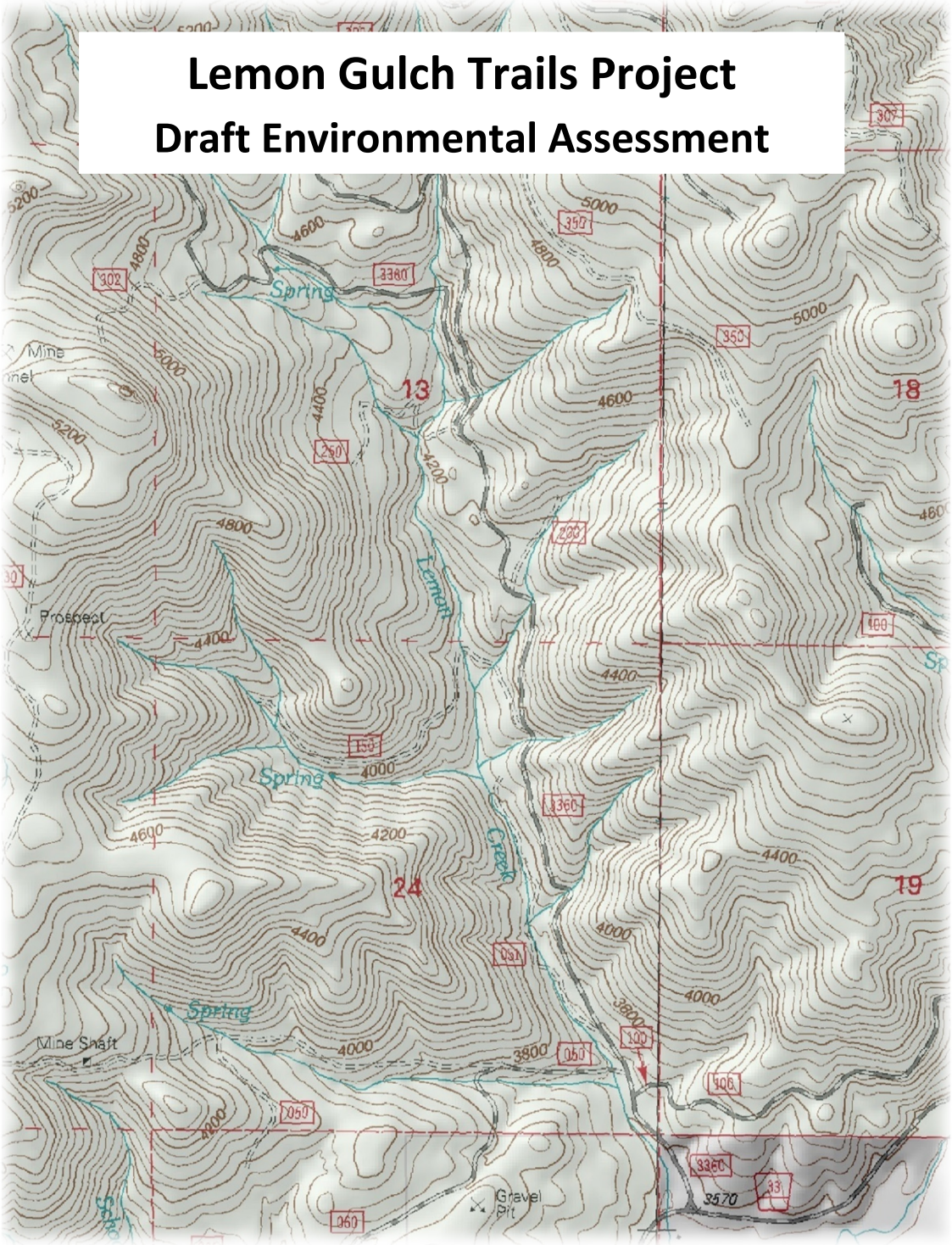
Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Pacific Northwest Region/Ochoco National Forest

November 2022

# Lemon Gulch Trails Project

## Draft Environmental Assessment



View of Steins Pillar from project area.

**For More Information Contact:**
Beth Peer
Forest Environmental Coordinator
3160 NE Third Street
Prineville, OR 97754
elizabeth.peer@usda.gov

We make every effort to create documents that are accessible to individuals of all abilities; however, limitations with our word processing programs may prevent some parts of this document from being readable by computer-assisted reading devices. If you need assistance with any part of this document, please contact the Ochoco National Forest at 541-416-6500.

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at How to File a Program Discrimination Complaint and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.

# Table of Contents

# Chapter 1 – Purpose and Need

## Introduction

The Ochoco National Forest (ONF) is proposing to develop a mountain bike trail system on the west side of the Lookout Mountain Ranger District about 20 miles northeast of Prineville, Oregon. The initial proposed action announced in March 2021 included a maximum of about 52 miles of new trail construction and trailheads. This EA analyzes five alternatives to the proposed action. The Agency's preferred alternative is Alternative 6 which would include 27.5 miles of trail.

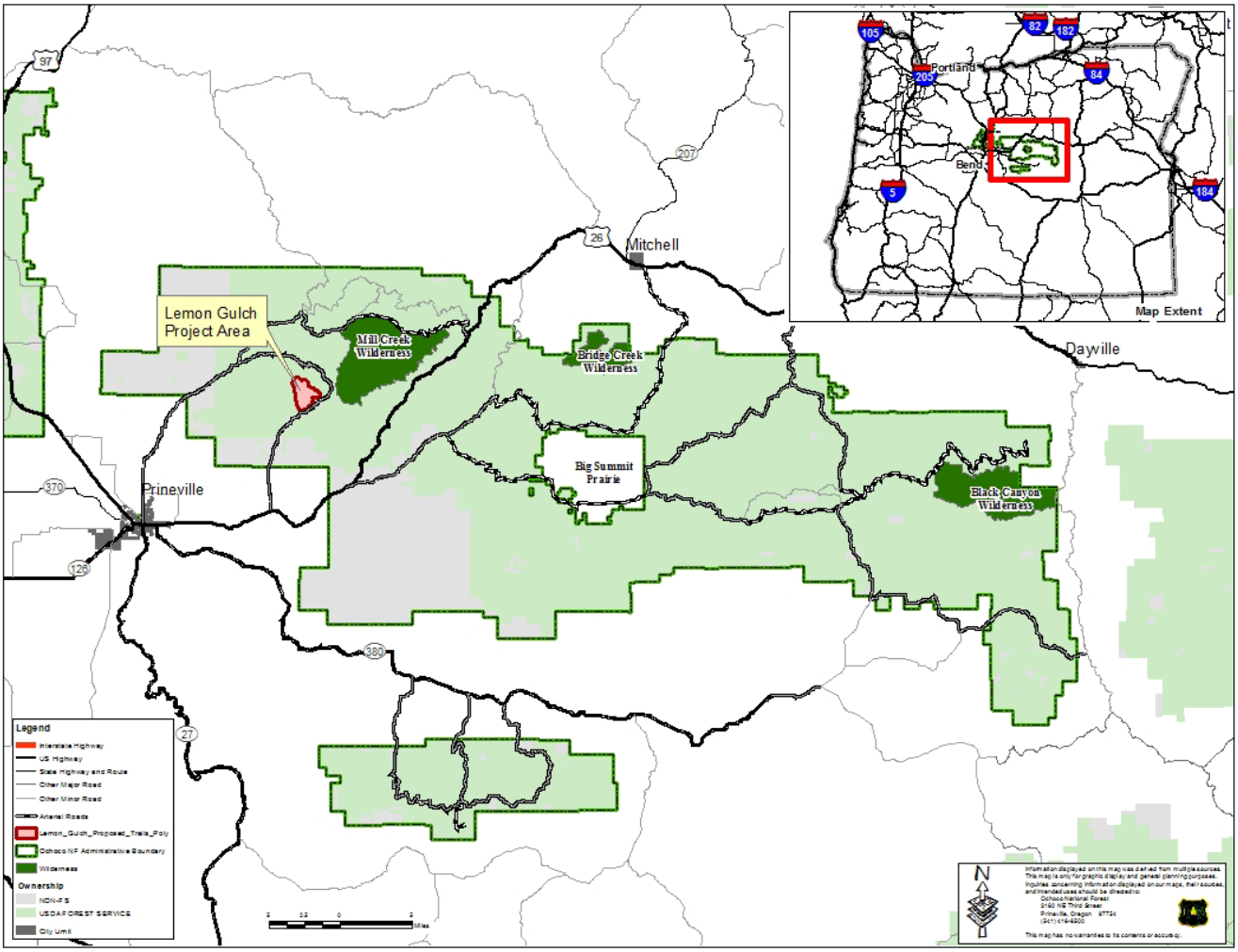



Figure 1: Vicinity of the project area in Central Oregon

The Ochoco National Forest has prepared this environmental assessment (EA) to comply with the National Environmental Policy Act (NEPA), in accordance with CEQ's implementing regulations at 40 CFR 1500-1508 and Forest Service implementing regulation at 36 CFR 220. An agency may prepare an EA for proposed actions that are not likely to have significant effects if it will assist in agency planning and decision making (40 CFR 1501.5 (a) and (b)).

## Background

The overall goal for recreation on the Ochoco National Forest is to "[p]rovide for a variety of recreational experiences across all areas of the Ochoco National Forest, in a manner consistent with other resource objectives and environmental constraints." (Ochoco Land and Resource Management Plan (LRMP) 4-22).

Objectives include providing a managed trail system for a variety of uses, including hiking, horseback riding, mountain biking, all-terrain vehicles, cross-country skiing, and snowmobiles. The Forest Plan envisioned a total of about 468 miles of non-motorized summer trails on the Forest. LRMP 4-23 to 4-24. There are currently about 156.5 miles of non-motorized summer trail available on the Ochoco NF. Non-motorized summer trails on the Ochoco NF were each designed and purpose built for a specific use such as hiking or pack and saddle. There currently are no trail systems that were designed and built specifically for mountain bike use and bikes are prohibited by law on 44 miles of existing trail that are located in Wilderness.

The growing popularity of mountain biking was recognized in the 1989 Forest Plan. And mountain bike enthusiasts have been proposing new trail mileage on the Ochoco NF since at least the early 2010s. But their proposals created conflict with other trail user groups. The Ochoco NF asked these various user groups to work together to deconflict trail proposals. The Ochoco Trails Strategy Group (now Ochoco Trails) was formed for this purpose. Originally facilitated by the Crook County – Prineville Chamber of Commerce, the group set out to identify where it would make sense to modify the use or management of trails or add new trails. The group worked from late 2017 through 2018. A forest-wide trails proposal was presented to a community open house in September 2018. They used feedback to refine a non-motorized trail proposal for the Forest Service's consideration.

Members of Ochoco Trails discussing non-motorized trail proposals with Forest Service staff.

The Ochoco Trails proposal, submitted to the Forest Service in 2019, included trail systems, connections, and improvements to trails across the entire Forest with different components intended to serve non-motorized users such as equestrians, mountain bikes, and hikers. The Forest considered the various trail proposals through a natural resource lens. Primary concerns at the Forest scale were avoiding wildlife habitat fragmentation by recommending trail systems as close to town as possible and avoiding important big game summer habitat. South-facing slopes are preferred because they provide generally more open terrain for trail building and less maintenance from brush regrowth. It is also preferred to concentrate trails where there is already existing disturbance. After consulting with Oregon Department of Fish and Wildlife, the Forest Service opted to move forward with just one of three proposed mountain bike systems.[1]

## Purpose and Need

The project is needed because there is a demonstrated interest in new trail miles for mountain biking within the Ochoco NF and the Forest Plan has an objective that a managed trail system be provided for a variety of uses including mountain biking. There is a wide gap between the Forest Plan's objective of 468 miles of non-motorized summer trails and the existing 156.5 miles and there are currently zero miles of trail designed and built for mountain bike use. There is also a need to avoid a proliferation of user-created trails, as has occurred in other areas, by providing an opportunity on the Forest that is properly

[1] Other elements of the Forest-wide Ochoco Trails proposal have moved forward through planning and implementation, including equestrian trail improvements at Allen Creek and Dry Creek Horse Camps and conversion of winter trails to year-round trails in the Bandit Springs area. Also see page 16 for explanation why the Ochoco NF did not move forward with the other two mountain bike system proposals and other areas considered.

designed and located.

The purpose of the project is to provide a properly designed and built mountain bike system that is easily accessible, avoids important summer range wildlife habitat, and that meets the following objectives:

- Provide loops, downhill riding opportunities, and new mileage designed and managed for mountain bike use.
- Provide various levels of accessibility and trail difficulty to suit a wide array of people.
- Draw and more evenly distribute current and future mountain bike use away from other areas such as Lookout and Round Mountain to minimize interactions with other users and improve the experience and safety of equestrians and hikers in those areas.

## Management Direction

**Ochoco Land and Resource Management Plan (Forest Plan)**

The Forest Plan, as amended, provides guidance for management activities on the Ochoco National Forest. It establishes goals, objectives, and desired future conditions, identifies management areas within the Forest, and provides standards and guidelines for each management area as standards and guidelines that apply Forest-wide (USFS 1990b). The Forest Plan requires that a variety of recreational experiences will be provided across all areas of the Ochoco NF, in manner consistent with other resource objectives and environmental constraints.

Relevant Forest-wide Standards and Guidelines for the development of trails:

- Recreational activities will be managed to prevent deterioration within riparian areas.
- Provide facilities needed to protect public health and safety (toilets or campfire rings for example), and for environmental protection.
- Construct and maintain the trail system to standards suitable for type and amounts of use. Maintain trails to prevent resource damage, protect the investment in the system, and provide for user safety. In areas of concentrated use, trails should be designed and maintained to minimize impacts on riparian communities.

Proposed trail segments overlap the following two management allocations (Figure 2):

*General Forest:* The emphasis for General Forest is timber and forage production while meeting Forest-wide standards and guidelines for all resources. There are no specific management area standards or restrictions for nonmotorized trails. General recreation guidance states "[p]rovide recreational improvements where needed to protect the resources or sites. Sites receiving recurring use should be checked periodically for safety considerations (water sources, hazard trees)."

*Winter Range:* The management emphasis is for big game winter range habitat. The area is not accessible to motor vehicles from December 1 to May. There are no specific management area standards or restrictions for nonmotorized trails.

*Recreation Opportunity Spectrum (ROS):* The Forest Plan assigns an ROS class to each management allocation. The ROS provides a general framework for defining the types of outdoor recreation opportunities that will be provided in an area. According to the Forest Plan, the ROS class for General Forest and Winter Range management allocations ranges from Roaded Natural to Roaded Modified to Rural.

*Visual Quality Objective (VQ):* According to the Forest Plan, the VQO in General Forest and Winter Range is Maximum Modification (human activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background).

**Inland Native Fish Strategy**

The Inland Native Fish Strategy (INFISH) was developed to provide interim direction for the protection of habitat and populations of resident native fish outside of anadromous fish habitat in eastern Oregon, eastern Washington, Idaho, western Montana, and portions of Nevada. The following relevant standard was used to guide the project design:

RM-1: Design, construct, and operate recreation facilities, including trails and dispersed sites, in a manner that does not retard or prevent attainment of the Riparian Management Objectives and avoids adverse effects on inland native fish.

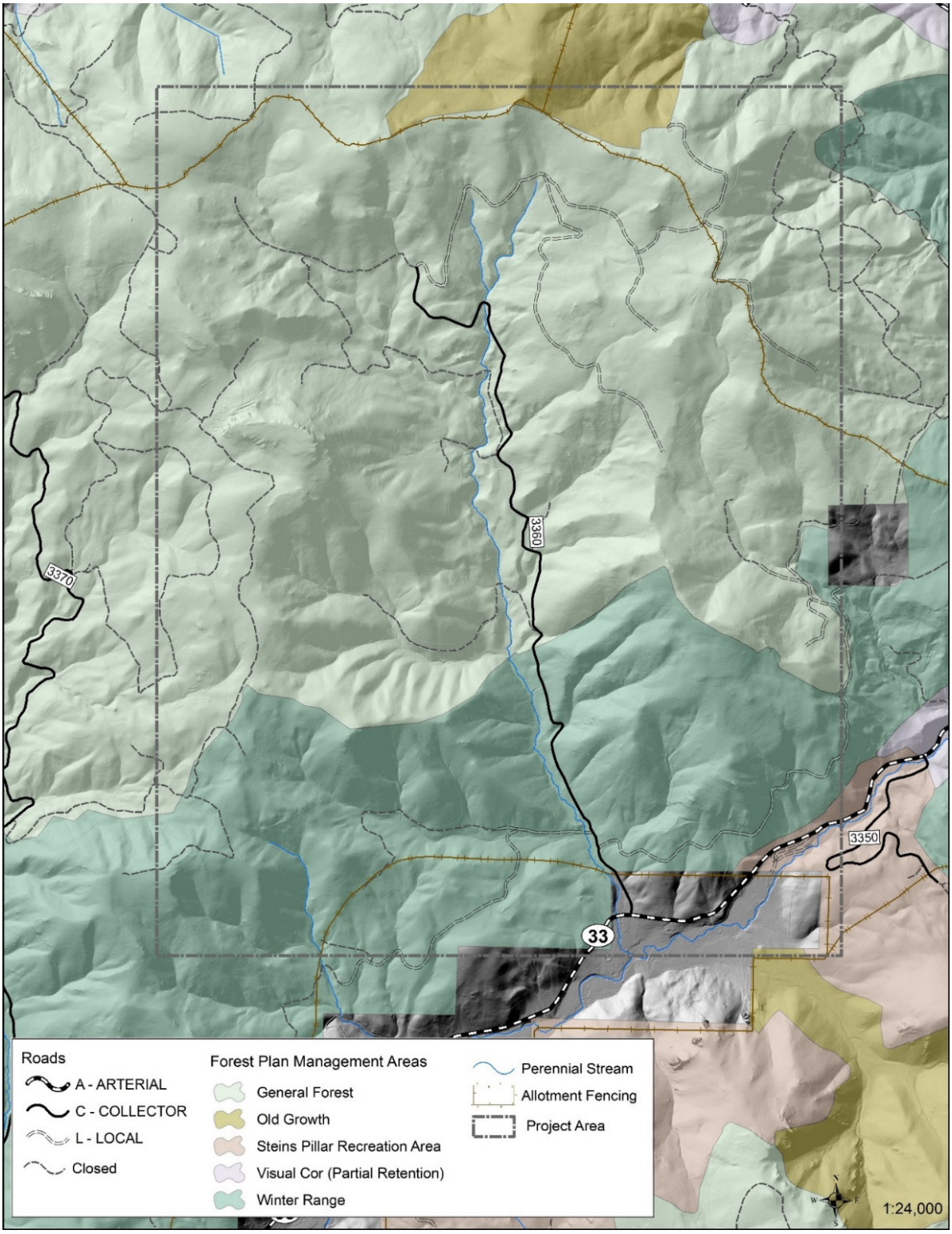



Figure 2: Forest Plan Management Allocations

# Chapter 2 – Issues and Alternatives

## Public Scoping

The Forest Service proposed a trail system on the Lookout Mountain Ranger District for up to 52 miles of trail with considerations for various skill levels, adaptive equipment, downhill opportunities, and loops. The trails would be designed for mountain bike use. Hiking would also be allowed. The proposed action has been slightly modified and is now referred to as Alternative 2 throughout the rest of this EA.

The District Ranger issued a letter dated March 10, 2021 announcing the proposal. The letter was distributed to 447 individuals, organizations, and government agencies; notices were also posted on social media. The project was posted to the Forest's project web page on March 2, 2021. Written responses were received from 90 individuals, agencies, and organizations during this initial scoping period which ended April 30, 2021. After hearing concerns from local landowners and grazing permittees who wanted more time to provide their input to the proposal, the Forest Service undertook additional public engagement during the spring and summer of 2021. Several meetings were held with affected permittees. Forest Service staff attended numerous meetings of the Crook County Natural Resources Advisory Committee. The Forest Service continued to receive written correspondence through December 2021, ultimately receiving comments from a total of over 130 individuals. The public input helped the Forest Service develop alternatives and identify relevant resources issues to analyze.

The ID Team and Responsible Official reviewed comments received in response to the scoping notice, information gathered during the additional public engagement efforts, and all additional correspondence. Issued raised were identified as either a key issue (which could lead to project design or alternatives), an analysis issue, or as an issue outside the scope of this project that will not be considered further. Key issues that were used in developing alternatives to the proposed action are described in the following section.

## Key Issues

**#1 - Potential for Impacts to Management of Livestock within Grazing Allotment**

For context, the proposed trail system is located almost entirely within one pasture of the 51,305-acre Mill Creek Allotment, the largest allotment on the Ochoco NF. The Lemon Pasture (15,084 acres), where nearly all proposed trails are located, is one of five pastures in the allotment (Table 1). The grazing season generally occurs from early May through September in the Mill Creek Allotment. The Lemon Pasture is typically used first and grazing occurs generally from early May through June, based on recent years' Annual Operating Instructions (see Table 1). One trail segment falls within the Hereford Pasture of the Steins Allotment in alternatives 2 and 5.

Table 1: Allotments and pastures overlapping the project area

| Mill Creek Allotment | Acres | General timeframe of use by permittee* |
|---|---|---|
| Lemon Creek Pasture | 15,084 | May – June** |
| McKay Pasture | 9,756 | June - July |
| Harvey Creek Pasture | 4,473 | Aug – Sept |
| A-Y Pasture | 4,679 | Aug – Sept |
| Big Pasture | 17,312 | July - Sept |
| **Total** | **51,305** | |
| **Steins Allotment** | | |
| Hereford Pasture*** | 410 | June – Sept |
| Steins Pasture | 4,030 | June – Sept |
| **Total** | **4,440** | |

* The exact timing of use in each pasture varies by year per Annual Operating Instructions.
**Lemon Creek Pasture, where most of the proposed trails are located, is typically used for six weeks between early May and late June. There are no proposed trails located in other pastures of the Mill Allotment.
*** One trail segment bisects the Hereford Pasture. There are no proposed trails in the remainder of the Steins Allotment.

Concerns raised about the presence of mountain biking within an active allotment fall within two categories: potential impacts to the permittee's ability to manage livestock distribution properly, and potential safety issues related to encounters between recreationists and cows. The timing of overlap between grazing operations and trail use would occur early in the grazing season because the Lemon Pasture is typically used first, and a majority of the livestock would be out of the pasture by July 1st.

This issue is addressed with all action alternatives by the inclusion of a phased approach to implementation. Nearly all fence crossings have been eliminated in the action alternatives. This issue is also addressed in varying ways with Alternatives 3, 4, 5, and 6 by reducing the amount of trail within or near areas identified as important to maintaining livestock distribution across the Lemon Pasture and by identifying options for trailhead locations.

**#2 - Potential for Impacts on Wildlife and Wildlife Habitat**

Recreation use has potential to impact wildlife by fragmenting habitat and creating disturbance during construction and use. Some scoping respondents raised concerns about effects to wildlife and specific suggestions include locating trails to avoid any goshawk nests or post-fledgling areas, minimizing fragmentation, and monitoring recreation use of the project area.

As described under "Alternatives and Project Design not Analyzed in Detail" the Forest Service already vetted trail proposals through wildlife habitat considerations. The Lemon Gulch project is located to avoid area of important summer range along the summit of the Ochoco Mountains, keep use close to town where existing recreational use already occurs, and avoid riparian habitat as much as possible. This issue is further addressed with project design in all action alternatives by including seasonal restrictions near active raptor nests or elk calving sites. Additionally, under all action alternatives, the winter motorized closure would remain in effect and would be applied to the non-motorized mountain bike trails.

Alternatives 3, 4, 5, and 6 also address this issue by reducing the amount and density of trails to varying degrees, with particular attention paid to large blocks of wildlife core habitat.

## Analysis Issues

In addition to the key issues, other environmental components will be considered in this EA to compare the alternatives, though they did not result in differing design elements between alternatives. These issues are important for providing the Responsible Official and public with complete information about the

effects of the project and how well each alternative meets the purpose and need. Impacts to the following resources are assessed: recreation experience, soil, water quality, aquatic species, botanical resources, invasive plant introduction and spread, transportation system, and cultural resources.

## Issues not Given Detailed Analysis

Some scoping comments that were received by the Forest Service were considered but did not lead to the development of an alternative and were not carried through into analysis (Table 2). The reasons may be one of the following: 1) the comment raises an issue that is outside the scope of the proposed action; 2) raises an issue that is already decided by law, regulation, Forest Plan, or other higher-level decision; 3) raises an issue that is adequately addressed in all alternatives; or 4) raises an issue that is conjectural and not supported by scientific or factual evidence. Also see the section titled "Alternatives not Analyzed in Detail."

Table 2: Scoping comments or concerns that were not carried into analysis

| Comment/Concern | Discussion |
|---|---|
| Some commenters expressed concerns that a trail system will increase the incidence of garbage dumping or other lawlessness in the area. | This issue is conjectural. There is no evidence that recreationists coming to a trailhead for biking would increase the incidence of dumping in the area above what already occurs (e.g. commenters noted abandoned RVs and tires on the roadside). The Forest Service will emphasize pack-it-out policy at the trailhead informational kiosk. Should monitoring show that litter is a problem the Forest could choose to add a dumpster at the lower trailhead. |
| Some commenters have expressed concerns that there would be no funds available for trail maintenance. | Future maintenance of trails on the Forest is outside the scope of this analysis which discloses the anticipated environmental effects of constructing trails and associated infrastructure.<br><br>Nevertheless, with our partners, individual volunteers, youth crews, and Forest Service crew, more miles of trail are being logged out and maintained faster than ever before. This project would be funded through grants from organizations such as Travel Oregon or from Oregon's Recreation Trails Program. Trails would be adopted by Ochoco Trails and COTA to ensure they receive annual and adequate maintenance. |
| Some commenters made statements that recreational use of trails is not compatible with the culture of the area and would destroy a way of life for people who live near the Ochoco National Forest. | This issue has already been decided by law and policy. The Multiple Use Sustained Yield Act of 1960 authorizes and directs the Secretary of Agriculture to develop and administer the renewable resources of timber, range, water, recreation, and wildlife on the national forests for multiple use and sustained yield of the products and services. And as described previously, the Ochoco Forest Plan includes objectives for providing recreation opportunities across the Forest, including mountain biking. Trails are an important means of providing access to public lands which are open to all visitors regardless of where they live. It is unclear how trails in the National Forest could change a person's way of life. |

| Comment/Concern | Discussion |
|---|---|
| The Forest heard from one individual who felt that the Forest Plan should be revisited with a modified focus. | Revision of the Forest Plan is outside the scope of this proposed action. The alternatives are developed to be consistent with current management direction. |
| The Forest received a request to consider assessing user fees to offset the cost of maintenance and administration of the trail system and associated infrastructure such as toilets. | The Forest Service is authorized under the Federal Land Recreation Enhancement Act (FLREA) to charge a recreation fee at certain types of sites. Those sites must meet a certain level of development to be part of the fee system. This project is not being designed to meet that level of development. Were it to meet the development criteria, an FLREA process to consider user fees would be conducted outside of the NEPA process which is for authorizing the construction of the trails and trailheads. Such a process through FLREA involves public involvement and regional review and approval. |
| Some commenters have expressed opposition to a perceived change in character of the area from mixed dispersed use to a "destination ski resort type" mountain bike trail complex that may bring "hundreds/thousands of new visitors." | This concern is unfounded as the proposed project is in no way comparable to a ski resort type of experience and anticipated visitation would not be hundreds or thousands per day. No large, paved parking lots, ski lifts, heavily engineered trails, or removal of large trees is proposed. The proposed action is consistent with the Recreation Opportunity Spectrum (ROS) designation for the area as discussed on page 36. |

## Alternatives Analyzed in Detail

Federal agencies are required by NEPA to evaluate reasonable alternatives to the proposed action, and, for alternatives that the agency eliminated from detailed study, briefly discuss the reasons for their elimination. 40 CFR 1502.14 (a). The Forest Service developed four alternatives to the Proposed Action, for a total of five action alternatives plus the No Action alternative. This section describes the reasonable alternatives that were developed to address resource concerns specific to the Lemon Gulch. Other alternatives were considered but eliminated from detailed analysis, see page 21.

### *No Action*

The Forest Service heard from people who were not opposed to mountain bike trails in general but were opposed to mountain bike trails specifically in the Lemon Gulch Area. Reasons for this were generally based on a personal connection to this part of the National Forest either because of its proximity to their property or because of their own use of it for recreation or livestock grazing. Some comments also expressed opposition to mountain biking anywhere on the National Forest. Additionally, some members of the public believe there are adequate opportunities for mountain bikers when considering existing roads and trails and that new trails specifically designed for mountain biking are unnecessary.

Under the No Action alternative, the trail system and associated infrastructure such as parking, signage, and toilets would not be constructed. The No Action alternative addresses the issue of opposition to the proposed action and serves to compare the environmental effects of the actions against the existing condition.

### *Action Alternatives*

Five action alternatives are analyzed in detail. **The following project components would be**

**common to all five action alternatives:**

*Multi-Use Trails*

Most of the trails would be multi-use, designed for primary use by mountain bikes but also open to hiking and trail running. Equestrian use of the trails would be discouraged to reduce conflicts, but not excluded through Forest Order unless serious issues arise.

*Public Education*

There are several components to public education that are included in any action alternative to reduce conflict, manage expectations, and prevent unwanted impacts. Informational materials will emphasize invasive plant prevention, pack-it-out policy, informing trail users about the presence of livestock and how best to ride within an active allotment, and to take the opportunity to generally inform the public about the multiple uses and benefits of public lands.

*Resource Protection Measures:*

All work would follow resource protection measures and water quality best management practices to avoid unwanted environmental impacts. These would be adhered to during project implementation under any action alternative and are considered in the effects analysis. A complete list is included in Appendix B of this EA.

*Motorized Closure and Trail Closure in Winter Range*

The FSR 3360 road system is closed annually from December 1 to May 1 for deer and elk winter range. The winter range closure would be applied to non-motorized use on the Lemon Gulch trail system to emphasize wildlife utilization in the winter months.

*Informal Dog Closure in Spring*

Visitors would be strongly discouraged from bringing dogs to the trails until after July 1. This would be emphasized in informational materials and educational efforts. A Forest Order could be put in place if not voluntarily adhered to and issues are occurring and reported.

*Recreation Events*

Recreation events on this trail system will only be allowed after the July 4th holiday and before the last Saturday in August, but this could be adjusted based on annual coordination with range and with changes in hunting or season dates. The intent is to avoid larger than normal amounts of visitors and vehicles during times of grazing and hunting. The size of the proposed trailheads will constrain the size of any event.

*Trail Design and Construction*

Trails would be built by hand and with a mini excavator and will include construction of trail tread (single track generally about 18 inches wide), riding features, and drainage features. Work would follow direction and guidelines in the Trails Management Handbook (FSH 2309.18) and Forest Service Standard Specifications for Construction and Maintenance of Trails (EM-7720-103). A list of trail segments and their length is included in Appendix A.

The Mill Creek Vegetation Project is closing a 0.15-mile segment of Forest System Road (FSR) 3360-100/130 which would be incorporated into the trail system. FSR 3360-100 serves as a catch road to the trail system and would remain open to motorized use, except for that segment. A short segment of trail will occur on FSR 3360-015 which is currently closed. In some alternatives, the lower portion of the cross-country trail on the west side of the project area would use FSR 3360-050 which will remain open to motor vehicles.

Entry and junction signs would be installed on 4x4 posts. Fence crossings have been eliminated except under Alternative. Where the trail crosses allotment fencing a ride over cattle guard and adjacent pass through gate would be installed.

Exact trail tread locations may be adjusted during implementation to avoid things such as weed sites or large snags.

*Trailhead Parking and Facilities:*

Three parking areas are proposed. Two options for upper and lower trailhead location are under consideration. The exact location of the parking areas will be coordinated with vegetation management activities to take advantage of log landing areas and minimize ground disturbance as much as possible.

The trailhead parking areas will be designed to a low level of development with surface of native material providing informal parking. Small parking areas are typically head-in parking. The toilet and ADA pad and ramp would have a gravel base. Some gravel may be introduced in particularly soft or muddy locations if compacted native surface is not adequate. See Figure 3 and Figure 4.

There are two options under consideration for the lower trailhead. These are shown as #6 and #7 on Figures 5 and 6. With the phased approach to implementation, the initial capacity at the main trailhead (lower trailhead) would provide room for about 20 vehicles on about 0.5 acre. At a maximum build out, the lower trailhead area would accommodate a maximum of about 35 vehicles and would require additional excavation.

One option for the middle trailhead is designated #2, shown on Figures 5, 6, and 7. It is on an existing landing that is already graded level but would require removal of about 25 saplings.

The upper trailhead would be for those choosing to leave a vehicle at the bottom or middle and shuttle a vehicle to the top. One option is located on an old landing that is already used for general parking and the other option would require removal of a few stumps and clearing of shrubs and small trees and compaction of the site. At about 1/5 - 1/4 an acre, either option could accommodate about 15 vehicles. Two options for the upper trailhead are designated #1 and 4 shown on Figures 5 and 7. A middle parking area would be for uphill or downhill riding and is located on an existing landing site measuring about 1/5 acre.

It is expected that some groups would bring two vehicles in order to shuttle, i.e. two or more riders could leave one car at the bottom trailhead and shuttle in one vehicle to the top. The inclusion of middle and upper parking areas is not intended to increase the amount of use the area will receive; rather it is intended to facilitate the shuttling of vehicles. It is expected that the middle trailhead would get the least amount of use.

Installation of a CXT vault toilet is proposed at the main primary lower trailhead. Multi-panel kiosks would be constructed at the trailheads to display maps, rules and regulations, and interpretive sign panels (See Figure 3 and Figure 4 for examples). A boot brush station with an interpretive signage panel will provide for invasive plant prevention and education. If monitoring shows a need, picnic tables and garbage collection could be added.

*Trail Difficulty Levels and Adaptive Mountain Bike Trails*

The trail system would follow the trail difficulty framework of beginner, intermediate, advanced, and expert. Each proposed trail segment has been given an initial estimate of the difficulty level which is displayed in Appendix A. Some trails will be designed for adaptive mountain biking equipment that is used by people with disabilities. These trails follow the same difficulty framework but are typically designed to be wider and with a more level camber. In the Appendix A trails list, these are coded "aMTB."

*Phased Implementation, Monitoring, and Adaptive Management*

The system would be built out over time and as the availability of grants, funding, employee and volunteer labor allow. Implementation would be through phases under any of the action alternatives. See Appendix C for details.

Figure 3: Typical single vault toilet

Figure 4: Typical trailhead sign

**Alternative 2**

Alternative 2 is essentially the proposed action that was scoped with the public. Modifications made between scoping and this EA include eliminating the original placement of the lower trailhead and providing two new options as well as modifying the placement of the middle trailhead to be below the road. The climb trail (#2.0) has been modified to eliminate any fence crossings. The estimated capacity for lower trailhead parking has been reduced since scoping based on public feedback during scoping, review of comparable trailhead use, a desire to limit excavation and utilize existing flat areas, and the desire to limit the size of recreation events that could take place.

In addition to the project components common to all action alternatives described above, this alternative includes the following:

A total of 51.3 miles of single-track trail to be built over three phases. Figure 5 displays the full extent of the trails in Alternative 2 and the trailhead options. See Appendix B for the Resource Protection Measures and Appendix C for the Implementation Plan.

**Alternative 3**

This alternative includes a reduced footprint for the trail system to address concerns about impacts to grazing operations and wildlife habitat. Specifically, no trails on the west side of the drainage and fewer trails throughout the east side of the drainage, retaining larger blocks of unaffected wildlife habitat and reducing trail miles in high use grazing areas.

