, potentially impacting plants or habitat by trampling plants and compacting soil (Fredericks 1989, Kagan 1996, Halvorson, personal communication).

Fire exclusion has also resulted in habitat loss due to conifer expansion and biomass buildup, changing the plant community and resulting in “shrinking meadows.” Road construction across meadow habitats has contributed to fragmentation of populations and reduced ability of plants (bulblets) to migrate and colonize available habitats.

Some authorities indicate there is a risk of losing viability (extinction) in rare plants with characteristics similar to *Calochortus longebarbatus* var. *peckii*. This plant has relatively low genetic variability and limited ability to expand into suitable habitat. These factors indicate relatively high risk of losing viability (Fredericks 1989, Kagan 1996, Peck 1998). However, other authorities indicate species that reproduce asexually are also considered more tolerant of small population sizes (Barrett and Kohn 1991, Menges 1991). With at least one *C. longebarbatus* var. *peckii* population (outside the Burn and Crystal Springs Analysis Area) able to produce bulbs from a different part of the plant (Kagan 1996), this species apparently exhibits some genetic diversity that may be important in maintaining viability. Given the inconclusive studies of *C. longebarbatus* var. *peckii* genetics (Ferrari 1996), maintaining whatever genetic variability exists among Burn and Crystal Springs area populations may be important in maintaining viability. Because of the generally small population sizes, estimated to range from a few to a few hundred individuals, Helliwell (1992) suggested that with the exception of Grant Meadows, populations of *C.*

*longebarbatus* var. *peckii* within the Marks Cr. watershed may be at risk of extirpation. Loss of any populations could result in a loss of genetic diversity that is important for continued viability. This may be especially relevant to *C. longebarbatus* var. *peckii*, as the total worldwide population is limited to the Ochoco Mountains. Therefore, this biological evaluation presumes that maintaining all populations listed above is necessary to ensure continued viability and avoid a possible trend towards listing.

Because of past losses and continuing threat of lost habitat, the condition and stability of riparian vegetation and watershed stability indicates the degree of risk. The key to maintaining viability of *Calochortus longebarbatus* var. *peckii* is in maintaining or improving existing riparian habitat. Therefore, anticipated effects to this plant, and other species associated with riparian habitats, will be tied to the anticipated effects to riparian vegetation.

Because of the lack of statistically supported information on population trends of *Calochortus longebarbatus* var. *peckii* and how it is affected by management activities such as grazing, information gathered on a close relative, *Calochortus longebarbatus* var. *longebarbatus*, is also included in this report. This variety of *C. longebarbatus* occupies similar habitats, and appears to share the same threats (Kaye and Rittenhouse 1990, 1994, Croft et al 1997). Information gathered from studies and observations of *C. longebarbatus* var. *longebarbatus* in southern Oregon and Northern California will also be used in the description of anticipated effects to *C. longebarbatus* var. *peckii*. Also included is information on other rare *Calochortus*, especially regarding their response to grazing.

Though the Draft Species Management Guide for *Calochortus longebarbatus* Wats. var. *peckii* Ownbey (Kagan 1996) is currently the most complete guide for management, it has not been formally adopted. In addition, an updated, draft conservation strategy (Dewey 2007) is under review by the Pacific Northwest Regional Office. With no formal, adopted direction on management of this species in place, focus for management nonetheless appears to be on maintaining and improving riparian habitat. Completion of the conservation strategy is expected in 2008.

#### MOONWORT or GRAPE FERN (*Botrychium* spp.)

Several species of *Botrychium* are on the Regional Forester's Sensitive Species List (USDA Forest Service 2004a). They have been documented in most of the western states and Canada. The six species of sensitive *Botrychium* known to occur on the Ochoco NF occupy similar riparian habitats, and are discussed here as one group. This group includes ascending moonwort (*Botrychium ascendens*), crenulate moonwort (*B. crenulatum*), Mingan's moonwort (*B. minganense*), mountain moonwort (*B. montanum*), twin-spike moonwort (*B. paradoxum*), and pinnate moonwort (*B. pinnatum*). *B. ascendens*, *B. crenulatum*, and *B. paradoxum* are on the ORNHIC (2007) List 1. *B. montanum*, is on the ORNHIC List 2, meaning this species is considered by the ORNHIC to be threatened with extirpation from the State of Oregon. *B. minganense* and *B. pinnatum* have recently been determined to be less at risk, and are currently on ORNHIC List 4, meaning these species are of conservation concern but are not currently listed (by the State of Oregon) as threatened or endangered. Because they have been determined to be more common than originally believed, proposed changes would remove *B. minganense* and *B. pinnatum* from the Regional Forester's Sensitive Species List (USDA 2007). *Botrychium* spp. are considered rare and local species, meaning the few, known populations are usually small.

These are small, primitive plants closely related to ferns. They reproduce by spores, and are associated with mycorrhizal fungi. Habitat for the six *Botrychium* spp. is primarily moist ground sedge/forb communities associated with seeps, drainages, and the edges of wet meadows at relatively high elevations, generally over 5,000 feet. *Botrychium* sites also are more commonly found within or adjacent to coniferous forest, especially grand fir (*Abies grandis*) communities. In the Burn and Crystal Springs Analysis Area, grand fir communities are less common than ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menzeisii*) communities. Though several surveys have been completed, none of these species have been documented in the analysis area. However, these small plants are easily overlooked, except in very intensive surveys.

Known sites occupied by populations of *Botrychium spp.* in other portions of the Ochoco NF are partially shaded to fully open at the edges of clearcuts. However, more individuals have been found at intact sites versus altered sites. At least one population is in a natural wet meadow. Habitat and populations appear to be stable (Ianni et al 1996, Lesko, personal observation).

Though habitat for these species is moist areas that can attract livestock, primary habitat occurs at higher elevations, and often in relatively higher density mixed conifer forest stands that tend to produce less forage and therefore normally receive less use by livestock.

It has been suggested that *Botrychium spp.* are dependent on some level of disturbance, and the ensuing lack of competition from other plant species for reproduction. However, this disturbance has often observed to be natural, such as flooding or other natural processes that occasionally create small openings for spores to become established. Though grazing animals may disperse *Botrychium* spores, the impact of grazing on populations is not well understood. It has not been demonstrated that deciduous species of *Botrychium* can withstand repeated defoliation by grazing, though it is suggested that the relationship these plants have with endophytic (living inside the plant) fungi may offer an additional carbohydrate source (Zika 1992, 1994). Livestock grazing could directly impact plants by removing or damaging plants by livestock consumption, damage or kill plants from trampling, or indirectly affect plants by contributing to changes in the local hydrology (stream downcutting) that can damage habitat. At present, few areas of habitat appear to be at risk from non-native invasive plants.

The Ochoco NF has a draft management guide for *Botrychium ascendens*, *B. crenulatum*, *B. paradoxum*, & *B. pedunculatum* (Zika 1994) that provides some guidance, along with another draft management guide for *Botrychium* on the Mt. Hood NF (Zika 1992). Both suggest protecting habitat by maintaining buffers adjacent to timber harvest, etc.

PORCUPINE SEDGE (*Carex hystericina* Muhl. ex Willd.) and INTERIOR SEDGE (*Carex interior* Bailey)

These species have been documented across Canada and the northern and western United States. They are associated with very wet riparian habitats, usually in association with perennial water.

*Carex hystericina* is on the ORNHIC (2007) List 4. On the Ochoco NF, *C. hystericina* has been found only along Black Canyon Creek and other creeks on the Paulina Ranger District. It also occurs in the Bridge Cr. watershed on public lands administered by the Bureau of Land Management. Though surveys of potential habitat have been completed, this species has not been documented in the analysis area. It also appears to be more often associated with non-forested lower elevations. Therefore, it is likely this species does not occur in the analysis area.

*Carex interior* has recently determined to be at less risk. It was previously on the ORNHIC (2004) List 4. Now, apparently due to recent information that has determined it is more abundant than previously thought, it is no longer included in the listing of rare, threatened, or endangered species of Oregon (ORNHIC 2007). *C. interior* has been documented on the Ochoco NF, but not in the Burn and Crystal Springs Analysis Area. Because of the revised status, proposed changes to the Regional Forester's Sensitive Plant List remove *C. interior* from the Regional Forester's Sensitive Species List (USDA 2007).

Both species appear to be tolerant of moderate grazing disturbance (Lesko, personal observation). In Oregon, habitat for these species appears stable (Helliwell, personal communication, Yates, personal communication, Halvorson, personal communication).

The Ochoco NF has no management guides for these species.

SILVERSKIN LICHEN (*Dermatocarpon luridum* (With.) Laundon) and MARGINED STREAMSIDE MOSS (*Scouleria marginata* Britt.)

The lichen *Dermatocarpon luridum* has been documented in a variety of aquatic habitats in Washington, Oregon, and California. It is on ORNHIC (2007) List 3, meaning that more information is needed before

status can be determined, but which may be threatened or endangered in Oregon or throughout its range. It has been found on rocks or bedrock in streams, rivers, or seeps that are usually submerged or inundated for most of the year. Surveys have occurred on other portions of the Ochoco NF, and this species was documented. However, the species formerly identified as *D. luridum* in N. America has been identified as *D. meiophyllizum* Vain. The taxonomy is expected to be clarified prior to the next update to the R6 Sensitive Species List.

Because this species occupies a variety of aquatic habitats, and perennial streams occur in the watershed, habitat is presumed present. The Ochoco NF has no management guide for *Dermatocarpon luridum*. Habitat does not appear to be threatened by invasive species. Livestock use that results in physical damage by hooves could impact this species, but maintaining habitat for this species appears to be more related to maintaining water quality. This species was recently found to tolerate a wider range of water quality conditions than was believed earlier (Dewey 2008).

The moss species *Scouleria marginata* is endemic to the Pacific Northwest, found in southern British Columbia, Washington, Idaho, western Oregon, and northern California. It is on ORNHIC List 3. A conservation assessment for *Scouleria marginata* was completed for the Forest Service Pacific Northwest Region and BLM Oregon/Washington (Harpel 2005). The assessment identifies habitat as bedrock material or very large boulders along the margins of perennial river systems. It often forms dark mats on exposed to shaded rocks in streams; seasonally submerged or emergent. Surveys have occurred on portions of the Ochoco NF, and this species was not found (Dewey 2008). However, because perennial streams occur in the analysis area, habitat is presumed present. Habitat does not appear to be threatened by invasive species. Livestock use that results in physical damage by hooves could impact this species.

The conservation assessments identifies the biggest threats as direct damage to plants by in-stream activities such as adding large wood, with indirect threats including changes in water quality or stream flows. Maintaining habitat for this species appears to be related to maintaining water quality. Alternatives that maintain, enhance, or degrade water quality are expected to have similar effects to habitat for this species (Harpel 2005, Dewey, personal communication).

### Environmental Consequences

Environmental consequences to sensitive plants considered in this environmental assessment are summarized by alternative in Table 37.

**Table 37. Expected Direct, Indirect, and Cumulative Effects of Alternatives to Sensitive Plant Populations and Habitat – Burn and Crystal Springs Grazing EA**

Species	Alt 1	Alt 2	Alt 3	Alt 4
<i>Achnatherum hendersonii</i>	NI	MIIH	MIIH	MIIH
<i>Achnatherum wallowaensis</i>	NI	MIIH	MIIH	MIIH
<i>Artemisia ludoviciana</i> ssp. <i>estesii</i>	NI	NI	NI	NI
<i>Astragalus diaphanus</i> var. <i>diurnus</i>	NI	NI	NI	NI
<i>Astragalus peckii</i>	NI	NI	NI	NI
<i>Astragalus tegetarioides</i>	NI	NI	NI	NI
<i>Botrychium ascendens</i>	NI	MIIH	MIIH	MIIH
<i>Botrychium crenulatum</i>	NI	MIIH	MIIH	MIIH
<i>Botrychium minganense</i>	NI	MIIH	MIIH	MIIH
<i>Botrychium montanum</i>	NI	MIIH	MIIH	MIIH
<i>Botrychium paradoxum</i>	NI	MIIH	MIIH	MIIH
<i>Botrychium pinnatum</i>	NI	MIIH	MIIH	MIIH
<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i>	NI	NI	NI	NI
<i>Calochortus longebarbatus</i> var. <i>peckii</i>	NI	MIIH	MIIH	MIIH
<i>Camissonia pygmaea</i>	NI	NI	NI	NI
<i>Carex backii</i>	NI	NI	NI	NI
<i>Carex hystericina</i>	NI	MIIH	MIIH	MIIH

Species	Alt 1	Alt 2	Alt 3	Alt 4
<i>Carex interior</i>	NI	MIIH	MIIH	MIIH
<i>Carex stenophylla (C. eleocharis)</i>	NI	NI	NI	NI
<i>Cypripedium parviflorum</i>	NI	NI	NI	NI
<i>Lomatium ochocense</i>	NI	NI	NI	NI
<i>Mimulus evanescens</i>	NI	NI	NI	NI
<i>Penstemon peckii</i>	NI	NI	NI	NI
<i>Rorippa columbiana</i>	NI	NI	NI	NI
<i>Thelypodium eucosmum</i>	NI	NI	NI	NI
<i>Thelypodium howellii</i>	NI	NI	NI	NI
<i>Dermatocarpon luridum</i>	NI	MIIH	MIIH	MIIH
<i>Scouleria marginata</i>	NI	MIIH	MIIH	MIIH

NI = No Impact

MIIH = May Impact Individuals or Habitat but would not contribute to a trend towards Fed. listing

WIFV\* = Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species

BI = Beneficial Impact

\*Trigger for a Significant Action as defined in NEPA

**Direct and Indirect Effects - Species Associated with Riparian Habitats - *Calochortus longebarbatus* var. *peckii*, *Botrychium* spp., *Carex hystericina*, *Carex interior*, *Dermatocarpon luridum*, and *Scouleria marginata***

Riparian habitat conditions vary over the analysis area. While some are presently considered stable, others are in an improving trend and some are considered unstable (USDA Forest Service 1998a, 2004c).

In addition, because of the tendency of livestock to gather in riparian meadow systems that are commonly associated with *Calochortus longebarbatus* var. *peckii*, and habitat is influenced strongly by livestock use, this plant is the principal sensitive plant discussed in analysis of effects.

A range of conclusions among authorities exists as to whether livestock grazing effects on *Calochortus longebarbatus* var. *peckii* is detrimental or beneficial to this species, and is discussed in the description of effects for alternatives. However, among the sensitive plant species, *C. longebarbatus* var. *peckii* has had the most noticeable losses of habitat. The critical factor in maintaining viability appears to be in maintaining habitat. Livestock management and other factors that maintain or improve riparian habitat are expected to maintain viability of *C. longebarbatus* var. *peckii*, as well as the other sensitive plant species associated with riparian areas.

**Alternative 1**

This alternative includes no grazing, range improvements, or other activities that could directly or indirectly affect riparian habitat associated with *Calochortus longebarbatus* var. *peckii*, *Botrychium* spp., *Carex hystericina*, *Carex interior*, *Dermatocarpon luridum*, and *Scouleria marginata*. Habitat and populations would be maintained, and may increase as some riparian systems would be expected to gradually recover in the long term (>10 years). However, some riparian systems would still be at risk of change, especially due to stream downcutting that results in reductions of riparian habitat and could reduce water quality. Though livestock influences would be absent, other influences, such as roads, would still be present and contribute to continued risk. However, risk would gradually decline over time as vegetation recovers and streambank stability increases.

Though monitoring by the Bureau of Land Management indicates *Calochortus longebarbatus* var. *peckii* appears to be declining where livestock have been excluded from grazing, riparian habitat associated with this species is expected to gradually expand, as the perimeter of transitional riparian habitat associated with this species would increase. Therefore, expanding habitat and populations of *C. longebarbatus* var. *peckii*, at least in the short term (<10 years), is expected to offset any decline due to lack of grazing disturbance. In addition, prescribed burning associated with the ongoing prescribed burning program are



expected and would help maintain, and possibly expand, *C. longebarbatus* var. *peckii* habitat in both the short and long term, especially where conifers are expanding into meadow habitats. Additional discussion of burning and other anticipated activities is discussed in the cumulative effects section of this report.

Non-native invasive plants (noxious weeds) would continue to threaten riparian systems by directly displacing native vegetation, including sensitive plant species. Weeds can also indirectly threaten riparian systems, and sensitive plants associated with these habitats, by increasing risk of erosion, as these non-native plants commonly provide little root-binding strength to soils (Sheley et al 1999c). This could alter habitat for sensitive plants, especially those associated with riparian areas.

Non-native invasive plants (noxious weeds) would also continue to influence riparian habitat by directly displacing native vegetation, including sensitive plant species. Weeds would also continue to indirectly threaten riparian habitats and water quality, and therefore, sensitive plants associated with these habitats, by increasing risk of erosion, as these non-native plants commonly provide little root-binding strength to soils (Sheley et al 1999c). This could alter habitat for sensitive plants, including those associated with riparian areas.

There would be no exposed soils would due to absence of livestock trampling. Therefore, risk for introduction and spread of noxious weeds that could displace sensitive plants and indirectly alter habitat, would be minimized. Absence of livestock as a vector of weeds would also result in decreased weed risk. Other vectors, such as vehicles and wildlife would still be present, so new introductions are still likely. Existing untreated infestations are expected to spread. However, non-native invasive plants presently occupy a relatively small portion of riparian habitats, and are not expected to pose a short-term threat (<10 years) to the viability of sensitive plants associated with this habitat. They may pose a long-term threat (>10 years), but due to variables that are hard to predict, long-term assessment of weed effects on sensitive plants would be speculative. Further discussion of weeds, including long-term effects, is discussed in cumulative effects and in the non-native invasive plants (noxious weeds) sections of this report.

With cessation of livestock grazing, accumulations of grasses and other plants would increase, potentially increasing wildfire risk that could affect sensitive plants. Because these sites are moist, wildfire is not expected to reach an intensity level that could threaten viability of these plants or damage habitat. Wildfire could indirectly affect sensitive plants associated with riparian habitats by removing vegetation, thereby reducing the buffering capacity during runoff events. This could result in erosion and downcutting that may damage stream systems and reduce riparian habitat. Though fuels would increase with no grazing, there would be no measurable change to wildfire risk. Forest conditions on this portion of the Ochoco NF are such that fuels typically carrying wildfire are natural accumulations of forest biomass (trees and natural forest ground litter) rather than ground vegetation that would be reduced through grazing (Scholz 2006). Therefore, there would be no measurable difference between the alternatives in indirect risk to riparian habitats from wildfire. Additional discussion of wildfire is discussed in cumulative effects.

The anticipated effect, compared with other alternatives, is the highest rate of recovery for riparian vegetation among the alternatives. Habitats associated with these species are expected to be stable or gradually improve as vegetation recovers. Though livestock influences would be absent, other influences, such as roads, would still be present and contribute to continued risk. Risk of downcutting and loss of habitat would still be present, but would be less than in other alternatives. However, this risk would decline in the long term as vegetation recovers and streambank stability increases.

Therefore, for *Calochortus longebarbatus* var. *peckii*, the six *Botrychium* spp., *Carex hystericina*, *Carex interior*, *Dermatocarpon luridum*, and *Scouleria marginata*, **no impact** to the viability or habitat of these species is expected.

See the cumulative effects section for additional discussion.

## Alternative 2

This alternative would result in grazing of areas occupied by or containing habitat for *Calochortus longebarbatus* var. *peckii*, the six *Botrychium* spp., *Carex hystericina*, *Carex interior*, *Dermatocarpon luridum*, and *Scouleria marginata*. Initiating grazing earlier in the year than has historically occurred, before plants are fully developed and soils sufficiently dry, could damage plants or habitat. Proposed range improvements including fencing and water developments, along with other activities such as salting areas for livestock that concentrate livestock, could also impact sensitive plants or habitat.

The intention of this alternative is to improve bank stability and riparian vegetative cover by improving livestock distribution and meet Forest Plan objectives for desired condition (USDA 1989) by allowing recovery of riparian vegetation, while reducing risk to *C. longebarbatus* var. *peckii*. Range improvements would assist in improving distribution of livestock.

A range of conclusions among authorities exists as to whether livestock grazing effects on *Calochortus longebarbatus* var. *peckii* is detrimental or beneficial to this species. Monitoring on lands managed by the BLM indicates *C. longebarbatus* var. *peckii* maintains viable populations in areas with moderate grazing, and excluding livestock from *C. longebarbatus* var. *peckii* habitat appears to result in decreased densities of this species (Halvorson, personal communication). However, risk to *C. longebarbatus* var. *peckii* can be compounded by initiating grazing earlier in the year, when soils are moist and susceptible to damage, and immature plants are more vulnerable to grazing and trampling (Kagan 1996, Halvorson, personal communication).

The close relative, *Calochortus longebarbatus* var. *longebarbatus*, occurs on similar habitats in other areas of the Pacific Northwest. It is also listed as sensitive in Region Six, and appears to share the same threats (Kaye and Rittenhouse 1990, 1994, Croft et al 1997). Studies in northern California indicate that grazed populations of this *Calochortus* exhibited lower densities of plants than ungrazed populations (Kaye and Rittenhouse 1990). Goldenberg (1995), states that livestock may be beneficial to *C. longebarbatus* var. *longebarbatus* by reducing competition, but this effect may not be necessary for continued viability, and soil compaction resulting from livestock can be detrimental by altering soil water flow patterns. Another study of a similar species, *Calochortus greenei* S. Wats. indicates no conclusive evidence of either beneficial or detrimental grazing effects (Menke and Kaye, 2003).

One authority (Fiedler 1986, 1987) states that among rare *Calochortus* species, their responses to environmental (including herbivory and microclimate) influences are often inconsistent. However, one commonality among rare *Calochortus* associated with moist meadow habitat appears to be population declines following damage or loss of habitat.

The critical factor in maintaining viability appears to be in maintaining habitat. Livestock management and other factors that maintains or improves riparian habitat is expected to maintain viability of *Calochortus longebarbatus* var. *peckii*, as well as the other sensitive plant species associated with riparian areas.

Construction of an enclosure at Corral Flat, an area occupied by *Calochortus longebarbatus* var. *peckii* would offer protection from grazing and trampling by livestock during the plant's growing season, when it is most vulnerable. Once every four years, this area would be available for grazing before July 15, when plants and habitat are more vulnerable to damage by livestock. Rest from grazing on 3 of every 4 years is expected to reduce overall risk of livestock damage to plants or habitat, and reduce buildup of vegetation that could otherwise reduce habitat suitability for this plant. This area may also be managed for *C. longebarbatus* var. *peckii* by periodic prescribed burning as discussed under cumulative effects later in this report.

With deferred rotation, improved distribution (compared to current management) due to active management and range improvements, and by grazing the exclosure before July 15 on 1 of every 4 years, the anticipated effect of this alternative is improved riparian habitat and stability over existing livestock management. Deferred rotation and active management may be the more influencing factors to improving habitat for riparian species.

Because livestock use would be earlier in the season than has historically occurred, risk of further damage to riparian systems could be higher than current management (Alternative 3). However, because this alternative also implements daily management, range improvements, and deferred-rotation as compared with current management, earlier use is expected to be offset by these grazing modifications, and riparian habitat would be expected to improve as compared with Alternative 3. Because overall livestock use would be greater, and riparian pastures would not be initially rested, this alternative would be less beneficial to riparian habitat than Alternative 4 and therefore less beneficial to *Calochortus longebarbatus* var. *peckii* and other sensitive plant species associated with riparian habitats.

Though continued risk of further habitat loss would still be present, continued viability of *C. longebarbatus* var. *peckii* and other sensitive riparian species is expected. Anticipated effects are based on the assumption that range utilization standards would be met and would result in an improving trend in riparian conditions.

Some livestock trampling and grazing, plus range improvements, would occur in proximity to sensitive plant populations and habitat. Project design elements for range improvements and salting are expected to not result in direct impacts to sensitive plants or habitat from construction of improvements or increased use of riparian habitats.

Non-native invasive plants (noxious weeds) would also continue to influence riparian habitat by directly displacing native vegetation, including sensitive plant species. Weeds would also continue to indirectly threaten riparian habitats and water quality, and therefore, sensitive plants associated with these habitats, by increasing risk of erosion, as these non-native plants commonly provide little root-binding strength to soils (Sheley et al 1999c). This could alter habitat for sensitive plants, including those associated with riparian areas.

With the same amount of livestock use (measured in AUMs), exposed soils due to livestock trampling would be the same as other action alternatives. Therefore, risk for introduction and spread of noxious weeds that could displace sensitive plants and indirectly alter habitat, would continue at the same level. However, non-native invasive plants presently occupy a relatively small portion of riparian habitats, and are not expected to pose a short-term threat (<10 years) to the viability of sensitive plants associated with this habitat. Long-term effects on sensitive plants would be speculative. Additional discussion of effects from noxious weeds is in the next section of this report.

Compared with other alternatives, there would be no measurable increase or decrease in direct or indirect risk to riparian habitats from wildfire. Though wildfire risk would still be present, these sites are moist, and wildfire is not expected to threaten these plants or habitat. In addition, forest conditions on this portion of the Ochoco NF are such that fuels typically carrying wildfire are such that fuels typically carrying wildfire are natural accumulations of forest biomass (trees and natural forest ground litter) rather than ground vegetation that would be reduced through grazing (Scholz personal communication 2006). Therefore, there would be no measurable difference between the alternatives in risk to riparian habitats from wildfire. Additional discussion of wildfire is included in the cumulative effects section.

Livestock use that results in physical damage by hooves could impact the sensitive moss and lichen species. However, recent observations indicate the lichen *Dermatocarpon luridum* is fairly resilient to the effects of livestock on riparian habitats and water quality than was believed earlier (Dewey 2008). In addition, observations indicate that moss species, such as *Scouleria marginata*, that occupy rocky, steep stream habitats are not usually associated with high livestock use (Lesko, personal observation).

The other sensitive plants associated with riparian habitats such as the sensitive *Botrychium spp.* and *Carex spp.* occupy a wider array of habitats, including springs, seeps, and higher gradient systems that are less likely to be affected by livestock. These species also appear to be maintaining viability with livestock use (Lesko, personal observation). Populations of these species are also more widespread (ORNHIC 2004, 2007), and so losses of species viability are less likely.

Therefore, for *Calochortus longebarbatus* var. *peckii*, the six *Botrychium spp.*, *Carex hystericina*, *Carex interior*, *Dermatocarpon luridum*, and *Scouleria marginata*, implementation of Alternative 2 **may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability.**

See the cumulative effects section for additional discussion.

### Alternative 3

This alternative would result in continued grazing, at present levels and season, of areas occupied by or containing habitat for *Calochortus longebarbatus* var. *peckii*, the six *Botrychium spp.*, *Carex hystericina*, *Carex interior*, *Dermatocarpon luridum*, and *Scouleria marginata*. No new range improvements would occur. Existing range operations, such as use of salting grounds already present, would continue. The pattern of livestock use would not change.

A range of conclusions among authorities exists as to whether livestock grazing effects on *Calochortus longebarbatus* var. *peckii* is detrimental or beneficial to this species. Monitoring on lands managed by the BLM indicates *C. longebarbatus* var. *peckii* maintains viable populations in areas with moderate grazing, and excluding livestock from *C. longebarbatus* var. *peckii* habitat appears to result in decreased densities of this species (Halvorson, personal communication).

The close relative, *Calochortus longebarbatus* var. *longebarbatus*, occurs on similar habitats in other areas of the Pacific Northwest. It is also listed as sensitive in Region Six, and appears to share the same threats (Kaye and Rittenhouse 1990, 1994, Croft et al 1997). Studies of this *Calochortus* in northern California indicate that grazed populations of this *Calochortus* exhibited lower densities of plants than ungrazed populations (Kaye and Rittenhouse 1990). Goldenberg (1995), states that livestock may be beneficial to *C. longebarbatus* var. *longebarbatus* by reducing competition, but this effect may not be necessary for continued viability, and soil compaction resulting from livestock can be detrimental by altering soil water flow patterns. Another study of a similar species indicates no conclusive evidence of either beneficial or detrimental grazing effects (Menke and Kaye, 2003).

One authority (Fiedler 1986, 1987) states that among rare *Calochortus* species, their responses to environmental (including herbivory and microclimate) influences are often inconsistent. However, one commonality among rare *Calochortus* associated with moist meadow habitat appears to be population declines following damage or loss of habitat.

The critical factor in maintaining viability appears to be in maintaining habitat. Livestock management and other factors that maintains or improves riparian habitat is expected to maintain viability of *Calochortus longebarbatus* var. *peckii*, as well as the other sensitive plant species associated with riparian areas.

Because current livestock grazing management would continue, risk from early-season grazing would be the least among action alternatives. Soils would be drier and plants would be more developed. However, initiating grazing later in the season can also lead to greater concentrations of livestock in riparian areas. Because active management of livestock and deferred rotation would not occur in this alternative, it is expected that livestock impacts on riparian habitats would be greater than other action alternatives. Existing riparian habitat conditions are expected to remain the same. Therefore, measurable change in *Calochortus longebarbatus* var. *peckii* habitat and populations is not expected.

With the same amount of livestock use (measured in AUMs), exposed soils due to livestock trampling would be the same as other action alternatives. Therefore, risk for introduction and spread of noxious weeds that could displace sensitive plants and indirectly alter habitat, would continue at the same level. However, non-native invasive plants presently occupy a relatively small portion of riparian habitats, and are not expected to pose a short-term threat (<10 years) to the viability of sensitive plants associated with this habitat. Long-term effects on sensitive plants would be speculative. Additional discussion of effects from noxious weeds is in the next section of this report.

Non-native invasive plants (noxious weeds) would continue to influence riparian habitat by directly displacing native vegetation, including sensitive plant species. Weeds would also continue to indirectly threaten riparian habitats and water quality, and therefore, sensitive plants associated with these habitats, by increasing risk of erosion, as these non-native plants commonly provide little root-binding strength to soils (Sheley et al 1999c). This could alter habitat for sensitive plants, including those associated with riparian areas.

Compared with other alternatives, there would be no measurable increase or decrease in direct or indirect risk to riparian habitats from wildfire. Though wildfire risk would still be present, these sites are moist, and wildfire is not expected to threaten these plants or habitat. In addition, forest conditions on this portion of the Ochoco NF are such that fuels typically carrying wildfire are natural accumulations of forest biomass (trees and natural forest ground litter) rather than ground vegetation that would be reduced through grazing (Scholz 2006). Therefore, there would be no measurable difference between this and other alternatives in risk to riparian habitats, and associated sensitive plant populations and habitat, from wildfire. Additional discussion of wildfire is included in the cumulative effects section.

Habitat does not appear to be threatened by invasive species.

Livestock use that results in physical damage by hooves could impact the moss and lichen species. However, observations indicate that moss species that occupy rocky, steep stream habitats are not usually associated with high livestock use (Lesko, personal observation).

The other sensitive plants associated with riparian habitats such as the sensitive *Botrychium spp.* and *Carex spp.* occupy a wider array of habitats, including springs, seeps, and higher gradient systems that are less likely to be affected by livestock. These species also appear to be maintaining viability with livestock use (Lesko, personal observation). Populations of these species are also more widespread (ORNHC 2004, 2007), and so losses of species viability are less likely. Measurable change to habitat and populations of *Calochortus longebarbatus var. peckii* is not expected.