In addition to the project components common to all action alternatives, described above, this alternative includes the following:

A total of 21 miles of single-track trail to be built over three phases (Figure 6). See Appendix B for the Resource Protection Measures and Appendix C for the Implementation Plan.

**Alternative 4**

This alternative includes a reduced footprint for the trail system to address concerns about impacts to grazing operations and wildlife habitat. Specifically, though similar to Alternative 3, there are fewer trail miles in the north and northeast sections of project area which reduces trail overlap with high use grazing areas and no trails on the west side of the project area. Additionally, an alternative N-S arterial route is located along a portion of FSR 3360.

In addition to the project components common to all action alternatives, described above, this alternative includes the following:

A total of 19.1 miles of single-track trail to be built over three phases (Figure 7). See Appendix B for the Resource Protection Measures and Appendix C for the Implementation Plan.

**Alternative 5**

This alternative includes a reduced footprint for the trail system to address concerns about impacts to grazing operations and wildlife habitat but also includes the western cross-country trail. Specifically, this alternative has a higher concentration of trails in the northeast portion of the project area and includes the western cross-country trail that is not included in Alternatives 3 or 4 but eliminates the eastern side climb trail.

In addition to the project components common to all action alternatives, described above, this alternative includes the following:

A total of 28.7 miles of single-track trail to be built over three phases. See Appendix B for the Resource Protection Measures and Appendix C for the Implementation Plan.

**Alternative 6**

This alternative was created by combining components of Alternatives 3, 4, and 5 to provide a smaller footprint than Alternative 2, but also provide a complete mix of trail types. In addition to the components common to all action alternatives, described above, this alternative includes the following:

This alternative was created by combining components of Alternatives 3, 4, and 5 to provide a smaller footprint than Alternative 2, but also provide a complete mix of trail types. In addition to the components common to all action alternatives, described above, this alternative includes the following: A total of 27.5 miles of single-track trail to be built over three phases (Figure 9). The cross-country trail (#23) is made shorter by using FSR 3360-050 which eliminates two fence crossings and eliminates trails in the Steins Allotment. The alternate catch line (#13.3, 13.4) is used rather than 22.3 which eliminates a trail segment in a cattle trailing area along Lemon Creek. This alternative also eliminates several downhill trails (10, 11.1, 12.0, 14, 15.2) which reduces density trails in high use grazing areas and avoids more core wildlife habitat. See Appendix B for the Resource Protection Measures and Appendix C for the Implementation Plan.

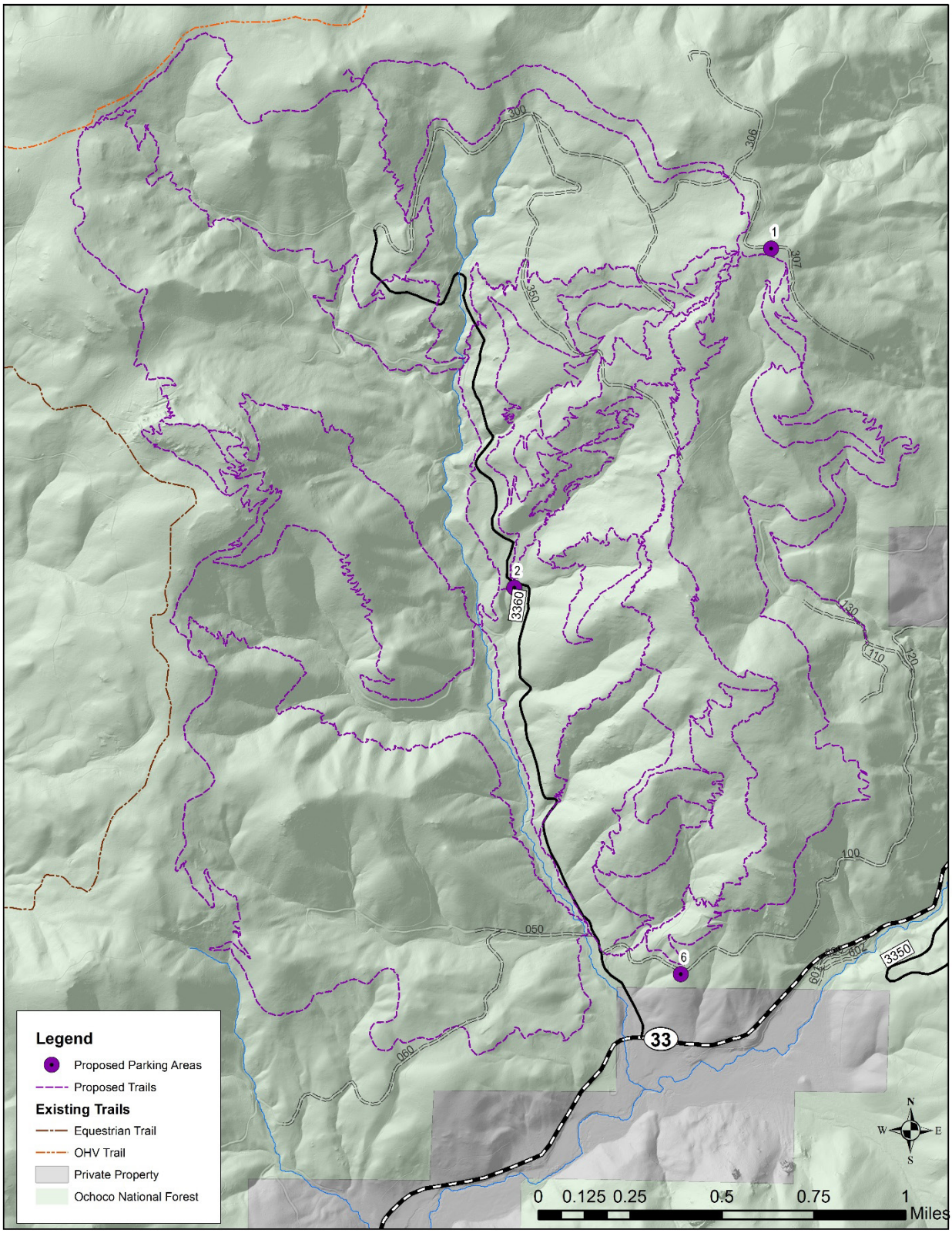



Figure 5: Alternative 2 proposed trails and trailheads

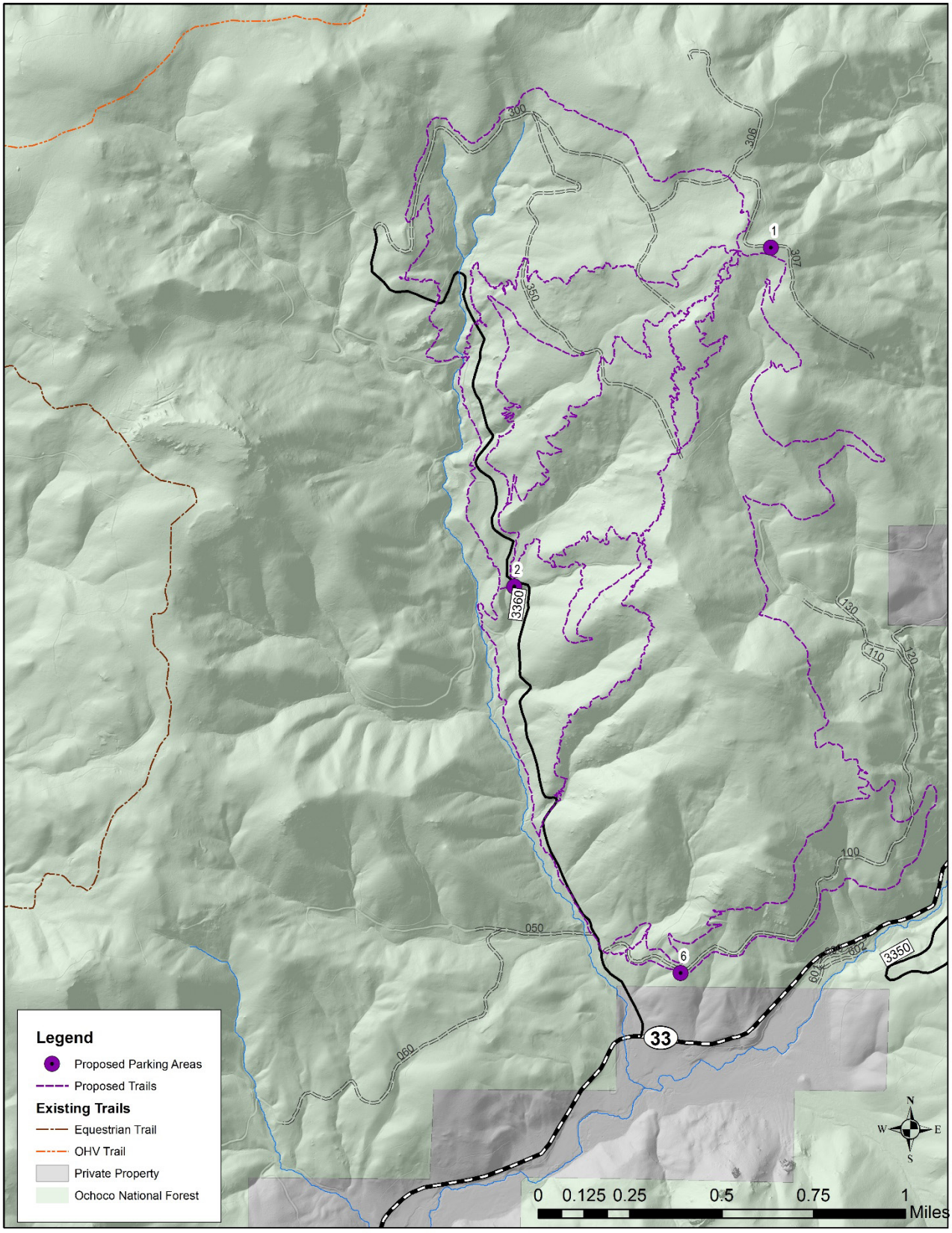



Figure 6: Alternative 3 proposed trails and trailheads

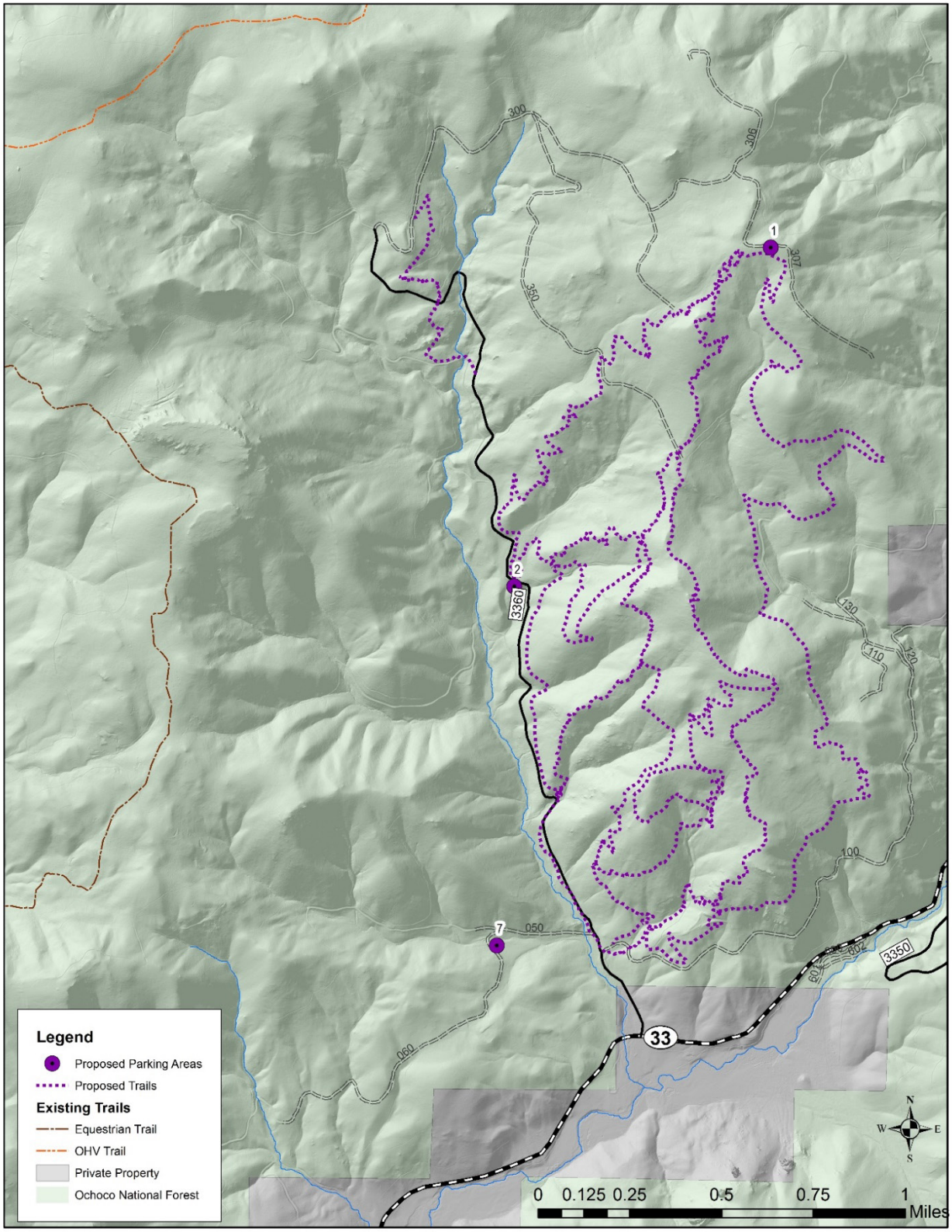



Figure 7: Alternative 4 proposed trails and trailheads

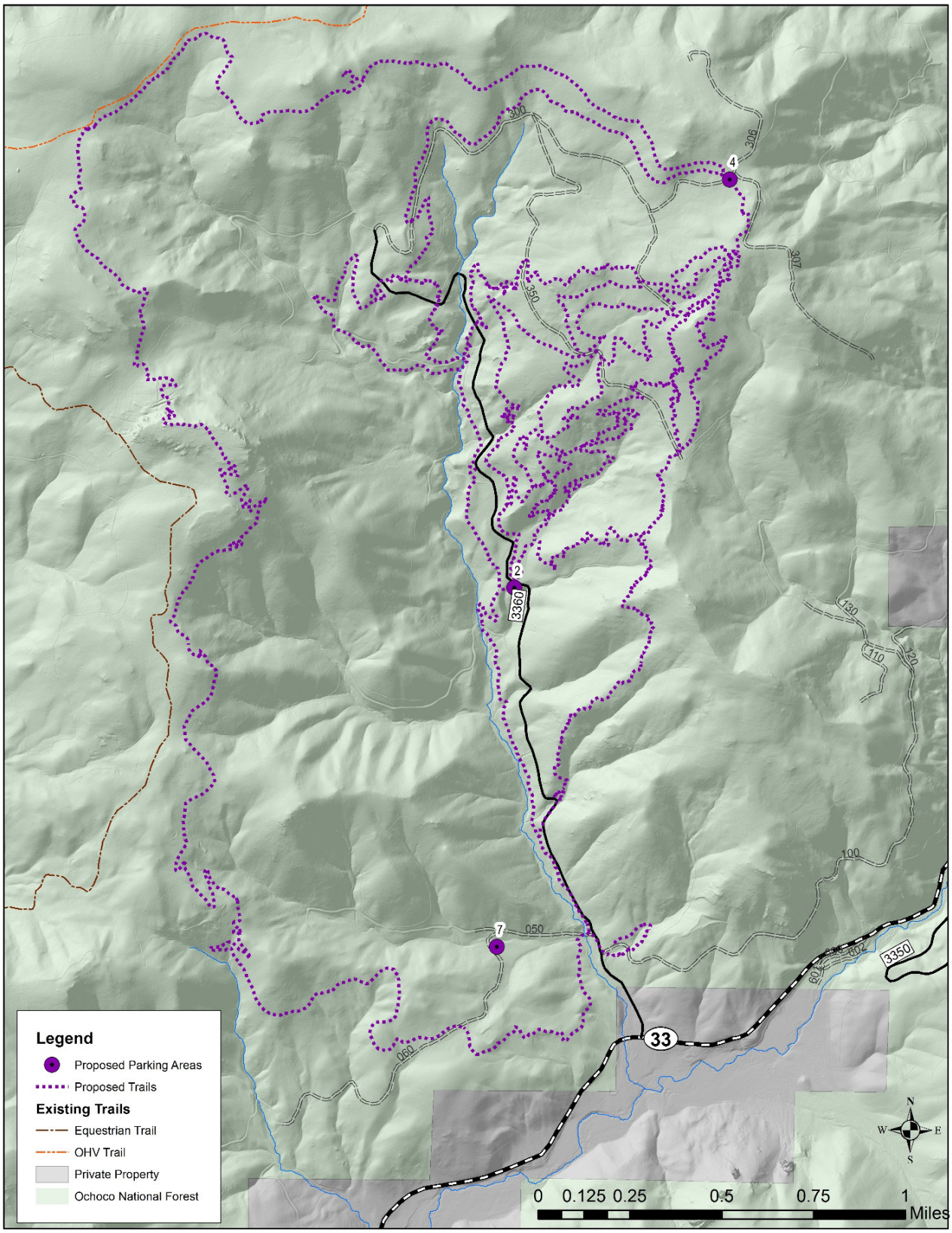



Figure 8: Alternative 5 proposed trails and trailheads

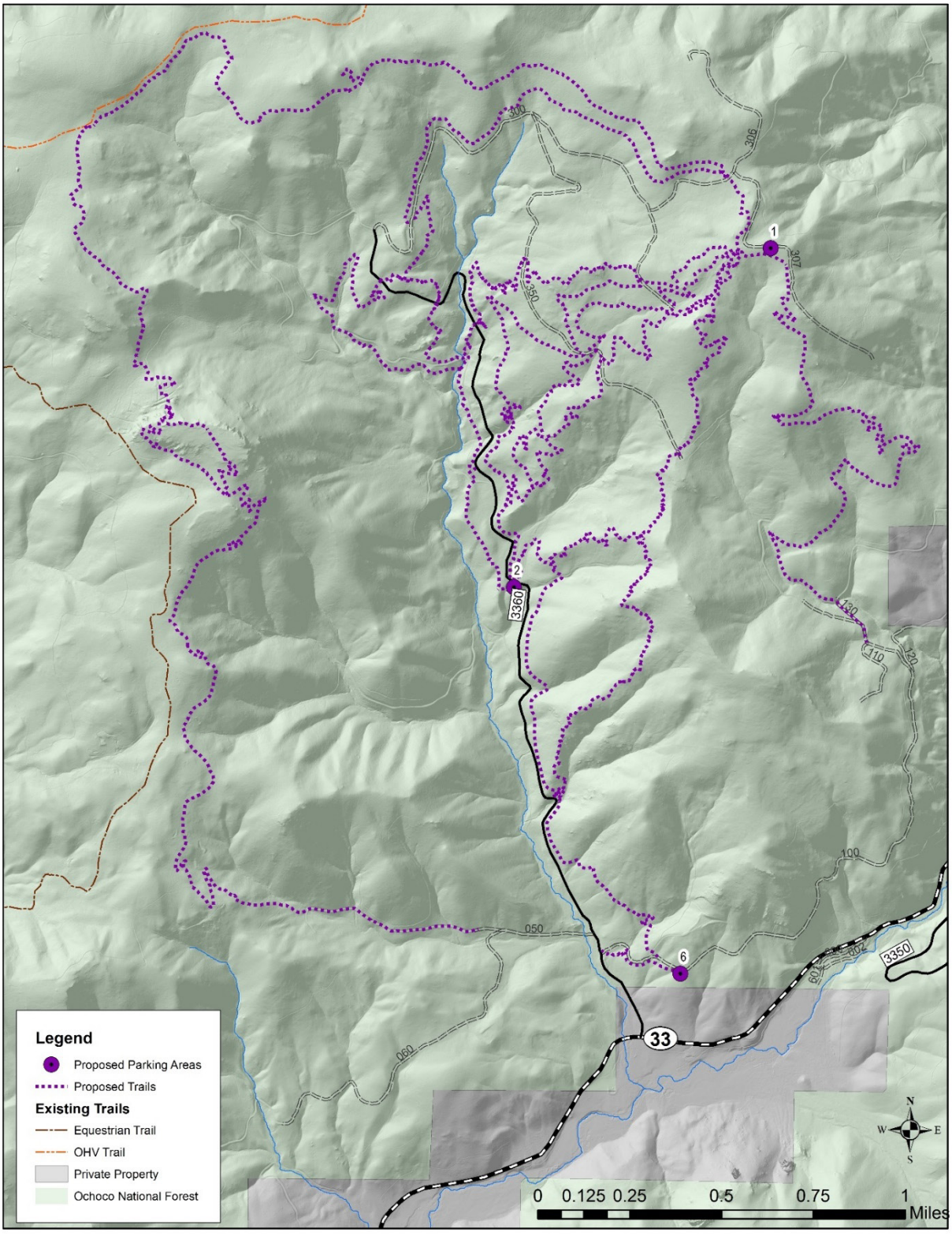



Figure 9: Alternative 6 proposed trails and trailheads

## Comparison of the Alternatives Analyzed in Detail

The range of alternatives considers options for fewer miles of trail and less density of trail in some areas, focused on the issues around wildlife core habitat and locations of livestock grazing infrastructure. The miles of trail range from about 19 to just under 52. Alternative 2 provides the most trails across the east and west sides of the drainage. Alternatives 3 and 4 keep the trails on the east side of the drainage in differing combinations, while Alternative 5 maintains the cross-country loop on the west side of the drainage and Alternative 6 is a mix of these elements. The following Table 3 compares the alternatives by number of miles of trail for each difficulty level. Table 4 provides trail type, Table 5 provides a footprint, and Table 6 compares the alternatives based on the key issue measures and attributes, summarized from the environmental consequences section.

Table 3: Comparison of the miles of trail difficulty level for each alternative.

| Alternative | Beginner | Intermediate | Advanced/Expert | Total Miles |
|---|---|---|---|---|
| Alternative 1 | 0 | 0 | 0 | 0 |
| Alternative 2 | 11.2 | 26.2 | 13.9 | 51.3 |
| Alternative 3 | 6.8 | 8.1 | 6.1 | 21 |
| Alternative 4 | 2.8 | 9 | 7.3 | 19.1 |
| Alternative 5 | 7.7 | 13.6 | 7.4 | 28.7 |
| Alternative 6 | 9.8 | 11.2 | 6.5 | 27.5 |

Table 4: Comparison of the miles of trail type for each alternative.

| Alternative | Downhill | Cross-Country | Climb | Total Miles |
|---|---|---|---|---|
| Alternative 1 | 0 | 0 | 0 | 0 |
| Alternative 2 | 39.9 | 8.7 | 2.7 | 51.3 |
| Alternative 3 | 21 | 0 | 0 | 21 |
| Alternative 4 | 19.1 | 0 | 0 | 19.1 |
| Alternative 5 | 20.5 | 8.2 | 0 | 28.7 |
| Alternative 6 | 17.8 | 7 | 2.7 | 27.5 |

Considering the full spatial extent of the trails across the project area, the footprint of the trails project relative to the "project area" (3,370-acre polygon drawn around the outside extent of trails in the proposed action). All action alternatives have a footprint of less than one percent of the project area (Table 5).

Table 5: Comparison of trail footprint

| Alternative | Extent of trail system footprint within project area (acres)* | Percent of project area in trails |
|---|---|---|
| Alternative 1 | 0 | 0 |
| Alternative 2 | 18.7 | 0.6 |
| Alternative 3 | 7.5 | 0.2 |
| Alternative 4 | 6.9 | 0.2 |
| Alternative 5 | 10.4 | 0.3 |
| Alternative 6 | 10 | 0.3 |

*Trails are typically built around 18 inches wide, 24 inches in places to account for corners and trails designed for adaptive mountain bike equipment. This footprint was calculated using 36 inches to account for any areas of disturbance during trail building.

Table 6: Comparison of how each alternative addresses the key issues

| Key Issue | Alt. 1 No Action | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Alt. 6 |
|---|---|---|---|---|---|---|
| **Livestock Grazing Management** | No impact to the current grazing management | 23.4 miles trail within 0.5 miles of water development | 8 miles trail within 0.5 miles of water development | 4 miles trail within 0.5 miles of water development | 14.6 miles trail within 0.5 miles of water development | 14.1 miles trail within 0.5 miles of water development |
| **Wildlife Habitat** | No impact to wildlife habitat | Average core patch size 18 acres | Average core patch size 139 acres | Average core patch size 67 acres | Average core patch size 80 acres | Average core patch size 73 acres |

## Decision to be Made

The responsible official for this project is the District Ranger of the Lookout Mountain Ranger District, Ochoco National Forest. The scope of the decision to be made is limited to development of recreational trails, related infrastructure, and trail use management in the Lemon Gulch project area on National Forest System Lands.

The Responsible Officials can select the no action or one of the action alternatives being analyzed in detail as described above or combine elements from different alternatives. The decision will be based on a comparison of how well the alternatives meet the purpose and need for action, how well alternatives address the key issues, potential for environmental effects, and consideration of public comment.

## Alternatives and Project Design Not Analyzed in Detail

Public comments received in response to the Proposed Action expressed concerns they had with the proposed action and in some cases provided suggestions for a different course of action. Some of these alternatives may have duplicated the alternatives considered in detail or were determined to be unable to meet the project's Purpose and Need. Alternatives that were considered but dismissed from detailed consideration are summarized below.

### *A. Build the Mountain Bike Trail System Somewhere Else*

The Forest Service heard from people who were not opposed to mountain bike trails in general but were opposed to mountain bike trails specifically in the Lemon Gulch Area and suggested that the Forest Service look at other areas for a mountain bike trail system. The No Action alternative addresses the desire to see no trails built in the Lemon Gulch area. An alternative location for a mountain bike trail system such as that proposed in Lemon Gulch area would essentially be a new and different project requiring a new proposal based on specifics of that location. Other areas proposed for mountain bike trail projects were considered but not analyzed in detail, either being rejected due to resource issues or because they would not meet the purpose and need and also because the No Action alternative addresses the desire to see no trails build in the Lemon Gulch area.

*Mountain Bike Trail Systems that were part of the Ochoco Trails Forest-wide Proposal*

As noted on page 2 of this EA, the Ochoco Trails group worked on developing a Forest-wide trails proposal that was presented to the Forest in February 2019. The Ochoco Trails proposal involved numerous proposals for the Forest to consider including trails with primary use for hikers, equestrians, and mountain bikers, as well as multi-use trails. For progressive mountain bike trail networks with large vertical relief and variable terrain that could provide various riding difficulty levels, three project options were included in the proposal: the Potlid Trail Complex, the Scotty Creek/Cougar Creek Trail Complex, and the Lemon Gulch Trail Complex. The Potlid and Scotty/Cougar Creek locations were rejected by the Forest Service for the reasons outlined in the following paragraphs:

*A1. The Potlid Mountain Bike Trail Complex Proposal*

This proposal had been considered during Forest Service and ODFW review of the Forest-wide Ochoco Trails proposal. This location was not pursued for further analysis for several reasons. First, the high elevation areas of the Ochocos where Potlid is located provide most of the deer and elk summer habitat on the west side of the Forest; therefore, the value of wildlife core habitat and elk security habitat are elevated in this area. In addition, these areas are currently identified as priority habitats for continued restoration efforts for elk and mule deer. The Forest Service and conservation partners have made investments in habitat improvement through motorized road closures which also makes the existing wildlife core and elk security habitat important to retain. The area already has a non-motorized multi-user trail and trailheads present, as well as motorized routes. Additional trail development that would meet the purpose and need (see page 2) would further fragment the limited elk security habitat as well as reduce the connectivity of the existing core habitat that has been created through the afore mentioned habitat improvement projects in this area. The Forest Service does not support a new trail network in this area because of its importance for elk during summer months due to the north-facing slopes and cool/moist forest they provide.

Additionally, this proposal is located in the Trout Creek Watershed. The Forest Service does not support a new concentrated trail network in this watershed because of the presence of Mid-Columbia Steelhead (a species listed as threatened under the Endangered Species Act, and its designated Critical Habitat.

*A2. The Scotty/Cougar Creeks Mountain Bike Trail Complex Proposal*

This proposal had been considered during Forest Service and ODFW review of the Forest-wide Ochoco Trails proposal. This location was not pursued for further analysis for several reasons. First, as with

the Potlid location, the high elevation areas of the Ochocos where Potlid is located provide most of the deer and elk summer habitat on the west side of the Forest; therefore, the value of wildlife core habitat and elk security habitat are elevated in this area. In addition, similar to Potlid, this area is currently identified as priority habitat for continued restoration for elk and mule deer. The Forest Service and conservation partners have made investments in habitat improvement through motorized road closures which also makes the existing wildlife core habitat and elk security habitats important to retain. The area already has a non-motorized multi-use trail and trailhead present, as well as motorized routes. Additional trail development to meet the purpose and need and objectives of a mountain bike system (see page 2) would further fragment limited core habitat in the area. The north-facing slopes provide cool moist forest which are important to elk during summer months.

Additionally, this proposal is located in the Bridge Creek Watershed. The Forest Service does not support a new trail network in this watershed because of the presence of Mid-Columbia Steelhead (a species listed as threatened under the Endangered Species Act), and its designated Critical Habitat.

*Other Locations for Mountain Bike Trails Suggested by Commenters*

*A3. Build the Mtn. Bike System in the Lookout Mountain Recreation Area*

The Forest Service was asked why the mountain biking trail system proposal was not located in the Lookout Mountain area.

In 2014, the Forest Service received a proposal for new mountain bike trails in various locations across the Ochoco National Forest, including within the Lookout Mountain Recreation Area. Because that proposal raised serious concerns from other trail user groups (equestrians and hikers), it was deferred, and the Forest Service instead waited for the various user groups to work together on developing an integrated trail proposal that would address the needs and wants of all user groups while minimizing conflicts amongst them. That was the beginning of Ochoco Trails' proposal, which is described above.

The Ochoco Trails group proposal presented to the Forest Service in February 2019 did not include a proposal for a mountain biking system in the Lookout Mountain area because of its popularity with equestrians and hikers. The Ochoco Trails group and the Forest Service recognize that mountain bikers do use the Lookout Mountain and Round Mountain trails and will continue to do so; however, the Lemon Gulch proposal is in part intended to help redistribute current and growing mountain bike use and to separate the uses and limit conflicts.

The Lookout Mountain Recreation Area is also an Inventoried Roadless Area. As such, it provides a large patch of elk security habitat that the Forest Service does not want to see further fragmented. The area also partially overlaps the Big Summit Wild Horse Herd Territory.

For these reasons, a mountain bike trail system of the kind proposed in Lemon Gulch was not developed for detailed analysis in the Lookout Mountain area.

*A4. Build a Mtn. Bike Trail System in the Bandit Springs Area*

Some public comments suggested that we should provide the mountain bike trail system in the Bandit Springs area. This alternative was not considered in detail to meet the purpose and need because the Forest Service already analyzed and authorized the conversion of 12 miles of existing winter trails to multi-use summer trails that are now available to hikers and mountain bikes in this location. The trail system at Bandit Springs is not designed specifically to meet the mountain biking objectives, however, and does not provide a system designed and purpose built for mountain biking.

*A5. Build the Mtn. Bike Trail System within another Recreation Management Area*

Though some commenters felt that trails should be located in a Recreation Management Area, no specific proposal was provided; therefore, the Forest Service looked at areas allocated in the Forest Plan as Recreation Areas. The Ochoco National Forest LRMP designated five Recreation Areas: Bandit Springs Recreation Area, Lookout Mountain Recreation Area, Hammer Creek Wildlife/Recreation

Area, Steins Pillar Recreation Area, and Deep Creek Recreation Area. These locations were reviewed for potential to accommodate a multi-use trail system focused on mountain biking as described in the purpose and need. Lookout Mountain Recreation Area was addressed previously under A3. Bandit Springs was addressed previously under A4.

The Hammer Creek Wildlife/Recreation Area is located in the Maury Mountains in the southernmost portion of the Ochoco National Forest. The Forest Plan states "The Hammer Creek Area provides habitat diversity not found in the rest of the Maury Mountains. This diversity combined with minimal access makes the area valuable habitat for a wide variety of animal species." LRMP 4-80. The Forest prioritizes wildlife habitat in this area and it also is not easily accessible.

Steins Pillar Recreation Area consists of about 1,070 acres within the Mill Creek Watershed, directly across Mill Creek from the proposed action project area. As with the proposed action, access for the Steins Pillar Recreation Area is on County Road 33. An existing 2-mile trail, designed for hikers and not suitable to mountain biking, crosses the area.

Deep Creek Recreation Area is a 77-acre piece of land which runs along Deep Creek on the Paulina Ranger District, east of Big Summit Prairie. This management allocation is too small and does not provide the terrain needed for a mountain trail system.

Though some management allocations have an emphasis on certain kinds of recreation, the Forest Plan does not require trails or other recreation uses be located exclusively in Recreation Management Areas. None of these areas were included in proposals for new trail systems from the recreating public and the Forest Service has not identified these areas as a suitable location for a mountain bike trail system such as the one proposed in Lemon Gulch. The suggestion to replace the current proposal with a proposal in one of these other areas is essentially the same as the No Action Alternative for this site-specific project analysis.

*A6. Build the Mtn. Bike Trail System in an Area with Little to No Grazing*

The Forest Service was asked to consider an alternative that evaluates a trail system in an area where there is little to no grazing, in order to keep recreation and grazing separate. No specific proposal was provided so the Forest Service looked at areas where there is little to no grazing. There are about 48 active grazing allotments within the Ochoco NF ranging in size from a couple hundred acres to over 51,000 acres (Mill Creek Allotment is the largest on the Forest) for a total of about 731,450 acres. This amounts to over 86% of the Ochoco NF System lands, including Wilderness areas, which means all other Forest uses and activities including recreation (hunting, fishing, sightseeing, hiking, etc.), forest management (thinning, fuels reduction, stream restoration, etc.), and wildlife habitat, must be able to occur within areas that have active grazing permits. The existence of livestock grazing does not disqualify an area from accommodating other activities. Nevertheless, the Forest Service reviewed areas where there is no current authorized grazing (allotments either closed or vacant) or a low level of grazing, to assess the feasibility of a mountain bike trail system.

Closed allotments: The Lookout Allotment is located within the Lookout Mountain Recreation Area and Inventoried Roadless Area. See below at A6 for a discussion of why this area was not considered in detail in this EA for a mountain bike trail system. Bearskull/Cottonwood Allotment is on the far northeast side of the Ochoco NF. It encompasses Inventoried Roadless Areas and Wilderness. The area is not easily accessible, and bikes are prohibited in Wilderness portions.

Vacant allotments: Allen Creek Allotment is located between the Crooked River Grassland the Ochoco NF. It is approximately one fifth National Forest System lands interspersed with private lands that are not a suitable size for a mountain bike system that would meet project objectives. Slayton Allotment is located at the southwest edge of the Ochoco NF. As with Allen Creek, there is only a small piece of NFS lands within the allotment which is not a suitable size for a mountain bike system that would meet project objectives.