Therefore, for *Calochortus longebarbatus var. peckii*, the six *Botrychium spp.*, *Carex hystericina*, *Carex interior*, *Dermatocarpon luridum*, and *Scouleria marginata*, implementation of Alternative 3 **may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability.**

See the cumulative effects section for additional discussion.

#### **Alternative 4**

This alternative would result in grazing of areas occupied by or containing habitat for *Calochortus longebarbatus var. peckii*, the six *Botrychium spp.*, *Carex hystericina*, *Carex interior*, *Dermatocarpon luridum*, and *Scouleria marginata*. Initiating grazing earlier in the year than has historically occurred, before plants are fully developed and soils sufficiently dry, could damage plants or habitat. Proposed range improvements including fencing and water developments, along with other activities such as salting areas for livestock that concentrate livestock, could also impact sensitive plants or habitat.

The Coyle Cr. and Middle riparian pastures would be rested a minimum of 4 years, or until trend switches to an upward trend.

The intention of this alternative is to improve bank stability and riparian vegetative cover by improving livestock distribution and meet Forest Plan objectives for desired condition (USDA 1989) by allowing recovery of riparian vegetation, while reducing risk to *C. longebarbatus* var. *peckii*. Range improvements would assist in improving distribution of livestock.

A range of conclusions among authorities exists as to whether livestock grazing effects on *Calochortus longebarbatus* var. *peckii* is detrimental or beneficial to this species. Monitoring on lands managed by the BLM indicates *C. longebarbatus* var. *peckii* maintains viable populations in areas with moderate grazing, and excluding livestock from *C. longebarbatus* var. *peckii* habitat appears to result in decreased densities of this species (Halvorson, personal communication). However, risk to *C. longebarbatus* var. *peckii* can be compounded by initiating grazing earlier in the year, when soils are moist and susceptible to damage, and immature plants are more vulnerable to grazing and trampling (Kagan 1996, Halvorson, personal communication).

The close relative, *Calochortus longebarbatus* var. *longebarbatus*, occurs on similar habitats in other areas of the Pacific Northwest. It is also listed as sensitive in Region Six, and appears to share the same threats (Kaye and Rittenhouse 1990, 1994, Croft et al 1997). Studies in northern California indicate that grazed populations of this *Calochortus* exhibited lower densities of plants than ungrazed populations (Kaye and Rittenhouse 1990). Goldenberg (1995), states that livestock may be beneficial to *C. longebarbatus* var. *longebarbatus* by reducing competition, but this effect may not be necessary for continued viability, and soil compaction resulting from livestock can be detrimental by altering soil water flow patterns. Another study of a similar species, *Calochortus greenii* S. Wats. indicates no conclusive evidence of either beneficial or detrimental grazing effects (Menke and Kaye, 2003).

One authority (Fiedler 1986, 1987) states that among rare *Calochortus* species, their responses to environmental (including herbivory and microclimate) influences are often inconsistent. However, one commonality among rare *Calochortus* associated with moist meadow habitat appears to be population declines following damage or loss of habitat.

The critical factor in maintaining viability appears to be in maintaining habitat. Livestock management and other factors that maintains or improves riparian habitat is expected to maintain viability of *Calochortus longebarbatus* var. *peckii*, as well as the other sensitive plant species associated with riparian areas.

By adding 2 riparian pastures and resting these pastures a minimum of 4 years, plus the additional livestock exclosures at Corral Flat and Coyle and Mud Springs, riparian habitat is expected to increase in density and vigor. These areas that provide habitat for *Calochortus longebarbatus* var. *peckii* would be protected from grazing and trampling by livestock during the plant's growing season, when it is most vulnerable. Once every four years, these areas would be available for grazing before July 15, when plants and habitat are more vulnerable to damage by livestock. Rest from grazing on 3 of every 4 years is expected to reduce overall risk of livestock damage to plants or habitat, and reduce buildup of vegetation that could otherwise reduce habitat suitability for this plant. This area may also be managed for *C. longebarbatus* var. *peckii* by periodic prescribed burning as discussed under cumulative effects later in this report.

With initial rest, deferred rotation, improved distribution (compared to current management) due to active management and range improvements, and by grazing the exclosures and riparian pastures before July 15 on 1 of every 4 years, the anticipated effect of this alternative is improved riparian habitat and stability over existing livestock management. Deferred rotation and active management may be the more influencing factors to improving habitat for riparian species.

Because livestock use would be earlier in the season than has historically occurred, risk of further damage to riparian systems could be higher than current management (Alternative 3). However, because this alternative also implements riparian pastures, livestock exclosures, daily management, range

improvements, and deferred-rotation as compared with current management, earlier use is expected to be offset by these grazing modifications, and riparian habitat would be expected to improve as compared with Alternatives 2 and 3. Therefore, among action alternatives, this alternative would be the most beneficial to *Calochortus longebarbatus* var. *peckii* and other sensitive plant species associated with riparian habitats.

Though continued risk of further habitat loss would still be present, continued viability of *C. longebarbatus* var. *peckii* and other sensitive riparian species is expected. Anticipated effects are based on the assumption that range utilization standards would be met and would result in an improving trend in riparian conditions.

Some livestock trampling and grazing, plus range improvements, would occur in proximity to sensitive plant populations and habitat. Project design elements for range improvements and salting are expected to not result in direct impacts to sensitive plants or habitat from construction of improvements or increased use of riparian habitats.

Non-native invasive plants (noxious weeds) would also continue to influence riparian habitat by directly displacing native vegetation, including sensitive plant species. Weeds would also continue to indirectly threaten riparian habitats and water quality, and therefore, sensitive plants associated with these habitats, by increasing risk of erosion, as these non-native plants commonly provide little root-binding strength to soils (Sheley et al 1999c). This could alter habitat for sensitive plants, including those associated with riparian areas.

With the Coyle Cr. riparian pasture initially being rested a minimum of 4 years, and a corresponding reduction in AUMs to 733, exposed soils due to livestock trampling would be less than other alternatives. Following the period of rest, the same amount of livestock use (measured in AUMs) would occur, and exposed soils due to livestock trampling would be the same as other action alternatives. Therefore, risk for introduction and spread of noxious weeds that could displace sensitive plants and indirectly alter habitat, would continue at the same level. However, non-native invasive plants presently occupy a relatively small portion of riparian habitats, and are not expected to pose a short-term threat (<10 years) to the viability of sensitive plants associated with this habitat. Long-term effects on sensitive plants would be speculative. Additional discussion of effects from noxious weeds is in the next section of this report.

Compared with other alternatives, there would be no measurable increase or decrease in direct or indirect risk to riparian habitats from wildfire. Though wildfire risk would still be present, these sites are moist, and wildfire is not expected to threaten these plants or habitat. In addition, forest conditions on this portion of the Ochoco NF are such that fuels typically carrying wildfire are such that fuels typically carrying wildfire are natural accumulations of forest biomass (trees and natural forest ground litter) rather than ground vegetation that would be reduced through grazing (Scholz personal communication 2006). Therefore, there would be no measurable difference between the alternatives in risk to riparian habitats from wildfire. Additional discussion of wildfire is included in the cumulative effects section.

Livestock use that results in physical damage by hooves could impact the sensitive moss and lichen species. However, recent observations indicate the lichen *Dermatocarpon luridum* is fairly resilient to the effects of livestock on riparian habitats and water quality than was believed earlier (Dewey 2008). In addition, observations indicate that moss species, such as *Scouleria marginata*, that occupy rocky, steep stream habitats are not usually associated with high livestock use (Lesko, personal observation).

The other sensitive plants associated with riparian habitats such as the sensitive *Botrychium spp.* and *Carex spp.* occupy a wider array of habitats, including springs, seeps, and higher gradient systems that are less likely to be affected by livestock. These species also appear to be maintaining viability with livestock use (Lesko, personal observation). Populations of these species are also more widespread (ORNHIC 2004, 2007), and so losses of species viability are less likely. Measurable change to habitat and populations of *Calochortus longebarbatus* var. *peckii* is not expected.

Therefore, for *Calochortus longebarbatus* var. *peckii*, the six *Botrychium* spp., *Carex hystericina*, *Carex interior*, *Dermatocarpon luridum*, and *Scouleria marginata*, implementation of Alternative 4 **may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability.**

See the cumulative effects section for additional discussion.

### **Species Information - Species Associated with Scabland Habitats**

SENSITIVE NEEDLEGRASS SPECIES (*Achnatherum hendersonii* (Vasey) Muhl. and *A. wallowaensis* Maze & K.A. Robson)

These perennial grasses are regional endemic species. As stated previously, *Oryzopsis hendersonii* has been split taxonomically into the two sensitive *Achnatherum* species (Maze and Robson, 1996). They are associated with residual, clay soils known as lithosols. This habitat is commonly referred to as non-forest balds, or "scablands." Both species are on the ORNHIC List 1. These species are uncommon and widely scattered on the Ochoco NF. These species occur sporadically in central and northeastern Oregon on rocky, scabland ridges, often in association with rigid sagebrush (*Artemisia rigida* (Nutt.) Gray), Sandberg bluegrass (*Poa secunda* J Presl), onespoke oatgrass (*Danthonia unispicata* (Thurb.) Munro ex Macoun), and buckwheat (*Eriogonum* Michx.) species. These habitats also commonly provide habitat for several species of *Lomatium* Raf., that are an important cultural food for local Native American Tribes. Dry, heavy clay to gravelly, droughty, shallow soil is common, with aspect mostly south to southwest, with gentle to moderate slopes. Stone circles, stripes, and nets are common signs of frost heaving in these sites (Vrilakas 1990, Maze and Robson 1996). Known sites are at elevations of 3,400 to 5,400 feet. Closest documented populations are on land managed by the BLM within the North Fork Crooked River watershed. None have been documented within the Burn and Crystal Springs Analysis Area, though not all areas of suitable habitat have been surveyed. The Ochoco NF has no management guide for these species, though a draft species management guide for *Oryzopsis hendersonii* on the Wallowa-Whitman National Forest provides some guidance (Vrilakas 1990).

Because scabland habitat does not recover from disturbance, protection is emphasized under direction of the Ochoco National Forest Land and Resource Management Plan. Effects described below are also intended to address effects on scabland habitat as required under the Forest Plan (Appendix B, USDA 1989).

Studies indicate that where scabland soils occur on slopes exceeding 15%, measurable erosion has occurred over the last 100 years. As a result of these changes, productivity and plant community composition has also likely changed due to the loss of surface soil, grazing, and invasion by exotic species. Monitoring indicates the majority of this change occurred several decades ago. Where scablands occur on flatter slopes, less erosion has occurred, indicating little change in productivity and plant communities (David, personal communication).

Though habitat has been altered, it is difficult to estimate effects of these changes on sensitive *Achnatherum* populations. Monitoring of these species has not been extensive. Habitat appears stable, and, except for road construction and some damage by OHV traffic, has changed little over the last few decades. The majority of this habitat presently appears to be stable. Assuming grazing effects remain at the current level, this habitat is expected to remain suitable for these species.

Non-native invasive plants, especially annual grasses, are apparent on some scabland habitats. However, if associated soils remain in their generally stable condition, effects of exotics are less apparent. Long-term effects of exotic grasses on the viability of these species is unknown, but if associated soils remain relatively undisturbed, long-term viability is not expected to be threatened.

Because scabland habitats have inherently low fuel levels, these habitats are less likely to burn, though they are known to burn during wildfire events (Johnson 1998). When they do, the relatively light fuel



loads burn with low fire intensity. In addition, these sites would also burn during the driest part of the summer, when plants are dormant and less vulnerable to wildfire. Therefore, wildfire is not likely to affect these species because these species are likely to be adapted to, and remain viable with periodic wildfire.

Livestock grazing appears to be the biggest threat, especially if changes to grazing seasons would result in more or earlier livestock use on scablands than has occurred historically. Grazing improvements could also cause an increase in livestock use on scablands. Earlier or increased use could lead to damage of this fragile habitat, and threaten the viability of native plants associated with scabland habitats, including sensitive *Achnatherum* species. However, use of range readiness guidelines appear to be successful in maintaining habitat by authorizing turnout of livestock only when soils become sufficiently dry and plants are sufficiently developed. Because Alternatives 2 and 4 would result in livestock use generally earlier than historical use, monitoring of scabland sites is recommended under these alternatives to ensure range readiness before livestock are authorized to enter the Forest.

### **Direct and Indirect Effects - Species Associated with Scabland Habitats - *Achnatherum hendersonii* and *A. wallowaensis***

#### **Alternative 1**

This alternative includes no activities that could affect individuals or habitat for these species. Populations and habitat would be maintained.

Scabland sites are of relatively low productivity. Though accumulations of grasses and other plants otherwise consumed by cattle could increase, scabland habitat typically receives relatively light use by livestock, regardless of whether grazing occurs in the vicinity. In addition, these species are likely to be adapted to, and remain viable, with periodic wildfire. Therefore, there would be little change to fuel accumulations or wildfire effects, and therefore, no measurable difference between alternatives in risk to habitat. Therefore, wildfire is not likely to affect these species.

Non-native invasive plants, especially annual grasses, are apparent on some scabland habitats. However, if associated soils remain in their generally stable condition, these plants are not expected to affect viability of sensitive plants associated with scabland habitat.

Because no livestock grazing or improvements would occur, and scabland habitat is not expected to change measurably, implementation of this alternative is expected to result in **no impact** to the viability or habitat of these species is expected.

See the cumulative effects section for additional discussion.

#### **Alternatives 2, 3 and 4**

These alternatives would result in some livestock grazing on scablands that provide the primary habitat for *Achnatherum hendersonii* or *A. wallowaensis*. Range improvements and other activities could also affect sensitive plants and habitats associated with scabland.

These sites are also known to receive relatively light use from livestock because vegetation on these habitats is generally mature, and therefore less palatable, by the time of livestock turnout. For these reasons, scabland habitats associated with *Achnatherum hendersonii* and *A. wallowaensis* is generally not expected to change (David, personal communication).

Scabland habitats are considered stable (David, personal communication). These species have maintained populations with moderate grazing (Halvorson, personal communication). However, livestock use before soils are sufficiently dry could result in post-holing, pedistalling, trampling, pulling of plants, and livestock trailing that could damage scabland habitat. Grazing before plants are sufficiently developed could also damage these sensitive plants. The Ochoco National Forest Land and Resource Management Plan (USDA 1989) points out that scabland habitat is fragile, because damage as a result of management

is nearly impossible to mitigate. Protection of scablands is important in maintaining sensitive *Achnatherum* habitat and to meet Forest Plan direction for protection of scabland habitat itself. See also Appendix B.

Because Alternatives 2 and 4 would result in livestock use generally earlier in the season than has occurred historically, sensitive plants and habitat associated with scablands could be at greater risk of damage from livestock grazing and trampling. Effects determinations assume scabland habitat would be protected from damage by livestock by implementing range readiness guidelines that protect scablands by allowing no grazing before soils are sufficiently dry and plants sufficiently developed. Range readiness guidelines for Alternative 3 would not change. Guidelines for Alternatives 2 and 4 would allow earlier livestock grazing than Alternative 3, but would still meet Forest Plan direction for avoiding damage to soils and habitat. All alternatives are expected to result in no measurable increase in livestock post-holing and other impacts to soils that could damage scabland habitat. Grazing and associated livestock trampling would affect some scabland habitat, though not measurably more than occurs under current management. Viability of *Achnatherum hendersonii* or *A. wallowaensis* is expected to continue.

Effects determinations for these alternatives assume compliance with range readiness guidelines would not adversely affect these species or their habitat. Therefore, monitoring of scabland sites is recommended under alternatives 2 and 4 to ensure range readiness guidelines are being followed. See also the recommended monitoring section of this report. Project design elements for range improvements, such as fencing, and other activities, such as salting areas, are expected to result in no increase of use on scabland habitats, and are therefore not expected to affect viability.

Non-native invasive plants, especially annual grasses, are apparent on some scabland habitats. However, if associated soils remain in their generally stable condition, these plants are not expected to affect viability of sensitive plants associated with scabland habitat.

Because scabland habitat typically receives relatively light use by livestock, there would be no measurable difference in fuel accumulations, and associated wildfire risk, between alternatives. In addition, these species are likely to be adapted to, and remain viable with periodic wildfire.

Therefore, implementation of Alternatives 2, 3 or 4 **may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability.**

See the cumulative effects section for additional discussion.

### **Cumulative Effects to Sensitive Plants**

Cumulative effects are those that are expected from the alternatives, when added to other past, present, and reasonably foreseeable actions.

Past, present and reasonably foreseeable actions are included in Table 43.

Noxious weed control is expected to continue, both under the current Ochoco National Forest and Crooked River National Grassland Integrated Weed Management Plan (USDA 1998b), and through an Environmental Impact Statement (EIS) for management of invasive plants, expected to be completed in 2006.

Use by the wild horse herd is expected to continue, and add to the effects of grazing by permitted cattle. Though Burn and Crystal Springs Allotments are not included in the wild horse management area, for the past few years a few strays have been seen in the area. In fall of 2007, livestock gates were opened and with early snowfall, by the beginning of 2008, most of the horses left the area. It is expected that relatively light use by horses will continue in the next decade.

Assessing the size and extent of pre-settlement populations of (now listed) sensitive plant species in the Burn and Crystal Springs Analysis Area would be speculative. However, road construction, livestock grazing, fire exclusion, introduction of non-native plants, and other factors have resulted in changes to

forest, scabland, riparian, and aquatic habitats (USDA Forest Service/USDI Bureau of Land Management 1996, USDA Forest Service 2001). Because these influences have altered habitat quality and plant species diversity in both upland and riparian areas, these species are likely to have been more abundant.

While overall habitat quality has declined since pre-settlement, upland habitats generally appear relatively stable. Forest habitats are generally stable, and are expected to remain stable for the foreseeable future. Habitats for sensitive species associated with scabland (lithosol soils) have changed little in the last few decades, and are expected to remain in their current condition (David, personal communication).

However, riparian habitats appear to be still threatened by effects resulting from stream downcutting and other factors (USDA Forest Service 1998a, 2004c). Though risk of loss of riparian habitat continues, riparian habitat improvement projects, such as protection fencing, planting, headcut (stream channel) repair, and development of riparian pastures, may result in enhancement and expansion of habitat for sensitive species associated with riparian areas. At present, effectiveness of these projects, and whether they offset current losses, such as from stream downcutting, has yet to be determined.

Expansion of conifers into meadow systems is also occurring, resulting in reductions of meadow habitat, but currently does not appear to be affecting viability of sensitive plants or any other native plant species. However, fuels and vegetation management activities associated with the Burn and Crystal Springs project are expected to reverse the trend of conifer expansion into meadows. This is expected to maintain or improve habitat conditions, and the potential for continued viability, of species associated with meadows, especially *Calochortus longebarbatus* var. *peckii*.

Timber harvest and prescribed burning occurring with the Spears vegetation and fuels reduction projects are expected. Other ongoing vegetation and fuels management projects are likely to occur in the analysis area beyond the 10 year period associated with the project area.

Assuming prescribed burning occurs within design parameters, cumulative effects of burning are not expected to affect sensitive plants or habitat associated with riparian zones. These areas are moist, and fire would not generally affect habitat during normal burning parameters. The exception would be burning in the transitional riparian habitat along the forest/meadow interface that can provide habitat for *Calochortus longebarbatus* var. *peckii*. The area fenced for *C. longebarbatus* var. *peckii* in Alternatives 2 and 4 could also be managed for this species by periodic prescribed burning under the Spears or Ochoco Fuels projects. As mentioned earlier, burning in this habitat is expected to maintain or improve habitat for this species.

Because scablands have inherent low productivity, fuel levels are relatively low, and given that prescribed burning occurs during spring and fall when fire intensity is relatively low, scablands are not expected to be affected by prescribed burning. Therefore, no effect is expected on sensitive plant species associated with scablands. Sensitive plant habitat associated with upland areas is generally in plant communities that have historically been maintained by periodic fire. Therefore, burning is not expected to have any cumulative impact on viability of sensitive plant species.

Burning in areas outside of scabland is likely to result in increased exposed soils, which can increase susceptibility to noxious weed infestation and spread that can affect sensitive plant habitat. This risk increases when prescribed fire exceeds normal intensities. Fuels management projects, such as grapple piling, can concentrate fuels and result in scorching of soils that can leave these sites more susceptible to noxious weeds.

Though risk for introduction and spread of noxious weeds would increase with burning, this activity is not expected to result in substantial changes to habitat that would increase risk for introduction and spread of noxious weeds. Therefore, cumulative effects resulting from potential weed introduction and spread due to prescribed fire and wildfire are not expected to affect viability of sensitive plant species for at least the next decade.

Burning is likely to improve forage production and palatability, and therefore can result in increased livestock use on burned areas. If these areas burn too hot, or if livestock grazing occurs before sufficient recovery of vegetation and the soil organic layer, grazing can impact these areas by compacting and displacing soil, and increase risk of riparian degradation and for introduction and spread of noxious weeds. This could affect sensitive plants and habitat. However, large-scale burning can also help distribute livestock over a wider area. Prescribed burning within riparian areas is normally avoided, except where specific areas are expected to benefit from burning. These areas are commonly within the Riparian Habitat Conservation Area (RHCA) boundary, but are generally outside the actual riparian zone, the area influenced by higher moisture levels.

With the current vegetation and fuels conditions in the analysis area, wildfire is foreseeable. Wildfire could affect native plant communities and associated sensitive plants directly (Owen 2003), or indirectly by increasing susceptibility to noxious weeds (Asher et al 2001).

The sensitive plant species associated with riparian areas, *Calochortus longebarbatus* var. *peckii*, the six *Botrychium* spp., *Carex hystericina*, *Carex interior*, *Carex backii*, *Dermatocarpon luridum*, and *Scouleria marginata*, are not expected to be affected by wildfire. These species occur in areas that are generally moist year-round, or in the case of *C. longebarbatus* var. *peckii*, are usually dormant during wildfire season. These are also areas with generally light fuel loads, and therefore are not expected to burn with high intensity. *Calochortus* spp. are also generally recognized as dependent on disturbances such as wildfire (Kagan 1996, Kaye and Rittenhouse 1990, 1994).

Species associated with scabland, *Achnatherum hendersonii* and *A. wallowaensis* occur on areas with relatively low fuel density. However, these habitats are known to burn during wildfire events (Johnson 1998). Wildfire would historically occur during summer, when plants are dormant and less vulnerable. Therefore, these species are likely to be adapted to, and remain viable with periodic wildfire.

Wildfire suppression on the Ochoco NF generally avoids construction of fire line, using instead natural fuel breaks such as ridgelines, or human-created breaks, such as roads. This practice reduces the amount of soil disturbance associated with wildfire suppression and prescribed burning projects; therefore reducing opportunities for weed establishment and spread.

Determining more specific potential effects due to wildfire would be speculative, due to so many unknown variables, such as fuels conditions during a wildfire event, weather, suppression forces available, and other factors that influence wildfire size, intensity, and effects of suppression.

In general, thinning and fuels reduction treatments that move conditions towards the historical range would reduce potential adverse effects due to wildfire. These activities are to be implemented in the Burn and Crystal Springs and other projects over the next decade. With several thousand acres of thinning and fuels treatments anticipated over the next decade, potential effects due to wildfire and wildfire suppression are expected to decrease as more acres are treated each year.

In the Burn and Crystal Springs Analysis Area, non-native invasive plants (noxious weeds) currently occupy relatively little sensitive plant habitat, and though they appear to be spreading into sensitive plant habitat, especially Canada thistle in *Calochortus longebarbatus* var. *peckii* habitat, they do not appear to be threatening viability at present.

Non-native invasive plants primarily occupy heavily disturbed areas, such as roads, log landings, and mineral material sources. However, because populations of sensitive plant species are generally not associated with disturbed areas, and associated weed sites, noxious weeds currently do not appear to threaten the viability of sensitive plants or any other native plant species for at least the next decade. Projecting potential expansion and effects beyond a decade is not possible due to the many variables that are difficult to predict, including future wildfire, if introductions of new species of invasive plants would occur, whether or not biological controls would become established, and if the Forest Service would continue to use herbicides to control these weeds.

Though non-native invasive plant species currently do not appear to threaten viability of sensitive plant populations, weeds are expected to continue to be introduced by vehicles and livestock. However, control measures for most non-native invasive plants are also occurring under the 1998 Integrated Weed Management Plan, and are expected to continue. Though Canada thistle is relatively common, and continues to expand, it currently occupies less than 1% of the analysis area, and does not currently appear to be affecting viability of sensitive plants. Biological controls for this species are also relatively common for this species throughout Central Oregon, and some have established in the analysis area. Expansion of biological control agents may ultimately result in a decline of this weed in the analysis area. Assuming control measures continue, noxious weeds are expected to have a relatively minor effect on sensitive plants for at least the next decade. Therefore, cumulative effects are not expected to change the described direct and indirect effects on sensitive plant species.

The Forest Service Northwest Regional Office has completed a Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) (USDA 2005) that provides programmatic direction for treatment of non-native invasive plants through herbicides and other means. The Deschutes and Ochoco National Forests are currently completing site-specific analysis for treatment for non-native invasive plants. This is expected to result in additional treatment areas on the Ochoco NF for integrated noxious weed management beginning in 2007. Treatment areas are primarily along roads and other areas that generally do not provide habitat for sensitive plants. Therefore, implementation of additional weed management is expected to have little short-term effect on sensitive plant species, and may assist in maintaining long-term viability of these species.

Other activities such as installation and maintenance of fence, such as that used in aspen enhancements, are reviewed for potential effects to sensitive plant species. Effects from these activities are expected to have no to little effect on habitat or populations of these species.

Impacts from increases in recreation, firewood cutting, and other uses are not foreseen on sensitive plant habitat.

Therefore, for all alternatives, cumulative effects from past, present, and reasonably foreseeable actions are not expected to change the direct and indirect effects determinations for the Burn and Crystal Springs Grazing EA alternatives.

## **Invasive Plants**

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Non-native invasive plants are aggressive plants capable of degrading environmental quality. Noxious weeds are a subset of these plants, and designated “noxious” by the Secretary of Agriculture or state agencies (USDA 2000, ODA 2001). Because some non-native species known to be aggressive have not been officially designated as “noxious,” the term, “non-native invasive plants” is becoming more common. Many use the term, “noxious weeds” for all non-native invasive plants (Sheley et al 1999c). In this section, both terms are used to describe plants considered “non-native invasive” on the Ochoco NF.

The Forest Service is directed to manage and control noxious weeds (U.S. Congress 1974, USDA 1995c, U.S. President 1999). Though this direction includes avoiding activities that increase the potential for noxious weeds, the Forest Service is also directed to issue grazing permits, sell timber, implement thinning and fuels treatments, and maintain a road system for administrative use and the recreating public. Because of these ongoing activities, the Forest Service is directed to implement prevention measures to reduce the potential for introduction and spread of noxious weeds (USDA 1995b, 1995c, 2003, 2005). A discussion of other laws and direction for managing noxious weeds is included in Appendix C.

### ***Affected Environment***

During the past half-century, many non-native invasive species have expanded their range in the western United States. The introduction and spread of noxious weeds can reduce the diversity and abundance of

native vegetation, forage, diversity, continuity, and quality of wildlife habitat, increase erosion, and decrease water quality (Sheley and Larson 1994, Scott and Pratini 1995, Sheley et al 1997, USDA/USDI 2000). Non-native weeds have developed many characteristics, such as rapid growth rates, high seed production, and extended growing periods that give them advantages over native plants. Their spread is often unchecked because their native pathogens and invertebrate feeders are not present (Roché et al. 1994, Sheley et al 1999b, DiTomaso 2000).

Though most weed infestations occur along roads, indicating spread by vehicles, proposed livestock grazing can also increase the potential for introduction and spread by selective grazing of more palatable species (Olson 1999, Belsky and Gelbard 2000). Spiny broadleaf species, such as thistles, tend to be avoided by livestock. This can favor a rapid shift in the dominant species within these communities (Callihan and Evans 1991). Livestock trampling that exposes soils can create a seedbed for noxious weeds (Lacey et al 1990, Sheley et al 1999b). Livestock (and wildlife) can carry weed seed in their digestive tract, as well as in their coat (Declerck 1997, Sheley et al 1999b). Construction of range improvements, and associated livestock use, can also remove vegetation and expose soils. Weeds can also be introduced by seed that could come in with equipment or mineral material (gravel) used for range improvements. Other vectors include water, wind, livestock, wildlife, and mineral material and heavy equipment used for road maintenance and construction projects. Of increasing concern is the public using horses on the National Forest, with the hay brought in for feed possibly containing noxious weed seed.

These aggressive, non-native plants are often difficult to replace with native species. Damage to soils, notably losing the soil A-horizon, such as from road construction or burning slash piles, can result in sites not capable of returning to their original native plant communities for several decades or longer. Noxious weeds (and some non-native grasses) often out-compete native species on these altered sites (Hall, personal communication).

However, while non-native invasive plants are often associated with disturbance, some studies indicate that disturbance is not necessary for invasion of noxious weeds to occur. Noxious weeds have been documented invading relatively undisturbed, stable plant communities (Lacey et al 1990, Wagner et al 2001).

A variety of non-native noxious weeds occur in the Burn and Crystal Springs Analysis Area (Appendix D), generally on disturbed sites such as road shoulders, old log landings, etc. Broadleaf noxious weeds are the most common. Included is Canada thistle (*Cirsium arvense* (L.) Scop.). Of the noxious weeds present in the analysis area, it occupies the most area, and occurs in all allotments. It continues to spread in both upland and riparian areas. It can be found on a variety of sites, including rock pits, roadsides, dispersed camping areas, meadows, old harvest units, and others. This perennial plant has an especially deep root system, making hand pulling infeasible. Consequently, this species is a low priority for treatment.

However, Canada thistle currently occupies less than 1% of the analysis area. Though observations indicate it is more common on disturbed sites, it also occupies areas that have had relatively little disturbance, especially in riparian areas. Where it occurs in disturbed forested sites, such as clearcuts, it appears to decline over time as succession progresses, especially with increasing shade (Lesko, personal observation). Because it is so common and so widely spread over the National Forest, including the Burn and Crystal Springs Analysis Area, the current management strategy focuses on the establishment of biological controls (insects). These biological controls are present over portions of the Ochoco NF, and are relatively common on private and public lands adjacent to the analysis area. However, no biological controls appear to have established in the analysis area. An overall assessment of long-term (over the next few decades) effectiveness of biological controls on the Ochoco NF cannot be described at this time.

Other common non-native noxious weeds include the knapweed (*Centaurea* L.) species, that occur in all allotments. Others include whitetop (*Cardaria draba* (L.) Hand.) which is largely limited to the eastern portion of the analysis area, and Mediterranean sage (*Salvia aethiopsis* L.), which is currently limited to

the eastern portion. These species are also most commonly found along roadsides, and are currently being controlled through the use of herbicides and by hand pulling.