Bear Creek allotment was suggested by Mill Creek and Steins Allotment permittees as a possible

location for the mountain bike trail system because there is a relatively low level of livestock grazing (currently one active pasture) which could mean a lower potential for conflicts between recreation and livestock grazing, though a specific trail system was not proposed. Because of its location, the Bear Creek Allotment was not analyzed in detail as a trail system for the same reasons as described above for Potlid and Scotty/Cougar (see A1 and A2). The Bear Creek allotment is located in the same northern high elevation portion of the Ochoco as the Potlid and Scotty/Cougar areas; therefore, it is also within Critical Habitat designated for Mid-Columbia Steelhead as discussed previously; and the relatively lower level of livestock grazing in this area means that elk do not have to compete as much with livestock for forage during the summer months which elevates the importance of summer range in this area.

### *B. Modify Grazing to Reduce Conflicts with other Uses in the Lemon Gulch Area*

*B1. Reduce the Livestock Grazing Season or Reduce the Number of Livestock Authorized in the Project Area*

Public feedback on the proposed trail system included concerns that cows and bikes together in the Forest could be an unsafe situation, particularly if a fast-moving bike were to come upon a cow or a person on horseback. It was also pointed out that cows may tend to use the trails to move through the pasture and could cause damage to the trail tread and leave manure along the trails. A 2010 Record of Decision authorized grazing in the Mill Creek Allotment through the adoption of an Allotment Management Plan and reissuance of two term grazing permits, at a maximum of 2,067 AUMs with variable numbers and seasons of use under an adaptive management regime. Actual numbers and seasons of use are specified in Annual Operating Instructions.

Potential conflicts such as this could be reduced if there were fewer cattle in the area during the recreation season or if the grazing allotment were modified to exclude grazing from the area where trails would be located. This kind of mitigation was not analyzed in detail in an action alternative because modifications to the grazing permit by reducing AUMs or the pasture boundary is outside the scope of this project's purpose and need for action and because other alternatives were developed which would reduce potential for conflict with grazing operations.

*B2. Modify the Lemon Pasture with additional Fencing*

The Forest considered a suggestion to further compartmentalize the Lemon Pasture by putting a fence line north-south dividing the lemon creek drainage from the rest of the pasture. This could reduce the time that cattle are in the trail area, rather than all of the permitted cattle being spread across the entire Lemon Pasture for the grazing period and would also make it possible for the area to remain ungrazed in some years.

The Allotment Management Plan provided for the retention of five pastures in the Mill Creek Allotment to "maintain flexibility in that allotment in case of reduced availability of forage, which could be caused in any year by factors such as wildfire, prescribed fire, or poor condition of resources." (USDA Forest Service 2010). This mitigation was not analyzed in detail in an action alternative because modifying the allotment pastures is outside the scope of this project's purpose and need for action.

### *C. Keep the Mountain Bike Trail System closed throughout the Grazing Season*

The grazing season generally occurs from early May through September in the Mill Creek Allotment. The Lemon Pasture is typically used first and grazing occurs generally from early May through June, based on recent years' Annual Operating Instructions. It was suggested that all conflicts with grazing can be avoided by keeping the trails closed through June when most cows would have moved out of the Lemon Pasture.

This alternative was not considered in detail because it would not allow use of the trails during the months of May and June when trail riding conditions are highly desirable. The trail system would be closed Dec. 1 – May 1 to reduce disturbance to big game winter range habitat and use of the trail system will be

discouraged during wet periods to avoid damaging the trails. The overlap of grazing in the pasture and the recreation season is limited in time and space; further restricting the time the trails would be available to the public is not warranted. Educational materials be used to ensure the public is aware of when livestock will be present. This may discourage some visitors who would prefer to ride when the grazing is over and local volunteers do some clean up and maintenance of the trails. As stated previously, the existence of livestock grazing does not disqualify an area from accommodating other activities. The phased implementation approach will allow for monitoring of the Designated Monitoring Areas within the pasture to determine if unexpected negative effects begin to occur.

### *D. Prohibit Recreational Special Use Events on the Mountain Bike Trail System*

The Forest considered whether the action alternatives should include a prohibition on special recreation events. These events would increase the number of vehicles, bikes, and people in the project area for short periods of time which could increase potential for conflicts with grazing and disturbance to wildlife. A complete ban on events was not analyzed in detail because the action alternatives include sideboards on recreation events, such as limiting them to outside the timeframe grazing occurs in the Lemon Pasture.

# Chapter 3 - Environmental Consequences

This EA is tiered to the analysis in the Final Environmental Impact Statement for the Ochoco National Forest Land and Resource Management Plan. The FEIS for the Forest Plan anticipated substantial recreational development across the Ochoco National Forest and disclosed that additional trail miles (up to 468 miles of non-motorized summer trail) would have effects to natural resources, for example compacting soils where trails and trailheads were located (UDA Forest Service 1989b).

There will be no impact to the following resources because they are not present, and they will not be discussed further: Wilderness, Inventoried Roadless Areas, Research Natural Areas, Old Growth Management Areas. Additionally, there would be no impact to cultural resources as all known or discovered sites would be avoided.

**Project Record**

The interdisciplinary team (IDT) includes Forest specialists for each discipline. Specialists on the IDT conducted analysis to determine the environmental consequences of the project and/or reviewed contents of the environmental assessment. Some information was incorporated directly into the environmental assessment, whereas some resources are covered in stand-alone reports. In some cases, this environmental assessment provides a summary of the report and may only reference technical data upon which conclusions were based. Specialist reports are incorporated by reference into this environmental assessment (40 CFR 1501.21).

## Recreation

### *Methodology*

The Recreation Resource Specialist has formed professional judgements on probable effects to the public's recreation experience. Probable effects are based on personal observations, past work experiences, and professional contacts. The resource condition indicators used in this report are available miles of mountain bike trail by type and difficulty. This section also discusses camping availability as well as compatibility with other recreational trail users.

Table 7: Resource condition indicators and measures for assessing effects to the recreation experience

| Indicator | Measure |
|---|---|
| Availability of trails designed for mountain biking | Number miles mountain biking trail |
| Available type of mountain biking trail | Number miles downhill, climb trail, cross-country, adaptive trail mileage |
| Available of different difficulty levels | Number miles beginner, intermediate, expert trail |

### *Trail Terminology*

Trail Management Objectives (TMOs) are developed through five fundamental concepts that are the cornerstones of Forest Service trail management: Trail Type, Trail Class, Managed Use, Designed Use, and Design Parameters.

*Type*: The Lemon Gulch system will be a "standard/terra" "Type" defined as a trail that has a surface consisting predominantly of the ground and that is designed and managed to accommodate use on that surface.

*Trail Class* and associated Design Parameters: These would be assigned during the implementation phase when exact layout commences on the landscape.

*Managed Use*: Managed Use indicates the intent to accommodate a specific use (s) and are usually a smaller group of the allowed uses on the trail, that is, uses that are allowed unless specifically prohibited. In Alternatives 2-6 all non-motorized recreation is allowed. The managed uses will differ depending on where in the system a segment of trail exists. In the steeper grades with a high level of constructed controls described the trail user objectives the managed use will be for mountain bikes; in other locations, such as the cross-country segments, the managed uses will be for mountain bikes and foot traffic/hiking.

*Designed Use:* The Designed Use is the Managed Use of a trail that requires the most demanding design, construction, and maintenance parameters. The Designed Use of all trails in Alternatives 2-6 would be for mountain bikes. If an Alternative is approved the Lemon Gulch network would be the first trails designed for bicycle use on the Ochoco National Forest or the Crooked River National Grassland.

**Trail User Objectives**

The Trail User Objectives are considered part of accepted contemporary mountain bike planning, objectives, language, and design parameters in the United States through public and private agreement around Best Management Practices. The concepts are best demonstrated in the collaborative "Guidelines for a Quality Trail Experience" publication.

The Forest currently lacks trails designed for mountain bikes as the preferred use. The Lemon Gulch proposal will accommodate multiple uses with some areas optimized for progressive mountain bike Flow trails in the project area that have the highest slope angles. These areas will have constructed management controls to ensure trail sustainability, resource protection, and provide for a quality recreation experience for the most users. These would include speed controls such as grade reversals, switchberms, corraling anchors, and similar features that interrupts continuous unchecked speed while maximizing enjoyment. Constructed features such as stone pitching, stepdowns, raised tread, rock gardens also build technical challenges. Many of these will have easier optional lines to allow users to progress and develop their skills and desired challenge as comfort allows. During implementation, some of these trails may be designated as one-way depending on factors such as grade and sight distances. In addition to Flow, the system will incorporate Cross-country trails that are constructed to minimize the amount of landscape modification which maximizes the natural setting character. As implementation occurs these trails would use the most amount of unaltered natural features into the design and layout to create technical challenges utilizing existing rocks, roots, grade, etc.

The Trail network will have a mix of trail user objectives depending on location within the Lemon Gulch system. This creates diverse riding opportunities for the greatest number of skill levels and rider goals. In areas with the steepest grades with multiple natural, enhanced natural and constructed features the focused objective is "Challenge", often associated with very difficult ratings (black diamond) while in other locations such as lower grades and Cross-country trails the objective is "Play" often affiliated with lower risk and easier trails (green circle).

### *Existing Condition*

*Non-motorized Trails*

The Forest Plan (1989) called for providing 563.6 miles of summer use trails by 2009 including ATV and mountain bike routes. The Ochoco National Forest (ONF) currently has about 156.5 miles of non-motorized summer use trails in the designated trail system. Outside of Wilderness, 112.3 miles of trail are open to bikes; however, none of these trail miles were ever designed for bicycle use. From the time the Forest Plan was written in 1989 until 2018, no trails were designed, managed, or developed for mountain biking. Several trails have more recently become used by mountain bikes but are not meeting the need for today's mountain bike niches which include cross-country, all mountain, enduro, and downhill style gravity riding that many users seek today.

**Summary of Non-motorized Summer Trail Mileage on Ochoco National Forest (156.5 miles):**

- Allowable use = hike/horse: 44.2 miles
  - 44.2 managed for pack/saddle; bikes prohibited (Wilderness)
- Allowable use = hike/bike: 1.8 miles
  - 1.8 miles managed for hiking
- Allowable use = All non-motorized: 110.5
  - Of these, 25.3 miles are managed for bike use,
  - 3.55 managed for hiking
  - 81.65 managed for pack/saddle

The following two paragraphs briefly describe existing trail miles on the ONF that are managed for bikes.

Lookout Mountain and Round Mountain Trails have become popular trails with local and regional riders and have been advertised in guidebooks for decades. Their use has been increasing as populations grow and mountain bike and hiking trends continue to increase in the region. Lookout Mountain Trail is 11 miles and Round Mountain is 8 miles. Because these trail systems were designed for pack and saddle and not for mountain bikes, some safety issues have arisen including blind corners and short sight distances. Cougar Creek, Scotty Creek, and Potlid trails are also used by mountain bikes. Potlid is 6.5 miles, Cougar Creek is 7.9 miles, and Scotty Creek is 4.3 miles. These trails are rugged and receive low use as they are remote, steep, and do not provide loop opportunities that many are seeking. They are also not suitable to beginner or intermediate riders.

A recent conversion of winter trails to year-round use (biking, hiking, and equestrians) added 6.6 miles of summer non-motorized trail to the Forest at the Bandit Springs area. The trails are gently rolling and placed on old roads and skid trails which are ideal for beginner riders and "cross country" specific bicycles. The area does not provide a quality experience for intermediate and expert riders that are looking for "gravity" niches with features that utilize the advances of modern suspensions and abilities of most mountain bikes sold today.

Anecdotal evidence suggests a degree of user conflict on the Forest, between horseback riders and mountain bikers, as well as between motorized users versus non-motorized users.

Currently, there is no conflict occurring with recreational trail users in the Lemon Gulch area. Representatives of equestrian trail users in Ochoco Trails support construction of trails at Lemon Gulch because they expect it to draw use from other trail systems which will reduce conflicts.

*Developed and Dispersed Camping Availability*

Camping is a popular activity in the Mill Creek area where Lemon Gulch is planned. On the way to the area, Crook County operates a large campground at Ochoco reservoir. This campground is largely underutilized as Ochoco Reservoir has been in a drought cycle and boating and fishing opportunities have been minimal providing ample opportunity for visiting bikers to camp on their way to Lemon Gulch or on the way home. Wildcat Campground is a moderately used campground at the end of Mill Creek road and operated by a Forest Service concessionaire. This campground is rarely full and has ample opportunity for visiting bikers to camp.

Additionally, dispersed camping is legal across the Ochoco National Forest and visitors may park and camp anywhere within 300' of open roads shown on the Motor Vehicle Use Map (MVUM) as long as they are not creating new disturbance to vegetation and the landscape. Several existing dispersed campsite sites in Lemon Gulch area have fire rings already constructed by previous visitors; use is light. Sites along Mill Creek see higher use in the summer season.

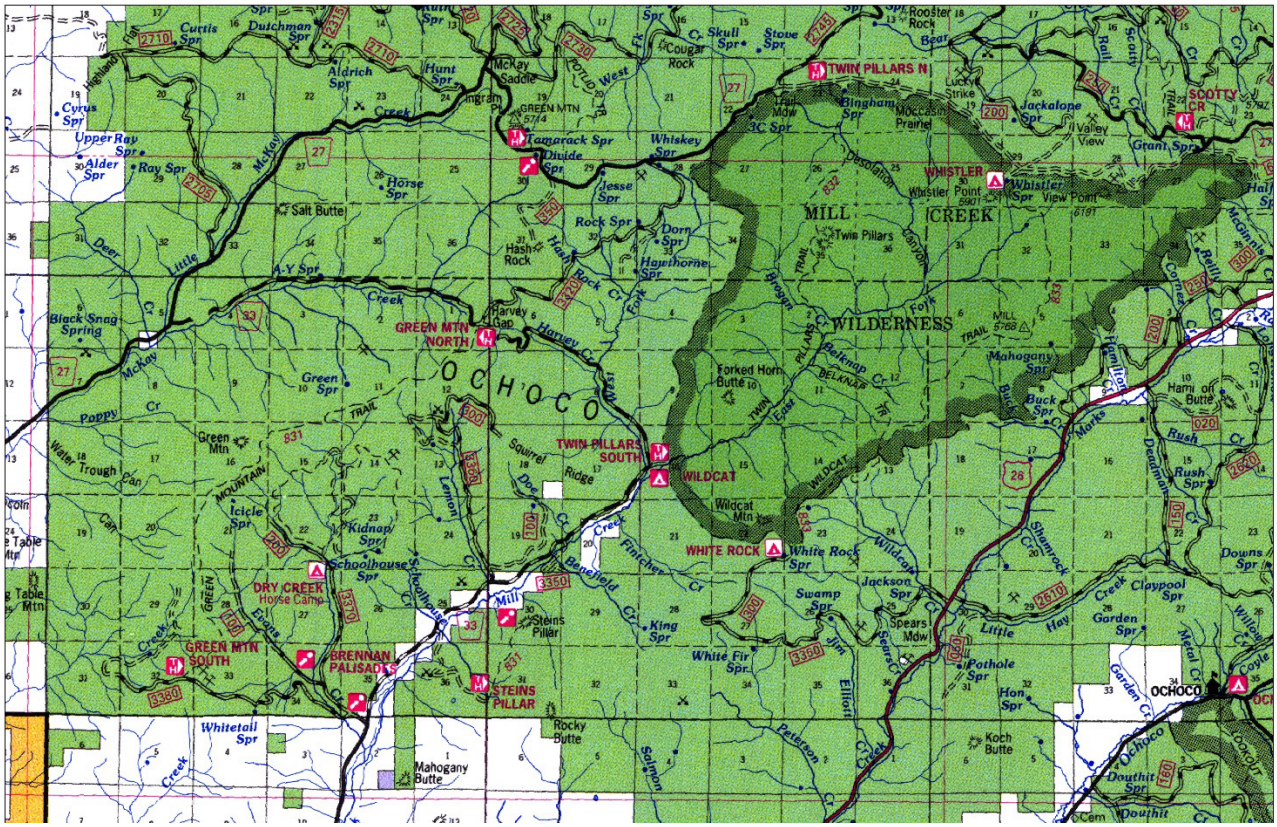



Table 8: Ochoco National Forest Visitor Map displaying western side of the Ochoco National Forest where project area is located

### *Environmental Consequences*

The alternatives provide different miles of trail by type and difficulty as summarized in Table 9. Refer to Figures 5 through 9 for maps of the trail systems by alternative. See Appendix A for list of individual trail segments and maps of trail difficulty and type.

Table 9. Summary comparison of trail availability by action alternative. The No Action (Alt 1) would provide zero miles of trail of any type or difficulty.

| | Alt 2 | Alt 3 | Alt 4 | Alt 5 | Alt 6 |
|---|---|---|---|---|---|
| **Trail Type (miles)** | | | | | |
| Downhill | 39.9 | 21 | 19.1 | 20.5 | 17.8 |
| Cross-Country | 8.7 | 0 | 0 | 8.7 | 7 |
| Climb | 2.7 | 0 | 0 | 0 | 2.7 |
| Adaptive | 12.4 | 9 | 3.5 | 12.4 | 11.9 |
| **Trail Difficulty (miles)** | | | | | |
| Beginner | 11.2 | 6.8 | 2.8 | 7.7 | 9.8 |
| Intermediate | 26.2 | 8.1 | 9 | 13.6 | 11.2 |
| Expert | 13.9 | 6.1 | 7.3 | 7.4 | 6.5 |
| Total | 51.3 | 21 | 19.1 | 28.7 | 27.5 |

Objectives for a trail system that meet the needs of today's variety of users include:

- ✓ Multiple loop options of varying difficulty
- ✓ Shuttle assisted downhill riding (riders shuttling to the top with their own vehicles)
- ✓ Long distance single-track cross-country riding
- ✓ Climb trails with reasonable grades and switchbacks
- ✓ Adaptive bike miles for people with disabilities
- ✓ Single track trails off of open or closed road prisms
- ✓ Sustainable, modern and progressive network of trails
- ✓ A quality network that would draw users and volunteers to assist in construction and maintenance over time
- ✓ Near to town, with suitable roads for access

The action alternatives meet these objectives at varying levels.

**Alternative 1 – No Action**

Under the no action alternative, the trails, toilet, and trailheads at Lemon Gulch would not be constructed. There would continue be no miles of trail designed for mountain bikes on the Ochoco National Forest, only those managed through changed Trail Management Objectives (TMOs) from Pack and Saddle. Mountain bikers coming to the Ochoco National Forest would continue using the relatively high use areas on Lookout and Round Mountain. Conflicts between bikes and other users would continue as all user groups consider these as top trails to visit. Low use would continue on Potlid, Cougar and Scotty Creek trails and moderate use can be expected on Bandit Springs when complete.

Frequent outcomes of under-met opportunity on public lands nationally have resulted in illegal trail building activity creating environmental impacts.

Under the no action alternative, it is expected that developed and dispersed camping in the western portion of the Ochoco National Forest would continue to increase annually with more visitors coming to enjoy their National Forests and as a function of general population growth and recreation trends.

**Alternative 2 – Mountain Bike Trail Opportunity**

Under Alternative 2, a maximum of 51.3 miles of single-track trail designed and managed for mountain bike use would be constructed. Three trailheads would be provided which would include information kiosks, and picnic tables may be placed. Additionally, an ADA parking pad and toilet facility would be constructed at the lower trailhead. The trails would be built out in phases. Initial parking capacity would be up to 20 vehicles at the lower trailhead, with smaller areas in the middle and upper trailheads. Monitoring would indicate if larger areas are necessary with a maximum buildout capacity of 35.

The mileage provided in Alternative 2 would satisfy the need for gravity-specific riding with shuttling options, an uphill climb trail, long distance cross-country riding, and trails designed for riders with a disability on adaptive mountain bikes (Table 9). There would be 11.2 Beginner miles, 26.2 Intermediate miles, and 13.9 Expert miles. It is expected that providing a 51.3 mile network, close to the population center of Prineville, would satisfy the multiple needs and desires of the biking community and would draw mountain bikers from Lookout and Round Mountain to Lemon Gulch as it would provide more of the experiences they are seeking in a tight network with less user conflict with other user groups.

This alternative provides a high quality, progressive mountain bike trail system with adequate miles and difficulty levels which includes adaptive, gravity, downhill, uphill and cross-country trail options. Building this system would serve to decrease biking use levels on Lookout Mountain and minimize conflicts with other users yet provides varying opportunities some individuals are seeking. Additionally, it

would reduce bike use and demands in other areas of the Forest.

Under the proposed action, Lemon Gulch would be the main draw for mountain bikers on the Forest. Lookout and Round Mountain trails would continue to see some level of use by bikers, but most would choose Lemon Gulch for a majority of rides. There is no established patterns of hiking or equestrian use at Lemon Gulch and those uses are not expected to cause conflicts on the Lemon Gulch Trails. Equestrians and hikers can easily move through the Lemon Gulch area without being on the developed tread and can avoid any encounter with bikes at Lemon Gulch. The open park like terrain, especially after Mill Creek Vegetation Project is complete, does not have the same type of thick forest with blind corner encounters like Lookout Mountain and Round Mountain do. Lookout and Round Mountain would be a much safer and enjoyable option for hikers and equestrians when a majority of bike use shifts to Lemon Gulch.

It is expected that construction of this system would take up to a decade to complete. Maintaining 51.6 miles in one area would be an accomplishable challenge that would keep mountain bikers busy for the long- term.

**Alternative 3 – Mountain Bike Trail Opportunity**

Under Alternative 3, the total number of miles would be reduced to 21 to address concerns about impacts to grazing operations and wildlife habitat. There would be 6.8 Beginner miles, 8.1 Intermediate miles, and 6.1 Expert miles. Most of the miles west of Lemon Creek would be eliminated, including the outer long distance, cross-country trail. Several downhill options on the east side of Lemon Creek, as well as the climb trail on the far east side of the project would also be eliminated

It is expected that the same number of gravity riders would come to experience Lemon Gulch as would come to experience the full 51.6 miles originally planned. Over time, local and repeat visitors may be unsatisfied with the low number of miles offered and use may shift back to Lookout and Round Mountain. The 20.7 concentrated miles will increase the "persons at one time" (PAOT) on one side of Lemon Creek rather than spreading use out over the 51.6 miles on both sides of the creek. This concentration will increase crowding potential as well as rider rotations which will generate a higher level of maintenance needs. The elimination of the climb trail would force many riders to ride to the top on the 3360 and 3360300 roads causing an increased concern for vehicle and bike conflict with more riders utilizing the road than would have used the climb trail in Alternative 2. The climb trail provides most of the cross-country miles niche and style of riding. Eliminating this reduces the diversity of trail options which will reduce the overall opportunity to a sector within the cycling community. This will likely attract the gravity focused downhill rider almost exclusively.

Figure 10: This photo shows one type of adaptive bike being used on a mountain bike trail. Photo courtesy DREAM Adaptive Recreation.

**Alternative 4 - Mountain Bike Trail Opportunity**

Under Alternative 4, the total number of miles would be reduced to 19.1 to further address concerns about impacts to grazing operations and wildlife habitat. There would be 2.8 Beginner miles, 9 Intermediate miles, and 7.3 Expert miles.

In addition to the elimination of the outer long distance cross-country trail, downhill options, and the climb trail, this would also eliminate the beginner trail north of the 3360300 Road. Without an east-west traverse on the north and climb trail on the east this alternative would put many riders on the road. This would not satisfy the need for a trail system designed and managed for mountain bike use, as much of the use would be forced onto the open road system rather than riding trails where they will not meet vehicles. Eliminating these trails and features dramatically reduces the diversity of trail options which will reduce the overall opportunity to a sector within the cycling community. This will likely attract the gravity focused downhill rider almost exclusively in the same way as Alternative 3. This Alternative also has a section of beginner trail that does not connect well to the rest of the trail system. Without the long distance-cross country trail intact, users will continue to seek that experience at Lookout and Round Mountain and continue to experience conflict between users on those trails.

Similar to Alternative 3, It is expected that the same number of gravity riders would come to experience Lemon Gulch as would come to experience the full 51.6 miles proposed in Alternative 2. Over time, local and repeat visitors may be unsatisfied with the low number of miles offered and use may shift back to Lookout and Round Mountain. The 18.9 concentrated miles will increase the "persons at one time" (PAOT) on one side of Lemon Creek rather than spreading use out over the 51.6 miles on both sides of the creek. This concentration will increase crowding potential as well as rider rotations which will generate a higher level of maintenance needs. The elimination of the climb trail would force many riders to ride to the top on the 3360 and 3360300 roads causing an increased concern for vehicle and bike conflict with more riders utilizing the road than would have used the climb trail in Alternative 2. The climb trail is also the majority of the cross-country miles niche and style of riding. Eliminating this dramatically reduces the diversity of trail options which will reduce the overall opportunity to a sector within the cycling community. This will likely attract the gravity focused downhill rider almost exclusively.

**Alternative 5 - Mountain Bike Trail Opportunity**

Under Alternative 5, the total number of trail miles would be reduced to 28.7 to address concerns with grazing operations and wildlife habitat. There would be 7.7 miles of Beginner trails, 13.6 Miles of Intermediate trails, and 7.4 miles of Expert trails.

This alternative includes the long-distance cross-country trail on the west side and the east-west beginner traverse north of 3360300 but eliminates the outer portion of the cross-country loop on the west side as well as the climb trail. Therefore, there would still be uphill bike traffic encountering vehicles on 3360 that would be mostly eliminated in Alternative 2 as they would most often use the climb trail. Many of the downhill options are shortened in this alternative and without the rest of the downhill trails on the east side and most riders would not continue down to the bottom trailhead.

**Alternative 6 - Mountain Bike Trail Opportunity**

Under Alternative 6, the total number of trail miles would be reduced from 51.6 to 27.5 to address concerns with grazing operations and wildlife habitat. There would be 9.8 miles of Beginner trails, 11.2 miles of Intermediate trails, and 6.5 miles of Expert trails.

This alternative includes the long-distance cross-country trail on the west side and the east-west beginner traverse north of 3360300. It also does include the climb trail which will reduce uphill bike traffic encountering vehicles on 3360. Additionally, this alternative includes proposed adaptive trails of all difficulty levels.

**All Action Alternatives – Other Recreation Use**

*Other Recreation Uses*

As with No Action, overall outdoor recreation use is expected to continue to grow on the Ochoco National Forest and in the project area specifically due to its proximity to town and accessibility. Existing equestrian, OHV, and Wilderness trails would continue to provide opportunity for these uses. Use on the Lemon Gulch trails would be open to all non-motorized use, though horseback riding would be discouraged because of the potential for conflicts with mountain bikes and because of the availability of roads, equestrian trails, Wilderness trails, and cross-country riding opportunity in the area.

Figure 11: This photo shows a mountain bike on a single-track trail meandering through a ponderosa pine forest.

It is predicted that there would be slight increases in camping at developed sites at both Ochoco Reservoir and Mill Creek Campgrounds and there will be more vehicle encounters on the roads within the project area. Dispersed sites at Lemon Gulch and along Mill Creek could become more popular with mountain bikers and see more use overall. As that use begins, it is expected that some of the long-term camping associated with houselessness along Mill Creek would be reduced as recreation focused visitors tend to report, clean up, and partner with the USFS to ensure riding areas remain clean and seek to eliminate littering, dumping, inappropriate warming fires, etc. that can be associated with camps with individuals experiencing houselessness.

Under alternatives with fewer miles and less diversity of trail types, there may be less visitation to Lemon Gulch than with the proposed action. This would result in less paid camping visitation to Ochoco Reservoir and Wildcat Campgrounds. There would be less dispersed camping in the Lemon Gulch and Mill Creek area associated with mountain biking, although that use would continue to increase with general camping, population growth, and increasing houselessness in the area.

**Cumulative Effects All Alternatives**

Cumulative effects occur when the effects of a proposal overlap in space and time with effects of ongoing or reasonably foreseeable future projects and actions. Cumulative effects are assessed at the Mill Creek Watershed scale because that area is close to town where effects of growing recreation pressure will be most evident. There are no reasonably foreseeable future projects that would affect the amount of recreation use in the area. The Mill Creek Vegetation Management Project may impact the availability of trails and access to dispersed sites during project implementation which will include staging of logging equipment, road maintenance, thinning operations and fuel treatments (piling and underburning).

At the Forest scale, which is the scale at which the Forest Plan provides objectives for trails, Alternative 1 adds no additional trails to the system, so there would be no cumulative effect to the amount of non-motorized trails. Alternatives 2, 3, 4, 5, and 6 add between 19.1 and 51.3 miles of non-motorized trail.

The Forest Plan has an objective of 468 miles of non-motorized trail available for hikers, equestrians, and mountain bikers. The action alternatives all increase the amount of available non-motorized trail and therefore all would move the Forest towards the Forest Plan objective. Alternative 2 increases total summer non-motorized trail mileage from 156.5 to 207.8; Alternative 3 increases it to 177.5; Alternative 4 increases it to 175.6; Alternative 5 increases it to 185.2; and Alternative 6 increases it to 184. Alternative 2 would best move the non-motorized trails towards Forest Plan objectives, followed by Alternatives 6, 5, 3, and 4 (Table 10).

Table 10: Cumulative Miles of Summer Non-Motorized Trail by Alternative Compared to Forest Plan Objective

| | Total Miles Non-Motorized Summer Trails on Forest | Percent of Forest Plan Objective for Non-Motorized Summer Trails |
|---|---|---|
| Alt 1 | 156.5 | 32% (current condition) |
| Alt 2 | 207.8 | 42.5% |
| Alt 3 | 177.5 | 36.5% |
| Alt 4 | 175.6 | 36.1% |
| Alt 5 | 185.2 | 38.1% |
| Alt 6 | 184 | 37.8% |

Newly designed, sustainable trails that meet bikers' needs would be constructed to get ahead of the increased use seen in recreation trends on National Forest and other public land in the western United States. Alternative 2 would provide the most recreation opportunity for the widest variety of users, followed by 5, 6, 3, then 4 (Table 9). Although Alt 5 has more miles, the addition of the climb trail and more miles for adaptive users makes Alt 6 have the most opportunity for the widest variety of users. The more miles constructed here, the less conflicts other trail users will experience on other trails, especially Lookout and Round Mountain, and considering the overall growth in recreation use on public land.

## Socio-Economics

Local, regional, and national studies were reviewed including the web sites of various user groups and researchers such as American Trails, Headwaters Economics, Oregon State Extension Service, and the U.S. Census Bureau. Local and regional planning documents were also reviewed to determine the possible effects of the trail system. With this assessment, we assume that existing recreation activities that currently occur in the area, such as camping, hiking, horseback riding, bike riding, and sightseeing will continue to attract locals and visitors to the area, and that Mill Creek Road/Forest Road 33 will continue to provide a primary access point to the west side of the Ochoco National Forest.

### *Affected Environment*

*Demographics*

The Lemon Gulch project area is in Crook County, Oregon (Figure 12), which according to the U.S. Census in 2021, had a population of 25,739.[2] Federal lands make up 49.6% of the county's 1.91 million acres (U.S. Census Bureau 2020, Figure 13).

[2] This population exceeds projections prepared by Portland State University Center for Population Research. They projected a population of just 22,404 in the year 2025 (Kittelson and Associates 2017).

The county's population is growing and diversifying, like many areas with significant natural capital and lifestyle opportunities. That growth has accelerated recently: the population rose 2.48% between 2020 and 2021, exceeding growth in neighboring Deschutes County. People are moving to and visiting Crook County to enjoy the environmental amenities (Sorte 2004).

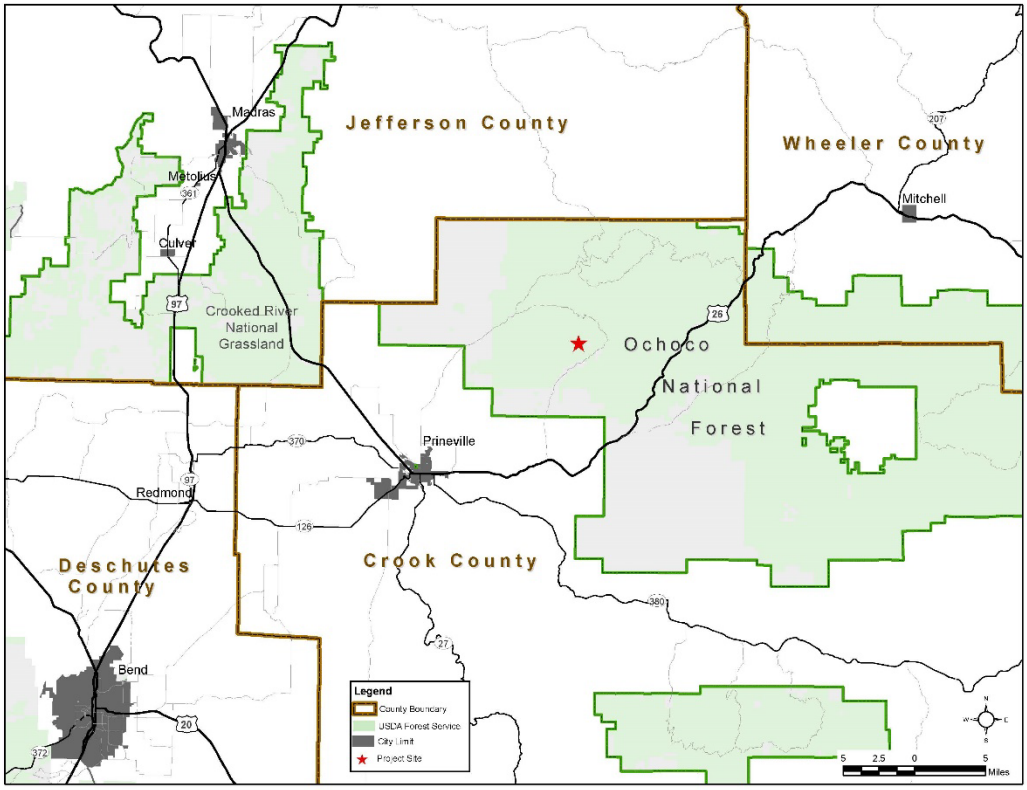



Figure 12: The project area lies within Crook County. Prineville is the largest population center near the project area.

Demographic data shows that the total population is low in the majority of Crook County east of Prineville, where the project area is located. It also shows that the county east of Prineville has the highest percentage of elderly: 25-35% of the population is over age 65 (Kittelson and Associates 2017).

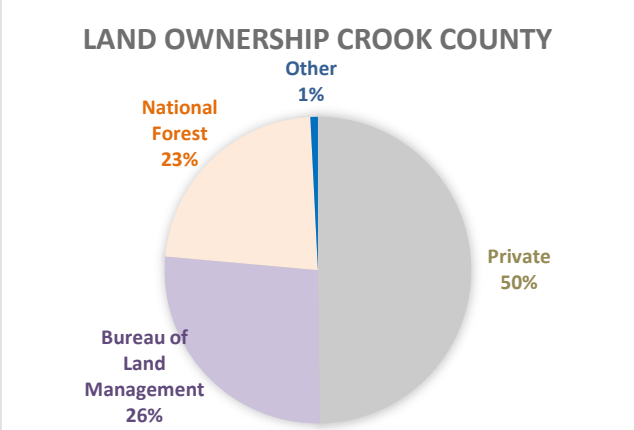



Figure 13: Land Ownership in Crook County

Mill Creek Road, which accesses the project area, is categorized as a Major Collector Road in Crook County's transportation plan (Kittelson and Associates 2017). The County's transportation plan does not identify any needed widening or other work for the portion of the road leading to the project area. Between Highway 26 and the National Forest boundary, approximately 27 tax lots are located directly adjacent to the NE Mill Creek Road, which accesses the National Forest and the project area. A subset of these tax lots are immediately adjacent to National Forest System lands. Some of these property owners have a residence on their lot and others live outside the area.

The county seat, and largest population center in proximity to the project area, is the city of Prineville. According to the U.S. Census Bureau estimate, Prineville's population in 2022 is 11,227 (U.S. Census Bureau 2022). Population growth has been occurring at a rate of 3.56% per year and increased by nearly 30% since the previous census in 2010.

*Recreation Economy*

A 2021 report found that outdoor recreation is a significant contributor to the economy of Crook County based on expenditure of $86 million by local recreationists and visitors. This supported 800 full and part time jobs and $35 million in GDP contributions (Earth Economics 2021). The presence of public lands is considered an amenity that can attract new businesses, residents, and visitors. Public lands provide recreational, environmental, and lifestyle amenities that can stimulate economic growth. It also contributes to a resilient diversified economy. A Crook County commissioner stated in a 2015 interview with the Bend Bulletin newspaper, that "Outdoor tourism is really our bread and butter," when referring to how the leisure and hospitality sector was leading the economic recovery of Crook County following the last recession. In the same newspaper article, the then leader of the local Chamber of Commerce felt that doubling the amount of single-track trail in the Ochoco National Forest would represent an opportunity to further diversify Crook County's economy.[3] This diversified economy including outdoor amenities aided Prineville's early economic rebound following the COVID pandemic earning Prineville a top ten ranking on Heartland Forward's list of the Most Dynamic Micropolitans of 2022 (Heartland Forward 2022).[4]

According to their Natural Resource Policy document, the Crook County Court has a policy to follow certain principles in making decisions about natural resources within the County. Supported principles include the expansion, revitalization and continuation of multiple uses on all public lands in Crook County and a year-round multiple use management approach on public lands as a means of continuing and enhancing recreation opportunities within the County. The County, through their Natural Resource Policy, supports "the accessibility, improvement, maintenance, and development of motorized and non-motorized trails to facilitate recreation and access to natural resources for residents and visitors." (Crook County Board of Commissioners 2019).

The 2021 Prineville/Crook County Economic Profile provides this characterization of Prineville:

> "*Prineville is the oldest community in the Central Oregon region but remains innovative in terms of industry diversification, nationally-acclaimed infrastructure projects, and the progressive attitude of local leaders and partners.*
>
> *Beyond the affordability and the business-friendly and forward-looking culture, Prineville is home to some of the countless outdoor amenities that make Central Oregon such an attractive place to live and work.*
>
> *An economy that was traditionally driven by forest products, Les Schwab Tires, and agricultural operations, now boasts some of the largest employers in the region in the form of high-technology data centers and supporting sector employers."* (Economic Development of Central Oregon 2021)

*Recreation Opportunity Spectrum (ROS)*

The ROS is a planning system that provides a general framework for defining the types of outdoor recreation opportunities to be provided in an area. ROS classifications range from Primitive inside a

[3] https://www.bendbulletin.com/business/bicycling-boosts-crook-county-economy/article_54f3482b-f27d-5d0a-9966-649cb588f745.html

[4] See related news article: https://pamplinmedia.com/ceo/162-news/561952-449737-prineville-named-a-top-10-dynamic-micropolitan

designated wilderness to Urban in forests adjacent to metropolitan areas, thereby enabling managers to provide a variety of settings in which to recreate, each with their own characteristics and opportunities.

The LRMP assigns ROS categories of Roaded Natural, Roaded Modified, and Rural to the management allocations where the Lemon Gulch project is located. All of these categories may occur across the Mill Creek watershed. Definitions provided in the LRMP are as follows (there is no definition for Roaded Modified, but it can be assumed to fall along the spectrum between Roaded Natural and Rural):

> *Roaded Natural:* Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.
>
> *Rural:* Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation, or pastoral agricultural development. Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking area available. (LRMP p. GL-20)

The proposed trail system and associated trailheads would be compatible with the Roaded Natural classification of ROS.

### *Environmental Consequences*

*Benefits and Impacts to Local Communities*

**Alternative 1 – No Action**

Under the No Action Alternative, no new trails would be built and there would therefore be no additional benefits to the economy of the area or to the health and lifestyle of local residents.

**All Action Alternatives**

Studies show that communities benefit from recreation on public land, for example:

- Public lands provide recreational, environmental, and lifestyle amenities that can stimulate economic growth. While amenities alone are typically not sufficient to foster growth, they have increasingly been shown to contribute to population growth and economic development. (Headwaters Economics 2021).
- "Communities that are able to capture the most spending from recreation visitors have businesses that offer services and goods desired by those engaged in outdoor recreation. On average, expenditures for lodging; food, and drink in restaurants, bars, and grocery stores; and fuel account for the majority of recreation trip spending." (White et al, 2016).

Communities adjacent to and near public lands benefit from trails on those lands. Because rural towns can benefit from the amenities on public lands when they use them to attract new businesses, residents, and tourism, the presence of a new successful trail system may result in increased economic outcomes for the residents and businesses of Prineville. Additional visitors would spend money at local businesses in town including at grocery stores, hotels, and restaurants. In fact, in a recent move in response to increased visitors, the Prineville Chamber of Commerce installed a "cycling station" to assist visiting bicyclists with their trip and to encourage their use of local businesses for food, drink, and lodging.

It isn't possible to determine how much economic outputs a specific recreation site such as the Lemon

Gulch trails would create, but according to Forest Service Research, average spending of national forest visitors ranges from about $26 per party per trip for local residents on day trips to $580 for nonlocal visitors on overnight trips per party per trip for visitors (White 2017). Additionally, the average economic value of recreation benefits (how much those involved in recreation value their recreation experience) is estimated to be $86.74 per day (in 2016 dollars) for biking in the Pacific Northwest Region of the Forest Service (Rosenberger et al. 2017).

For those who already live nearby, the close proximity of the proposed trail system to Prineville would provide local residents a high-quality outdoor recreation experience relatively close to home with accompanying health and lifestyle benefits. Crook County on the Move, a program of the Crook County Foundation that encourages healthy lifestyles for people of all physical abilities, expressed support for the proposed trail system because of the plan's incorporation of a variety of use levels from the beginner biker, to adaptive mountain bike trails for people with disabilities or limited mobility, to options for hikers.

Property owners near the Ochoco National Forest and project area have expressed concerns about increased noise, traffic, garbage, trespass, increased risk of human-caused fires, and impacts to natural resources. Those opposed to the trail system believe it to be an unnecessary development that does not belong in Crook County, or at least in this part of the County. On the other hand, local trail users, others in the community, and across Central Oregon have expressed strong support for the project.

Similar to comments received from residents and landowners near the current project area, home and property owners nationwide often express concerns and fears about proposed trails near their neighborhoods. But studies in various parts of the United States show that concerns about trails lowering property values and increasing crime are unfounded. In fact, trails have consistently been shown to increase (or have no effect on) property values, to have no measurable effect on public safety, and to have an overwhelming positive influence on the quality of life for trail neighbors as well as on the larger community (Webel 2007).

According to a recent road count conducted by Crook County, there is an average of 300 trips per day on the Mill Creek Road. The location where the road count was conducted is unknown, so it is not possible to know how many of the trips were to private property along the road or people heading to the National Forest for any number of reasons. Numerous destinations are located along or accessed by the Mill Creek Road. Once it crosses onto the National Forest, it becomes Forest Road 33 and provides access to Steins Pillar Trailhead, Wildcat Campground, Mill Creek Wilderness, and other destinations. The property owners with residences directly adjacent to Mill Creek Road could see an increase in road use but an increase in traffic volume on the Mill Creek Road due to the trail system may be difficult to discern. Peak recreation use of the National Forest typically occurs on weekends, especially holiday weekends, so these are the times when increased road use may be most noticeable. As noted in the Transportation section of this EA, the volume of road use is not expected to noticeably contribute to degraded road conditions.

It is unlikely that trespass would occur on private property near the project as a result of people coming to ride the trail system. The trailheads and trails are not immediately adjacent to private property. People who come to use the trails are not expected to be interested in riding off the trails and would therefore not venture onto private property. Informational signage at the trailhead would notify visitors of private property within the vicinity, and trails would be signed.

There is anecdotal evidence that unlawful behavior such as garbage dumping is curtailed in areas where recreation developments occur. Visitors to the trail system are not expected to increase garbage dumping on the Mill Creek Road or on roads in the project area. Leave No Trace principles would be promoted. Should trash at the trailheads or on project area roads become evident, the Forest Service could add a dumpster at the lower trailhead. However, there does not appear to be any trash problems associated with other trails and trailheads on the Forest caused by trail users. Trash is occasionally dumped at trailheads and toilets by dispersed campers who generally are not trail users. Trail users often report trash, clean up voluntarily, and organize clean up events.

*Scenic Views*

The visual quality objective (VQO) for the area is Maximum Modification. This objective provides the acceptable landscape alteration measured by the degree of deviation from the natural-appearing landscape. The LRMP defines this VQO as "human activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background" (background considered from 4 miles away to the horizon). There is no identified viewing location. Maximum modification corresponds to low scenic integrity level in the updated methodology for analyzing impacts to scenic resources, the Scenery Management System according to the 1995 Landscape Aesthetics: A Handbook for Scenery Management. All alternatives would be consistent with the objective of maximum modification/low scenic integrity because from any viewpoint, trails and trailheads in the background would blend with the forest structure.

---

## Wildlife (Key Issue #1)

This section assesses the impacts of new trails to wildlife by analyzing the following factors:

- Potential for adverse changes in amount, condition, or suitability of habitat for a species or suite of species due to implementation of proposed actions.
- Potential for disturbance to species or suite of species due to implementation of proposed actions.
- Potential for adverse changes in connectivity of habitat (i.e. increase in fragmentation) for wildlife species.

### *Methodology*

Species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during field reconnaissance, non-Forest Service databases, status/trend and source habitat trends documented for the Interior Columbia Basin, and professional judgement. Informal wildlife surveys were conducted for some species. Field reconnaissance and/or informal surveys were performed during 2017, 2018, 2019, 2020, and 2021.

Reproductive habitat for the various wildlife species was determined using district occurrence data, scientific literature, various data sets, and professional experience. The Viable Ecosystem Management Guide (Viable) was used to determine the live tree component of habitat and formed the basis of acres of existing reproductive habitat.

Existing vegetative conditions, including snag components, in the analysis area were determined by the use of field reconnaissance, aerial imagery, and image analysis software.

The Ochoco National Forest Land and Resource Management Plan (Forest Plan) requires the use of habitat capability models in determining habitat effectiveness for big game species (USFS 1989a). The Habitat Effectiveness Index (HEI) as described by Thomas et al. (1988) is used to address this requirement.

**Information Sources**

This analysis draws on notes and field data collected during the 2017 - 2021 field seasons and professional knowledge of the project area. Discussions with other forest resource specialists also supplemented this work. Other formal data sources consulted include:

- Viable Ecosystems Management Guide (Simpson et al. 1994) – describes a seral/structural matrix for characterizing forest vegetation within each plant association group.
- Habitat Effectiveness Index (HEI) (Thomas et al. 1988) – a model for estimating elk habitat effectiveness on the landscape.

- Plan Implementation Note and Explanation (PIN 11; USFS 1990) – HEI tables in the Forest Plan are based on data and outputs aggregated at the Forest level. Because on the ground conditions vary significantly from this average, PIN 11 disaggregated the Forest wide management objectives down to the District/Watershed level. This resulted in three Forest wide HEI tables broken down into 52 watershed specific tables.
- Natural Resource Manager Wildlife Application version 2.12.3 – the agency standard for managing information about terrestrial wildlife on National Forest System Lands. A database that consists of observations, sites, and surveys, along with attributes associated with each.
- District/Forest GIS databases – consists of miscellaneous databases used for analysis. For example, forest road layers, watershed layers, administrative boundary layers, etc.
- The Blue Mountain Elk Nutrition Model for the eastside of Oregon is still in a beta testing phase and is not available for use in this analysis. In addition, data from recent efforts by Oregon Department of Fish and Wildlife (ODFW) related to GPS and radio-collared elk and mule deer is not available for analysis as it is currently being collected. As such, the best *available* science will continue to be utilized for big game effects analysis.

### *Resource Indicators and Measures*

The resource indicators and measures used for assessing effects are summarized in Table 11. The definition and applicability of each resource indicator is discussed in the respective Existing Condition sections below.

For most species, acres are quantified using the Viable Ecosystems Management Guide, while other species (or guilds of species) require other methods of analysis. For example, primary cavity excavator habitat was measured using snag density and down wood cover, while elk and big game habitat was quantified by habitat effectiveness and road density and its juxtaposition on the landscape.

The duration of effects for each resource issue is described according to the following terms and definitions: Short-term – 0 to 5 years; Mid-term – 5 to 25 years; and Long-term – 25+ years.

Table 11: Resource condition issues, indicators, and measures for assessing effects to wildlife

| Issue | Indicator or Measure | Source |
|---|---|---|
| Species *(i.e. Threatened Endangered, Proposed, and Sensitive Species; Management Indicator Species; Other Species; and Birds of Conservation Concern)* or habitat response to proposed activities | acres of habitat affected, and/or habitat modeling analyses – including Viable, Plant Association Groups (PAGs), Habitat Effectiveness Index, DecAID, or designated habitat (*Quantitative*);<br>disturbance to species or habitat (*Qualitative*);<br>effects determination *(Qualitative)* | Forest Service Manual 2670; National Forest Management Act, Forest Plan as amended by Eastside Screens, Endangered Species Act, Executive Order 13186; Best available science and literature |
| Change in connectivity of habitat for wildlife species | acres of connectivity habitat designated; core habitat analysis (*Quantitative*);<br>effects determination (*Qualitative*) | Forest Plan as amended by Eastside Screens, Best available science, and literature |

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

Threatened, endangered, proposed, and candidate species refer to those species specifically listed under the Endangered Species Act (ESA) by the US Fish and Wildlife Service (USFWS). Sensitive Species refer to those species identified by the Forest Service Regional Forester for which species viability is a concern. This analysis only includes effects to species that fall in these categories suspected or

documented on the Ochoco National Forest. These determinations of occupancy are made by the USFWS and USFS. Currently, the gray wolf is the only terrestrial threatened, endangered, or proposed species with any potential to occur within the analysis area. The Regional Forester's Special Status Species list contains 20 terrestrial animal species as documented or suspected on the Ochoco National Forest (USFS 2021), in addition, as the wolverine is no longer a candidate species under the USFWS it is considered as a sensitive species in this analysis. Table 12 lists these sensitive species as well as threatened, endangered, and proposed species for the Ochoco National Forest and additionally describes whether individual species were considered, or not, for further analysis.

Table 12: Threatened, endangered, proposed, and sensitive species for the Ochoco National Forest and Crooked River National Grassland: occurrence within the project area and consideration of potential for impact.

| Species | Species Occurrence in the Project Area and Consideration of Potential Impact for Further Analysis |
|---|---|
| **gray wolf** *Canis lupus* | **Considered.** This species is currently known to utilize the analysis area as dispersal habitat, but is not known to occupy it, or the Ochoco National Forest, on a permanent basis. Through communications with ODFW and USFWS, surveys have not detected any known dens, rendezvous sites, or Areas of Known Wolf Activity. Potential exists for prey species to be impacted by proposed actions. The Ochoco National Forest completed a programmatic biological assessment for gray wolves in 2020, however new trail construction is an excluded action within that assessment. Therefore informal consultation with the USFWS will be completed for this species. |
| **western bumblebee** *Bombus occidentalis* & **Morrisoni bumble bee** *Bombus morrisoni* | **Considered.** Species are suspected to occur within analysis area, though they have not been documented. Surveys did not confirm occupancy, but habitat is present in the form of riparian areas, moist meadow, and other areas where flowering plants occur throughout the year. Potential exists for flowering vegetation within riparian and moist meadow habitat to be impacted by project activities. |
| **wolverine** *Gulo gulo* | **Considered, but not carried forward.** Species is not known or suspected to occur within the analysis area. Surveys have not detected presence of this species on the Forest. Suitable habitat in the form of isolated areas with consistent snowpack is extremely limited within the analysis area. No measurable impacts from project activities are anticipated to this habitat. |
| **white-headed woodpecker** *Picoides albolarvatus* | **Considered, but not carried forward.** Species is known to occur within analysis area. Proposed actions would not impact live trees within ponderosa pine habitats to any measurable degree. Disturbance may occur during trail construction but would be isolated and short-term in nature and therefore negligible at the project scale. Thus no anticipated adverse changes in habitat or species use of the area will occur. |
| **Lewis's woodpecker** *Melanerpes lewis* | **Considered, but not carried forward.** Species may occur within riparian habitats within analysis area, though no observations have been documented. Recently burned habitat is not present. Riparian habitat components necessary for suitable reproductive habitat for this species such as large diameter cottonwood is not present in large quantities within the analysis area. Disturbance may occur during trail construction but would be isolated and short-term in nature and therefore negligible at the project scale. Thus no anticipated adverse changes in habitat or species use of the area will occur. |
| **silver-bordered fritillary** | **Considered, but not carried forward.** Species is not known or suspected to occur within the analysis area. The host plant, bog violet, has not been documented |

| Species | Species Occurrence in the Project Area and Consideration of Potential Impact for Further Analysis |
|---|---|
| *Boloria selene* | within the project area. Moist meadow habitats in general are limited within the analysis area and surveys did not document the presence of this species. Thus no anticipated adverse changes in habitat or species use of the area will occur. |
| **monarch butterfly** *Danaus plexippus* | **Considered, but not carried forward.** Species is not known or suspected to occur within the analysis area. The host plant, milkweed, has not been documented within the project area. Moist meadow habitats in general are limited within the analysis area and surveys did not document the presence of this species. Thus no anticipated adverse changes in habitat or species use of the area will occur. |
| **bald eagle** *Haliaeetus leucocephalus* | **Considered, but not carried forward.** Species is not known to nest within analysis area. Surveys and field reconnaissance did not detect any nests or potential nesting areas. No large bodies of water are present, or within close proximity, which might serve as foraging habitat. Project would not impact potentially suitable habitat for this species. |
| **white-tailed jackrabbit** *Lepus townsendii* | **Not Considered.** Species has not been documented within the analysis area. Habitats dominated by bunchgrass or shrubs are not present. Project would not impact habitat for this species. |
| **Townsends big-eared bat** *Corynorhinus townsendii* | **Not Considered.** Species has not been documented within the analysis area. Project would not impact habitat (i.e. cave, mine, or other nesting/roosting structures) for this species. |
| **spotted bat** *Euderma maculatum* | **Not Considered.** Species has not been documented within the analysis area. Project would not impact habitat (i.e. cave, rock, cliff, or other nesting/roosting structures) for this species. |
| **fringed myotis** *Myotis thysanodes* | **Not Considered.** Species has not been documented within the analysis area. Project would not impact habitat (i.e. cave, mine, or other nesting/roosting structures) for this species. |
| **grasshopper sparrow** *Ammodramus savannarum* | **Not Considered.** Species is not known or suspected to occur within the analysis area. Open grassland or prairie habitats are not present. Project would not impact habitat for this species. |
| **greater sage-grouse** *Centrocercus urophasianus* | **Not Considered.** Species is not known or suspected to occur within the analysis area. No known leks, or other seasonal range exists within 15 air miles. Project would not impact habitat for this species. |
| **bufflehead** *Bucephala albeola* | **Not Considered.** Species is not known or suspected to occur within the analysis area. No large bodies of water are present which might serve as foraging or nesting habitat. Project would not impact habitat for this species. |
| **tricolored blackbird** *Agelaius tricolor* | **Not Considered.** Species is not known or suspected to occur within the analysis area. No large marsh areas are present which might serve as foraging or nesting habitat. Project would not impact habitat for this species. |
| **upland sandpiper** *Bartramia longicauda* | **Not Considered.** Species is not known or suspected to occur within the analysis area. No large-scale open prairie habitats are present which might serve as foraging of nesting habitat. Project would not impact habitat for this species. |
| **American white pelican** *Pelecanus erythrorhynchos* | **Not Considered.** Species is not known or suspected to occur within the analysis area. No large bodies of water are present which might serve as foraging or nesting habitat. Project would not impact habitat for this species. |
| **horned grebe** | **Not Considered.** Species is not known or suspected to occur within the analysis |

| Species | Species Occurrence in the Project Area and Consideration of Potential Impact for Further Analysis |
|---|---|
| *Podiceps auritus* | area. No large bodies of water are present which might serve as foraging or nesting habitat. Project would not impact habitat for this species. |

## Existing Condition – Gray Wolf (*Canis lupus*)

Since 2011, radio-collared wolves from various packs have been confirmed travelling through the Ochoco National Forest (ODFW 2016), however individuals' use of the Forest appears to be of short duration as they move through to other habitats. The Oregon Department of Fish and Wildlife (ODFW) designates Areas of Known Wolf Activity (AKWA) throughout the state of Oregon on an annual basis. ODFW defines these areas as those where wolves are permanent residents, or have sustained use during periods of the year, and often include denning and rendezvous sites. In addition, no areas of wolf activity have been designated on the Ochoco, with the closest areas located > 30 miles west of the project area (ODFW 2022c). According to the USFWS, "occupied wolf range" is defined as follows: areas of confirmed presence of resident breeding packs of wolves or an area consistently used by $\geq$ 1 resident wolf or wolves over a period of at least one month (USDI Fish and Wildlife Service 1994). By this definition, the Ochoco National Forest does not contain any identified occupied wolf range. The closest area that would meet this definition would be approximately 30 miles to the west of the project area (ODFW 2022c).

ODFW also conducts depredation investigations which are made available on a monthly basis throughout the year. According to these reports there have been no confirmed wolf depredations of livestock in Crook County as of June 2022 (ODFW 2022a).

Anecdotal observations of wolves have occurred on the Forest, some of these reports have been corroborated or confirmed with photographic evidence, including photos from USFS remote sensor camera trap surveys. To date, photos of the occasional wolf represent the only physical evidence of wolves detected outside of the known radio-collared wolf data provided by ODFW and USFWS. Numerous surveys have been conducted on the Forest in an effort to determine levels of wolf activity, but to date no evidence of resident wolves has been detected.

There are approximately 238,000 acres of available habitat for the gray wolf on the District. Within the Lemon Gulch Trails project area, approximately 3,305 acres of suitable habitat exists, as well as abundant prey in the form of deer and elk. High road densities and human presence may limit wolf presence within the project area.

As the Ochoco National Forest does not contain any identified areas of known wolf activity (as designated by ODFW), nor does it meet the USFWS definition for occupied wolf range, the project area primarily serves as dispersal habitat for transient wolves.

Areas within and adjacent to the project area have varying densities of roads and associated levels of human use. In general, use of the Forest is higher during summer and fall seasons, with the majority of use during daylight hours. Areas with lower human use exist within and surrounding the project area and are represented by wilderness areas, unroaded areas, and areas with effectively closed roads. These areas are available for use by this species as it moves across the landscape should human disturbance factors cause it to shift away from areas with higher human use. In addition, times of reduced human use would occur each day, as well as outside the peak seasonal use of the Forest in which dispersing wolves would continue to be able to move through the area with less influence from human use.

Movement of dispersing wolves would not be inhibited by topography or other natural factors within the Forest or project area as the Forest does not contain a multitude of topographical relief or large bodies of water that would restrict or funnel movement.

## Environmental Consequences – Gray Wolf

### Alternatives 1, 2, 3, 4, 5 & 6

Wolves are not known to reside on the Ochoco National Forest. Therefore, no effects are anticipated to established packs, dens, or rendezvous sites, as they are not known or suspected to occur on the Forest, or within the Lemon Gulch Trails project area.

The project area serves as dispersal habitat for transient wolves. Effects to dispersing wolves were evaluated based on a change in the following criteria; 1) human use, 2) barriers to movement, and 3) prey availability. In addition, the duration and exposure to potential effects were evaluated.

In the recent past, multiple collared wolves were tracked dispersing across the Ochoco National Forest. Tracking data indicated that on average their approximate duration of time spent on the Forest was less than 5 days each. This would indicate that use of the area, and therefore exposure to potential effects is of limited duration.

Roads and trails present across the Forest, including within the project area, facilitate a high amount of human disturbance. Alternative 1 does not remove human disturbance from the area, nor does it add to the existing ambient disturbance already present. All action alternatives include an increase in human use of the area, by increasing use of existing roads, and increasing the existing trail density by varying amounts in each alternative (Table 13).

Table 13: Comparison of the trails and trail density for each alternative for the Lemon Gulch Trails project.

| Alternative | Total Miles of Trail | Total Trail Density ($mi/mi^2$) |
|---|---|---|
| Alternative 1 | 0 | 0 |
| Alternative 2 | 51.3 | 10.0 |
| Alternative 3 | 21 | 4.0 |
| Alternative 4 | 19.1 | 3.6 |
| Alternative 5 | 28.7 | 5.4 |
| Alternative 6 | 27.5 | 5.3 |

There are no proposed activities which might serve as a barrier to movement for gray wolves. Proposed trails do not create a physical barrier for this species, and therefore the ability of the species to maneuver through the landscape would not be impeded by any proposed action under any alternative.

This project is not expected to significantly affect distribution or population size of prey species for wolves to such a degree that prey would be unavailable for the needs of the species under any of the alternatives. While prey species such as deer and elk may avoid the project area during times of high use, there is abundant habitat outside of the project area where dispersing wolves may find prey. All the action alternatives propose to increase trail miles and density within the watershed, which would increase human use and adversely impact use of the project area by gray wolf prey species. Under Alternative 2 there is potential for primary prey species such as elk and deer to be displaced to a greater degree over the mid- to long-term when compared to alternatives 3, 4, 5, or 6 as an increase in trail miles and human-caused disturbance within the project area would lead to increased fragmentation of habitat for these species, as well as potential for social avoidance. Alternatives 3, 4, 5 and 6 do adversely impact habitat for prey species as well, but to a lesser degree than Alternative 2 with regard to fragmentation of core habitat. This displacement may make it increasingly difficult for dispersing wolves to secure prey during the season of trail use within the project area. Prey such as elk and mule deer may be displaced onto nearby private

lands, which in turn may encourage wolves to occupy those same habitats as they disperse through the area increasing the potential for conflicts with private landowners. For a more detailed explanation of effects to big game species see the Rocky Mountain elk and mule deer analysis in the management indicator species section.

Therefore, due to the scope and scale of the project, the abundance of suitable habitat located in close proximity to proposed activities, the limited duration of potential disturbance and exposure, and the lack of detrimental effects to prey species, any potential effects to wolves dispersing through the project area would be insignificant and discountable.

**Cumulative Effects**

The cumulative effects boundary includes the 6 subwatersheds that fall within or adjacent to the Lemon Gulch Trails project boundary (Wildlife Report Appendix A, Figure A-2). All of the activities listed in Appendix A were considered for their cumulative effects to the gray wolf or its habitat.

Effects from other commercial and noncommercial treatments previously implemented within the project area were included in the existing condition. Vegetation management treatments currently in the implementation phase, which have the potential to overlap in time and space with proposed actions, include commercial and non-commercial harvest as well as prescribed burning. Activities proposed in the Mill Creek, McKay, and Spears Fuels and Vegetation Management projects (i.e. thinning of dense forest stands within upland and riparian habitats, stream restoration, prescribed burning, hardwood enhancement, and road closures) would combine with actions proposed in the Lemon Gulch Trails project to both improve habitat conditions for prey species of the gray wolf as well as degrade habitat conditions.

Livestock grazing as authorized by the Marks Creek and Mill Creek AMPs is ongoing within the cumulative effects boundary with the exception of a few exclosures. These existing allotment management plans previously authorized combined with annual operating instructions, adhere to the Forest Plan Standards and Guides which are intended to maintain forage for big game as well as maintain or improve riparian conditions in specified locations. Effects from these actions would contribute beneficially toward habitat conditions for the gray wolf and its prey, however effects from the action alternatives of Lemon Gulch would not contribute beneficially to ongoing habitat improvement occurring within the cumulative effects boundary.

**Determination**

Activities associated with the implementation, construction, and maintenance of the Lemon Gulch Trails project would not impact established wolf packs, dens or rendezvous sites as no populations currently occupy the Ochoco National Forest, nor are there any areas of known wolf activity (as identified by ODFW) on the Forest. In addition, the Ochoco National Forest does not meet the USFWS definition of occupied wolf range, where potential impacts to the species should be considered. Wolves dispersing across the project area would not be inhibited by the implementation of this project, as no physical barriers are proposed. The potential for disturbance to dispersing wolves is considered low because both documented and suspected use of the project area by wolves is infrequent in nature. In addition, suitable source habitats and diurnal patterns of human use provide relief should a dispersing individual's movements be influenced by any human use. This project does propose to increase human use above existing levels, however proposed activities would likely occur during daylight hours, and would therefore not be expected to impact species potential use of the area. Effects to prey species from project implementation may cause minor shifts in distribution seasonally, however these impacts are insignificant at the landscape scale and would not impact population levels or viability and are therefore discountable. Therefore, the determination for wolves is **May Effect, not Likely to Adversely Affect (NLAA)** for all action alternatives.

## Existing Condition – Morrisoni bumble bee & Western bumble bee

Bumble bees obtain their nutrition by gathering pollen and nectar from a variety of flowering plants. A constant supply of flowers in bloom from spring to autumn is therefore necessary to provide suitable

habitat for these species (Evans et al. 2008). Western bumble bees primarily nest underground in abandoned rodent nests and potential nest sites may be limited by the abundance of rodents and the presence of undisturbed grassland (Evans et al. 2008).

Past management actions including the exclusion of fire and intensive grazing have decreased the abundance, distribution, and quality of habitat conditions within open meadow and riparian habitats reducing the availability of flowering vegetation suitable for these species.

Historic and recent observations confirm the occurrence of western bumble bees on the Forest, although widespread distribution data is still lacking due to limited historic survey effort. Similarly, the Morrison bumble bee occurs on the Crooked River National Grassland but has not been confirmed elsewhere on the Forest. Neither species has been documented in the analysis area, although their presence is suspected. Potential habitat for these species in the analysis area is likely limited to isolated patches in open meadows and grassland/forb habitats where suitable populations of flowing plants occur. Bumble bee habitat within the analysis area may occur on 19 acres of meadow and 328 acres of grass/forb habitat. It is reasonable to conclude that not all the acres referenced as habitat contain the necessary flowering plant component needed to provide habitat, however for the purposes of this analysis it is assumed that the necessary flowering plants are present.

## Environmental Consequences – Morrisoni bumble bee & Western bumble bee

### Alternative 1

This alternative would not treat habitat within the project area for these species. In the short to mid-term, the various habitats that may currently exist for this species would be maintained in their current condition.

### Alternatives 2, 3, 4, 5, and 6

Alternatives 2, 3, 4, 5, and 6 propose activities in bumble bee habitat (Table 14). Alternative 2 proposes the most miles of trail within potential bumble bee habitat, with alternative 4 being the next highest. A similar overall amount of trail miles is proposed within bumble bee habitat for alternatives 3 and 5 which propose to impact less than half the amount of habitat when compared to alternative 2 or 4. In addition to the trail construction identified in Table 14, all action alternatives propose to place the northern most trailhead and parking area within identified bumble bee habitat.

Proposed trail and parking area construction activities would adversely impact individuals or habitat through the disturbance of vegetation and/or overwintering sites. Areas converted to trails, trailheads, or parking areas, would be expected to no longer serve as suitable habitat for bumble bees due to soil compaction and the loss of vegetation in those areas. This impact would be expected to persist into perpetuity as trails and parking areas would be maintained over time and vegetation continually removed. However, the maximum loss of habitat is expected to be less than 5 acres or < 2% of the total available habitat within the project area, therefore impacts to bumble bees or their habitats is expected to be minimal at the project scale.

There is potential for an increased level of ambient disturbance due to an overall increase in human presence related to use of the trails, but this is expected to have a negligible effect on bumble bees or their habitats at the project scale.

Table 14: Miles of new trail construction by habitat types within potential bumble bee habitat by alternative

| Alternative | New Trail in Meadow Habitats (miles) | New Trail in Grass/Forb Habitats (miles) | Total New Trail (miles) | Approximate Acres Impacted[1] |
|---|---|---|---|---|
| **Alternative 1** | 0 | 0 | 0 | 0 |
| **Alternative 2** | 0.27 | 5.53 | 5.80 | 2.1 |
| **Alternative 3** | 0 | 1.25 | 1.25 | 0.5 |
| **Alternative 4** | 0 | 4.10 | 4.10 | 1.5 |
| **Alternative 5** | 0.01 | 1.43 | 1.44 | 0.5 |
| **Alternative 6** | 0.01 | 2.16 | 2.17 | 0.8 |

[1]Acres were calculated using 3 feet as the assumed maximum trail width

### Cumulative Effects

The cumulative effects boundary includes the 1 watershed that the Lemon Gulch Trails project boundary falls within (Wildlife Report Appendix A, Figure A-1). All of the relevant past, present and reasonably foreseeable future actions in Appendix A, Table A-1 that fell within this boundary were considered for their cumulative effects to bumble bees or their habitat.

Vegetation management treatments, including commercial and noncommercial thinning as well as prescribed burning, within the cumulative effects boundary are currently in the planning phase for the Mill Creek Restoration project, and the implementation phase for the Mill Creek AMP project. These foreseeable treatments are likely to overlap to some degree with potential bumblebee habitat. In addition, some proposed riparian restoration activities have yet to occur within these project areas. These activities would target dense forest habitats to reduce fire risk and remove fire intolerant species, opening up the canopy and improving understory vegetative conditions. Riparian restoration activities would prevent further lowering of the water table, thus allowing moisture levels in associated meadow habitat to be, at a minimum retained, but likely improved, ensuring habitat for this species is maintained within the cumulative effects boundary.

Livestock grazing as authorized by the Mill Creek AMPs is ongoing within the cumulative effects boundary with the exception of a few exclosures. Grazing animals can decrease flower and seed production, directly consuming reproductive structures, or indirectly by stressing the plant and reducing energy available to develop seeds (Wallander et al. 1995, Lacey et al. 1992). The continued implementation of livestock grazing in the subwatersheds is likely reducing the abundance and quality of habitat for this species.

The Lemon Gulch trails project would contribute a slight negative trend in habitat to the overall cumulative effects, however projects previously mentioned would beneficially contribute. Therefore, the combined effect of the proposed action alternatives from the Lemon Gulch Trails project, with these current and reasonably foreseeable actions would be that the abundance and distribution of bumblebee habitat would likely increase at the cumulative effects boundary scale.

**Determination**

The determination of effect of the action alternatives on the western bumble bee and Morrison bumble bee is **May Impact Individuals or Habitat, but not likely to result in a trend toward federal listing or loss of viability of the species or populations (MIIH)** due to potential for disturbance and displacement of individuals during use of the trail system and the slight reduction in overall available habitat.

### *Management Indicator Species*

Management indicator species (MIS) are species selected because their welfare is presumed to be an indicator of the welfare of other species using the same habitat or whose condition can be used to assess the impacts of management actions on a particular area, or other species of selected major biological communities. Table 15 lists the terrestrial species selected as MIS in the Forest Plan. The National Forest Management Act of 1989 (NFMA) directs the Forest Service to provide habitat to maintain viable populations of existing native and desired non-native vertebrate species.