The Ochoco NF is currently managing noxious weeds under the 1998 Integrated Weed Management Plan and Environmental Assessment/Decision Notice (USDA 1998b), and the Ochoco National Forest Land and Resource Plan (LRMP) as amended July 25, 1995 to implement noxious weed management (USDA 1995b). Weed management includes a variety of strategies, depending on the species, size of infestation, and location. Included are chemical, cultural, mechanical and biological controls.

The Forest Service Northwest Regional Office has completed a Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) (USDA 2005) that provides programmatic direction for treatment of non-native invasive plants through herbicides and other means.

The Deschutes and Ochoco National Forests are currently completing site-specific analysis for treatment for non-native invasive plant infestations, some of which are recently documented. This is expected to result in additional treatment areas and different methods on these Forests for integrated noxious weed management beginning in 2007.

### Site Analysis

Most weed infestations have been present in the analysis area for at least two decades. Existing conditions favor establishment and spread of noxious weeds, and weeds are likely to continue to be introduced and spread to new areas within the Ochoco NF. A history of grazing, road construction, and logging has increased the potential for introduction and spread by removing vegetation and exposing soils, increasing susceptibility to invasion by noxious weeds. Wildfires, wildfire suppression, and prescribed burning can also increase risk (Asher et al 2001). Vehicle traffic and other ongoing uses are expected to continue to introduce weeds to the area.

Noxious weed inventories indicate most infestations begin on disturbed areas, such as road shoulders and log landings. The majority of infestations are along roads, indicating primary introduction of noxious weeds is through vehicles. Some of these infestations appear to be expanding into areas that are less disturbed.

Noxious weed surveys are ongoing along both open and closed roads within the analysis area, where weeds most commonly occur. Infestations of the common weed species Canada thistle and bull thistle (*Cirsium vulgare* (Savi) Tenore) were not all documented when encountered, especially where scattered individual plants occur along road shoulders. Because Canada thistle and bull thistle are so widespread, and treatment options so limited, documenting all known infestations is not a priority for the weed management program. However, at least 95% of the infestations of common weed species have been documented along the road system.

Currently there are approximately 9 documented weed species and 35 documented weed sites encompassing approximately 5 acres (Table 38). These weed infestations range from a handful of plants, to several acres of infestations. Several species of noxious weeds are present in or near the analysis area. Some species, such as leafy spurge (*Euphorbia esula* L.) are present in the vicinity, but have not been documented in the analysis area. New infestations are documented as they are encountered.

**Table 38. State of Oregon listed noxious weed species and non-native invasive plants in the Burn and Crystal Springs allotment area.**

Species	Life Form
spotted knapweed ( <i>Centaurea maculosa</i> Lam.)	perennial forb
diffuse knapweed ( <i>C. diffusa</i> Lam)	perennial forb
hound's tongue ( <i>Cynoglossum officinale</i> L.)	biennial forb
teasel* ( <i>Dipsacus sylvestris</i> Huds.)	biennial forb
St. John's wort, ( <i>Hypericum perforatum</i> L.)	perennial forb
Mediterranean sage ( <i>Salvia aethiopsis</i> L.)	biennial forb
medusahead ( <i>Taeniatherum caput-medusae</i> (L.) Nevski)	annual grass
Canada thistle ( <i>Cirsium arvense</i> (L.) Scop.)	perennial forb
bull thistle ( <i>Cirsium vulgare</i> (Savi) Tenore)	biennial forb

\*not listed as noxious by State of Oregon, but considered a non-native invasive plant on the Ochoco NF due to potential for displacing native vegetation

Documented infestations are mapped; the map is included with the Invasive Plants report in the project file located at the Lookout Mountain Ranger District.

Table 39 lists the noxious weed treatment areas that are currently being treated under the 1998 Integrated Weed Management Plan.

**Table 39. Burn and Crystal Springs Allotment noxious weed infestations receiving treatments.**

Location	Weed Species	Weed Density	Treatment History
FS 22 Rd System	medusahead Mediterranean sage hound's tongue spotted knapweed diffuse knapweed Canada thistle	scattered plants along road system	chemical, hand pulling, biocontrol
Highway 26 Rd System	medusahead hound's tongue spotted knapweed diffuse knapweed St. John's wort Canada thistle	scattered plants along road system	chemical, hand pulling, biocontrol
FS 2610/2630 Rd System	medusahead hound's tongue spotted knapweed diffuse knapweed Canada thistle	scattered plants along road system	chemical, hand pulling, biocontrol

Individual noxious weed plants are occasionally found by field-going personnel outside these documented infestations and are hand pulled and removed when encountered.

The aggressiveness of the treatment strategy is based on the type of weed to be controlled. For species such as spotted knapweed, the threshold for control is one plant. For other noxious species, including Canada thistle, teasel, and St. John's wort in riparian areas, herbicide or hand pulling is infeasible. The plan is release of biological controls and monitoring. Common weed species, such as bull thistle, are not receiving any treatments. Though this species quickly establishes the first few years following burning or other disturbance, its density decreases over time as other vegetation becomes re-established.

### **Selection of Weed Control Strategy**

There are five strategies for managing noxious weeds: no action, prevention, early treatment, correction, and maintenance. The no-action strategy was not considered for this project because noxious weeds are present and are recognized as a problem. The Federal Noxious Weed Management Act of 1974 (U.S. Congress 1974), Executive Order 13112 (U.S. President 1999), and Ochoco National Forest Management



Plan (USDA 1995a, 1995b, 1998b) direct the Forest Service to control noxious weeds and implement prevention measures (USDA 2003). Controls will continue under the existing weed management plan.

The recommended strategy for activities related to this project is prevention. The National Strategy for Invasive Species Management states that weed management is most effectively accomplished by prevention (USDA 2004b). Design elements for preventing introduction and spread have been incorporated in alternatives (see Table 8 above). Prevention measures include: avoiding or minimize disturbance within existing infestations; a weed ID workshop for Forest Service personnel involved in the project; informing and including the weed coordinator with project planning and implementation; ensuring mineral material (i.e. gravel) used in the project would come from weed-free sources, identifying and documenting new weed infestations during implementation, maintaining an invasive plant inventory and using it for project planning and implementation; completing pre and post project monitoring; and ensuring any equipment used would be weed-free. These management actions have been reviewed by the interdisciplinary team, and are considered feasible.

The prevention strategy is designed to eliminate the expansion of current populations and to reduce risk of new infestations. If prevention measures are not adequate to prevent the introduction and spread of noxious weeds, early treatment would be implemented under existing or future noxious weed management plans.

Early treatment, correction and maintenance strategies are already implemented in the area due to existing weed infestations. Since 1996, targeted infestations of specific weeds were treated with herbicide and manual controls. Monitoring indicates that in most areas where treatment has occurred, density of noxious weeds is decreasing. This is most apparent in those areas receiving herbicide treatments. Prevention and early treatment strategies are integrated with action alternatives to prevent the spread of existing weed infestations and to prevent new infestations.

The Ochoco NF plans to continue early treatment, correction and maintenance programs for treating existing weed infestations within and adjacent to the Burn and Crystal Springs Analysis Area. Weed treatment would be completed under the existing integrated weed management plan, until a new management plan is adopted.

Biological controls, such as *Urophora carduii* for Canada thistle, have been released on the Ochoco National Forest and adjacent lands by the Oregon Department of Agriculture and partnering agencies in Oregon. Releases are expected to continue.

The rating criteria for prevention efficacy are:

**Poor:** The action would have benefit, but would have a major conflict with other objectives and goals. Table 40 lists possible prevention actions with poor efficacy.

**Low:** The action would have benefit, but the benefit is difficult or expensive to achieve and of minor value, and may have conflicts with other objectives or goals.

**Medium:** The action would have minor or major benefit, and conflicts with other objectives or goals are minor or none.

**High:** The action would have major benefit; conflicts with other objectives or goals are minor or none. The action also helps meet other objectives or goals.

Feasible prevention measures with medium and high efficacy are incorporated into each action alternative as design elements (see Chapter 2). These procedures have been an Ochoco NF standard for the past few years. Weed management is consistent with objectives for the Ochoco NF projects.

**Table 40. Noxious Weed Prevention Measures (design elements) Not Considered Feasible for this Project**

Action	Efficacy	Discussion
Quarantine livestock for 1 week minimum prior to entry on the National Forest to allow natural elimination of weed seed	POOR	Quarantine areas not available Expensive to feed livestock prior to entry on National Forest
Inspect coat of livestock for weed seed and remove if present	POOR	Expensive Difficult to identify weed seed
When cause/effect relationship is established between grazing and weeds, close pastures or portions thereof until infestations are controlled	POOR	All pastures are infested, so would be expensive to close Canada thistle may spread in riparian regardless of grazing Conflict with purpose and need to provide grazing
Encourage livestock permittees to maintain weed free feedlots and parking and staging areas.	POOR	Unreasonable to access and monitor private lands Effectiveness would probably be limited

## Environmental Consequences

### Direct and Indirect Effects

Analysis of effects related to noxious weeds can be described in two ways:

- effects of the noxious weeds themselves;
- effects of the alternatives on potential for introduction and spread of noxious weeds (weed risk).

#### Effects due to non-native invasive plants themselves can include the following:

- Changes to ecosystems by altering soil properties. Specifically, erosion may increase and organic matter may be reduced, affecting available nitrogen to plant communities. Weeds take up soil nutrients rapidly, further depleting soil nutrient reserves. Weeds can produce compounds that may affect soil microorganisms and affect soil fertility. Weeds can also reduce infiltration and water-holding capacity of soils (Sheley et al 1997, Olson 1999, USDA/USDI 2000)
- Altering the composition of plant communities by displacing native plants - This can reduce habitat values for native wildlife species dependent on native plant communities. Loss of abundance and diversity of wildlife can occur (USDA/USDI 2000).
- Economic losses due to reductions in quality of forage for livestock and land values – Some noxious weeds, such as St. Johns wort, are toxic to livestock (Olson 1999, USDA/USDI 2000).

Though in some areas, densities and corresponding ecological impacts of non-native invasive plants can be relatively high, such as cheatgrass (*Bromus tectorum* L.) threatening species associated with sagebrush habitats of the Great Basin (USDI 2000), noxious weeds comprise less than 1% of the vegetative cover on the Burn and Crystal Springs Analysis Area of the Ochoco NF, and impacts are not measurable at this time. However, given the existing infestations, current and anticipated human activities, and potential for introduction and spread, weeds could become more of a long-term (>10 years) influence on habitats within the analysis area.

As with other portions of the Ochoco National Forest, weed infestations in the Burn and Crystal Springs Analysis Area are generally widespread, and limited to road corridors (Appendix B). However, due to ongoing weed management, these infestations are typically small, less than 1/10 acre. Widespread, small infestations that are being controlled are not conducive to site-specific concerns or management recommendations under this project. Though Canada thistle is not actively being controlled, the

numerous, widespread infestations of this weed are also not conducive to site-specific concerns or recommendations.

Because current effects due to noxious weeds are relatively low, and are not expected to increase measurably, the remainder of the effects analysis for noxious weeds will be on evaluating the risk for introduction and spread of noxious weeds, by alternative.

### **Direct and Indirect Effects related to noxious weed risk**

Most non-native invasive plants are shade intolerant, and therefore have greater potential for invasion on non-forest sites or forest sites that have been disturbed (Sheley et al 1998).

Alternative 1 includes no grazing, range improvements, or other activities that remove vegetation, expose soil, and permit the introduction of livestock as a weed vector that increases the potential for introduction and spread of invasive plants. Compared with other alternatives, Alternative 1 offers the lowest risk for introduction and spread of noxious weeds.

Alternatives 2, 3 and 4 include grazing and range improvements that increase risk for introduction and spread of invasive plants. Because relative livestock use, based on AUMs, is similar for all action alternatives, relative risk is approximately the same. However, deferred rotation of pastures in Alternatives 2 and 4 could offer some reduction of weed risk by allowing vegetation to recover more fully following grazing (Sheley et al 1999a)

Most of the risk of weed introduction is mitigated through design elements that require equipment be cleaned before entering lands managed by the Forest Service. Heavy equipment such as backhoes would be free of soil, weed seed and plant parts. This substantially reduces the risk of introducing new infestations. However, vehicles, including stock trucks used for hauling are exempt from this requirement, and therefore still pose a risk. Forest Service vehicles are another possible source of weed spread, especially when coming from other areas where weeds may be prevalent. Livestock are another possible vector for introduction, especially when coming from private lands that may be infested.

Further discussion of noxious weeds, including effects from past, present, and reasonably foreseeable activities, is in the following cumulative effects and risk assessment.

### **Cumulative effects related to noxious weed risk**

Cumulative effects are those that are expected from the alternatives, when added to other past, present, and reasonably foreseeable actions. The reasonably foreseeable activities included in the discussion of cumulative effects are listed on Table 4 (sensitive plants discussion) of this report.

Existing conditions favor establishment and spread of noxious weeds. Many areas have had road construction and timber harvest. This has increased the potential for introduction and spread by removing vegetation and exposing soils, creating an ideal seedbed for noxious weeds. In addition, road systems have created a pathway for entry of noxious weeds into the National Forest.

The exact source of present infestations is unknown. The location pattern shows concentrated sites along primary travel corridors, especially high-use corridors such as FS 23. The primary vector for noxious weeds appears to be vehicles.

Implementation of the Spears and other vegetation and fuels management projects over the next decade is expected to increase risk for weed introduction and spread by reducing shade and removing vegetation and the soil organic layer. Other present and reasonably foreseeable activities, including recreation, wildfire suppression, and other activities suggest a high risk for introduction and spread of noxious weeds. As described earlier, this risk can be exacerbated by livestock grazing (DeClerk 1997, DiTomaso 1997, Miller et al 1998, Olson 1999, Belsky and Gelbard, 2000, Zimmerman et al 2002).

Prevention measures, through design elements incorporated into the alternatives and under the current weed management program, would help reduce the potential effects of noxious weeds.

Though weed densities have generally decreased where controls have been implemented, on the majority of sites, some seed production still occurs from plants that germinate after treatment, re-sprout after incomplete pulling, or otherwise escape the control. As long as seed production continues, eradication is difficult. This situation is complicated by the persistence of viable seed in the soil for many years (Eddleman, personal communication).

Not all noxious weeds can be effectively controlled by herbicides or other measures. The 1998 Noxious Weed Environmental Assessment and Decision Notice limits herbicide use to knapweed and a few other species. The most effective chemicals for use on whitetop are presently not available for use on the Ochoco NF. Untreated infestations would continue to spread, displacing native and desirable non-native vegetation, reducing biodiversity, and increasing potential for other negative impacts as previously described.

Biological controls (insects) have been introduced for some species, such as Canada thistle, but establishment has not been observed in the analysis area, and infestations continue to spread. It is known that biological controls generally do not eradicate weed infestations. Where biological controls establish, the populations of the controls are more likely to reach equilibrium with noxious weed infestations. Ongoing research and monitoring has shown some success in reducing weed densities in other areas Central Oregon, but trends for establishment and effectiveness of biological controls on the Ochoco NF are still unknown.

Projecting the potential effects related to ecological decline, or rate and extent of spread is largely speculative due to many unknown variables, including weather patterns, funding, and especially the completion date and decisions related to the current Deschutes NF/Ochoco NF process for managing non-native invasive plants. For example, if future noxious weed management is limited to measures other than herbicide treatments, and funding for control declines, spread and establishment of new infestations is more likely than a continuation of current management.