Viability of MIS was assessed using the Historic Range of Variability (HRV) concept; comparing current amounts and distribution of habitat to historical conditions (Wisdom et al. 2000; Suring et al. 2011). By managing habitat within HRV it is assumed that adequate habitat would be provided because species survived those levels of habitat in the past to be present today. The greater departure of current habitat conditions from HRV, the more likely it is that population viability would be compromised. For the purposes of this project HRV analyses was used to analyze effects to pileated woodpecker habitat only, as other MIS considered for further analysis were addressed using other more species-specific analyses.

Table 15: Management Indicator Species identified in the Ochoco National Forest Land and Resource Management Plan for the Ochoco National Forest and Crooked River National Grassland: representing habitat, habitat requirements, occurrence within the project area and consideration of potential for impact.

| MIS Species | Representing Habitat, Habitat Requirements, Species Occurrence in the Project Area and Consideration of Potential Impact for Further Analysis |
|---|---|
| **Primary cavity excavators** | *Representing:* snag habitat |
| | *Habitat Requirements:* snag habitat |
| | **Considered, but not carried forward.** Snag habitat is present within the project area as are primary cavity excavators. Direct removal of snags is not proposed under any alternative, nor will snag habitat be impacted by implementation of the proposed actions. |
| **Pileated woodpecker** | *Representing:* old growth habitat |
| | *Habitat Requirements:* closed canopy, late-seral subalpine, montane, and lower montane forests |
| | **Considered.** Designated Old Growth Management Areas and habitat with old growth characteristics are present within the project area. Trails are proposed within Pileated Feeding Habitat (PFH) and therefore may impact this species. |
| | *Representing:* species that are commonly hunted |

| MIS Species | Representing Habitat, Habitat Requirements, Species Occurrence in the Project Area and Consideration of Potential Impact for Further Analysis |
|---|---|
| **Rocky Mountain elk and mule deer** | *Habitat Requirements:* habitat generalist – mixture of successional stages in both forest and grasslands |
| | **Considered.** Big game species such as elk and deer and their habitats are present within the analysis area. Proposed actions would impact components of these habitat types and therefore may impact these species or their use of the habitat. |
| **Golden eagle and prairie falcon** | *Representing:* cliff, talus, or cave habitats |
| | *Habitat Requirements:* nesting habitat includes ledges along rims and cliffs |
| | **Considered, but not carried forward.** Cliff, talus, and/or cave habitat is present but not widespread within the project area. Treatment of cliff, talus, or cave habitats is not part of the purpose and need of this project, nor is it identified as a proposed activity in any alternative. No measurable impacts are anticipated to current cliff or rock habitats as a result of implementing any proposed alternative. Identified Resource Protection Measures will mitigate potential adverse impacts to nesting raptors and their habitats.<br><br>*Forest Plan Consistency*: Because this project impacts no cliff, talus, or cave habitats across the Forest, the overall effects would result in no change to the amount, nor condition, of the existing habitat, and thus is insignificant at the scale of the Forest. The Lemon Gulch Trails project is consistent with the Forest Plan, and thus continued viability of the golden eagle and prairie falcon is expected on the Ochoco National Forest. |
| **Bald Eagle** | *Representing:* State or Federal Threatened or Endangered Species |
| | *Habitat Requirements:* associated with large bodies of water and nests in forested areas near water |
| | **Considered, but not carried forward.** Suitable nesting habitat, in the form of forested or rocky habitats within close proximity to a large body of water are not present for this species within the project area. No measurable impacts are anticipated to potential nesting habitat as a result of implementing any proposed alternative. No known nests exist for this species within the project area currently, however if one is found, Resource Protection Measures will mitigate potential adverse impacts to any nesting raptors and their habitats.<br><br>*Forest Plan Consistency*: Because this project impacts no known nesting areas or habitats within close proximity to a large waterbody across the Forest, the overall effects would result in no change to the amount, nor condition, of the existing habitat, and thus is insignificant at the scale of the Forest. The Lemon Gulch Trails project is consistent with the Forest Plan, and thus continued viability of the bald eagle is expected on the Ochoco National Forest. |

## Existing Condition – Pileated woodpecker (*Dryocopus pileatus*)

Habitat for pileated woodpeckers is increasing across the Blue Mountains due to an increase in dense, multi-canopy stands from fire suppression (Wisdom et al. 2000). However, densities of large-diameter

snags (>20 inches DBH) have declined from historical to current levels due to the transition of stands to early seral forests that lack the historical structure, which included large snags and large emergent trees that survived crown fires (Wisdom et al. 2000; Korol et al. 2002). In addition, within drier ponderosa pine sites, structural conditions used by pileated woodpeckers have increased due to fire suppression. However, this habitat type does not produce large-diameter snags (>20 inches DBH) in densities used by pileated woodpeckers.

Currently there are 14,510 acres of designated Old Growth Management Areas (OGMAs) (outside of wilderness and research natural areas) and another 16,620 acres of pileated feeding habitat in stands of mixed conifer and ponderosa pine averaging 300 acres in size. Some designated OGMAs may be functioning as habitat currently but are not likely to continue to serve as habitat because they are allocated on drier sites that likely cannot sustain dense conditions needed by pileated woodpeckers. A query of the forest database shows there are currently 63,478 acres of pileated habitat on the Ochoco National Forest which may occur within or outside of designated old growth management.

The Forest Plan allocated areas for old-growth management (MA-F6) to provide habitat for wildlife species dependent on old growth averaging 300 acres in size. The Forest Plan also stipulated that additional "supplemental feeding habitats" now referred to as Pileated Feeding Habitats (PFH), averaging 300 acres in size, would be located adjacent to these old-growth management areas to meet the needs of the associated wildlife species (USFS 1989a).

There is one OGMA that falls within the project area (Table 16). Consistent with Forest Plan direction, supplemental feeding areas for this species, or PFHs were identified adjacent to the OGMAs. Additional habitat outside of OGMAs is suitable for pileated woodpeckers, as identified by Viable modeling, bringing the total pileated woodpecker habitat within the Mill Creek watershed to 9,495 acres which is above the maximum value within the Historic Range of Variability (7,390 acres).

Table 16: Old growth management areas (OGMAs) and associated pileated feeding habitat (PFH) within the Lemon Gulch Trails project area

| Old Growth Management Area | D3-04 OGMA | D3-04 PFH |
|---|---|---|
| Total Acres | 304 | 322 |
| Acres Within the Project Area | 3 | 143 |

## Environmental Consequences – Pileated woodpecker

### Alternative 1

Under the no action alternative, no management activities are proposed. Habitat would remain as described in the existing condition section. Alternative 1 would not directly affect pileated woodpecker habitat and would retain the most habitat when compared to the action alternatives.

### Alternatives 2, 3, 4, 5, and 6

There is likely to be no physical impact to any pileated woodpecker habitat components under any of the action alternatives. Trail construction and maintenance would not impact snag or live tree components. Some existing downed wood may be altered during trail construction by cutting an 18-inch wide section of any downed wood that lines along the trail to accommodate riders, however this piece would be rolled aside, remain within the project area, and be available for foraging opportunities for this species. Snags would not likely be present around trailheads or parking areas due to these areas likely overlapping with landing sites from the implementation of the Mill Creek Restoration project which would likely clear any snags out of these areas to facilitate a safe working environment for processing harvested trees.

Table 17 displays the miles of new trail in various pileated woodpecker habitats within the project area. Alternative 2 proposes the highest number of miles in pileated feeding habitat (PFH) and in suitable reproductive habitat as described by the Viable Ecosystem Model (Viable). No alternative proposes any trail miles in the Old Growth Management Area (OGMA) within the project area.

Table 17: Miles of trails within pileated woodpecker habitats (Old Growth Management Areas- OGMA, Pileated Feeding Habitat – PFH, and suitable reproductive habitat as determined by Viable) by alternative

| Alternative | New Trail in OGMA (miles) | New Trail in PFH (miles) | New Trail in Viable Habitat (miles) |
|---|---|---|---|
| Alternative 1 | 0 | 0 | 0 |
| Alternative 2 | 0 | 2.2 | 7.8 |
| Alternative 3 | 0 | 0.6 | 2.3 |
| Alternative 4 | 0 | 0 | 0.3 |
| Alternative 5 | 0 | 1.9 | 5.0 |
| Alternative 6 | 0 | 1.9 | 4.5 |

While no physical alterations of pileated habitat are anticipated, the proposed miles of trail in each alternative would impact the habitat suitability of areas of overlap through disturbance and fragmentation of habitats. Alternatives 2, 5, and 6 provide the highest levels of fragmentation and disturbance within pileated woodpecker habitat, with Alternative 3 following behind at about half that of Alternative 5. Alternative 4 provides almost no fragmentation, and has the lowest level of disturbance anticipated for this species of any of the action alternatives (Table 17). Both disturbance and fragmentation have adverse impacts to the suitability of pileated woodpecker habitats, impacting the ability of individuals to nest and forage effectively within suitable habitat within the project area.

**Cumulative Effects**

The cumulative effects boundary includes the 6 subwatersheds that fall within or adjacent to the Lemon Gulch Trails project boundary (Wildlife Report Appendix A, Figure A-2). All of the past, present and reasonably foreseeable future actions in Appendix A, Table A-1 were considered for their cumulative effects to pileated woodpeckers or their habitat.

Vegetation management treatments, including commercial and noncommercial thinning as well as prescribed burning, within the cumulative effects boundary are currently in the planning phase for the Mill Creek Restoration project, and the implementation phase for the McKay and Spears Fuels and Vegetation Management projects and the Mill Creek AMP project. These projects intend to reduce overstocked forested stands within dry forest types in an effort to restore stands to their historic condition as well as promote a more fire-tolerant landscape. These foreseeable treatments are likely to overlap to some degree with pileated woodpecker habitat as they would likely target dense stands containing grand fir and Douglas-fir. Although these actions would reduce habitat for the pileated woodpecker, the habitats designated by the Forest Plan for this species (e.g. OGMAs and PFHs) would be deferred from vegetative treatments and remain in their current abundance and distribution into the foreseeable future. Thus, suitable habitat that falls outside of these designated habitats has the potential to be reduced, though habitat for this species would be expected to persist on the landscape.

Fuels treatments yet to be implemented from the Mill Creek AMP project occur within pileated woodpecker habitat. These treatments may influence the distribution of this species as certain areas may be avoided during implementation due to effects from smoke. In addition, these treatments, and those proposed in the McKay, Spears, and Mill Creek fuels and vegetation management projects would not be

burned simultaneously, nor in a contiguous block, so refugia would exist across the project area where this species would be expected to persist.

Disturbance related to implementation of other projects within the cumulative effects boundary would occur at varying times in the short- and mid-term as proposed vegetation management and restoration activities occur. These disturbances would combine with an increase in ambient disturbance from the Lemon Gulch Trails project to produce an upward trend in overall disturbance in the short- and mid-term, with a subset of that disturbance remaining on the landscape into perpetuity.

Therefore, the combined effect of the proposed action alternatives from the Lemon Gulch Trails project, with these current and reasonably foreseeable actions would be that the abundance and distribution of pileated woodpecker habitat would remain within the HRV at the cumulative effects boundary scale, though a higher level of disturbance would be expected.

**Forest Plan Consistency**

The Forest Plan indicates that the allocated OGMAs are intended to provide reproductive habitat for pileated woodpeckers, and additionally PFHs for supplemental feeding areas. Wildlife and Fish standards and guidelines for MA-F6 indicate that vegetative management would not be allowed, until further research is available on the needs of the dependent species.

In accordance with the Forest Plan, no alternative in the Lemon Gulch Trails project proposes vegetative management treatments within an OGMA or supplemental feeding habitat (PFH). In addition, all OGMAs and PFHs within the project area are sufficient in size and meet standards established in the Forest Plan.

**Conclusion**

A long-term adverse effect is anticipated to habitat suitability from an increased level of disturbance and habitat fragmentation, the intensity of which varies by alternative. This project implements Forest Plan standards by ensuring Old Growth Management Areas and respective pileated woodpecker feeding habitats are sufficient in size. Because this project impacts less than 1 percent of suitable habitat across the Forest, the overall direct, indirect and cumulative effects would result in a small negative trend of habitat. The loss of habitat would be insignificant at the scale of the Forest, and thus continued viability of the pileated woodpecker is expected on the Ochoco National Forest.

## Existing Condition – Rocky Mountain Elk (*Cervus elaphus*) & Mule Deer (*Odocoileus hemionus*)

Rocky Mountain elk and mule deer are species that are commonly hunted and were chosen as terrestrial MIS for populations of big game and their habitat (USFS 1989a). The Forest strives to provide forage, thermal cover, and security habitats (hiding cover) to maintain healthy populations of Rocky Mountain elk and mule deer that are consistent with population management objectives established by the Oregon Department of Fish and Wildlife (USFS 1989a).

The objective of the Ochoco National Forest as stated in the Forest Plan is to manage elk and deer habitat to meet the population objectives of the ODFW to the extent practicable. Big game management on the Ochoco National Forest is a cooperative effort between the Forest Service and the ODFW where the Forest Service manages habitat while ODFW manages populations. The agencies cooperate by managing big game according to pre-established Management Objectives (MOs) for each big game management unit. The management objective is the number of elk and deer that ODFW manages for, to prevent depletion of big game animals, and to provide optimum recreational and aesthetic benefits for the public including quality hunting and wildlife viewing opportunities in the present and in the future. The project area falls within the Grizzly Game Management Unit (GMU). The current MOs in this unit are (1) population of 8,500 mule deer and 1,500 elk, and (2) 15 males per 100 females for both species.

Mule deer populations have been generally declining across the western United States. This decline is evident in the Grizzly GMU as well (ODFW 2022b). In contrast, the elk population within the Grizzly

GMU has been steady over the last 5 years (ODFW 2022d). The current population numbers of both elk and mule deer are below the management objectives for the Grizzly GMU. However, when you consider the Ochoco National Forest is made up of more than one GMU, the combined population of elk across this landscape exceed the population objectives identified in the Forest Plan for this decade. In contrast, when considering the combined GMUs for the Ochoco National Forest, mule deer population numbers are below Forest Plan objectives.

Elk and mule deer use the project area throughout most of the year. Seasonal movements are primarily influenced by snow depth. During winters with below average snowfall, both species can remain at higher elevations within the project area in areas outside of the traditional Winter Range habitats. During winters with normal to above normal snow accumulations, the majority of animals move to lower elevations within the project area on the Forest (i.e. Winter Range), or off Forest onto private lands, or BLM managed lands.

Calving and fawning primarily occur in proximity to riparian areas that provide access to high quality forage, water, and cover. Aspen stands and other riparian hardwoods such as willow are likely to be attractive areas for calving and fawning. High quality habitat that lies within close proximity to open roads is not likely to serve as suitable calving or fawning habitats due to disturbance related factors from motorized vehicle use.

The project area contains various riparian habitats including perennial and intermittent creeks. The most prominent riparian area lies along Lemon Creek, the only perennial water source in the project area, which runs parallel to the existing main access road (FS Road 3360). Lemon Creek also has numerous dispersed campsites adjacent to it and is within a grazing allotment which utilizes a portion of the habitat adjacent to it as a stock driveway annually for up to 360 cow/calf pairs and riders. These existing uses have led to the current condition of this riparian habitat which is largely devoid of riparian vegetation for forage and hiding cover, and has resulted in this riparian area not being considered as high quality habitat for calving and fawning.

Other riparian areas exist outside of Lemon Creek, however these areas do not have perennial flow and as such have a lower site potential for maintaining a vigorous hardwood or vegetative component. In addition, many of these areas are also in close proximity to open motorized routes and/or are within identified areas of high utilization by grazing livestock or livestock trailing. Because of these reasons these areas are therefore also not considered high quality habitat in their current conditions.

Currently habitat that may serve as high quality calving and fawning habitat is relatively limited within the project area. Identification of specific calving sites is infeasible as they change annually because an elk's reproductive strategy is adapted to seasonal fluctuations in forage quantity and quality (Sadleir 1987). Additionally, the timing and location of calving is related to variations in plant phenology, timing of peak forage quality between geographic areas, and the differences in age of the primary sires or cow body condition (Raedeke et. al 2002). There is currently no peer reviewed literature describing calving and fawning habitat that is specific enough for GIS analysis, and therefore potential calving habitat has not been mapped. However, areas within the project area that have the highest likelihood of providing habitat features important to calving elk can be identified. RHCAs across the project area were mapped and categorized according to INFISH criteria (see Aquatics Report for more information). Category 1, 2, and 3 RHCAs were identified as the most likely to provide available forage, persistent water, and hiding cover within close proximity to one another, as they contain perennial streams and/or wet meadows larger than 1 acre in size. Areas fitting these criteria within 200m of an open road or motorized trail were removed, as well as areas within 100m of a non-motorized trail or administrative use only road (i.e., gated road) as these areas are more likely to have moderate to high levels of human disturbance. Areas within core habitat patches less than 100 acres in size were removed as these areas are not likely serving the needs of big game based on overall patch size. The area that remained included riparian habitats that existed in relatively undisturbed and unfragmented habitats which may have the highest utility to elk or deer for calving or fawning.

A manual exercise was then completed for each identified area utilizing professional judgement related to cover needs, site aspect, vegetation type, potential for disturbance, shape and/or juxtaposition of habitat on landscape, etc. to eliminate any potential areas that were lacking critical habitat components and therefore did not serve as suitable high-quality habitat. Field reconnaissance was completed in the spring to field verify these assumptions. Across the project area 4 sites were identified as having a high likelihood of containing the necessary habitat components for calving and fawning. These sites equated to approximately 24 acres. Of the 4 identified sites, portions of 1 of them lie more than ½ mile from an open road or motorized trail in identified elk security habitat and therefore may have a higher utility for elk or deer in comparison to other sites. Field reconnaissance of these sites determined they were marginal, lacking at least one critical component at each site. While these areas may have suitable habitat components, they are not necessarily utilized by elk or deer for calving or fawning, however these sites represent the best-known estimate of areas within the Lemon Gulch project that contain important habitat attributes to calving elk. It is important to note, that while riparian corridors are an important piece of parturition habitat, the combination of these areas and the adjacent upland habitats provide utility to calving elk as well as elk calves in the form of hiding cover and forage and make up a larger more diverse area that is used by elk during the calving season.

Wallows primarily occur near water in proximity to riparian areas or where moist, soft ground can be found. Identification of specific wallows is not feasible because similar to calving areas, they may change from year to year based on seasonal fluctuations in forage or availability of water. Bull elk may return repeatedly to the same wallow, but wallows may also be abandoned after one season which makes maintaining an accurate inventory infeasible. Existing springs and seeps within the project area may serve as suitable wallowing habitat. Due to the network of roads and trails within the project area some seeps, springs, and bogs, lie immediately adjacent to an open motorized route or non-motorized trail, these areas are not likely to serve as high quality habitat due to higher levels of human disturbance. In addition, livestock grazing may be present within portions of the project during rutting season and may impact use of the project area by elk, thus reducing the utility of some wallows. Across the project area 12 springs, seeps, and other potential wet habitats were identified. Of the 12 identified sites, 7 occur within 200 meters of an open road or motorized trail, and 1 occurs within 100 meters of a non-motorized trail or administrative use only road, leaving 4 sites that have low potential for human disturbance and thus are the most likely areas to support elk wallowing. Of the 4 sites, 1 lies more than ½ mile from an open road or motorized trail in identified elk security habitat and therefore may have a higher utility for elk in comparison to other sites. While these areas may have suitable habitat components they are not necessarily utilized by elk for wallowing, however these sites represent the best-known estimate of areas within the Lemon Gulch project that contain important habitat attributes to wallowing elk.

Upland shrub species that provide forage for big game such as mountain mahogany, ceanothus, upland willow and bitterbrush do not occur in large numbers within the project area. Mountain mahogany was likely represented by higher populations and wider distribution historically because there were more open ponderosa pine stands and shrub steppe habitat that occurred at lower elevations. Bitterbrush did not cover large areas historically and remains limited within the project area.

Aspen communities provide important wildlife habitat in the Western United States used by a wide variety of ungulates, small mammals, and birds (USFS 1985). Aspen is a highly preferred forage species for domestic cattle, deer, and elk in the blue mountains. However, in Oregon and the project area, many aspen groves are in severe decline, are made up of older age classes, and are likely out-competed and replaced by conifer species.

Recreational use, both motorized and non-motorized, within the project area has increased in the last 10 years. This is largely facilitated by the network of open roads within the project area. Many studies and research have documented that elk avoid areas near open roads or trails because of increased human disturbance associated with motorized and non-motorized recreational activities (Ager et al. 2003; Lyon 1979; Miller et al. 2020; Rowland et al. 2000, 2005; Wisdom et al. 2018). Currently, the open road densities for the Mill Creek watershed without taking into account various seasonal road closures within

are as follows: General Forest - 0.77 mi/mi$^2$, General Forest Winter Range – 0.86 mi/mi$^2$, and Winter Range – 1.38 mi/mi$^2$.

**Analysis**

The Forest Plan did not identify a model for deer habitat analysis, but did however, identify the use of the Habitat Effectiveness Index (HEI) model, as described by Thomas et al. (1988), for estimating elk habitat effectiveness on the landscape. In addition, the Forest Plan established minimum habitat effectiveness standards for various Management Areas and standards for open road density (i.e. the number of miles of road per square mile). Quantity and quality of cover, and open road density are the main factors influencing the index. Construction and implementation of a trails system does not have an impact on the abundance or distribution of hiding or thermal cover as it does not alter overstory conditions, nor does this project change the current density of open roads in any proposed alternative. Therefore, because the main factors contributing to the HEI calculation (i.e. cover and roads) are not expected to change in a measurable way, the habitat effectiveness index was not recalculated for this project.

It is recognized that current habitat models, such as HEI, that predict habitat suitability for elk do not reflect new research findings from the last 20 years. Efforts are underway to develop an elk habitat model to better account for forest conditions and nutritional availability. These efforts are known as the Blue Mountains Elk Nutrition and Habitat Models. At the time of this analysis these models were not currently published for use, thus this analysis continues to use the HEI methodology, as well as incorporating additional best-available science analyses.

A project-level elk security habitat analysis was conducted to address potential effects to big game habitat. A detailed explanation of the methods and assumptions can be found in Appendix C. Currently, 1% of the project area provides security habitat for deer and elk, with an average block size of 38 acres (Table 18).

Table 18: Elk security habitat acres and percentage of project area for the existing condition within the Lemon Gulch project area and Mill Creek watershed.

| Metrics | Project Area Acres | Project Area Percent of Area | Watershed Acres | Watershed Percent of Area |
|---|---|---|---|---|
| **Security Habitat** | 38 | 1% | 13,835 | 38% |
| **Average Block Size** | 38 | | 285 | |

A project-level core habitat analysis was completed to assess potential effects to wildlife species habitat from fragmentation (Wildlife Report Appendix B). This analysis is valuable for assessing effects to wide-ranging species such as deer and elk and can help quantify the impact to habitat suitability from any proposed changes to roads and trails within the project area that may influence connectivity. Currently, 48% of the project area provides core habitat, with an average patch size of 264 acres (Table 19). Approximately 77% of the surrounding Mill Creek watershed provides core habitat with an average patch size of 755 acres (Table 19).

Table 19: Core habitat metrics for the existing condition within the Lemon Gulch Trails project area and the Mill Creek watershed (WS).

| Metrics | Project Area Acres | Project Area Proportion of Area | Project Area Proportion of Core | WS Acres | WS Proportion of Area | WS Proportion of Core |
|---|---|---|---|---|---|---|
| ***Total Core Habitat Acres*** | *1,556* | *48%* | *100%* | *27,923* | *77%* | *100%* |
| Under 50 Acres | 28 | <1% | 2% | 180 | <1% | <1% |
| 50-100 Acres | 0 | 0% | 0% | 159 | <1% | <1% |
| Over 100 Acres | 1,556 | 47% | 98% | 27,584 | 76% | 99% |
| ***Average Core Patch Size*** | *264* | | | *755* | | |

## Environmental Consequences – Rocky Mountain Elk & Mule Deer

### Alternative 1

None of the proposed actions would occur under this alternative. With this lack of action, the existing condition as described for elk and mule deer would be unchanged in the short-term and therefore there would be no anticipated direct effect to elk or mule deer habitat quantity or quality, nor their populations.

Alternative 1 would not directly affect habitat of the Rocky Mountain elk or mule deer and therefore would not contribute to a negative trend in viability on the Ochoco National Forest.

### Alternative 2

In general, vegetative components such as canopy cover and hiding cover would not be impacted to any measurable degree with the implementation of this alternative. Open road densities would not be altered as a result of any proposed actions. Therefore, as previously mentioned there would be no impact to the HEI through the implementation of this alternative.

Approximately 0.44 miles of trail would intersect with the existing acres of elk security habitat within the project area under Alternative 2 (Table 20). Because elk security habitat is defined by motorized use, only changes in the motorized use within the area would be cause for an increase or reduction in the available elk security habitat. As the proposed trails within the Lemon Gulch Trails project are non-motorized, no change in the total amount of elk security habitat present on the landscape is anticipated. However, an increase in disturbance within the 38 acres of elk security related to non-motorized trail use, would still have an effect on the suitability of this habitat for elk. Wisdom et al. (2018) determined that elk avoid non-motorized trail-based recreation, similarly to their avoidance of roads open to motorized routes on public forests. These avoidances represent habitat compression for this species, which is a form of habitat loss for these wide-ranging species (Wisdom et al. 2018). Flight distances of elk due to mountain bike use were observed on average around 900 feet (Wisdom et al. 2018). Therefore, during the use of trails intersecting the 38-acre block of elk security, this area would not likely serve as secure habitat.

Table 20: Total miles of trail by alternative that intersect with elk security habitat acres for the various alternatives within the Lemon Gulch project area.

| Alternative | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 | Alt 6 |
|---|---|---|---|---|---|---|
| **Total Miles** | 0 | 0.44 | 0 | 0 | 0.44 | 0.51 |

Alternative 2 has the largest impact to existing core habitat within the project area in comparison to all other action alternatives as the total amount of core habitat and average core patch size available post implementation would be the lowest out of all the alternatives (Table 21). This alternative reduces the total core habitat by 1,051 acres or 32% and the average core patch size by 248. Alternative 2 retains only 1 patch of core habitat over 100 acres within the project area and fragments the remaining core habitat into much smaller blocks.

Table 21: Core habitat metrics for the existing condition and various alternatives within the Lemon Gulch Trails project area.

| Metrics | Alt 1 (Existing Condition) | Alt 2 | Alt 3 | Alt 4 | Alt 5 | Alt 6 |
|---|---|---|---|---|---|---|
| ***Total Core Habitat Acres*** | *1,556* | *532* | *1,331* | *1,138* | *1,078* | *1,057* |
| Under 50 Acres | 28 | 173 | 51 | 111 | 43 | 67 |
| 50-100 Acres | 0 | 123 | 0 | 0 | 56 | 56 |
| Over 100 Acres | 1,556 | 237 | 1,280 | 1,027 | 979 | 934 |
| ***Average Core Patch Size*** | *264* | *16* | *102* | *49* | *60* | *59* |
| ***Percent of Project Area*** | *48%* | *16%* | *40%* | *34%* | *33%* | *32%* |

In addition to impacts to habitat suitability, non-motorized recreation also alters activity budgets and movements of elk (Miller et al. 2020). Naylor et al. (2009) found the amount of time elk spent resting decreased when they were subjected to disturbance from mountain biking and hiking, while travel time for elk increased the most following exposure to mountain biking, followed by hiking and horseback riding. Alternative 2 proposes the highest number of trail miles and thus corresponds with the highest level of potential disturbance to elk and mule deer.

The Forest Plan includes the following standards and guidelines specific to the protection of elk calving sites and elk during calving season:

- Protect the character of elk calving sites (Forest Plan 4-246)
- Minimize disturbance from human activity during calving season, May 15 to June 30 (Forest Plan 4-246)

As described above in the existing condition, high quality calving and fawning habitat is largely not present within the Lemon Gulch Trails project area with only a few marginal sites equating to less than 25 acres total. Secure, or disturbance-free areas, within close proximity to riparian habitats with a significant hardwood vegetation component and hiding cover are relatively absent. In addition, up to 360 cow/calf pairs are present within this allotment in the spring during calving and fawning season and numerous scientific studies have shown the tendency of elk to spatially avoid cattle on the landscape (Coe et al. 2001; Stewart et al. 2002). Alternative 2 proposes numerous miles of trail within or adjacent to riparian habitats and up to 5 creek crossings, however the likelihood of these areas serving as calving and fawning habitat is low due to proximity to open roads, and lack of hardwood vegetation and hiding cover. Alternative 2 proposes a trail segment through a portion of one of the identified area of riparian habitat that could serve as marginal calving and fawning habitat, while another riparian area has a trail immediately adjacent to it. The action alternatives do not alter the overall character of riparian areas as Resource Protection Measures for any creek crossings would ensure no significant adverse stream alterations would occur. Trees and shrubs providing hiding cover and/or winter foraging opportunities would not be removed as part of the trail construction and would be avoided during trail layout. There would be an adverse impact to the forage component related to available grass and forbs where the trail

tread was placed, however as that tread is only a maximum of 36" this impact is negligible at the project scale (approximately 18.7 acres or 0.6%).

Resource Protection Measures are included to minimize disturbance to elk during calving season. Trail construction or maintenance activities within 0.25 miles riparian areas and/or hardwood stands that have low potential for human caused disturbance would be restricted during calving season (May 15-June 30). Seasonal restrictions may be waived, with approval of the District Ranger, in a particular year if surveys determine calving elk are not present. If calving elk are present, project activities would remain restricted until completion of calving season.

The Forest Plan includes the following standards and guidelines specific to the protection of wallows during the rutting season:

- Protect wallows during rutting season, September 1 to October 15 (Forest Plan 4-246)

Resource Protection Measures included in the Lemon Gulch Trails project would protect wallows during the rutting season by minimizing disturbance during critical time periods. Trail construction or maintenance activities within 0.25 miles of seeps, springs, bogs, or known wallows that have low potential for human caused disturbance would be restricted during rutting season (September 1-October 15). If wallows are located, they would be flagged, and no activities would be permitted within 0.25 miles of the wallow during the rutting season. Seasonal restrictions may be waived, with approval of the District Ranger, in a particular year if surveys determine wallows are inactive or elk are not present. If active wallows and/or wallowing is observed, project activities would remain restricted until completion of rutting season.

In addition, all known and discovered springs, seeps, or other wet areas would be avoided during trail layout so as to not adversely impact the character or function of these areas. Resource Protection Measures would ensure that trails were not within 50 feet of a spring or seep. Numerous trails proposed in Alternative 2 lie within 0.25 miles of identified seep/spring/wallow habitat.

**Alternative 3**

Generally, effects to elk and deer under Alternative 3 would be similar to those described for Alternative 2, however specific differences do exist.

There are no trails proposed within existing elk security habitat under this alternative.

Alternative 3 represents the least impactful action alternative to core habitat as it would retain the most total core habitat acres, highest number of acres in patches over 100 acres, and highest average core patch size (Table 12). This alternative would reduce the total core habitat by 253 acres or 8%, and the average core patch size by 162 acres. Alternative 3 retains all core habitat west of the central road and drainage within the project area, as no trails are proposed in the western portions of the project under this alternative. Alternative 3 retains a larger portion of core habitat in the southeastern/eastern portion of the project area and does not fragment the habitat into as small of patches when compared with Alternatives 2 or 4 (see Appendix B for additional tables and figures).

All trails proposed in Alternative 3 lie more than 0.25 miles of all the identified marginal calving and fawning habitat, as well as more than 0.25 miles away from all but 2 seep/spring/wallow habitats. This is substantially less than the overlap proposed in Alternative 2.

**Alternative 4**

Generally, effects to elk and deer under Alternative 4 would be similar to those described for Alternative 2, however specific differences do exist.

There are no trails proposed within existing elk security habitat under this alternative.

Similar to Alternative 3, Alternative 4 retains all core habitat west of the central road and drainage within the project area, as no trails are proposed in the western portions of the project under this alternative.

Alternative 4 and 5 are relatively similar in their core habitat metrics, though they are not the same. Alternative 4 would retain more total core habitat and acres in patches over 100 acres, though would have a lower average core patch size than Alternative 5 (Table 21). Alternative 4 would reduce total core habitat by 446 acres or 13%, and the average core patch size by 215 acres (Table 21).

This alternative proposes the fewest miles of trails of any action alternative within the Lemon Creek RHCA, and only 1 creek crossing. Similar to Alternative 3, all trails proposed in Alternative 4 lie more than 0.25 miles from all the identified marginal calving and fawning habitat, as well as more than 0.25 miles away from all but 1 seep/spring/wallow habitats. This alternative proposes the fewest miles of overlap of any of the action alternatives.

**Alternative 5**

Generally, effects to elk and deer under Alternative 5 would be similar to those described for Alternative 2, however specific differences do exist.

The same number of miles of trail proposed in Alternative 2 within elk security habitat are proposed within this alternative. Therefore, effects to elk security would be similar to those already discussed for Alternative 2.

Alternative 5 would reduce the total core habitat by 506 acres or 15%, and the average core patch size by 204 acres (Table 21). Alternative 5 retains habitat on both sides of the drainage, but less on the western side than that of Alternative 3 and 4 as a single trail runs adjacent to the western edge of the project boundary and reduces the core habitat while fragmenting some of it into smaller blocks (see Appendix B for additional tables and figures).

This alternative proposes the second most miles of trails of any action alternative within the Lemon Creek RHCA, and up to 3 creek crossings. Similar to Alternative 2, numerous trails proposed in Alternative 5 lie within 0.25 miles of the identified marginal calving/fawning habitat and/or seep/spring/wallow habitat. This alternative proposes the second most miles of overlap of any of the action alternatives.

**Alternative 6**

Generally, effects to elk and deer under Alternative 6 would be similar to those described for Alternative 2, however specific differences do exist.

Alternative 6 proposes slightly more miles of trail than Alternative 2 or 5 within elk security habitat (Table 20). Therefore, this alternative would have a more adverse effect to elk security than that of the other action alternatives.

Alternative 6 would reduce the total core habitat by 527 acres or 16%, and the average core patch size by 205 acres (Table 21). Similar to Alternative 5, Alternative 6 retains habitat on both sides of the drainage, but less on the western side than that of Alternative 3 and 4 as trails run adjacent to the western edge of the project boundary and reduce the core habitat while fragmenting some of it into smaller blocks (see Appendix B for additional tables and figures).

This alternative proposes fewer miles of trails within the Lemon Creek RHCA than Alternatives 2, 3, or 5, and up to 3 creek crossings. Similar to Alternatives 2 and 5, numerous trails proposed in Alternative 6 lie within 0.25 miles of identified marginal calving/fawning habitat and/or seep/spring/wallow habitat. This alternative proposes fewer miles of overlap than Alternatives 2 or 5 but more than Alternatives 3 or 4.

**Cumulative Effects**

The cumulative effects boundary includes the 6 subwatersheds that fall within or adjacent to the Lemon Gulch Trails project boundary (Wildlife Report Appendix A, Figure A-2). All of the past, present and reasonably foreseeable future actions in Wildlife Report Appendix A, Table A-1 were considered for their cumulative effects to Rocky Mountain elk and mule deer or their habitat.

Vegetation management treatments, including commercial and noncommercial thinning as well as

prescribed burning, within the cumulative effects boundary are currently in the planning phase for the Mill Creek Restoration project, and the implementation phase for the McKay and Spears Fuels and Vegetation Management projects and the Mill Creek AMP project. These projects intend to reduce overstocked forested stands within dry forest types in an effort to restore stands to their historic condition as well as promote a more fire-tolerant landscape. These foreseeable treatments are likely to overlap to some degree with deer and elk habitat. In addition, some proposed riparian restoration activities have yet to occur within these project areas. Riparian restoration activities would prevent further lowering of the water table, thus allowing moisture levels in associated meadow and hardwood habitats to be, at a minimum retained, but likely improved, ensuring critical parturition habitat for these species is maintained within the project area.

Livestock grazing as authorized by the Marks Creek, Mill Creek, and Bear Creek AMPs is ongoing within the cumulative effects boundary with the exception of a few exclosures. The proposed changes in grazing management activities would improve the overall grazing management of the area and the conditions of the habitat, thus providing more forage availability for both livestock and other ungulates such as deer and elk. However, the presence of livestock has been shown to have an adverse effect on big game due to dietary overlap as well as social avoidance. These effects would contribute adversely to the overall cumulative effects to elk and deer.

Fuels treatments yet to be implemented from the Mill Creek AMP project. These treatments may influence the distribution of big game species as certain areas may be avoided during implementation due to effects from smoke. In addition, these treatments, and those proposed in the McKay, Spears, and Mill Creek fuels and vegetation management projects would not be burned simultaneously, nor in a contiguous block, so refugia would exist across the project area where these species would be expected to persist.

Disturbance related to implementation of other projects within the cumulative effects boundary would occur at varying times in the short- and mid-term as proposed vegetation management and restoration activities occur. These disturbances would combine with an increase in ambient disturbance from the Lemon Gulch Trails project to produce an upward trend in overall disturbance in the short- and mid-term, with a subset of that disturbance remaining on the landscape into perpetuity.

The Mill Creek Restoration EA proposes to close roads and to physically reinforce existing closures. These changes in the motorized road system would increase the amount of elk security and core habitat present within the Lemon Gulch project area. When considering these other proposed actions and their effects to elk security habitat within the watershed, approximately 6.32 miles of trail would intersect with acres of elk security habitat within the Lemon Gulch project area under Alternative 2, and approximately 3.29 miles under Alternative 5 (Table 22). When combined with other projects Alternatives 3 and 4 would continue to not impact elk security habitat to any degree, as no trails are proposed within the expanded elk security habitat. These reasonably foreseeable future actions would increase the total amount of elk security habitat but when combined with the alternatives of the Lemon Gulch project would reduce the suitability of these expanded areas to serve as ideal elk security habitat.

Table 22: Total miles of trail by alternative that intersect with elk security habitat acres for the various alternatives within the Lemon Gulch project area when considering actions proposed in other projects within the cumulative effects boundary.

| Alternative | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 | Alt 6 |
|---|---|---|---|---|---|---|
| **Total Miles** | 0 | 6.32 | 0 | 0 | 3.29 | 3.86 |

When considering the other proposed actions and their effects to core habitat within the watershed, approximately 670 acres of core habitat would remain within the Lemon Gulch project area under Alternative 2, approximately 1,670 acres under Alternative 3, approximately 1,481 acres under Alternative 4, approximately 1,443 acres under Alternative 5, and approximately 1,379 acres under

Alternative 6 (Table 23). These reasonably foreseeable future actions would increase the total amount of core habitat but when combined with the action alternatives of the Lemon Gulch project a net reduction in total core habitat would be expected under Alternative 2 (-914 acres), Alternative 4 (-103 acres), Alternative 5 (-141 acres), and Alternative 6 (-204 acres), and a net increase in total core habitat would be expected under Alternative 3 (+86 acres). The average core patch size would have a net reduction under all action alternatives.

Table 23: Core habitat metrics for the various alternatives within the Lemon Gulch Trails project area when considering actions proposed in other projects within the cumulative effects boundary.

| Metrics | Alt 2 | Alt 3 | Alt 4 | Alt 5 | Alt 6 |
|---|---|---|---|---|---|
| ***Total Core Habitat Acres*** | *670* | *1,670* | *1,481* | *1,443* | *1,380* |
| Under 50 Acres | 165 | 48 | 116 | 44 | 68 |
| 50-100 Acres | 73 | 0 | 0 | 0 | 0 |
| Over 100 Acres | 432 | 1,622 | 1,365 | 1,399 | 1,312 |
| ***Average Core Patch Size*** | *18* | *139* | *67* | *80* | *73* |
| ***Percent of Project Area*** | *20%* | *51%* | *45%* | *44%* | *42%* |

Therefore, the combined effect of the proposed action alternatives from the Lemon Gulch Trails project, with these current and reasonably foreseeable actions on elk and deer and their habitats is that under Alternative 2, Alternative 5, and Alternative 6 a net reduction in total core habitat as well as a reduction in the suitability of the expanded elk security habitat would be expected. Under Alternative 3 a net increase in core habitat is expected, as well as the lack of any reduction in the suitability of the expanded elk security habitat as described in Alternative 2, 5, or 6. Alternative 4 would have a net decrease in core habitat but would not reduce the suitability of the expanded elk security habitat, similar to Alternative 3.

It is reasonable to conclude that when combined with other activities within the cumulative effects boundary Alternative 3 is the least impactful to deer and elk habitat, with Alternative 4 being the second least impactful. Alternative 2, when combined, is substantially more impactful to deer and elk habitat than the other four action alternatives.

**Forest Plan Consistency**

Elk and mule deer populations within the Grizzly GMU are below the state Management Objectives, however a harvestable surplus remains across the Ochoco National Forest and exceeds Forest Plan objectives. Activities in the Lemon Gulch project would protect the existing character of riparian areas where calving and fawning are likely to occur. Resource Protection Measures are in place to minimize disturbance to individuals and reduce impacts to calving/fawning and wallowing habitats. The Lemon Gulch project will not impact any of the variables that make up the Habitat Effectiveness Index, and therefore the associated standards would not be impacted.

**Conclusion**

Alternative 1 would not adversely affect habitat of the Rocky Mountain elk or mule deer and therefore would not contribute to a negative trend in viability on the Ochoco National Forest.

The overall direct, indirect, and cumulative effects for the action alternatives would result in a negative trend for some habitat variables for elk and deer, though some positive impacts would be expected to occur as well depending on the alternative. The overall amount of security habitat would remain the same though the utility of this habitat for elk would be reduced in Alternatives 2, 5, and 6. Core habitat would be expected to be adversely impacted within the project area under all alternatives, though a net increase would be expected under Alternative 3 when considering cumulative effects. During trail construction, trail maintenance, and/or trail use disturbance would be higher than the existing condition under all action alternatives. This project does not impact open road density, cover quantity, or cover quality, and therefore has no impact to the HEI. The Lemon Gulch project is consistent with the Forest Plan, and thus

continued viability of Rocky Mountain elk and mule deer is expected on the Ochoco National Forest.

### *Other Species or Habitat Identified in the Forest Plan*

The Forest Plan provides standards and guidelines for an additional suite of species identified as Other Species or Habitat. Table 24 includes these other species or habitats and subsequent information pertaining to management direction and presence or absence of habitat within the Mill Creek analysis area. Species already addressed including bald and golden eagles, prairie falcons, and species associated with dead and downed logs, are not addressed again.

Table 24: Other Species or Habitat Identified in the Ochoco National Forest Land and Resource Management Plan for the Ochoco National Forest and Crooked River National Grassland: management direction, occurrence within the project area and consideration of potential for impact.

| Species / Habitat | Management Direction, Species or Habitat Occurrence within the Project Area and Consideration of Potential for Impact. |
|---|---|
| Raptor habitat<br>&<br>Hawks and owls<br>&<br>Northern goshawk | *Management Direction:* Protect nest sites and nesting habitat. Minimize disturbance during the nesting period. |
| | **Considered.** A variety of raptors are known to nest and/or forage within the project area including hawks, owls, and goshawks. Suitable habitat for nesting and foraging is present. The Forest Plan, as amended, identifies protection measures to eliminate adverse effects from project activities to raptor nesting habitat. Habitat for raptor prey species may be impacted by project activities. |
| Antelope | *Management Direction:* Activities will be in accordance with ODFW population objectives. |
| | **Considered, but not carried forward.** Suitable habitat, in the form of open plains or broad areas dominated by sagebrush, are not present in the project area. Pronghorn have not been documented within the project area. No measurable impacts are anticipated to current pronghorn habitats as a result of implementing any proposed alternative.<br>*Forest Plan Consistency:* Because this project impacts no suitable pronghorn habitat, the overall effects would result in no change to the amount, nor condition, of the existing habitat. Current management on the Ochoco National Forest, as well as proposed by the Lemon Gulch Trails project is in accordance with the Oregon Department of Fish and Wildlife population objectives for pronghorn antelope. |
| Species associated with various plant communities and successional stages | *Management Direction:* Diversity is to be provided for by maintaining representative portions of all plant associations and having various successional stages represented in an area through time. |
| | **Considered, but not carried forward.** Species associated with the various plant communities and successional stages within the analysis area are analyzed throughout the document, whether as TES species, MIS, other species, or as birds of conservation concern and further analysis would be redundant. |
| Species associated with springs, bogs and other unique habitat | *Management Direction:* Identify, evaluate, and give appropriate protection. |
| | **Considered, but not carried forward.** The Lemon Gulch Trails project interdisciplinary team has identified and evaluated springs, bogs, and other unique habitats, designed the project to minimize impacts, and incorporated various resource protection measures in the event additional habitats are found. Examples of these resource protection measures include no trail construction within 50 feet from the start of dry soils around the edge of the spring or bog.<br>*Forest Plan Consistency:* In accordance with management direction from the Forest Plan this project has taken springs, bogs, and other unique habitat into consideration |

| Species / Habitat | Management Direction, Species or Habitat Occurrence within the Project Area and Consideration of Potential for Impact. |
|---|---|
| | during project planning, and additionally utilized Resource Protection Measures to mitigate any potential for adverse impacts. The Lemon Gulch Trails project is in compliance with the Forest Plan related to identification, evaluation, and providing appropriate protections for species associated with springs, seeps, bogs, and other unique habitats. |
| Introduced species | *Management Direction:* Evaluate proposals for introduction of wildlife through the NEPA process |
| | **Not considered.** There are no proposals for introducing wildlife species in the Lemon Gulch Trails project. |

## Existing Condition – Raptor Habitat (including Hawks & Owls & Northern Goshawk)

Raptors are birds of prey, of which numerous species occur or have been observed throughout the project area. The Forest Plan, as amended, provides guidance for: the protection of nests, the protection of habitat surrounding nests, and minimizing disturbance to nesting or roosting individuals.

A variety of raptors have been observed within the area of influence of this project or have been documented within the Lemon Gulch Trails project area. However, there are no known or documented occurrences of nesting raptors within the project area.

## Environmental Consequences – Raptor Habitat (including Hawks & Owls & Northern Goshawk)

Activities associated with trail construction or maintenance have little direct physical impact on raptors or their habitat. Forest raptor nests are typically located off the ground where there would be no risk of physical alteration by trail users. Habitat conditions preferred by each species vary according to various forest structural conditions. Generally, trail construction, maintenance, and trail use does not affect the live or dead mature tree component within a project area and as a result would not measurably affect nesting or roosting habitat. In addition, standards and guides associated with protecting raptor nesting habitat as stated in the Forest Plan, were incorporated in project planning and trail layout and all known nesting areas have been avoided in all action alternatives. Due to the overall lack of direct impacts to nesting raptors or their habitat this analysis focuses instead on two main parts: 1) change in potential habitat suitability for nesting raptors due to indirect disturbance, and 2) impacts to the raptor prey base (i.e. foraging habitat), by alternative.

### Alternative 1

Alternative 1 does not propose any treatments to raptor habitat. The existing ambient levels of disturbance would be unchanged. This alternative would maintain the suitability of all existing habitat for raptors and their prey.

### Alternatives 2, 3, 4, 5, and 6

All the action alternatives propose to increase the ambient levels of human use through construction and use of a non-motorized trail system which would indirectly increase the overall level of disturbance and reduce the suitability of existing habitat to serve as ideal nesting habitat for many raptor species. The level of disturbance and thus amount of habitat impacted varies by alternative. A core habitat analysis was conducted for the project area and shows the level of adverse impact to wildlife habitat due to fragmentation and disturbance (Wildlife Report Appendix B). These impacts would be greater during the primary season of use, which is likely to correspond with nesting season for most raptor species. Implementation of alternative 2 would have the greatest adverse impact to potential nesting habitat for raptor species. This adverse effect would be expected to persist into perpetuity as long as the trail remains

open and available to the public for use.

The construction of the trail tread would have a slight adverse impact to raptor prey species habitats as it would convert forested vegetation along the forest floor to bare soil, however the total acres impacted is a small percentage of the overall project area (Table 25). In addition, Resource Protection Measures would ensure large woody debris would not be removed from the project area, so as to continue to provide structure for small mammals, a key prey group for raptors.

Table 25: Miles of new trail construction and approximate acres of ground vegetation impacted by alternative

| Alternative | Total New Trail (miles) | Approximate Acres Impacted[1] | Percentage of Project Area |
|---|---|---|---|
| Alternative 1 | 0 | 0 | 0 |
| Alternative 2 | 51.6 | 19 | < 1 % |
| Alternative 3 | 20.7 | 8 | < 1 % |
| Alternative 4 | 18.9 | 7 | < 1 % |
| Alternative 5 | 27.7 | 10 | < 1 % |
| Alternative 6 | 27.5 | 10 | <1% |

[1]Acres were calculated using 3 feet as the assumed maximum trail width

**Cumulative Effects**

The cumulative effects boundary includes the 6 subwatersheds that fall within or immediately adjacent to the Lemon Creek Trails project boundary (Wildlife Report Appendix A, Figure A-2). All of the past, present and reasonably foreseeable future actions in Wildlife Report Appendix A, Table A-1 were considered for their cumulative effects to raptors or their habitat.

Vegetation management treatments, including commercial and noncommercial thinning as well as prescribed burning, within the cumulative effects boundary are currently in the planning phase for the Mill Creek Restoration project, and the implementation phase for the McKay and Spears Fuels and Vegetation Management projects and the Mill Creek AMP project. These projects intend to reduce overstocked forested stands within dry forest types in an effort to restore stands to their historic condition as well as promote a more fire-tolerant landscape. These foreseeable treatments are likely to overlap to some degree with raptor habitat. In addition, some proposed riparian restoration activities have yet to occur within these project areas. Riparian restoration activities would prevent further lowering of the water table, thus allowing moisture levels in associated meadow and hardwood habitats to be, at a minimum retained, but likely improved, ensuring habitat for raptor prey species is maintained within the project area.

Livestock grazing as authorized by the Marks Creek, Mill Creek, and Bear Creek AMPs is ongoing within the cumulative effects boundary with the exception of a few exclosures. These activities would improve grazing management and conditions of the habitat, thus providing improved habitat for raptor prey species.

Fuels treatments yet to be implemented from the Mill Creek AMP project occur within suitable raptor habitat. These treatments may influence the distribution of raptors as certain areas may be avoided during implementation due to effects from smoke. In addition, these treatments, and those proposed in the McKay, Spears, and Mill Creek fuels and vegetation management projects would not be burned simultaneously, nor in a contiguous block, so refugia would exist across the project area where this species would be expected to persist. Resource Protection Measures exists for all these projects to

minimize disturbance to nesting raptors.

Disturbance related to implementation of other projects within the cumulative effects boundary would occur at varying times in the short- and mid-term as proposed vegetation management and restoration activities occur. These disturbances would combine with an increase in ambient disturbance from the Lemon Gulch Trails project to produce an upward trend in overall disturbance in the short- and mid-term, with a subset of that disturbance remaining on the landscape into perpetuity.

The Mill Creek Restoration EA proposes to close roads and to physically reinforce existing closures. These changes in the motorized road system would increase the amount of core habitat present within the Lemon Gulch project area and reduce motorized access along certain road segments. This would likely result in retaining more nesting, roosting, and perch trees and snags as well as downed wood for raptor prey species along the road corridor as they would not be taken for firewood, either legally or illegally due to a reduction in public access.

Therefore, the combined effect of the proposed action alternatives from the Lemon Gulch Trails project, with these current and reasonably foreseeable actions would be that the abundance and distribution of habitat for raptors that select for dense forested habitats would be reduced at the cumulative effects boundary scale in the short- to mid-term, while those species that select for more open habitats would be increased. In addition, a higher level of ambient disturbance would be expected in the short-, mid- and long-term.

**Forest Plan Consistency**

As identified in the Forest Plan Standards and Guidelines for hawk and owl nests, a primary buffer of five chains (330 feet) would be flagged around each nest site and a seasonal restriction on trail construction and maintenance (March 1 to August 1), within 10 chains (660 feet) of active hawk or owl nests, would be implemented under all action alternatives. There are currently no known raptor nests within the Lemon Gulch Trails project area.

There are presently no known Post-fledging areas (PFA), nest cores, or goshawk territories within the project area. Should a nesting goshawk be discovered at any time, the seasonal restrictions outlined in the Forest Plan would apply.

Seasonal restrictions for raptors may be waived on a case-by-case basis, if appropriately timed monitoring indicates that the raptor nest area is not reproductive during that nesting season. This assessment cannot be made until well into the nesting season. All action alternatives considered in the Lemon Gulch project are consistent with the Forest Plan.

**Conclusion**

All action Alternatives propose to increase the number of miles of trail within the project area, and thus propose an increase to the ambient level of disturbance outside of the existing condition. A long-term adverse effect is anticipated to habitat suitability from an increased level of disturbance and habitat fragmentation, the intensity of which varies by alternative. There are no known nesting raptors within the project area, and if discovered resource protection measures for raptors would be implemented under all action alternatives.

Because this project impacts less than 1 percent of suitable habitat across the Forest, the overall direct, indirect and cumulative effects would result in a small negative trend of habitat. The loss of habitat would be insignificant at the scale of the Forest, and thus continued viability of raptors, including the northern goshawk, on the Ochoco National Forest is expected with the implementation of any of the action alternatives.

### *Birds of Conservation Concern*

Migratory birds breed in the U.S. and winter south of the border in central and South America. Continental and local declines in population trends for migratory and resident landbirds have developed

into an international concern and led to the creation of the North American Bird Conservation Initiative. Under this initiative, plans have been developed for the conservation of waterbirds, shorebirds, seabirds, and landbirds. The landbird initiative known as Partners-In-Flight (PIF) has developed a series of bird conservation plans for every state.

The Oregon and Washington Chapter of PIF was formed in 1992 and has since developed a series of publications aimed at assisting private, state, tribal, and federal agencies in managing for landbird populations. In 2000, Oregon-Washington Partners in Flight published the Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington (Altman 2000). This strategy has since been updated (Altman and Bresson 2017) to address the requirements contained in Executive Order 13,186 (2001) as well as those agreed upon by the USFS and USFWS (USFS 2008, 2014, 2016) regarding responsibilities of federal agencies to protect migratory birds. Many of the birds identified in this plan are also addressed in the U.S. Fish and Wildlife Service's Birds of Conservation Concern (USFWS 2021).

## Existing Condition - Birds of Conservation Concern

The BCC species list (USFWS 2021) was reviewed to determine which species may occur in the project area. Species and habitats that potentially occur within the project area are incorporated and effects disclosed in this analysis. Table 26 lists the BCC species found within Bird Conservation Region 10 which includes the Northern Rocky Mountains exclusively within the United States, and within which the Ochoco National Forest is located. This list identifies species, subspecies, and populations of migratory and resident birds not already designated as federally threatened or endangered that represent the highest conservation priorities and are in need of additional conservation actions.

In addition, Altman and Bresson (2017) developed a strategy for achieving functioning ecosystems for landbirds through the use of habitat requirements of "focal species" highly associated with specific attributes or conditions within each habitat type. The rationale for identifying focal species is to target the habitat attributes most in need of conservation or most important in a functioning ecosystem. By managing for a group of species representative of important components in a functioning ecosystem, many other species and elements of biodiversity would also be conserved. Table 27 displays habitat types in the project area that may be impacted by proposed project activities and the corresponding focal species identified by the Conservation Strategy for Landbirds and Associated Habitats and Ecosystems in the Northern Rocky Mountains of Oregon and Washington (Altman and Bresson 2017).

## Environmental Consequences - Birds of Conservation Concern

Table 26: Birds of Conservation Concern (BCC) species as identified by the U.S. Fish and Wildlife Service within Bird Conservation Region 10 Northern Rockies U.S. portion only that are known or likely to occur within the Lemon Gulch Trails project area and have potential to be impacted by the proposed actions. Species that are analyzed in other sections of this document (e.g., owls and cavity excavators) not included.

| BCC Species | General Habitat Requirements | Impacts to Habitat | |
|---|---|---|---|
| | | Alternative 1 | Alternatives 2, 3, 4, 5, & 6 |
| Rufous hummingbird | In Oregon, found in a variety of habitats, but prefers to breed in wooded habitats with high canopy and mature understory. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed the less the adverse impact from disturbance. |

| BCC Species | General Habitat Requirements | Impacts to Habitat | |
|---|---|---|---|
| | | Alternative 1 | Alternatives 2, 3, 4, 5, & 6 |
| Broad-tailed hummingbird | In Oregon, found in mountains, especially in canyons with riparian vegetation and in subalpine meadows. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed the less the adverse impact from disturbance. |
| calliope hummingbird *(Stellula calliope)* | Predominantly a montane species found in open shrub sapling seral stages (8–15 years) at high elevations and riparian areas. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed the less the adverse impact from disturbance. |
| olive-sided flycatcher *(Contopus cooperi)* | Open conifer forests (<40% canopy cover) and edge habitats where standing snags and scattered tall trees remain after a disturbance. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed the less the adverse impact from disturbance. |
| Evening grosbeak | Found in a variety of habitats depending on region. In the northwest, can be found in ponderosa pine, Douglas fir/western hemlock, mixed conifer, and subalpine-fir forests. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed the less the adverse impact from disturbance. |
| Cassin's finch *(Carpodacus cassinii)* | Open, mature coniferous forests of lodgepole and ponderosa pine, aspen, alpine fir, grand fir, and juniper steppe woodlands. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed the less the adverse impact from disturbance. |

Table 27: Effects to habitat types and their associated focal species as identified by the Conservation of Landbirds and Associated Habitats and Ecosystems in the Northern Rocky Mountains of Oregon and Washington that are known or likely to be present within the Lemon Gulch Trails project area and have

potential to be impacted by the proposed actions. Species analyzed in other sections of this document not included.

| Focal Species | General Habitat Requirements | Impacts to Habitat | |
|---|---|---|---|
| | | **Alternative 1** | **Alternatives 2, 3, 4, 5, & 6** |
| chipping sparrow *(Spizella passerina)* | Dry Forest: open herbaceous understory with scattered sapling pines. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | All action alternatives propose trails within the Dry Forest habitat. Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species and habitat. The fewer miles of trail proposed the less the adverse impact from disturbance. |
| Townsend's warbler *(Dendroica townsendi)* | Mesic Mixed Conifer Forest: high canopy cover and foliage volume. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | Only Alternatives 2, 5, and 6 propose trails within this habitat type. Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed the less the adverse impact from disturbance. |
| Nashville Warbler *(Leiothlypis ruficapilla)* & orange-crowned Warbler *(Vermivora celata)* | Mesic Mixed Conifer Forest: patches of dense understory shrubs. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | Only Alternatives 2, 5, and 6 propose trails within this habitat type. Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed the less the adverse impact from disturbance. |
| olive-sided flycatcher *(Contopus cooperi)* | Mesic Mixed Conifer Forest: forest edges and openings with scattered trees. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | Only Alternatives 2, 5, and 6 propose trails within this habitat type. Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed the less the adverse impact from disturbance. |
| red-naped sapsucker *(Sphyrapicus nuchalis)* | Riparian Woodland: large snags. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | All action alternatives propose trails within riparian habitats, however snag habitat would not be impacted by trail construction. Human-caused disturbance related to trail use is higher under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed within this habitat type the less the adverse impact from disturbance. |

| Focal Species | General Habitat Requirements | Impacts to Habitat | |
|---|---|---|---|
| | | Alternative 1 | Alternatives 2, 3, 4, 5, & 6 |
| red-eyed vireo *(Vireo olivaceus)* & yellow warbler *(Dendroica petechial)* | Riparian Woodland: high canopy and subcanopy cover and foliage volume. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | All action alternatives propose trails within riparian habitats. Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed within this habitat type the less the adverse impact from disturbance. |
| MacGillivray's warbler *(Oporornis tolmiei)* | Riparian Woodland: patches of dense understory foliage cover. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | All action alternatives propose trails within riparian habitats, though areas with dense understory foliage are sparse in this project area. Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The fewer miles of trail proposed within this habitat type the less the adverse impact from disturbance. |
| western wood pewee *(Contopus sordidulus)* | Riparian Woodland: broken canopies with extensive habitat contrast edges. | There would be no anticipated effect to this species or habitat as no trails would be developed under this alternative. | All action alternatives propose trails within riparian habitats. Trail construction and use would facilitate a higher level of human caused disturbance under all action alternatives than that found in the existing condition, which may impact nesting habitat for this species. The vegetative change that comes from creating an 18" tread footprint is not significant enough to create edge habitat or broken canopies and would not provide any measurable benefit to this species or habitat. The fewer miles of trail proposed within this habitat type the less the adverse impact from disturbance. |

**Cumulative Effects**

Birds of conservation concern as well as focal species and their habitats may breed in the U.S. and winter south of the border in central and South America. Therefore, it is extremely difficult to determine a suitable cumulative effects boundary that considers the direct and indirect effects from the Lemon Gulch Trails project and other projects overlapping in time and space and not dilute effects specific to the Lemon Gulch project. Therefore, the cumulative effects boundary includes the 6 subwatersheds that fall within or immediately adjacent to the Lemon Gulch Trails project boundary (Wildlife Report Appendix A, Figure A-2). All past, present, and reasonably foreseeable future actions (Wildlife Report Appendix A, Table A-1) were considered for their cumulative effects to migratory and resident landbirds.

Vegetation management treatments, including commercial and noncommercial thinning as well as prescribed burning, within the cumulative effects boundary are currently in the planning phase for the Mill Creek Restoration project, and the implementation phase for the Mill Creek AMP project. These foreseeable treatments intend to reduce overstocked forested stands within dry forest types in an effort to

restore stands to their historic condition as well as promote a more fire-tolerant landscape, opening up the canopy and improving understory vegetative conditions. Landscape objectives that limit or discourage large fires and insect outbreaks would help protect existing late and old forest structure from these disturbances. However, these same treatments would contribute to a negative trend in dead and defective wood habitat across the Forest. These treatments, combined with hazard tree removal along roads and trails as a result of new or ongoing/existing projects, would alter or remove some potential nesting, roosting, and foraging snags. In addition, some proposed riparian restoration activities have yet to occur within these project areas. Riparian restoration activities would prevent further lowering of the water table, thus allowing moisture levels in associated meadow habitat to be, at a minimum retained, but likely improved.

Livestock grazing as authorized by the Mill Creek AMPs is ongoing within the cumulative effects boundary with the exception of a few exclosures. Livestock grazing may cause shifts in plant species composition and abundance through the selection of more palatable forage species, reduce ground cover through trampling or consuming vegetation, and decrease insect availability for foraging birds. However, current grazing strategies within the projects listed above include adaptive livestock management that is expected to improve livestock distribution and further improve habitat conditions for birds in localized riparian and sensitive areas. These improvements to grazing management should contribute beneficially to the overall cumulative effects, however the continued implementation of livestock grazing in the subwatersheds is likely reducing the abundance and quality of habitat for those species who rely on undisturbed riparian habitats.

Therefore, the combined effect of the proposed action alternatives from the Lemon Gulch Trails project, with these current and reasonably foreseeable future actions would be that the effects to birds of conservation concern and/or focal species and their habitats would result in a slight negative trend of habitat suitability for all species due to habitat fragmentation and disturbance factors from an increase in human use within the project area.

**Forest Plan Consistency**

The Lemon Gulch Trails project is consistent with the Oregon-Washington Partners in Flight Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington (Altman 2000; Altman and Bresson 2017), the 2001 updated requirements contained in Executive Order 13,186, and the USFS and USFWS agreements regarding responsibilities of federal agencies to protect migratory birds (USFS 2008, 2014, 2016).

### *Summary of Environmental Effects to Wildlife Species*

Wildlife species may exhibit a variety of responses to the proposed trail system. Implementation of the trail system would potentially alter habitat conditions in the short-, mid- and long-term, resulting in either adverse or beneficial effects to terrestrial wildlife or their associated prey species. Intensity of effects may differ depending on context (e.g. location, extent, and timing of activities and the species involved).

Habitat is discussed in terms of existing as well as historic conditions. HRV is used as a reference condition for some species; effects on habitats are discussed, with the assumption that if appropriate habitat is available for a species, then that species occupies or could occupy the habitat. In addition, by managing habitat within HRV it is assumed that adequate habitat would be provided to ensure population viability for those species that would have occurred here historically (Landres et al. 1999). Table 28 is a summary of the environmental effects/impacts from the Lemon Gulch Trails project on terrestrial wildlife species and their habitats.

Table 28: Summary comparison of environmental effects to wildlife resources by alternative

| Species | Effects or Impacts Determinations | |
|---|---|---|
| | Alternative 1 | Alternatives 2, 3, 4, 5, & 6 |
| **Threatened, Endangered, Proposed, and Candidate Species** | | |
| gray wolf | No Effect | May Affect, Not Likely to Adversely Affect |
| **USFS Region 6 Sensitive Species** | | |
| Morrisoni bumble bee | No Impact | May Impact Individuals or Habitat |
| western bumble bee | No Impact | May Impact Individuals or Habitat |
| wolverine | No Impact | No Impact |
| white-headed woodpecker | No Impact | No Impact |
| Lewis's woodpecker | No Impact | No Impact |
| silver-bordered fritillary | No Impact | No Impact |
| monarch butterfly | No Impact | No Impact |
| bald eagle | No Impact | No Impact |
| white-tailed jackrabbit | No Impact | No Impact |
| Townsend's big-eared bat | No Impact | No Impact |
| spotted bat | No Impact | No Impact |
| fringed myotis | No Impact | No Impact |
| grasshopper sparrow | No Impact | No Impact |
| greater sage-grouse | No Impact | No Impact |
| bufflehead | No Impact | No Impact |
| tricolored blackbird | No Impact | No Impact |
| upland sandpiper | No Impact | No Impact |
| American white pelican | No Impact | No Impact |
| horned grebe | No Impact | No Impact |
| **Management Indicator Species** | | |
| primary cavity excavators | Consistent with Forest Plan and Continued Viability is Expected | |
| pileated woodpecker | Consistent with Forest Plan and Continued Viability is Expected | |
| golden eagle and prairie falcon | Consistent with Forest Plan and Continued Viability is Expected | |
| bald eagle | Consistent with Forest Plan and Continued Viability is Expected | |
| Rocky Mountain elk and mule deer | Consistent with Forest Plan and Continued Viability is Expected | |
| **Other Species or Habitats in the Forest Plan** | | |
| pronghorn | Consistent with Forest Plan and Continued Viability is Expected | |
| raptor habitat | Consistent with Forest Plan and Continued Viability is Expected | |
| hawks and owls | Consistent with Forest Plan and Continued Viability is Expected | |
| northern goshawk | Consistent with Forest Plan and Continued Viability is Expected | |
| **Birds of Conservation Concern** | | |

| Species | Effects or Impacts Determinations | |
|---|---|---|
| | Alternative 1 | Alternatives 2, 3, 4, 5, & 6 |
| Birds of Conservation Concern | Impacts to individuals may occur from disturbance during trail use, however viability of any species, or species use of the overall area should not change drastically due to the minute amount of physical alteration to various habitat types present within the project area and the abundance of suitable habitat remaining within the project area. | |
| Focal Species and Essential Habitat | Impacts to individuals may occur from disturbance during trail use, however viability of any species, or species use of the overall area should not change drastically due to the minute amount of physical alteration to various habitat types present within the project area and the abundance of suitable habitat remaining within the project area. | |

---

## Range (Key Issue #2)

### *Methodology*

Studies on how recreational uses, including biking, can affect livestock operations are lacking. Even in areas where recreation use is heavily concentrated, the potential for interaction between recreationists and livestock is primarily dealt with through education. The Forest Service reached out to public land managers around the west where recreation is co-existing with cattle grazing seeking information on effects to livestock operations and recreationists alike [personal communications in project file].

This analysis will consider the effects to grazing operations from the building and use of recreational trails and trailheads. The analysis considers the amount and density of trails in proximity to water developments salting, trailing, and high-use areas. Water developments are essential to proper management of the resource and disturbance around them may affect the distribution of livestock to and from these essential water sources. High-use areas were identified by permittees as areas where cattle naturally collect and are preferred for forage. Data sources relied upon include the Forest Service Geographic Information System (GIS), information and data provided by permittees, Grazing Permits and Annual Operating instructions for the Mill Creek and Steins Allotments.

### *Affected Environment*

The Ochoco National Forest provides a source of forage for domestic livestock which supports the ranching operations of permittees. There are 48 active grazing allotments within the Ochoco NF ranging in size from a couple hundred acres to over 51,000 acres for a total of about 731,450 acres. This amounts to over 86% of the Ochoco NF System lands.

A portion of the Mill Creek Allotment overlaps the project area (Figure 14). Mill Creek Allotment is the largest allotment on the Ochoco National Forest at 51,305 acres. There are two grazing permits issued for the Mill Creek Allotment which authorizes a total of 385 cow/calf pairs to graze the allotment during the grazing season. Annual Operating Instructions (AOIs) for the last several years show that the Lemon Pasture is usually grazed from early May to late June (Table 29). The Mill Creek Allotment Management Plan (AMP) outlines that the Lemon Pasture is to be used first every year. A portion of the Steins Allotment overlaps the project area (Figure 14). There is one active grazing permit issued on the Steins Allotment authorizing 16 cow/calf pairs. The area is usually grazed between mid-June and early September, based on AOIs (Table 29).

The Mill Creek Allotment is divided into five pastures (Table 29 and Figure 14). Lemon Creek Pasture, where most of the proposed trails are located, is typically used for six weeks between early May and late

June. One trail segment bisects the Hereford Pasture of the Steins Allotment in alternatives 2 and 5. There are no proposed trails in the remainder of the Allotments.

Table 29: Allotments and pastures

| Mill Creek Allotment | Acres | General timeframe of use by permittee* |
|---|---|---|
| Lemon Creek Pasture | 15,084 | May – June** |
| McKay Pasture | 9,756 | June - July |
| Harvey Creek Pasture | 4,473 | Aug – Sept |
| A-Y Pasture | 4,679 | Aug – Sept |
| Big Pasture | 17,312 | July - Sept |
| **Total** | **51,305** | |
| **Steins Allotment** | | |
| Hereford Pasture*** | 410 | June-Sept |
| Steins Pasture | 4,030 | June-Sept |
| **Total** | **4,440** | |

* The exact timing of use in each pasture varies by year per Annual Operating Instructions.
**Lemon Creek Pasture, where most of the proposed trails are located, is typically used for six weeks between early May and late June. There are no trails located in other pastures of the Mill Allotment.
*** One trail segment bisects the Hereford Pasture. There are no proposed trails in the remainder of the Steins Allotment.