One of the primary factors for continued risk is that seed can be introduced from weed-infested areas through soils attached to vehicles and road maintenance or other equipment. Roads will continue to provide dispersal and susceptible sites for noxious weeds. Expanding weed infestations outside the Burn and Crystal Springs Analysis Area will likely increase potential for new infestations. Weed densities adjacent to the analysis area are considered moderate to high. Not all of these infestations are being controlled. These infestations, especially those along main access roads into the analysis area, will continue to be a source for new infestations (Alexanian 2003). Human use on the analysis area of the Ochoco NF is increasing, especially from September through November during hunting seasons, and is expected to increase in the future as populations in nearby towns continue to grow. Late hunting season is a wet time of year, and is particularly conducive to weed spread due to mud clinging to tires. With growing recreational use, the potential for new infestations and spread appears likely to increase.

Road construction, timber harvest and prescribed burning would occur with the Burn and Crystal Springs and other projects in the analysis area. The potential for introduction of noxious weeds due to logging activity is much greater than other activities because of soil disturbance and removal of vegetation by log skidding and road and landing construction activity. Logging equipment (skidders, cats, feller-bunchers, etc.) is much more likely to bring in noxious weed seed or plant material because equipment may be transported from site to site with soil and weed seed or plant parts attached. Compared with log skidding and burning, soils heavily disturbed by road construction or use as log landings will be more susceptible to noxious weed infestation for many years, perhaps several decades. Though log-hauling may be no more responsible for introduction and spread of weeds than other traffic, log haul can substantially increase overall traffic on National Forest roads, increasing weed risk.

Following timber harvest activities, road and log landing rehabilitation areas would be reseeded with native or non-native grasses and forbs to occupy the site and reduce potential for noxious weed introduction or spread. Seed would be certified noxious weed-free by an approved testing laboratory. If available, native seed would be used.

Though timber harvest is not likely to occur for at least several years beyond implementation of Spears and other scheduled projects, non-commercial thinning and burning is expected to occur in the analysis area beyond implementation of these projects.

Hand thinning is generally low risk, but vehicles and people associated with this and other forest management activities can introduce weeds. Prescribed burning of natural fuel accumulations and activity fuels (logging and thinning slash) are generally lower risk also, but this can create bare soil areas that are more susceptible to invasion. However, compared with wildfire, this burning is generally low intensity, especially with spring and fall burning that is planned. Vegetation recovers much more quickly (often with greater vigor than before burning), and the majority of the soil organic layer is retained. Burning that maintains vegetation and the soil organic layer results in less susceptibility to noxious weed introduction and spread. In general, burning is expected to be relatively low-intensity. Areas where prescribed burning would take place are expected to re-vegetate quickly and become less susceptible to non-native noxious weeds.

An exception to low-intensity burning would be on areas where slash has been piled with a grapple, creating more dense fuel accumulations. These areas are expected to burn at higher intensity, and would be more susceptible to weed invasion, especially where they occur along travel corridors.

Fire suppression can result in introduction or spread of weeds by equipment brought in from different areas that may contain weed seed or plant parts. Due to the emergency nature of wildfire, prevention measures including equipment cleaning are not always implemented or feasible. Dozer lines, hand lines, drop points, safety zones, staging areas, etc. all create bare ground with heavy travel and disturbance. Vehicle traffic during and after suppression activity can introduce weeds to highly susceptible soils. Fire rehabilitation efforts mitigate many of the negative effects through seeding, weed control, erosion control and closing off areas to vehicles.

Grazing by the wild horse herd is expected to continue, and add to the risks of introduction and spread by permitted cattle. Though Burn and Crystal Springs Allotments are not included in the wild horse management area, for the past few years a few strays have been seen in the area. In fall of 2007 livestock gates were opened and with early snowfall by the beginning of 2008 most of the horses left the area. It is expected that relatively light use by horses will continue in the next decade.

The cumulative effects of present and reasonably foreseeable activities indicate a high risk for introduction and spread of noxious weeds. Studies have shown that noxious weeds have the potential to invade sites with relatively little grazing or other activity (Sheley et al 1997, Wagner et al 2001). Weeds will continue to be introduced and spread by vehicles, wildlife, windborne seed, and other sources. Therefore, new infestations are likely in the analysis area, regardless of the alternative chosen, including no action.

The degree of environmental impact due to noxious weeds is relative to the acres infested. Though over 160 infestations have been recorded within the analysis area, collectively they occupy less than 1% of the analysis area. Therefore, at present, environmental impact due to noxious weeds is not apparent, and is therefore considered low. Assuming noxious weed control continues, anticipated effects resulting from infestation and spread of noxious weeds is expected to remain relatively low.

### **Noxious Weed Risk Assessment**

Forest Service Manual direction requires that noxious weed risk assessments be prepared for all projects involving ground-disturbing activities. Proposed grazing and range improvement activities would remove

vegetation and expose soils, creating conditions conducive to the establishment of noxious weeds. 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 to be used during project implementation (Appendix C). The risk assessment assumes the above measures determined to be feasible will be implemented in action alternatives. The weed control strategy is discussed in the next section of this report.

The risk assessment is based on a checklist of risk factors, such as livestock grazing in pastures containing infestations. The Deep Timber Sales EIS weed risk assessment provided the basis for this analysis (Mafera 2003). The risk factors assessment includes these direct effects, as well as the cumulative effects of recreation use, etc. Alternatives were then rated for risk of introducing or spreading weeds. Any high-risk activity results in a high risk ranking for that alternative. The complete risk factor assessment is in Appendix E.

This checklist includes direct, indirect, and cumulative effects. An example of an activity with direct effects would be livestock grazing within or moving from areas with known weed infestations. This activity would likely directly spread weeds. An example of activity with indirect effects would be burning slash piles adjacent to infestations. Burned sites would be highly susceptible to weed spread. The checklist also includes the cumulative effects of reasonably foreseeable activities, such as ongoing vehicle use. Vehicles are expected to continue to introduce and spread noxious weeds.

The risk factor assessment indicates high risk for all alternatives, including no action. The primary factor for this rating is the cumulative effects of other anticipated activities, notably ongoing vehicle use. Action alternatives also include livestock movement within or from areas with known infestations. This is high risk. Table 41 compares weed risk, by alternative.

**Table 41. Summary of noxious weed/invasive plant risk factor assessment.**

	<b>Alt 1</b>	<b>Alt 2</b>	<b>Alt 3</b>
Risk of Noxious Weed Introduction/Spread	HIGH*	HIGH*	HIGH*
# Risk Factors Rated High	0	1	1

\*Based on ongoing vehicle use, etc.

Although action alternatives contain high-risk activities, cumulative effects due to past soil disturbance, ongoing vegetation and fuels management projects, and foreseeable vehicle use appears to be the primary influences for risk of weed introduction and spread. Prevention is the best defense against noxious weeds. Prevention measures determined to be feasible (Table 8), such as requiring equipment be clean and free of noxious weed seed and plant parts, is expected to lower the risk. These in conjunction with current infestation treatment would reduce the risk of weed introduction and spread. However, all activities involve a level of risk that cannot be completely prevented.

Vehicles and equipment have the largest potential to introduce new weed infestations and spread existing ones. However, there is potential for livestock to spread existing infestations, or to introduce new infestations, especially hounds-tongue (DeClerck-Floate 1997). Prevention measures, such as requiring clean equipment during construction or maintenance of range improvements, is expected to reduce weed risk considerably.

## **Heritage Resources**

The Heritage Stewardship Group conducted a cultural resource study of the selected area. The project was initiated to assess areas within the project area likely to be impacted by cattle grazing and range improvements. Two previously recorded prehistoric period sites were located with the project area, both of which had been determined not eligible to the National Register of Historic Places (NRHP). Thirteen historic period sites were also located within the project area. These were predominantly small sites associated with the early grazing. Seven sites were determined not

eligible to the NRHP. Five sites were unevaluated due to insufficient information. Three of these sites were deteriorated log watering troughs constructed for watering stock and 9 sites were carvings aspen trees representative of earlier stock grazing and herding on the forest. The Historic Summit Trail was determined eligible to the NRHP and runs along the northern boundary of Crystal Allotment. The Summit Trail route is representative of an early transportation route through the forest for stock grazing and forest administration. The Summit Trail is managed as a transportation route, maintaining visual qualities and historic segments and features (USDA FS 1989). The old Prineville to Mitchell highway and associated phone line route corresponds to Forest Road 22 and 2210 and is located on the eastern boundary of the project area.

Ochoco Forest land is within ceded lands of the Confederated Tribes of the Warm Springs Reservation through the Mid Oregon Treaty of 1855 and within the area of cultural interest to The Burns Paiute Tribe, The Confederated Tribes of the Umatilla Indian Reservation and The Klamath Tribe. Indian people continue to practice their traditional life ways on the national forest including hunting, gathering and collecting resources.

### ***Affected Environment***

Grazing has been an ongoing use on the Forest since the early 1900s. Coordination and heritage resource management has been in place on federal lands since the late 1970s. Since then the heritage resource management program has worked with the Oregon SHPO (State Historic Preservation Office) to avoid and manage heritage sites for new ground disturbing projects. The ongoing grazing of stock animals and existing improvements are not viewed as a new effect to heritage resources since the effect from over 100 years of grazing practices has already occurred. Information may be gained from monitoring selected high value sites which have seen impacts from grazing over the past 100 years.

In general, a cow or pair “walking” or grazing across the pasture would not have a detrimental impact on a heritage resources. Detrimental effects to heritage resources occurs where animals congregate and where use is concentrated, such as at water developments, along fence lines, corrals and salting areas. The timing of the grazing season is different in the action alternatives but the impacts to the heritage resource from cattle grazing would be the same whether the season is early May through July or May through September. Moist soil conditions would increase the likelihood of trampling and artifact breakage, such as at wet meadows and spring sites as well as springtime conditions. In a similar way, the difference between a rest-rotation system and a deferred-rotation would not create different effects to heritage resources. For these reasons, analysis will focus on areas where stock concentrate (fence lines, water developments, corrals, and salting areas) and not on the timing of grazing or use of pastures.

Previous survey had been completed in the project area and cultural sites have been documented (1994 Bialas, Cathy, Mary Maercklein and George Orr and 2007 Holtzapple). For this project, all proposed ground disturbing improvements were surveyed which added 269 new acres surveyed in the Crystal Allotment and 155 acres in the Burn Allotment. Combined with 820 acres of previous survey in the project area, a total of 1,244 acres were surveyed. This represents most of the high probability acres within both allotments since the timbered mid-slopes are low probability areas. No additional sites were documented during the 2008 field survey. Known sites including the log watering troughs, carved aspen, the old Prineville to Mitchell Highway route and associated phone line and the historic Summit Trail would not be affected by the proposed improvements or grazing within the Burn and Crystal Allotments. Section 106 compliance was completed on June 5, 2008 when a finding of No Historic Properties Affected was submitted to the Oregon State Historic Preservation Office.

## **Environmental Consequences for Heritage Resources**

The evaluation criteria to analyze the effects of grazing on heritage resources are based on disturbance to the resource and the qualities which make it eligible to the NRHP. The effect from grazing to heritage sites was considered and disturbance was determined to occur where cattle concentrate and cause a change in the surface and sub-surface conditions. Areas where cattle concentrate occur along fence lines, corrals and water developments. General grazing of cattle and cattle trailing across allotments were not included since the effect is dispersed over a large area and grazing practices have been ongoing over 100 years.

### **Direct and Cumulative Effects – Alternative 1**

Alternative 1 proposes to terminate grazing permits on the Forest. Current grazing operations would continue for 2 seasons and then cease. Fence lines and metal troughs would be removed and stock (cattle) would not be permitted. There would be no further direct effects after the 2 year continuance period to cultural sites from trailing, hoof action or soil disturbance and displacement. Removing stock grazing would reduce the detrimental effects to heritage resources. Removal of metal troughs and fences where heritage sites occur would be coordinated and implemented to avoid creating new disturbance at known sites. Log trough water developments or water piped to such troughs would not be removed.

All other activities would continue. Forest users would continue to drive and recreate in the Forest. Forest projects like prescribed burning, wildfires, fire suppression, stream improvement projects, wildlife projects, timber harvest, thinning of young trees and juniper would continue. There would be cumulative effects to heritage sites impacted by dispersed camping, artifact collecting and off road vehicle use. Projects including thinning of young trees near Ochoco Ranger Station and ongoing invasive weeds treatment have been designed to avoid or protect the qualities which make these sites eligible to the NRHP. These projects would not affect heritage sites and would not add to the cumulative effect to heritage resources.

### **Direct Effects – Alternatives 2, 3 and 4**

The 2008 field survey shows no new sites would be affected by proposed fence and coral construction and all known sites would be avoided or protected. The existing corrals scheduled to be removed were constructed in the 1970s or 1980s. No new spring developments would be constructed on cultural sites. The timing of grazing seasons reflected in Alternatives 2, 3 and 4 would not change the type of impact to heritage resources and will not be addressed. Site revisits to several known sites show there has been no effect from stock grazing to carved aspen, log watering troughs and the historic Summit Trail. The carved aspen and log troughs are deteriorating due to weathering and their expected life cycle and not from stock grazing. In the past log trough were replaced with metal troughs when they deteriorated and no longer held water. There would be no new direct effect(s) to heritage resources from proposed activities in Alternatives 2, 3 and 4.

In general, fewer cattle per pasture would reduce detrimental impacts where cattle are known to concentrate. Providing additional water developments in Alternatives 2 and 4 is intended to improve distribution and in turn decrease use and concentration of cattle at each water development. The potential for detrimental effects would be reduced with an increase in water developments. Distribution of cattle and the impact at water developments is difficult to assess because the type and degree of disturbance may change over time (seasons of use). Sites where disturbance is known to occur may be improved by design changes such as movement of cattle, placement of the water trough or use of protective fencing. Site specific impacts at water developments may change over the grazing seasons.



A deferred rotation grazing system would place the same number of cattle on the permit with more time in selected pastures while resting or not using one pasture each year. This would result in a slightly higher density of cattle per acre (increasing cattle numbers and resting one pasture each year). The effect of cattle trailing along a fence line for 10 days compared to 15 days would be comparable.

Alternative 3 would continue to graze cattle on the allotment acres for the longest grazing season and the effects would be comparable to recent past practices and the existing condition. The number of cattle would be about the same but the season of use would be longer or extend later in the summer.

### **Cumulative Effects – Alternatives 2, 3 and 4**

The Ochoco Mountains have been grazed for over 100 years. Most range improvements were initiated by the 1940s and damage to cultural sites was also well “established” by 1940. Current grazing continues to affect portions of the sites that have been altered since the early 1900s. The effect to heritage sites has occurred and continued grazing is not increasing the damage or leading to the loss of heritage resources. Since 1980 projects have been designed to avoid or protect heritage sites. For the past 25 years all new range improvements have been coordinated to avoid and protect heritage sites. In this same way, road construction and timber sale activity prior to 1980 contributed to greater damage and loss of heritage sites and information than grazing and associated activities.

Ongoing forest uses and activities and all scheduled activities would include the wild horse management area and wild horses adjacent to the designated area, Spears Vegetation treatments (commercial timber sales and understory thinning projects) and Ochoco Valley Fuels (understory thinning project). Forest users would continue to drive and recreate in the forest. There would be effects to heritage sites impacted by horse trampling in wet areas, dispersed camping, artifact collecting and off road vehicle use. Forest projects like prescribed burning, wildfires, fire suppression, stream improvement projects, wildlife projects, timber harvest, thinning of young trees and juniper would continue. These projects and the ongoing invasive weeds treatment have been designed to avoid or protect the qualities which make these sites eligible to the NRHP. Consultation with the Oregon SHPO has been completed on a project specific basis. These projects would not add to the cumulative effect to heritage resources.

Compliance with SHPO was completed on June 5, 2008. 424 new acres were surveyed and no sites were identified. Proposed water developments, fences, corral site area and cattle guard locations have been surveyed. Site updates were made to several sites where cattle effects may occur. The site revisits determined stock grazing had no impact to these types of sites. Known sites would be avoided or the qualities which make these sites eligible to the NRHP would be protected. As previously stated, a finding of no effect was submitted to the Oregon SHPO for all the proposed actions within the Burn and Crystal EA.

## **Treaty Rights**

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Treaty rights and privileges reserved by the Confederated Tribes of the Warm Springs Reservation for lands ceded to the federal government through the 1855 Treaty with The Tribes of Middle Oregon would be honored. Consultation with the CTWSR has been part of the NEPA process (personal communication with members of the CTWSR Culture and Heritage Committee June 19, 2008). Traditional foods and resources are present and there would be no change to access or availability. Reauthorization of the Burn and Crystal grazing allotments would continue to honor the rights and privileges of the CTWSR. Traditional foods like *kunch* would not be affected by stock grazing. This project proposes no change to road systems or access.

Local tribes would be contacted should any burial remains be discovered. Stock grazing would not change the American Indians inherent right of freedom to believe, express and exercise traditional religions. The project area is located in the Crooked River watershed and within areas of cultural interest to several neighboring tribes including The Burns Paiute Tribe, The Klamath Tribes and the Confederated Tribes of the Umatilla Indian Reservation

## Socio-Economics

### Affected Environment

For the purposes of describing socio-economics effects, the counties of Crook, Deschutes, and Jefferson were considered because they are the area most likely affected.

The major population centers and their population figures based on the 2000 census are Prineville (7,356), Bend (52,029), Redmond (13,481), and Madras (5,078) (U.S Department of Commerce, Bureau of Census 2001). The total population for the three-county area during the 2000 Census totaled 234,235. Populations and change for the region and by each individual county are displayed in Table 42.

**Table 42. Central Oregon population growth.**

County	Population		Change	Percent
	1990 Census Data	2000 Census Data		
<b>Jefferson</b>	13,676	19,009	5,333	39
<b>Deschutes</b>	74,958	115,367	40,409	53.9
<b>Crook</b>	14,111	19,182	5,071	35.9
<b>Totals</b>	102,745	153,558	50,813	50

Source: U.S. Bureau of the Census, Vital Records, Oregon Health Division

Future population projections mimic that of the past decade. Deschutes, Crook, and Jefferson Counties are expected to continue with aggressive growth.

Madras and Jefferson County have Central Oregon’s most culturally diverse population. Native Americans comprise 16 percent and Hispanics 18 percent of the area’s overall residents. Crook and Deschutes Counties’ minority populations are 7 percent and 5 percent, respectively. Oregon as a whole consists of a 15 percent minority population (U.S. Department of Commerce 2001).

According to the 2000 Census, estimated civilian labor force was 7,525 in Crook County (up 12 percent since the 1990 census), 57,614 in Deschutes County (up 40 percent since the 1990 census), and 8,570 in Jefferson County (up 31 percent since the 1990 census). The labor force in Oregon as a whole increased 18 percent.

In Crook County, the three largest employment sectors were trade (1,640), lumber and wood products (1,510), and government (1,180). Since then, with the closure of the remaining sawmills, employment in the lumber and wood products has decreased. In February 2006, there were 1,110 people employed in the lumber and wood products sector. In Deschutes County, the three largest sectors were Finance/Insurance/Real-estate (14,170), trade (13,080), and government (6,900). In Jefferson County, the three largest sectors were government (2,460), trade (1250), and lumber and wood products (1,150) (U.S. Department of Commerce, Bureau of Economic Analysis 2001 and Labor Trends 2006).

Unemployment rates in the individual counties were 9.1 percent in Crook County, 6.4 percent in Deschutes County, and 6.5 percent in Jefferson County. The unemployment rate in Oregon as a whole was 5.7 percent (U.S. Department of Commerce, Bureau of Census 2001).

Since then the economies have had both better and worse years. As of February 2006, unemployment rates in the individual counties were 7.7 percent in Crook, 6.1 percent in Deschutes, and 8.5 percent in Jefferson. The unemployment rate in Oregon as a whole was 6.5 percent (Labor Trends 2006)

The economies of Deschutes and Jefferson Counties, followed by Crook, are the most robust in all of central and southeastern Oregon. In Deschutes County, although there has been an increase in the number of jobs created, the huge increase in the labor force (up 40%) has negated much of this success, at least in terms of the unemployment rate. Crook County's overall economic diversity which is dominated by one manufacturing sector industry (lumber and wood products) and one wholesale trade sector company (Les Schwab) is lower than the other two economies; however, because of their diversity all three economies are expected to remain strong. Future projections call for continued growth and diversification of these economies (U.S. Department of Commerce, Bureau of Census 2001 and Oregon Employment Department).

Crook County's agricultural sector is heavily oriented toward livestock (cattle). However, much of the marketing and agricultural services for the tri-county area, are located in Jefferson County. Although farm employment is only about one third of what it was in 1970, it remains an important contributor to the local and surrounding communities' economies.

Statewide in 2005 there were 1,686,000 cattle. Livestock (cattle) sales statewide in 2005 were \$619,491,000, which comprised 21 percent of all agricultural sales. In Oregon, livestock sales lead all state agricultural production.

Agricultural crop sales in Crook County for 2005 totaled \$42,624,000. Livestock sales were 65 percent or \$27,487,000 of that total. Agricultural crop sales in Jefferson County for 2005 totaled \$42,958,000. Livestock sales were 29 percent or \$12,588,000 of that total. Agricultural crop sales in Deschutes County for 2005 totaled \$23,257,000. Livestock sales were 38 percent or \$8,929,000 of that total (Oregon State University 2005). Of the three counties' agricultural economic sectors, Crook County is the most dominated by cattle.

Most of the animals that currently graze on the Ochoco National Forest (including on these allotments) are mother or breeding beef cattle. They are part the ranching and farming economic base of the area. They produce the calves, which are sold to be "fed out" to produce consumer beef and provide a foundation for the beef industry. They are part of the basis of stability for the local industry. Livestock sales in Crook County were 65 percent (\$27,487,000) of the total agricultural crop sales, by far the single largest agricultural commodity in the county.

Changing the authorized level of use could affect the economic viability of the permittees' operations, depending on the minimum number of Animal Unit Months (AUMs) necessary for the permittees to remain in business. The magnitude of effects would depend upon several factors including: (1) options available to each permittee; (2) the size of their total operations; (3) debt structure; (4) access to and availability of private land for grazing; (5) availability and costs of replacement forage; (6) business goals and objectives; and, (7) the market for cattle.

Changing the number of permitted AUMs could affect the associated ranches' capacity because grazing on these allotments provide up to 50 percent of the ranches' forage needs.

## **Environmental Consequences**

### ***Alternative 1***

#### **Direct and Indirect Effects**

Under Alternative 1, grazing would be eliminated on both allotments. Whether the permittees would continue to maintain their business in a reduced form or supplement the forage loss

through other means could depend on several factors. The permittees may choose a number of different options to provide forage previously provided by these allotments. They may choose to: (1) graze on their own properties if they have sufficient grazing land; (2) find and graze on other private lands at a fee; (3) use alternative sources of feed such as purchasing hay; or (4) reduce the size of their herds (i.e. sell cattle) to reduce their demand for forage.

Eliminating cattle from these allotments could affect the economic viability of the livestock operations because of the additional costs associated with securing additional range or buying supplemental feed, to accommodate herd sizes consistent with current permitted numbers. Additional costs could include the possibility of additional fencing and establishment of water on newly acquired range, along with increased trucking costs, and labor costs associated with moving and otherwise handling cattle.

In Crook County, buying additional pasture use can cost up to \$15 per AUM (Fessler 2003). The amount charged per AUM on public lands is \$1.56 (2006). Along with additional forage costs, there may be added costs related to transporting cattle to various locations, hiring additional employees, or other administrative costs that may occur because of changing established grazing routines.

### **Alternatives 2, 3, and 4**

#### **Direct and Indirect Effects**

Alternatives 2 and 3 would not change permitted AUMs. Alternative 4 would temporarily reduce AUMs in the Crystal Springs Allotment to 733. This reduction would occur during the period of time when the riparian pastures are being rested, so would last for a minimum of 4 years and potentially longer. Permitted AUMs would return to 871 after the rest period is no longer necessary.

Alternatives 2 and 4 include an active management requirement in both allotments and additional maintenance with the addition of new water developments and/or fences. These requirements would increase the administrative cost to manage these allotments.

Although the changes in AUMs and increased administrative costs would have some economic impact on the permittees, the magnitude of effects depends upon a number of factors, including options available to each permittee, the size of their total operations, debt structure, and business goals and objectives. These factors are specific to each individual operation and only the permittees can choose which options fit their business needs.

Table 13 shows annual permitted AUMs by alternative. Assuming a direct relationship between herd size and total sales, the percentage decreases in AUMs noted for each alternative when compared to Alternative 3 provides estimates of changes in potential gross sales.

Grazing reductions could affect employment and income in three ways: (1) direct effects attributable to employment associated with the ranches; (2) indirect effects attributable to industries that supply materials, equipment, and services to the ranches; and (3) induced effects attributable to personal spending by the ranch owners, employees, families, and related industries.

Changes in jobs and personal income would result in changes in the economic activity of the communities where the permittees base their operations, hire employees, and buy equipment, supplies, and services. Under all alternatives, corresponding job and income effects would be attributable primarily to Crook and Jefferson Counties.

#### **Cumulative Effects**

The economic influence from implementation of any of the alternatives, including Alternative 1, is likely to be minimal within the economic context of the three county area as a whole.

Although the area has a substantial number of people whose work activities fall within the ranching life-style category, the ranching industry does not require substantial labor inputs to produce a unit of output (a single cow). In addition, the ranching industry is not tied as directly to Federal lands as the wood products industry. As a result, the elimination of livestock grazing under Alternative 1 would not have a major impact on the number of people making a living from ranching. Under Alternatives 2, 3, and 4, although there are differences in permitted numbers, actual use is expected to be relatively similar to the recent past, as a result all three action alternatives would help maintain the existing ranching industry and the people who make a living from it.

Employment trends within Crook County and throughout the Central Oregon area indicate the increased job supply is primarily in construction, services, and trade. Even considering other management activities in the project areas (timber harvest, road construction, burning, and precommercial thinning from the Spears Vegetation Management Project and other projects) the economic influence would be small.

## **Cumulative Effects**

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Cumulative effects have been discussed throughout this chapter. As discussed in the June 24, 2005, Council on Environmental Quality Memorandum on Guidance of the Consideration of Past Actions in Cumulative Effects Analysis, past actions that warrant consideration because they are continuing to cause identifiable effects in the project area have been considered and are described in Table 47. Past activities that have changed the environmental baseline have been included in the description of the affected environment. Table 43 also includes a description of present and reasonably foreseeable actions that were considered in the cumulative effects sections. The type and amount of activity have been described on an allotment-by-allotment basis to provide both the decision-maker and the public a better estimate of the expected effects.

Past activities include activities that have already been completed. Present activities include activities that have been authorized under a separate NEPA decision and are partially implemented or will be implemented in the near future (1-10 years). Reasonably foreseeable actions are those actions that have been proposed, but have not been authorized through a NEPA decision.

**Table 43. Past, Present, and Reasonably Foreseeable Future Actions**

Allotment	Past	Present	Reasonably Foreseeable
Project/Activity			
Burn	<p><u>Marks Creek fire</u>: burned almost 4,000 acres in 1967.  <u>Blaster fire</u>: burned 24 acres in 1994.</p>	<p><u>Spears Vegetation Management Project</u>: 65 acres of commercial harvest, 455 acres noncommercial thinning, and 317 acres fuels reduction activities.</p>	None identified.
Crystal Springs	<p><u>Riparian Planting</u>: Coyle Creek - 0.625 miles.  <u>Coyle Butte fire</u>: burned 83 acres in 1996.</p>	<p><u>Spears Vegetation Management Project</u>: 67 acres commercial harvest, 456 acres noncommercial thinning, 247 acres fuels reduction activities and 57 acres of aspen treatments.  <u>Ochoco Valley Fuels</u>: 184 acres fuels reduction activities.</p>	None identified.
Projects/Activities Common to all Allotments			
	<p>Historical livestock grazing, timber harvest, prescribed fire, fire suppression, firewood cutting, seeding non-native species, beaver trapping, road construction, and recreational activities, such as driving, camping, hunting, riding OHV's, and artifact collecting.</p>	<p>Firewood cutting, fire suppression, weed treatment, road maintenance, fence maintenance, and recreational activities such as driving, camping, hunting, and riding OHV's.</p>	<p>Fire suppression, firewood cutting, weed treatment, road maintenance, and recreational activities such as driving, camping, hunting, and riding OHV's.</p>

**Other Disclosures** \_\_\_\_\_

**State and Local Laws**

Implementation of all alternatives would be consistent with State and local laws, land use, and environmental policies.

**National Environmental Policy Act (NEPA)**

NEPA establishes the format and content requirements of environmental analysis and documentation. The entire process of preparing this environmental assessment was undertaken to comply with NEPA.

**National Historic Preservation Act**

The Burn and Crystal Springs Allotment Management Plan project area was reviewed for heritage resources under the terms of the 2004 Programmatic Agreement among the USFS R6, ACHP, and SHPO. The project complies with Section 106 of the National Historic Preservation Act by meeting Stipulation III (B) 1 (Undertaking meets the criteria in the PA for a No Historic

Properties Affected determination). For more information, see the June 5, 2008, transmittal letter for S.106 NHPA Compliance and Consultation located in the project file at the Lookout Mountain Ranger District.

## **Endangered Species Act 1973**

This Biological Evaluation (BE) documents possible effects of proposed activities on threatened and endangered species in the project area. There are no endangered species known or suspected to occur on the Ochoco National Forest. Threatened aquatic species that are known or suspected to occur on the Ochoco National Forest include bull trout and mid-Columbia River steelhead trout. Potential effects to these species were analyzed and the analysis is summarized in this Biological Evaluation. There would be no effect to bull trout or mid-Columbia River steelhead trout. Consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries Service is not applicable for the Burn and Crystal Springs project area.

## **Clean Water Act**

The objective of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of all waters to protect the Beneficial Uses as documented according to criteria by the Oregon Department of Environmental Quality (ODEQ). A beneficial use is a resource or activity that would be directly affected by a change in water quality or quantity. Beneficial uses are defined on a basin scale in the Oregon Administrative Rules for water quality and cover large areas of land. The beneficial uses for this project are derived from the entire Deschutes Basin (approximately 6.9 million acres).

The beneficial uses in the Burn and Crystal Springs Group AMP Project include irrigation, livestock watering, salmonid fish rearing, salmonid fish spawning, resident fish and aquatic life, wildlife and hunting, fishing, water contact recreation, and aesthetic quality. There is also industrial and domestic water supply use associated with wells.

Under Section 319 of the 1987 CWA Amendments, states are required to determine those waters that will not meet the goals of the CWA, determine those non-point source activities that are contributing pollution, and develop a process on how to reduce such pollution to the “maximum extent practicable.” Section 303(d) of the CWA requires that a list be developed of all impaired or threatened waters within each state. The ODEQ is responsible for compiling the 303(d) list, assessing data, and submitting the 303(d) list to the Environmental Protection Agency (EPA) for federal approval.

Except for a small water gap on Ochoco Creek, there are no 303(d) listed streams in the Crystal Springs or Burn Allotments. Two streams that are currently on the 2004/2006 303(d) list for exceeding the average of the 7-day maximum stream temperature standard for rearing of 18.0°C (64.4°F) are immediately adjacent to the project area and may be affected by water temperatures of streams flowing from the allotments. The following streams are on the 303(d) list from mouth to headwaters: Marks Creek and Ochoco Creek. Further discussion on these streams occurs under the “Description of Watersheds, Subwatersheds, and Streams” section of this report.