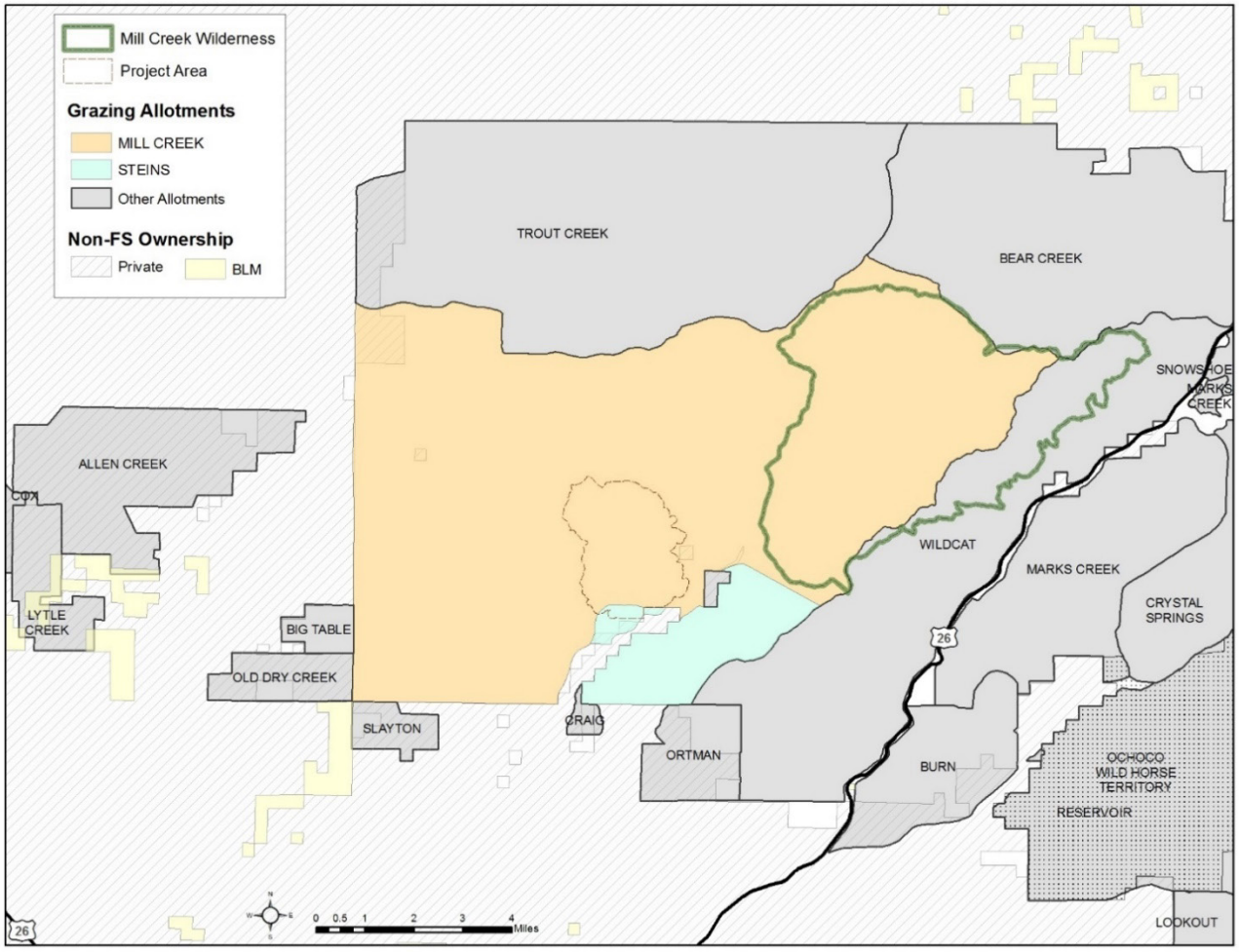



Figure 14: Grazing allotments on west side of Ochoco National Forest. Proposed trails lie within Mill Creek and Steins Allotments.

There are 60 water developments in the Mill Creek Allotment; 19 are located within the Lemon Pasture, and 4 of those are within the project area boundary (the project boundary encompasses all proposed trail segments) (Figure 15). There are no water developments in the Steins Allotment west of Mill Creek Road. While upland water developments draw livestock away from riparian areas, the intensity of annual livestock use on those riparian areas is limited by utilization, stubble height, and streambank alteration standards. Therefore, since livestock may utilize a given pasture up to the point those standards are reached, the development of upland water sources serves to extend the time in any given pasture prior to reaching these standards (USDA Forest Service 2010).

Salting and trailing areas are used by the permittee to distribute cattle across the pasture. Cattle spend more time in certain areas within the pastures, though it is desired that they utilize the entire pasture during the time they are in it. The presence of the permittee or representative on the allotment is meant to keep cattle dispersed and moving throughout the allotment/pasture, promoting utilization of vegetation throughout the allotment/pasture and keeping cattle from concentrating in riparian areas for long periods of time. Livestock are to be checked a minimum of two days per week before July 1st and a minimum of every other day after July 1st. (USDA Forest Service 2010).

Range monitoring occurs at Designated Monitoring Areas (DMAs) which are located in riparian areas that represent grazing use, and are indicative of overall livestock use within the pasture. There are 11

DMAs in the Mill Creek Allotment; two within the Lemon Pasture with one within the project area.

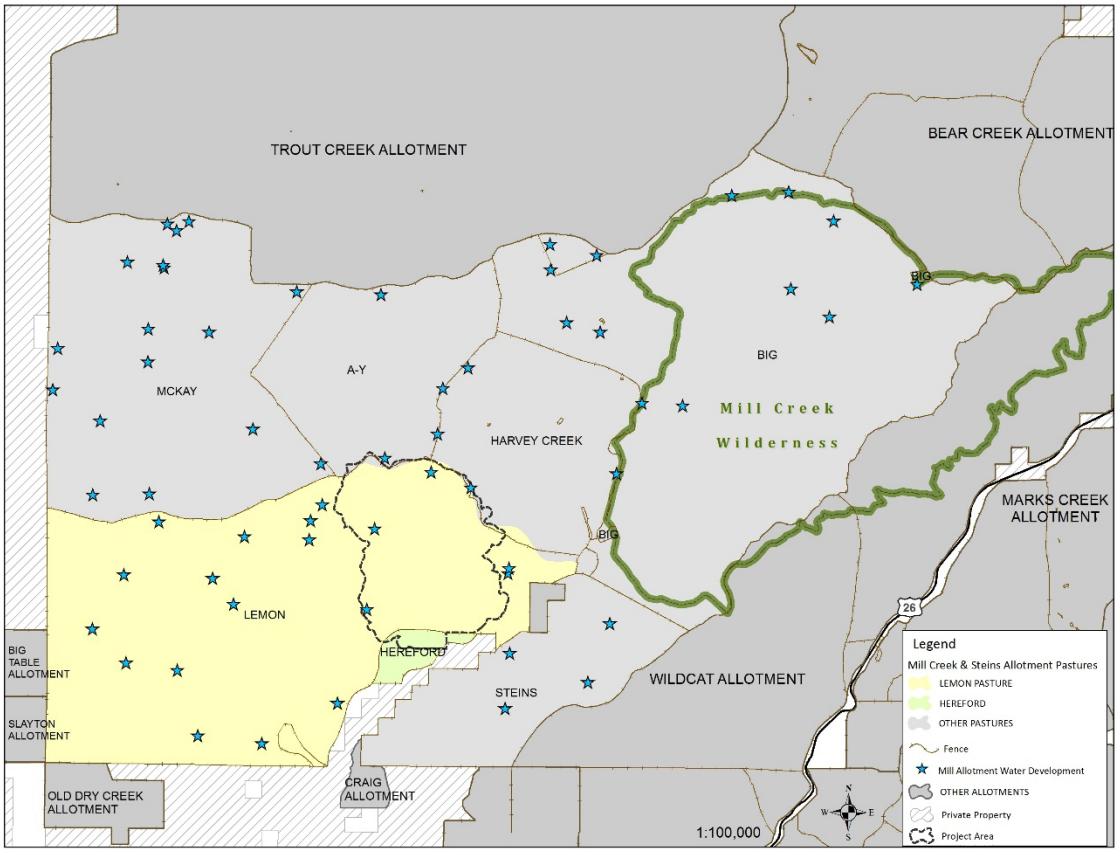



Figure 15: Mill Creek Allotment and Steins Allotment water developments and pastures

### *Environmental Consequences*

**Alternative 1 – No Action**

Under the No Action alternative, no new trails or trailheads would be built within the Mill Creek or Steins allotments. There would be no direct, indirect, or cumulative effect to livestock operations.

**Effects Common to All Action Alternatives**

*Rationale for Assumptions*

Due to the lack of peer reviewed science to help quantify effects to livestock grazing caused by the construction and use of mountain biking trails, the following assumptions are being disclosed and the rationale for each assumption.

Livestock Distribution and Potential for Livestock-Biker Encounters: As a surrogate to show differences in each alternative a buffer of a half mile was placed around each water development in or near the project area and a ¼ mile buffer around each salting location. These buffers were then used to track how many miles of trail were within these buffers for each alternative. The assumption is that since water is the most limiting resource for livestock that new trails in these areas could affect livestock distribution the greatest and salting locations would be the next limiting resource. These buffers in no way represent how far away water developments or salt need to be from a mountain bike trail for livestock to still use them, only a way to represent a range of potential effects across action alternatives. It is also acknowledged that not all of the buffers are created equal. Due to the location of a water development based on topography,

density of vegetation, or physical distance from the actual trail, effects would potentially be different but cannot be quantified, therefore they are strictly shown as miles of trail within these buffers. Locations of livestock high use areas were provided by the grazing permittees. The same assumption holds true for the areas of high use and the overlapping trail miles.

The assumption for the 25-yard buffer around cattle trails is that since livestock tend to use the path of least resistance, within this buffer, it is assumed that livestock would now use the proposed trails as their travel route and this may result in higher encounters with trail users.

Additionally, The Forest Service has reached out to managers of trail systems that are located within livestock grazing allotments on public lands. Local examples include Coyote Butte, Horse Butte, and Swamp Wells which are all multi-purpose trails with both horse and livestock use.

*Effects to Forage Availability*

Effects to actual forage availability would be nominal under any action alternative as trail tread and trailhead/parking areas would amount to less than 22 acres as disclosed in the Soils analysis and some of the trails would be located on non-productive ground. Based on AUM calculations done in Mill Creek EIS the Lemon pasture averages 24 acres for 1 AUM, therefore the actual highest potential loss of forage by trail tread and parking areas would be less than 1 AUM. There is potential for livestock dispersing away from the trails and trail users to less productive areas, at least initially. Based on anecdotal information from other range specialists, livestock become more accustomed to the trail users and would return to near pre-trails forage use.

*Potential for Livestock-Biker Encounters*

Safety concerns have been raised with the current project. Commenters expressed fears that mountain bikers could collide with livestock or with permittees working in the allotment on horseback. There are no known incidences of biker-livestock collision on National Forest System lands. A search of Forest Service records and an internet search for any reported incidents involving cyclists on trails running into cows turned up nothing. Several contacts were made with land managers where mountain biking and livestock grazing co-exist and none reported any incidents of collision. In Wolf et al., 2017, they examined grazing and recreational use on public lands in the San Francisco Bay area and found that over a four-year period of time only 2.25 negative interactions per million visitors were reported.

Many commenters voiced concerns about "excessive speed" on the trails, assuming that cyclists would be traveling at high speeds that would prevent them from reacting safely to an encounter with a cow or horse rider on the trail. Though the system is downhill, it is not built specifically for high speed. Switchbacks and grade reversals provide for a sustainable trail and naturally slows riders down. See Appendix C for some examples of the "know before you go" tips for recreationists who may encounter livestock, which will be used in educational materials.

*Education for Recreationists*

The Forest Service will promote proper trail etiquette for recreating when livestock are present. Giving recreation users notice about livestock being in an area works well as long as recreationists exercise care when they encounter livestock on the trail or near the trail.[5] As described in the description of alternatives, educational outreach would occur through the Forest Service website where trail information is provided, by using kiosks at the trailheads, through contacts with field rangers, and through our partners. It is important for the recreating public to be aware of livestock presence and the potential for encounters. It is well established that cattle will use trails as a path of least resistance when moving from one place to another; therefore, educational materials will also describe the unavoidable impacts livestock would have on the trails. Providing information about the use of the allotments will also give the public

[5] Steve Stuebner, Personal Communication. Idaho Rangeland Resources Commission (IRRC).

the ability to choose to visit after grazing season has ended.

*Effects to Livestock Distribution*

Trail users may cause livestock to scatter or move groups of them toward areas of concentration near fence lines or natural barriers. This can cause them to spend less time grazing, move to less desirable foraging areas where resources are more limited, areas that have already been grazed, or areas susceptible to damage by grazing. Trail users can be disruptive during herding operations as they tend to scatter livestock while they are being gathered and/or moved. These potential effects to distribution could lead to livestock distribution being reduced in the eastern portion of the Lemon pasture, resulting in potentially higher utilization in other portions of the pasture. Yearly monitoring of livestock utilization would be used to determine if a change in distribution is affecting forage utilization (see Appendix C – Implementation Plan). There is one DMA on Lemon Creek within the project area and one outside the project area but still within the Lemon Pasture in the Dry Creek drainage.

Disturbance effects could occur within the Lemon Pasture of the Mill Allotment and the Hereford Pasture of the Steins Allotment because this is where the proposed trails are located. It is possible that trail use could also affect cattle distribution when the cattle are adjacent to the project area in the A-Y and Harvey Pastures. However, the potential for trail users to disturb cattle is reduced by topography, vegetation, and distance. Effects are limited in time to when cattle are present during the grazing season which varies but generally lasts six weeks in the Lemon Pasture (Table 29). The trail system would open to mountain bikers on May 1st at the end of the winter range closure period. This coincides with the timing of livestock entering the Lemon Pasture. The potential for effects would occur throughout the six weeks livestock are scheduled to graze within the pasture.

Table 30: Comparison of the miles of trails within each pasture by alternative

| Pasture | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 | Alt 6 |
|---|---|---|---|---|---|---|
| Lemon (Mill Cr. Allotment) | 0 | 50.1 | 21.0 | 19.1 | 27.2 | 27.2 |
| Hereford (Steins Allotment) | 0 | 1.5 | 0 | 0 | 1.4 | 0 |
| Total | 0 | 51.6 | 21 | 19.1 | 28.6 | 27.2 |

**Alternative 2 – Direct and Indirect Effects**

Under Alternative 2, 51.6 miles of single-track mountain bike trail would be built over time, primarily within the Lemon Gulch Pasture of the Mill Creek Allotment. A total 23.4 miles of trail would fall within 0.5 miles of nine water developments, 14.5 miles of trail within 0.25 miles of nine salt grounds, 10.9 miles of trail in the high use areas, and 5.4 miles of trail within 25 yards of cattle trailing routes. Trails cross existing fences in two locations. At these locations, roll-over fence crossings would eliminate any need for gates being used for bike users. As these fence crossings are on the cross-country section of the trails, walk through stiles or fence step overs would need to be installed to eliminate gates for hikers. Gates would need to be installed for those on horseback.

Alternative 2 has the most trails in proximity to infrastructure that is intended to aid in distributing cattle throughout the pasture and may therefore have the most impact to grazing operations of any action alternative (Table 31).

**Alternative 3 – Direct and Indirect Effects**

Under Alternative 3, 21 miles of single-track mountain bike trail would be built over time, entirely within the Lemon Pasture of the Mill Creek Allotment. A total of 8 miles of trail would fall within 0.5 miles of four water developments, 7.4 miles of trail within 0.25 miles of six salt grounds, 2.9 miles of trail in the high use areas, and 1.7 miles of trail within 25 yards of cattle trailing routes. In this alternative, all trails

are located on the eastern side of the project area, eliminating trails within 0.5 miles of several water developments, and therefore is not expected to affect livestock use of these developments. The density of trails in the center or the project area is lower and would therefore be less impactful to salt grounds and have less potential to disturb livestock utilization within this area. This alternative does not have any trails in the Steins Allotment, and therefore no effects to livestock grazing in that allotment. There are no fence crossings under Alternative 3, eliminating the need for any gates.

**Alternative 4 – Direct and Indirect Effects**

Under Alternative 4, 19.1 miles of single-track mountain bike trail would be built over time entirely within the Lemon Pasture. This alternative has the fewest miles of trail proposed. Trails are entirely on the eastern side of the project area. A total of 4 miles of trail would fall within 0.5 miles of three water developments, 4.6 miles of trail within 0.25 miles of five salt grounds, 0.7 miles of trail in the high use areas, and 1.6 miles of trail within 25 yards of cattle trailing routes. The north and west sides of the Lemon Creek drainage would have no trail development, eliminating all trail miles within 0.5 miles of most water developments, eliminating trails within most high use areas, and avoiding most cattle trailing areas. This alternative eliminates trail #22 (main return to lower trailhead) avoiding a primary cattle trailing area, requiring cyclists to use Forest Road 3360 instead. There are no fence crossings under Alternative 4. This alternative has the least potential to disrupt livestock operations.

**Alternative 5 – Direct and Indirect Effects**

Under Alternative 5, 28.6 miles of single-track mountain bike trail would be built over time. Trails are primarily in the Lemon Pasture of the Mill Creek allotment but would cross into the Hereford Pasture of the Steins Allotment. A total of 14.6 miles of trail would fall within 0.5 miles of eight water developments, 10.3 miles of trail within 0.25 miles of seven salt grounds, 7.9 miles of trail in the high use areas, and 3.4 miles of trail within 25 yards of cattle trailing routes. Most of the trail density occurs in the eastern side of the Lemon Creek drainage. Alternative 5 retains the western cross-country trail (#23) but reduces the density of trails within 0.5 mile of Strickland Pond. It eliminates any trails within 0.5 miles of Doe Spring and Upper Doe Spring. Trails cross existing fences in two locations. At these locations, roll-over fence crossings would eliminate any need for gates being used for bike users. As these fence crossings are on the cross-country section of the trails, walk through stiles or fence step overs would need to be installed to eliminate gates use for hikers. Gates would need to be installed for those on horseback.

**Alternative 6 – Direct and Indirect Effects**

Under Alternative 6, 27.2 miles of single-track mountain bike trail would be built over time. Trails would solely be within the Lemon Pasture of the Mill Creek allotment. A total of 14.1 miles of trail would fall within 0.5 miles of nine water developments, 8.3 miles of trail within 0.25 miles of nine salt grounds, 7.7 miles of trail in the high use areas, and 2.2 miles of trail within 25 yards of cattle trailing routes. Most of the trail density occurs in the eastern side of the Lemon Creek drainage, although this alternative retains the western cross-country trail (#23). This alternative eliminates any trails within the bottom of the Lemon Creek drainage reduces the number of miles of trail within 25 yards of established cattle trails. This alternative also removes and adjusts some sections of trail to reduce the miles of trail within ¼ mile of salt grounds.

**Cumulative Effects – All Action Alternatives**

The spatial boundary for analyzing the cumulative effects is the Hereford pasture of the Steins Allotment and the Mill Creek Allotment because livestock not only graze the project area, but the rest of the Lemon Pasture and the other four pastures within the Mill Creek Allotment that falls outside of the project area.

There is ongoing non-motorized recreational trail use within the Mill Creek Allotment; however, there are no reasonably foreseeable additional trail proposals in the area. The addition of the Lemon Gulch trails would add, depending on the alternative, between 19.1 and 50.1 miles of non-motorized trail within the Mill Creek Allotment, bringing the total amount of non-motorized trails in the allotment to between 49.1 and 81.8 miles. Within the Steins allotment, depending on the alternative, between 0 and 1.5 miles of

non-motorized trail would be established.

Fuels and vegetation management is being planned in the area with the Mill Creek Forest Restoration Project. Thinning and fuels activities are expected to increase forage availability in the Allotment by reducing tree density and competition for light, water and other nutrients. Treatment areas are likely to occur in areas that are dense and provide less forage than the potential. After treatment, it's anticipated that these treated areas would receive increased use by livestock, within 2-3 years, because of improved forage conditions. Some of these thinning areas would overlap with the new trails, therefore these areas may not increase the potential forage availability while others would be away from the trails and may increase forage availability, potentially drawing livestock away from the trail system. Of the potential treatment areas within the Lemon Creek pasture, over half are outside of this project area.

**Summary Comparison**

The following table summarizes the amount and density of trails in proximity to water developments, salting and trailing areas, and in areas identified by permittees as high-use areas for each alternative (Table 31).

Table 31: Summary of trail miles in proximity to livestock grazing infrastructure.

| Pasture | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 | Alt 6 |
|---|---|---|---|---|---|---|
| Total miles of trail | 0 | 51.3 | 21.0 | 19.1 | 28.6 | 27.2 |
| Total miles of trail within ½ mile of a water development | 0 | 23.4 | 8.0 | 4.0 | 14.6 | 14.1 |
| Total miles of trail within ¼ mile of a salt ground | 0 | 14.5 | 7.4 | 4.6 | 10.3 | 8.3 |
| Miles of trail in cattle high use areas | 0 | 10.9 | 2.9 | 0.7 | 7.9 | 7.7 |
| Miles of trails within 25 yards of cattle trails | 0 | 5.4 | 1.7 | 1.6 | 3.4 | 2.2 |

Of the action alternatives, Alternative 4 would have the least potential effect on grazing operations in the Mill Creek Allotment. The Lemon Creek pasture would contain all the trails but there would be fewer miles of trail overall and near main livestock resources (water, salt, trails, and high use areas). Of the action alternatives that propose the cross-country trail, Alternative 6 would have the least potential effects due to the changes of moving the proposed trails further away from current livestock trails and salt grounds.

As the proposed trail system would be expected to be most heavily used when the livestock are permitted to be in the Lemon Creek pasture, this potential effect would occur throughout the entire time livestock are within the Lemon Creek pasture (approximately six weeks). In the Steins Allotment, Alternatives 2 and 5 would have the same potential effect on the Hereford Pasture. If DMA monitoring shows exceedances, the Mill Creek and Steins allotments as a whole would be affected. This level of effect is not anticipated because of the large size of the pasture and based on information gathered from other Forests. These action alternatives are not expected to have any effects to grazing in any other grazing allotment on the Forest.

In the short-term it is expected that livestock would most likely disperse away from the proposed trails as users are expected to be highest as it opens and livestock are not accustomed to mountain bikes and therefore, are expected to flee from them. As livestock become more accustomed to bikers and the novelty of a new trail system wanes, it is expected that livestock would return to a near normal use of the project area. This may increase the number of livestock using the proposed trails, which may increase the likelihood of biker/livestock encounters.

---

## Soils

The Ochoco Land and Resource Management Plan (Forest Plan) includes standards and guidelines for the soil resource to minimize impacts from proposed activities and maintain soil productivity. "In order to maintain site productivity, all project activities *will be planned to reduce soil compaction and displacement to the lowest reasonable level" (Ochoco FP p 4-196).*

Forest Wide Standards and Guidelines: The Ochoco Forest Plan also gives guidance to minimize impacts to riparian areas from the construction and maintenance of trails for the Recreation resource. For trails in general it states: *"Construct and maintain the trail system to standards suitable for type and amounts of use. Maintain trails to prevent resource damage, protect the investment in the system and provide for user safety. In areas of concentrated use, trails should be designed and maintained to minimize impacts on riparian communities"* (Forest Plan Chapter 4, Section 3, p. 4-177, 188).

The analysis in the FEIS for the Ochoco Forest Plan discloses the effects of recreation on the soil resource and notes that unregulated use could be worse (Ochoco FEIS, 4-63). The FEIS also discloses that ***soil productivity will not be maintained in areas dedicated to recreation sites, roads, etc***. (*emphasis added*) (FEIS at 4-104). In addition, the goals and desired future conditions on the Ochoco National Forest includes an expansion of recreation (LRMP 4-22 through 4-25).

Standard and Guidelines for specific Management Areas: The Ochoco Forest Plan speaks to minimizing impacts in riparian Management Areas and to acceptable compaction from the dedication of recreational trails in other Recreation Management Areas on the Forest. MA-F15 Riparian Areas: *No more than 10 percent of an activity area can be compacted or displaced to a degree which degrades vegetative productivity* (*Ochoco FP* 4-199).

### *Affected environment:*

**Ecological Region and Geology**

The Lemon Gulch project area is located within the Lemon Creek subwatershed drainage in the western portion of the Ochoco Mountains. Lemon Creek is a tributary to Mill Creek and flows south out of a horseshoe shaped valley. The project area lies within the Blue Mountain Level IV eco-region and is described as South Slope Ochoco Terrain at the Level V eco-region tier.

The geology of the area is comprised of the Clarno formation within highly dissected mountain terrain. Parent materials of this formation include andesitic lava flows, domes, breccia, interlayered saprolite, bedded volcaniclastic and epiclastic mudstone, claystone, siltstone, sandstone, conglomerate and mudflow (lahar) deposits (Walker 1990). Volcanic ash from Mt. Mazama covered the area approximately 7700 years ago and has subsequently been reworked by water and wind erosion. This ash is a variable surface component of the mineral soils in the area primarily on the leeward north and east aspects. Residual soils comprised of clay-loam or clay surface textures are present where the ash has been relocated by erosive processes.

Slopes in the Lemon Creek drainage range from 5 to slightly over 70 percent on primarily east, west, and south facing aspects. A few north aspects are present in tributary drainages on the west side of the subwatershed.

### Landtypes and Soils

The Ochoco National Forest Soil Resource Inventory (SRI) describes the landtypes and soils within the Lemon Gulch project area. Landtypes delineate and identify naturally occurring areas on the landscape consisting of unique features such as the soil mantle, bedrock, vegetation, climate, hydrology and landform (Paulson 1977). These features help define map units and interpretations for appropriate management uses. The landtypes in the Lemon Gulch project area are described in Table 32 and displayed in Figure 16.

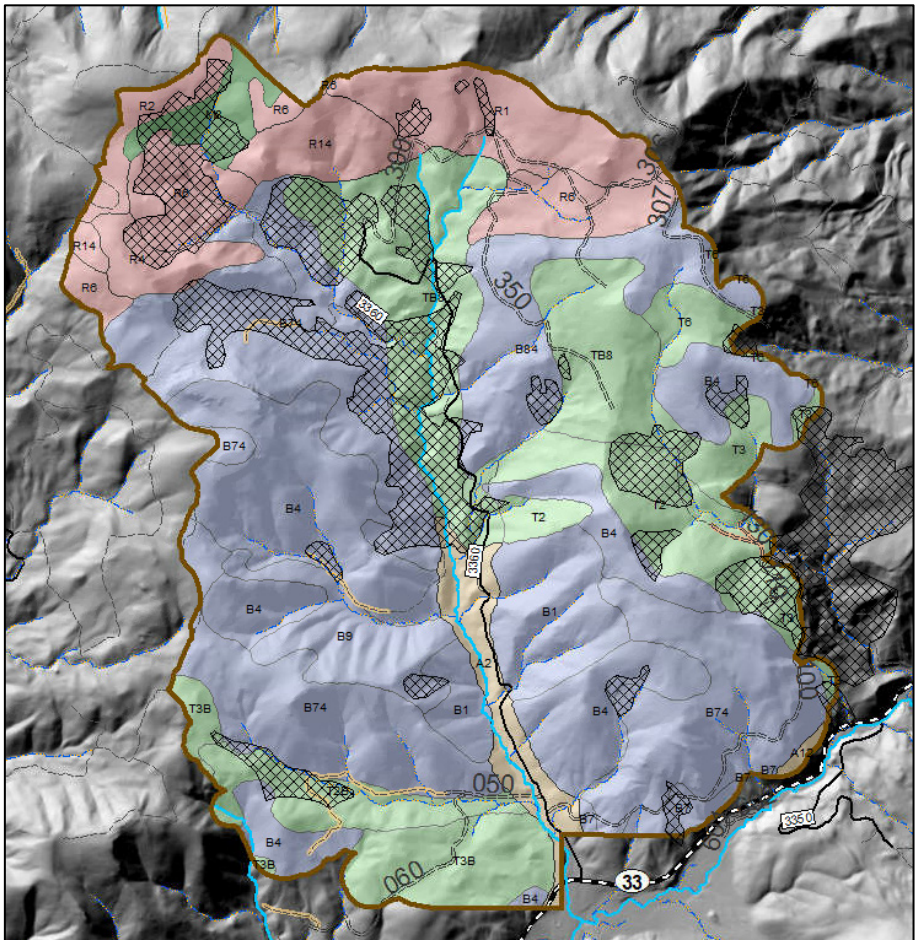



Figure 16: Mapped extent of Soil Landtypes and landslide deposits in Lemon Creek Drainage. See Table 32 for Soil Landtype descriptions and color codes. Landslide deposits are represented by black hatching.

Table 32: Major SRI landtypes in the Lemon Gulch project area

| Landtype | Acreage | Percent of Project Area | Parent Material |
|---|---|---|---|
| **B Landtypes (blue)** - found on dissected basalt mountain sideslopes. (shallow to deep soils). Mixtures of ash and loess characterize these soils over heavy clay rediuum from basalt bedrock. | 1784 | 53% | John Day/Clarno Basalts and Andesites |
| **T Landtypes (light green)** - found on steeper plateaus and escarpment edges, and are comprised of mixtures of ash and loess over residuum from tuffaceous volcanic ejecta and rhyolites | 524 | 16% | Tuffs and mixed volcanics |
| **R Landtypes (pink) —**found on mountain sideslopes on rhyolitic bedrock with skeletal mostly channery and flaggy soils (flat rock fragments). Thes soils often have mixed ash surfaces and more coarse subsoils. | 513 | 15% | Rhyolites |
| **L Landtypes Qsl (black hatch)** - Landslide deposits occur within the Lemon Creek project area on largely inactive old landslide features such as benchy topography and depositional lobes that are not mapped on the soils layer. Hatched areas represent geologic map unit Qsl on the | 705 | 21% | Landslide Deposits |

| Landtype | Acreage | Percent of Project Area | Parent Material |
|---|---|---|---|
| Lower North Fork Crooked River Geologic Map (ODGMI, 2021. Bulletin 108) | | | |
| **A Landtypes (tan) —**alluvial terraces with mixed alluvium and colluvium from upland slopes**.** | 101 | 3% | Mixed Alluvium |
| **M Landtypes (dark green)—**dissected alluvial terraces and depositional areas usally with fine sediment**.** | 50 | 1% | Mixed Alluvium-Meadows |

## Soil Characteristics

The Ochoco SRI further refines the landtypes within the Lemon Gulch project area by describing the parent materials and landforms of the soils. Surface soils in the project area consist of ash or clay material while buried soils and subsurface deposits are variable but are primarily comprised of skeletal clay subsoils. The type and depth of the subsurface materials can affect the function and capability of a given soil type.

*Ash Surface Soils (B and T Landtypes)*

The predominant B and T landtypes in the project area have varying amounts of ash ejected from Mount Mazama (now Crater Lake) around 7,700 years ago on the surface. These two landtypes comprise the majority of the project area. The surface ash ranges in depth from a few to as much as 20 inches and consist of ashy sandy loam and ashy loamy sand textures. The deepest ash soils primarily occur on north and east aspects in the project area which are the leeward sides of the prevailing west and southwest winds. South and west aspects generally have lesser amounts of ash, although some mid and lower slope areas have accumulated ash from the movement of water downslope over time.

Ash surface soils are highly permeable, have high infiltration rates, and are generally well-drained. Although the surface ash is susceptible to wind and water erosion because of the granular (single grained) structure, the ashy sandy loam textures have up to 20 percent clay which help bind the grains together and make it compactable if desired. The surface ash of the B and T landtypes is underlain by heavier textured clay loam soil weathered from basalts or tuffaceous material that is readily compacted and more resistant to wind and water erosion.

*Clay Surface Soils (R landtypes)*

Clay surface soils have little or no ash capping, generally because the ash that was deposited has been moved off the surface after 7,7700 years of wind and water erosion. They commonly have clay loam, silty clay loam or sandy clay loam surface textures that quickly grade to heavier clay in the subsurface. These soils are generally found on the hotter and drier south and west (windward) aspects in the area and are concentrated at the upper end of the Lemon Creek drainage within the project area.

Clay surface soils typically have low permeability and slower infiltration rates. Clay surface soils can be susceptible to detrimental puddling, post holing, plugging, and erosion during wet conditions or spring thaw conditions.

*Landslide deposits*

Landslide deposits associated with mostly dormant landslide terrain are present within the Lemon Creek and Doe Creek drainages. These deposits are mapped on a recently published Geologic map (DOGMI, 2021) and are shown in Figure 13. There is little evidence of active slides in the Lemon Creek drainage and most of the deposits have soil layers overlaying them associated with Mazama ash that indicate they have been dormant for some time. The Doe Creek drainage did have an area of dormant terrain re-activated in 2000 that initiated a slow-moving earthflow lasting five years before stabilizing. Although there are near surface groundwater features along the project boundaries east edge capable of re-activating

dormant slide terrain in the Doe Creek drainage, the results would likely be similar to the low energy earthflow that occurred in 2000.

**Actions Proposed for Analysis**

The Lemon Gulch proposed action and action alternatives would develop a network of recreation trails totaling up to 52 miles within the Lemon Creek drainage. It would also designate and develop multiple areas to provide trailhead parking and shuttle opportunities at the site.

Trails would be constructed under Forest Service (USFS) and International Mountain Bike Association (IMBA) construction standards and guidelines intended to produce sustainable trail treads over the range of proposed trail types and difficulties. These standards and guidelines are included by reference and are the agency, industry, and resource standard for minimizing erosion and increasing the sustainability of trails. These methods include a variety of features to provide drainage and stabilize the trail treads, including outsloped trail treads, drain dips, water bars and gradient reversals.

### *Environmental Effects*

**Direct Effects of Trail Construction**

The Lemon Gulch project would construct system trails for mountain biking, hiking, trail running and other non-motorized uses under the three action alternatives. Trail treads would be defined and constructed using machinery and/or hand tools. Machinery would include a small excavator or skid steer to define, bench (where needed) and compact the mineral soil surface, comparable to the methodology used for the renovated sections of the Scotty Creek downhill mountain bike trail located just west of Ochoco Summit. Construction of trail miles would occur in annual phases under each alternative, with up to 51.6 total miles implemented at full build out under Alternative 2.

Direct effects to the soil resource would be localized to the trail corridors in which they were built. For this analysis, it is conservatively overestimated that an average width of three feet would be disturbed for the construction of trail treads in the project area. Trail treads themselves are likely to average between 18 and 24 inches when completed. This would dedicate a maximum of 18.7 acres (Alt 2) and a minimum of 6.9 acres (Alt 4) of the soil resource to a hardened trail condition, depending on the alternative chosen for the project. Total miles of trail and the acreage of soil disturbance are summarized by alternative in Table 33.

Table 33: Acres of soil converted to trail tread by alternative.

| Alternative | Miles of trail | Acres of soil[6] | % of project area (3305 acres) |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 2 | 51.6 | 18.7 | 0.6% |
| 3 | 21.2 | 7.5 | 0.2% |
| 4 | 19.1 | 6.9 | 0.2% |
| 5 | 28.6 | 10.4 | 0.3% |
| 6 | 27.5 | 10 | 0.3% |

Trails built using a small excavator or skid steer to clear, define and compact a supporting surface for the trail tread would generally have a larger width of disturbance than trails built by hand. Some trail sections would be constructed using hand tools where machine work would be limited by steeper slopes or the rock content of the hillslope; or where a different character of the trail tread is desired. The width of the

[6] Acres of soil was calculated using an average 3 foot wide area of disturbance for all trail miles.

supporting surface for all constructions methods would also vary depending on the angle of the slope the trail traverses and the associated amount of benching needed to support a stable tread.

Soils within the project area are conducive to the construction of trails due to their depth and varying clay contents that allow for material to be benched and compacted in most areas. The construction of trails would remove organic and vegetative cover from the soil surface and compact the exposed mineral soil into a non-productive dedicated tread. Table 34 summarizes the individual soil units on which trails would be constructed within the project area as mapped in the Ochoco National Forest Soil Resource Inventory (Larsen 1990).