## **Wetlands and 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. Alternatives 1, 2 and 4 are consistent with these executive orders. These alternatives either eliminate or reduce livestock grazing in floodplains or wetlands. The level of livestock use in riparian areas under Alternatives 2 and 4 would reduce the amount of streambank alteration when compared with current uses

(Alternative 3). Alternatives 2 and 4 would not result in adverse modifications of floodplains or wetlands. Alternative 3 does not alter the current timing or distribution of livestock grazing; livestock tend to congregate in riparian areas and are causing streambank alteration that may lead to entrenched stream channels and cause adverse modification to floodplains.

## **Civil Rights and Environmental Justice**

Civil Rights legislation and Executive Order 12898 (Environmental Justice) 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 project is not located in a minority community and would not affect residents of low or moderate income. Therefore the proposed action would not pose a disproportionately high or adverse effect to those populations.

There is no known potential for disparate or disproportionately high effects from any of the alternatives considered in this environmental impact statement to low-income or minority populations. None of the alternatives considered would discriminate or negatively impact any individual or subset of the population described above.

## **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. Alternative 1, which would eliminate livestock grazing from two allotments, would result in an irretrievable loss of the economic value of forage for livestock. Under all three action alternatives, there would be a level of detrimental soil conditions that would cause an irretrievable loss of soil productivity.

## **Inventoried Roadless Areas and Wilderness**

The project area does not contain any Inventoried Roadless Areas or any Wilderness. The Diamond Peak Wilderness is adjacent to the northwest side of the project area, and may benefit from a reduced risk of catastrophic fire in the vicinity. Unit 28 lies adjacent to the Wilderness boundary. Fuels reduction may improve the ability to fight fire coming from the wilderness or heading towards it. A project to create barriers to OHV and other motorized/mechanized vehicles that can easily access the Wilderness is currently in the planning stages.



## CHAPTER 4 - CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

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### ***Federal, State, and Local Agencies:***

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U.S. Fish and Wildlife Service, Jerry Cordova  
Prineville-Crook County Chamber of Commerce

### ***Tribes:***

Confederated Tribes of the Warm Springs Reservation  
The Burns Paiute  
The Confederated Tribes of the Umatilla Indian Reservation  
The Klamath Tribes

### ***Others:***

Blue Mountains Biodiversity Project, Karen Coulter  
Sierra Club, Asante Riverwind  
The Wilderness Society, Bob Friemark  
Oregon Wild, Tim Lillebo  
Oregon Wild, Chandra LeGue  
Oregon Trout, Aubrey Russell  
Susan Jane M. Brown  
Forest Conservation Council, Bryan Bird  
Central Oregonian, Vance Trong  
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Archaeological Society of Central Oregon, Susan Gray  
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Center for Water Advocacy, Hal Shepherd  
Animal Welfare Insitutue, Andrea Lococo  
Grant County Conservationists  
Oregon Hunters Association  
The Bulletin  
Honorable Scott Cooper, Crook County Judge

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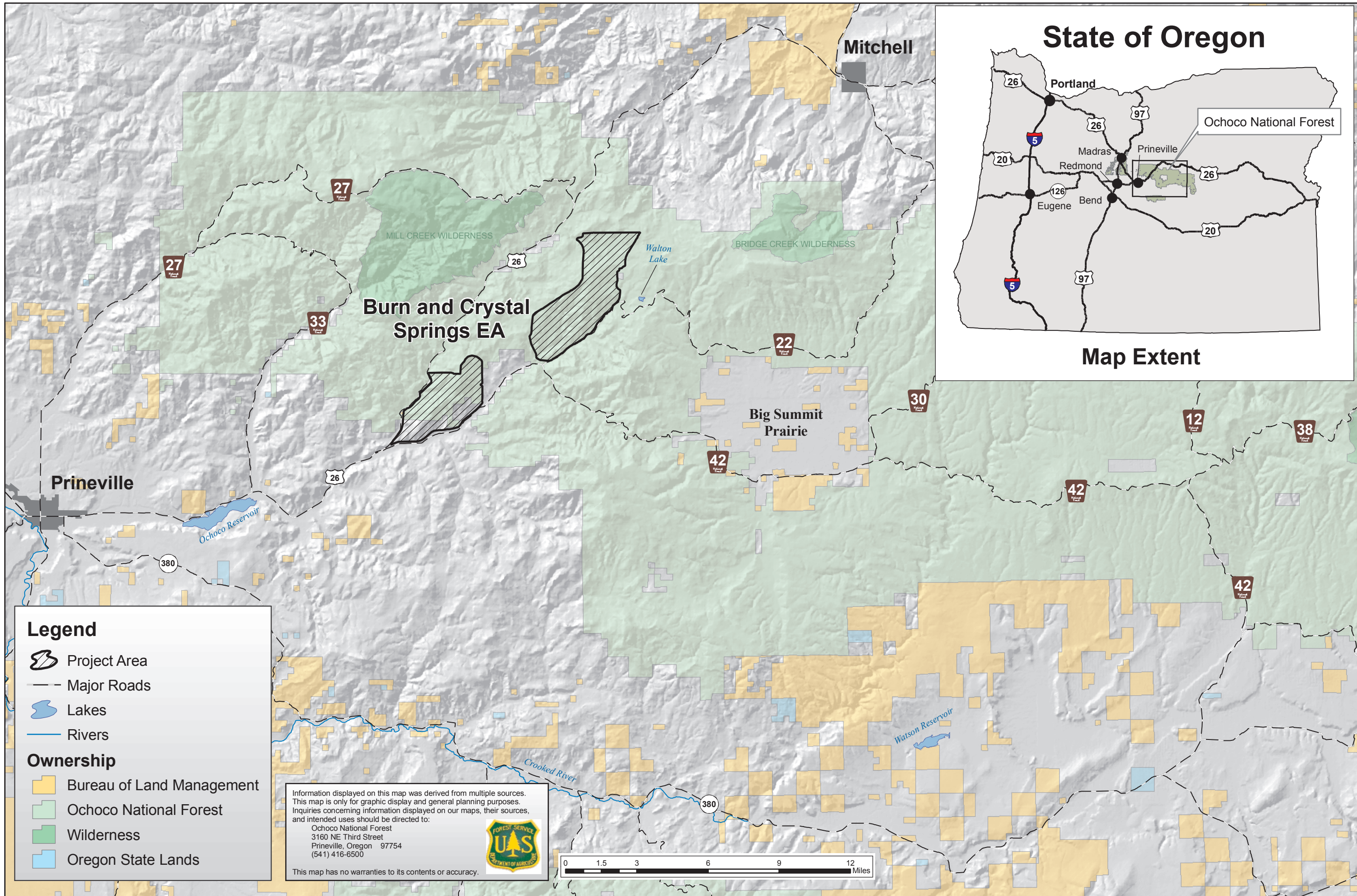
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## **APPENDIX A - MAPS**





**Legend**


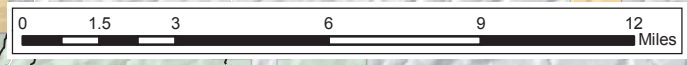
- Project Area
- Major Roads
- Lakes
- Rivers

**Ownership**

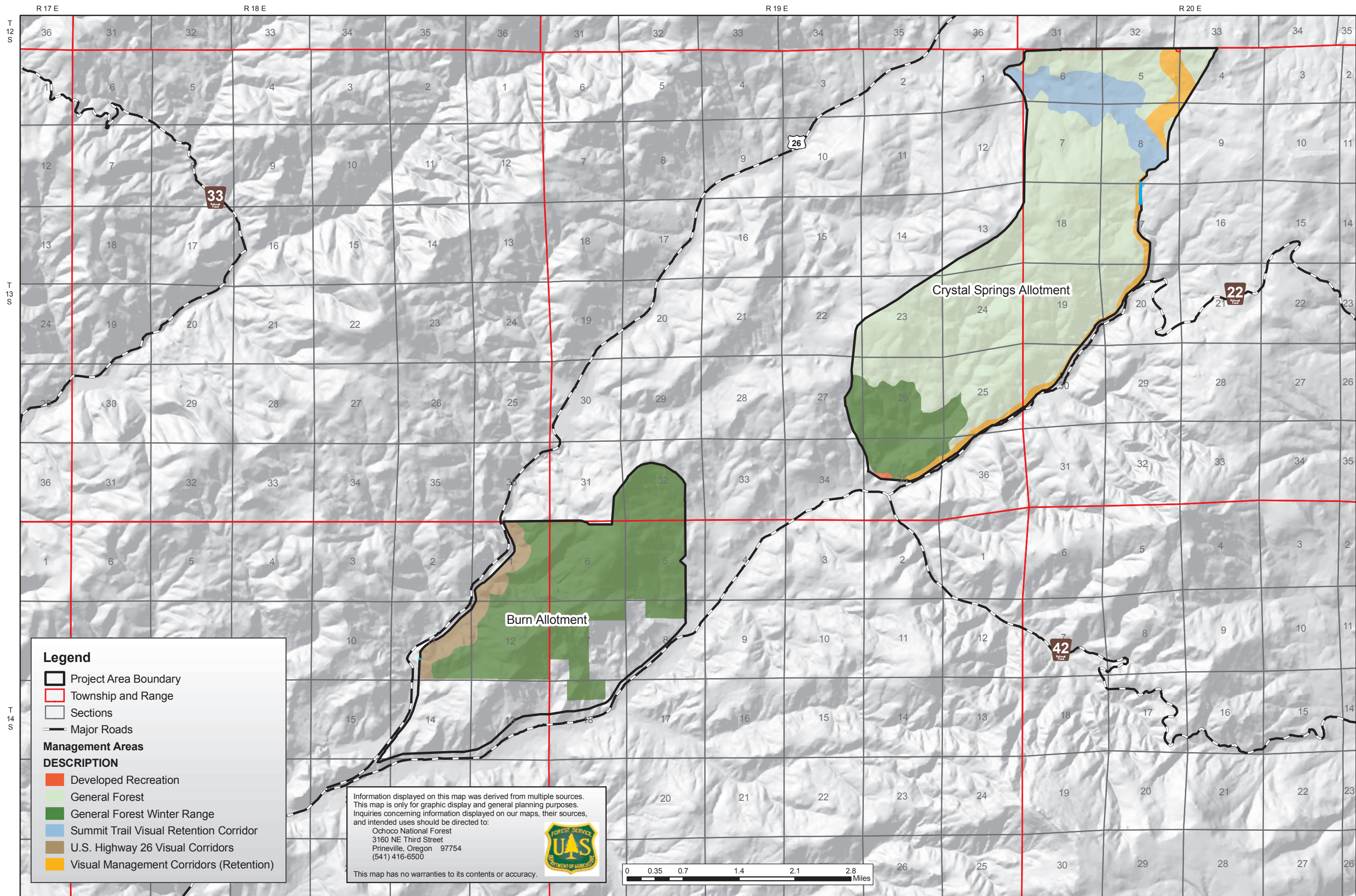
- Bureau of Land Management
- Ochocho National Forest
- Wilderness
- Oregon State Lands

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 Ochocho National Forest  
 3160 NE Third Street  
 Prineville, Oregon 97754  
 (541) 416-6500

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**Legend**

- Project Area Boundary
- Township and Range
- Sections
- Major Roads

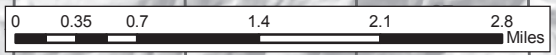
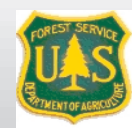
**Management Areas**

**DESCRIPTION**

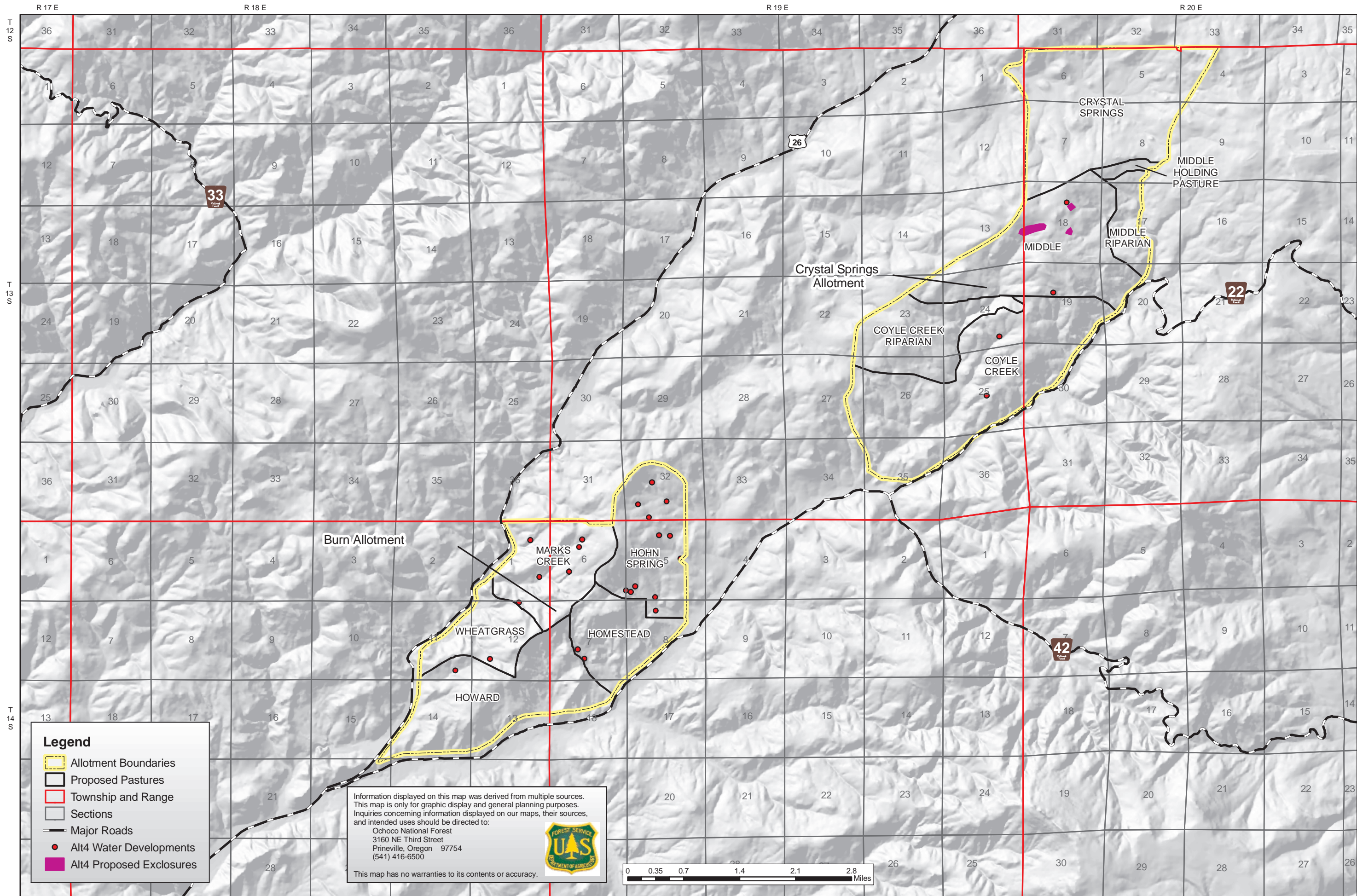
- Developed Recreation
- General Forest
- General Forest Winter Range
- Summit Trail Visual Retention Corridor
- U.S. Highway 26 Visual Corridors
- Visual Management Corridors (Retention)

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- Legend**
- Allotment Boundaries
  - Proposed Pastures
  - Township and Range
  - Sections
  - Major Roads
  - Alt4 Water Developments
  - Alt4 Proposed Enclosures

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