Table 34: SRI soil map units in the project area.

| Soil Type | Surface texture | Subsurface material |
|---|---|---|
| A12, A2 | mixed alluvium | clay loam |
| B1, B4, B7, B74, B84, B9 | ashy sandy loam | clay loam |
| M8 | clay loam | clay loam |
| R1, R14, R2, R6 | clay loam | skeletal |
| T2, T2B, T3, T3B, T6, TB8 | ashy sandy loam | clay loam |

Portions of trails would be bench cut where they crossed steeper slopes while other sections would lay on the surface at the angle of the slope. Backslopes above the bench cut trails would also have mineral soil exposed but most would be able to support the return of some vegetative or organic cover since they would not be compacted during this process. Although mineral soil on some backslopes would remain exposed over the long-term following the construction and implementation of the trails, the angle of repose and the clay content of the exposed soils would be conducive to keeping these slopes stable. However, some backslopes may be reinforced with rock or wood structures to prevent sloughing or failure. Bench cut trails across dormant landslide terrain in the Doe Creek area could possibly contribute to the reactivation of this terrain but are unlikely to cause mass slope movements. Drainage features along the bench cuts where groundwater was exposed or seeps are present are included in the design criteria to minimize this risk.

In summary, the estimated extent of soil disturbance summarized in Table 33 shows that the actual surface area of the soil resource that would be dedicated to a non-productive condition as trail tread is well less than 1% of the Lemon Gulch project area.

**Indirect Effects of Trail Construction**

Indirect effects of trail construction include the possibility of erosion from trail use and water movement. These effects are expected to be minimized due to the heavier texture of the soils and the Best Management Practices and Design Criteria incorporated into the trail construction. Trails would be designed and constructed for sustainability using guidance from Forest Service (USFS) and International Mountain Bike Association (IMBA) construction standards and guidelines. Direction and methodology in these documents are intended to produce sustainable trail treads over the range of proposed trail types and difficulties. These standards and guidelines are the agency, industry and resource standard for minimizing erosion and increasing the sustainability of trails. Methods include a variety of features to provide drainage and stabilize the trail treads, including outsloped trail treads, drain dips, water bars and gradient reversals.

Construction of trails under this guidance would include appropriate drainage features to shed rain and snowmelt water off the trails before they become an erosive force regardless of whether machinery or hand tools were used. Drainage features would include the placement of drain dips and waterbars in appropriate places and intervals along the trail pathways; outsloping of the trail tread; and culverts or raised trail construction across defined stream drainages. As a result, erosion from trails is expected to be

minimized to a degree that trail treads would remain stable and functional with use and hydrologic connections to stream drainages would be minimal.

**Effects of Parking Areas**

Three primary parking areas would be implemented for the project, one each in the Lower, Middle and Upper areas of the trail system. The lower parking area would be the primary trailhead and would include a kiosk and ADA accessible toilet. A total of seven areas are included for analysis in response to location issues brought up during the scoping period (Figure 17).

The designation of parking and trailhead facilities would dedicate approximately 1.0 acres of the soil resource to a compacted and non-productive state in the areas chosen. The middle parking area (TH #2) and one each of the upper (TH #4) and lower (TH #3) parking areas being considered are on compacted old landings and are comparatively unproductive sites for tree growth. One of the lower parking options (TH #7) would have productive forest soil converted to a compacted condition, while another one (TH #6) would have rocky scab soils dedicated to an unproductive condition. The second upper parking area being considered (TH #1) would convert productive soil to a compacted condition, while a possible parallel parking area for shuttlers (TH #5) would have no effect on an already compacted road shoulder.

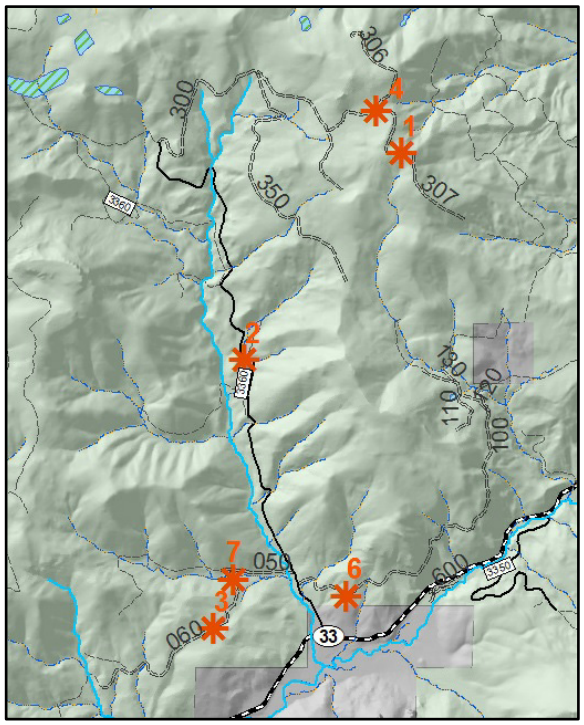



Figure 17: Proposed parking area options for the Lemon Gulch analysis.

Three sites are being evaluated as the primary lower trailhead and parking for the project, although only one would be implemented. These are TH #'s 3, 6 and 7 (Figure 18).

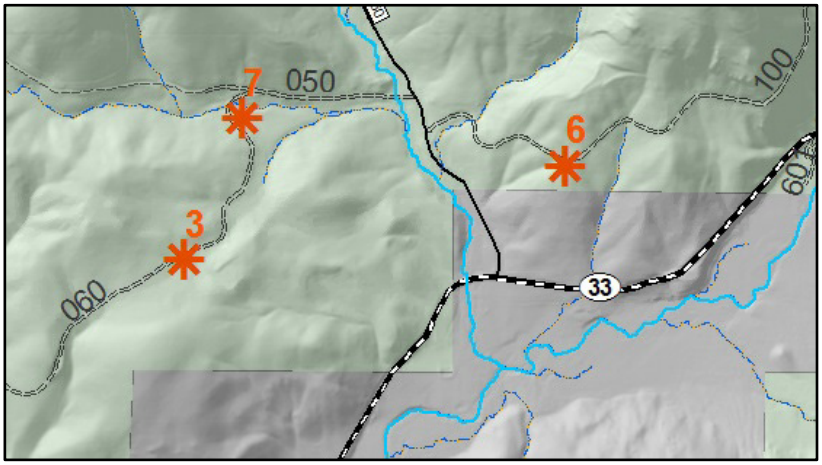



Figure 18: Lower parking trailhead options for analysis.

The first area (TH #3) is located on the south side of road 3360_060 approximately ¼ mile south of the intersection with road 3360_050. This site is an old landing approximately 0.50 acres in size that is already compacted and immediately adjacent to the road (Figure 19). There would be no change in the compacted condition of the soil resource, although it may be improved with a gravel, and a few small sapling trees would be removed.

Figure 19: Lower Parking Area Trailhead #3 off Forest Road 3360_060.

A second area for consideration as the lower parking area (TH #6) is located on road 3360_100 about ¼ mile east of the intersection with road 3360. This area is currently unimproved but has been utilized in the past, most likely as a landing or staging area, and has a shallow scab soil. Designation as a trailhead would dedicate approximately 0.50 acres of the soil resource to a non-productive condition. Some grading would be required to level the area (Figure 20).

Figure 20: Lower Parking Area Trailhead #6 off Forest Road 3360_100.

A third area under consideration for the lower parking area (TH # 7) is near the intersection of roads 3360_050 and 3360_060. This area would require grading and definition of an entrance road and parking spaces and the removal of trees from a commercial thinning unit in the Mill Creek Restoration project. These actions would convert approximately 0.50 acres of productive soil to a non-productive condition (Figure 21).

The chosen site for a lower trailhead would likely be improved with gravel to define parking and create ADA access to a newly installed vault toilet. It is estimated that approximately 75 cubic yards of soil and rock would be removed during the excavation for a single vault toilet installed at the primary lower parking trailhead site.

Figure 21: Lower Trailhead #7 option off Forest Road 3360_060

The proposed middle parking area (TH #2) is also located on an existing area of graded and compacted soil totaling approximately 0.25 acres. The area is an existing landing on the south side of road 3360 that is already hardened but would require the removal of approximately 25 sapling sized trees (Figure 22).

Figure 22: Middle Parking Area on the south side of Forest Road 3360

The primary upper parking area being considered (TH #4) would be adjacent to the 3360_306 road just south of the intersection with the 3360_307 (Figure 23). It is an old landing area approximately 0.20 acres in size that is already used for general parking and the soil resource is already compacted (Figure 24). In the future if a single vault toilet were to be installed at this location, it would require the excavation of approximately 75 cubic yards of soil and rock.

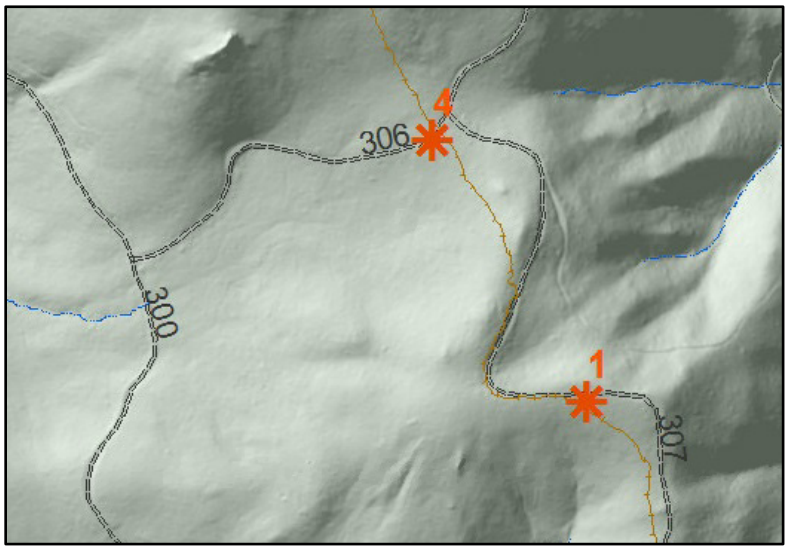



Figure 23: Proposed Upper Parking Area option locations.

Figure 24: Upper Parking Area #4 off Forest Road 3360_306

A second area is being considered as an alternative upper parking area (TH #1) that is located approximately ½ mile east on the 3360_307 road from the intersection with the 3360_306 road (Figure 23). This area would require the removal of a few stumps, the clearing of shrubs and a few small trees and the compaction of the soil resource to create a parking area for cars. This would convert approximately 0.20 acres of the soil resource to a hardened condition (Figure 25).

Figure 25: Overflow upper Parking Area #1 off Forest Road 3360_307

**Cumulative Effects**

The proposed Lemon Gulch trails overlay silvicultural treatment units planned under the Mill Creek Vegetation Management project. Under full build out of the Lemon Gulch project a total of 15.6 miles of trail would be constructed within 28 Mill Creek units proposed for commercial thinning (HTH). The dedication of the soil resource to support these trail miles would add a total of 5.6 acres of hardened soil disturbance to estimates for system infrastructure (roads and trails), landings, skid trails and off trail impacts within 1,201 Mill Creek unit acres. This amount would average an aerial extent of approximately 0.4 percent of these unit acres.

Grazing would also continue within the Lemon Creek drainage, maintaining existing cow trails in a

compacted condition and continuing the localized compaction and post holing of soil near water developments, seeps and shaded resting areas. This is currently a very low amount estimated to be less than 0.5 percent of any one proposed Mill Creek unit.

The percentage increase in soil disturbance from the proposed trails within any single Mill Creek treatment unit would range from less than one half of 1 percent to a high of 1.94 percent with a full build out of trails in the proposed action. The cumulative addition of these acreages dedicated to trails would cause slightly higher overall detrimental soil levels within up to 28 units proposed for commercial harvest treatments under the Mill Creek project. The ten units listed in Table 35 would have an increase greater than 0.7 percent within the unit area boundaries identified in the Mill Creek project. However, the cumulative addition of trails within any of the Mill Creek Units is unlikely to cause these unit areas to be out of compliance with Forest Plan standards for maintaining soil productivity.

The Mill Creek project also proposes to decommission portions of the 3360_050 (0.65 miles), 3360_150 (0.3 miles) and 3360_302 (0.22 miles) roads, which would return approximately 1.4 acres of the soil resource within the Lemon Creek drainage to a productive condition using an average road width of 10 feet. Alternative 6 would convert the 0.65 miles of the 3360_050 road proposed for decommissioning to a trail, reducing the amount of the soil resource returned to a productive condition by approximately 0.23 acres compared to the other action alternatives. In summary, the cumulative effects to the soil resource from the actions proposed in the Lemon Gulch project combined with other reasonable and foreseeable actions within the Lemon Creek drainage would not exceed management direction for the soil resource in the Ochoco Forest Plan under any of the proposed alternatives analyzed in this document.

Table 35: Highest percent increase in detrimental soil conditions within Mill Creek Units from proposed Lemon Gulch trails.

| Mill Creek Unit | Unit Acres | Lemon Gulch trail miles | Lemon Gulch trail acres | Percent of Mill Ck Unit |
|---|---|---|---|---|
| 84 | 20.4 | 0.49 | 0.18 | *0.87%* |
| 99 | 46.7 | 1.90 | 0.69 | *1.48%* |
| 101 | 21.4 | 0.44 | 0.16 | *0.75%* |
| 112 | 68.6 | 2.59 | 0.94 | *1.37%* |
| 121 | 12.5 | 0.37 | 0.13 | *1.07%* |
| 122.1 | 12.6 | 0.25 | 0.09 | *0.73%* |
| 123 | 50 | 1.25 | 0.45 | *0.91%* |
| 134 | 24.5 | 0.48 | 0.18 | *0.72%* |
| 136 | 72.8 | 1.38 | 0.50 | *0.69%* |
| 138 | 7.9 | 0.42 | 0.15 | *1.94%* |

---

## Hydrology and Aquatic Species

There are no standards and guidelines in the Ochoco Forest Plan related to trail construction in the Riparian Management Area. Forest-wide standards and guidelines related to protecting water quality are not specific to non-motorized trail construction. The Forest Plan speaks to compliance with State requirements for water quality and the use of Best Management Practices. Best Management Practices (BMPs) are standard conservation practices that have proven effective in protecting soil and water resource values during land management activities. BMPs from the National Best Management Practices for Water Quality Management of National Forest System Lands – Volume 1 (USDF 2012) relevant to the project are listed below and would be implemented as appropriate in the project area. Applicable Best

Management Practices and resource protection measures are listed in Appendix B of this EA. Full text of BMPs can be found in Appendix A of the Hydrology Report.

One applicable standard and guideline from INFISH requires the agency to design, construct, and operate recreation facilities, including trails and dispersed sites, in a manner that does not retard to prevent attainment of the Riparian Management Objectives and avoid adverse effects to inland native fish. (RM-1).

### *Existing Condition*

The project includes trail and trailhead construction in the Lower Mill Creek Subwatershed (HUC 12 170703050302) within the larger Mill Creek Watershed (HUC 10 1707030503). The climate is characterized by low precipitation and humidity, large daily temperature fluctuations, and high evaporation rates. Summers are typically hot and dry and winters are usually cool and moist. This area receives a modest amount of precipitation annually with an average of 17 inches, historically primarily as snow during winter though climate change predictions indicate a shift to more rain than snow. Surface water in the project area includes streams, springs, and springs developed for livestock use. Identified perennial streams in the project area include Lemon Creek and Schoolhouse Creek though professional observations have indicated that these streams have exhibited more of an intermittent nature the past 3-5 years. Neither of these perennial streams are listed for impairment with the Oregon Department of Environmental Quality. Aquatic survey data exists for Lemon Creek; however, Schoolhouse Creek is not on the list of perennial streams that are periodically monitored within the project area.

RHCAs are portion of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs are delineated around streams or water bodies and follow a standard width prescribed in INFISH. See Hydrology Report Appendix B for a map of streams and RHCAs in the project area.

Common conditions in the areas where trail stream crossings would occur consist of incised channels, coarsened channel substrate and very little riparian hardwoods. Watershed Condition Framework ratings related to this issue for the Lower Mill Creek subwatershed are water quality condition listed as fair, water quantity condition as fair, riparian/wetland vegetation condition as fair and aquatic habitat condition as poor.

The indicator that will be assessed for this analysis is general RHCA condition. Measures used to assess RHCA condition are pool quantity and quality, riparian shade, and sediment delivery to the stream network using percent stable banks and percent fines in channel substrate.

### *RHCA Condition*

#### Pool Quantity and Quality

Pools per mile data from stream surveys were used as the pool quantity metric while residual pool depth is used a metric for pool quality.

Survey data indicates an overall trend in decreasing pools per mile across the entire Mill Creek watershed. Lemon Creek (all reaches) exhibits less than 60 pools/mile (Figure 26) and falls well short of meeting management objectives of more than 96 pools per mile.

Pool characteristics are generally shallow exhibiting little habitat complexity. Survey data indicates an overall improving trend in residual pool depth throughout the Mill Creek Watershed though Lemon Creek showed no improvement in residual pool depth.

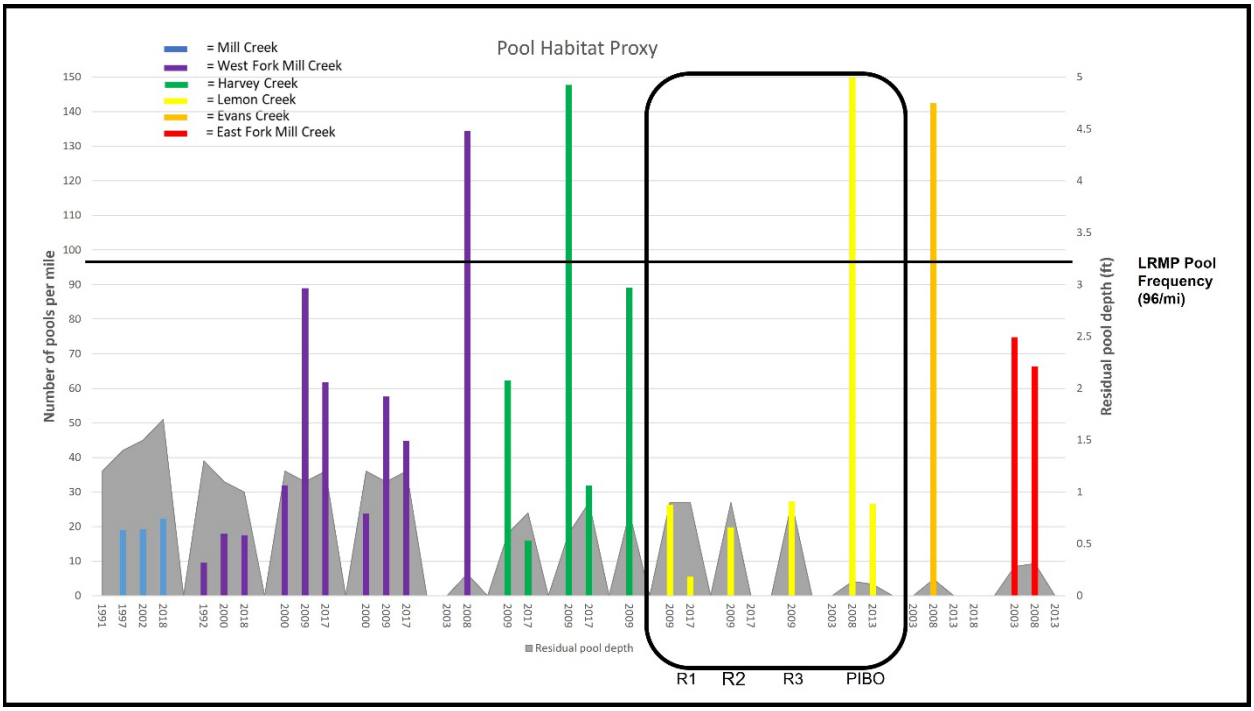



Figure 26: Pool habitat proxy showing pool frequency and residual pool depth for the entire Mill Creek Watershed with Lemon Creek highlighted for the project area.

## Riparian Shade

There is an observed overall trend of an improvement in total shade across the Mill Creek watershed but still below Forest Plan standards (Figure 27).

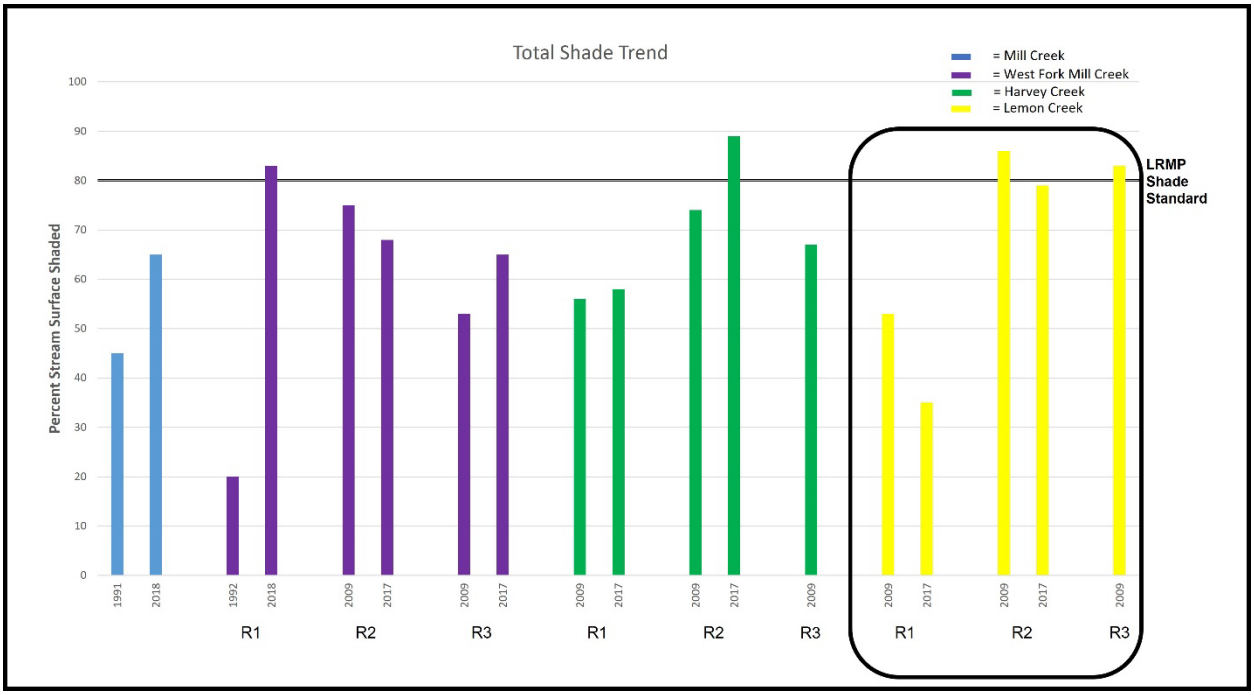



Figure 27: Total riparian shade trends for the entire Mill Creek Watershed with Lemon Creek highlighted for the project area.

**Sediment Delivery to the Stream Network**

The overall trend is the percent stable banks across the entire Mill Creek watershed remaining unchanged over time except for a few reaches. The uppermost reach of Lemon Creek had essentially no change in percent stable banks over the data range. Percent stable banks are below forest plan standards in the lower two reaches of Lemon Creek (Figure 28).

The overall trend is an increase in percent fines in the channel substrate across the entire Mill Creek watershed. The observed increase in percent fines occurred in the timeframe after the 2000 Hash Rock fire but no direct correlation can be made based on collected data. Very large increases were observed in percent fines in Reach 1 of Lemon Creek. Percent fines in the channel substrate are exceeding desired levels in the lower two reaches of Lemon Creek. Percent fines observed corelate closely with the trends in percent stable banks supporting a decrease in overall channel stability, increase in erosion and deposition, and decrease in aquatic habitat quality (Figure 28).

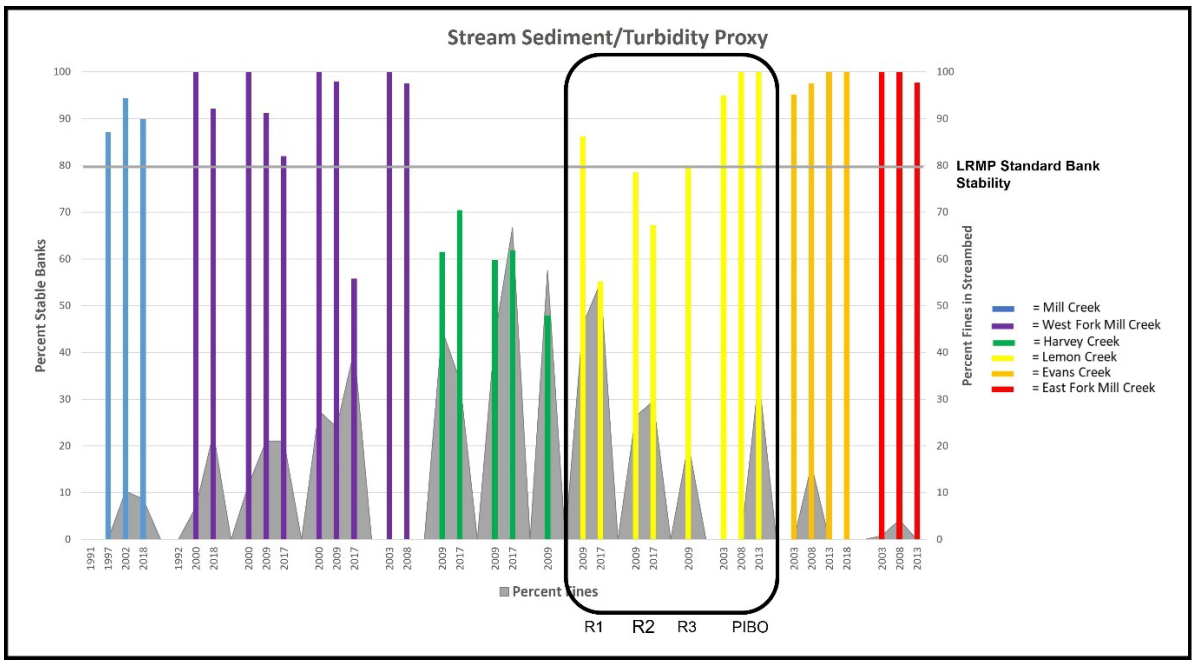



Figure 28: Stream sediment/turbidity proxy showing percent stable banks and percent fines in pool substrate for the entire Mill Creek Watershed.

### *Environmental Consequences*

Effects analysis assumes all resource protection measures and applicable BMPs are adhered to during implementation. The number of Category 1 and 2 RHCA stream crossings and the miles of trails within each RHCA Category will be used to assess the effects of the selected measures to assess RHCA condition between each alternative as summarized in Table 36.

Table 36: Analysis Indicators by Alternative

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Alt. 6 |
|---|---|---|---|---|---|---|
| Number of Category 1 and 2 RHCA stream crossings | 0 | 13 | 8 | 3 | 11 | 5 |
| Miles of Trail within RHCA Category 1 | 0 | 2.6 | 1.5 | 0.6 | 1.7 | 0.4 |
| Miles of Trail within RHCA Category 2 | 0 | 0.6 | 0.4 | 0.1 | 0.6 | 0.5 |
| Miles of Trail within RHCA Category 3 | 0 | 0.5 | 0 | 0 | 0.6 | 0.1 |
| Miles of Trail within RHCA Category 4 | 0 | 2.0 | 0.7 | 0.9 | 1.2 | 1.3 |
| Total miles of Trail within all RHCA Categories | 0 | 5.7 | 2.6 | 1.6 | 4.1 | 2.3 |

**Alternative 1 (No Action)**

There would be no trails or trailheads built with this alternative and therefore there would be no potential for effects to the condition of RHCAs in the project area.

**Effects Common to All Action Alternatives**

The potential for a decrease in overall RHCA condition exists at trail stream crossings during trail construction and use. There is the potential for the creation and operation of trails to increase the amount of sediment that reaches the stream network in addition to the natural sediment delivery that occurs. This potential is mitigated by project design and the small number of trails crossings streams and riparian areas.

Riparian shade will generally not be affected by the creation and operation of trails and trailheads as there is no large-scale removal of vegetative cover/overhead canopy being proposed within the project area and specifically within RHCAs.

Pool quantity is generally controlled by the amount of large wood in the channel for the type of streams in the project area (Montgomery et al. 1995, Beechie and Sibley 1997, Seixas et al. 2020) and there would be no effect to the number of pools as a result of the proposed action across all alternatives. There is the potential for pool quality, as assessed by percent fines in the channel substrate, to be affected by an increase in sediment in the stream network thereby potentially decreasing residual pool depth in the streams throughout the project area. However, the sustainable trail design features would minimize potential sediment delivery by armoring crossings, using elevated crossings, and choosing stable locations for crossings. Monitoring trail use would address erosion caused by wet weather use or other problems identified from the construction to minimize sedimentation downstream. The compacted trail tread is expected to be stable (see Soils report) with respect to surface erosion and, therefore, would not contribute to chronic sedimentation. The relatively low number of stream crossings for most alternatives along with the dry nature of the site would also minimize the potential for sediment being transported downstream and adding to the percent fines within the channel substrate and decrease in residual pool depth. Any additional sediment that reaches the stream network as a result of these actions would not be of an intensity and duration that would be detrimental to aquatic life and not exceed management direction within the Mill Creek watershed.

**Alternative 2**

Alternative 2 would have a total of 13 Category 1 and 2 stream crossings on Lemon Creek (Table 36).

Category 1 RHCAs stream crossings occur on segment 4.2, segment 22.3 (three crossings), segment 22.4, segment 23 (three crossings), segment 28.1 and segment 29 all of which cross Lemon Creek at the lower end of the stream (23.0 on Forest Road 3360-050 & 28.1 on Forest Road 3360-150).

Category 2 RHCAs stream crossings occur on segment 20.1, segment 21 (two crossings), and segment 22 which cross Lemon Creek at the upper end of the stream.

Alternative 2 would have a total of 5.7 miles of trails crossing through all RHCA Categories (Table 36).

With this alternative there would be a nominal effect to RHCA condition through the potential of increased sediment delivery to the stream network based on the number of stream crossings with this alternative; however, mitigation through BMPs and sustainable trail design features would not exceed management direction for pools per mile, riparian shade, and percent stable banks and not exceed management direction for state water quality standards.

**Alternatives 3**

Alternative 3 would have a total of eight stream crossings on Lemon Creek (Table 36). Category 1 RHCAs stream crossings occur on segment 4.2, segment 22.3 (three crossings) and segment 22.4, all of which cross Lemon Creek at the lower end of the stream. Category 2 RHCAs stream crossings occur on segment 20.1, segment 21 (two crossings) which cross Lemon Creek at the upper end of the stream.

Alternative 2 would have a total of 5.7 miles of trails crossing through all RHCA Categories (Table 36).

With this alternative there would be a nominal effect to RHCA condition through the potential of increased sediment delivery to the stream network based on the number of stream crossings with this alternative; however, mitigation through BMPs and sustainable trail design features would not exceed management direction for pools per mile, riparian shade, and percent stable banks and not exceed management direction for state water quality standards.

**Alternative 4**

Alternative 4 would have a total of three stream crossings on Lemon Creek (Table 36). Category 1 RHCAs stream crossings occur on segment 4.2, and segment 22.4 which cross Lemon Creek at the lower end of the stream. Category 2 RHCAs stream crossings occur on segment 20.1 which crosses Lemon Creek at the upper end of the stream.

Alternative 4 would have a total of 1.6 miles of trails crossing through all RHCA Categories (Table 36).

With this alternative there would be no measurable effect to RHCA condition based on the number of RHCA Category 1 and 2 stream crossings and along with mitigation through BMPs and sustainable trail design features and would not exceed management direction for pools per mile, riparian shade, and percent stable banks and not exceed management direction for state water quality standards.

**Alternative 5**

Under Alternative 5, 11 trail segments cross Lemon Creek (Table 36). Category 1 RHCAs stream crossings occur on segment 4.2, segment 22.3 (three crossings), and segment 22.4, all of which cross Lemon Creek at the lower end of the stream. Category 2 RHCAs stream crossings occur on segment 20.1, segment 21 (two crossings), and segment 22 which cross Lemon Creek at the upper end of the stream. Alternative 5 would have a total of 4.1 miles of trails crossing through all RHCA Categories (Table 36).

With this alternative there would be a nominal effect to RHCA condition through the potential of increased sediment delivery to the stream network based on the number of stream crossings with this alternative; however, mitigation through BMPs and sustainable trail design features would not exceed

management direction for pools per mile, riparian shade, and percent stable banks and not exceed management direction for state water quality standards.

**Alternative 6**

Under Alternative 6, five trail segments cross Lemon Creek (Table 36). Category 1 RHCAs stream crossings occur on segment 4.2 which crosses Lemon Creek at the lower end of the stream. Category 2 RHCAs stream crossings occur on segment 20.1, segment 21 (two crossings), and segment 22 which cross Lemon Creek at the upper end of the stream. Alternative 6 would have a total of 2.3 miles of trails crossing through all RHCA Categories (Table 36).

With this alternative there would be no measurable effect to RHCA condition based on the number of RHCA Category 1 and 2 stream crossings and along with mitigation through BMPs and sustainable trail design features; the project would not create effects exceeding management direction for pools per mile, riparian shade, and percent stable banks and not exceed management direction for state water quality standards.

**Cumulative Effects**

The spatial boundary for cumulative effects is the Mill Creek watershed (HUC10-1707030503). Ongoing and reasonably foreseeable future projects in the cumulative effects analysis area includes seasonal livestock grazing and the Mill Creek Dry Forest Restoration Project including thinning, fuels treatment, the placement of large woody debris into Lemon Creek as well as pool habitat improvement. The addition of large woody debris to the stream network along with floodplain reconnection through the variety of stream restoration actions will enable more natural and effective processing of sediment that reaches the stream system.

The Mill Creek Dry Forest Restoration project also proposes to decommission approximately 1.2 miles of road segments within the Lemon Creek drainage, which would remove these sections as part of the road system that act as part of the drainage network that contributes to sediment delivery to streams. A long-beneficial effect is anticipated from this work.

Therefore, the combined effect of the proposed action alternatives from the Lemon Gulch Trails project, with these current and reasonably foreseeable actions there would be no detrimental cumulative effects to the Mill Creek watershed that would exceed management direction for RHCAs in the Ochoco Forest Plan.

Alternatives 2 through 6 were designed to minimize impacts to RHCAs while allowing for multiple use principles and designed to comply with the Forest Plan, the Clean Water Act, and Oregon State water quality standards through the use of specific design features (e.g. use of industry-accepted sustainable trails design features) and BMPs. The project as designed would have no effect on current watershed condition ratings.

### *Aquatic Species*

The Ochoco National Forest and Crooked River National Grassland Land and Resource Management Plan, 1989, as amended calls for analysis for effects to Management Indicator Species (MIS) across the Forest. Fish species identified as Management Indicator Species (MIS) for the Ochoco National Forest in the Final Environmental Impact Statement for the Forest Plan are rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*). In the past, these fish have been stocked by the Oregon Department of Fish and Wildlife. They are no longer stocked in the streams in the Territory but may naturally reproduce in many streams (Classes I and II). Neither of these trout species are present in the project area.

For purposes of this analysis, Redband trout are analyzed as a surrogate for MIS fish species (Rife 2011) because effects to Redband trout are considered the same as effects to brook trout (Rife 2011). Effects to Redband trout are included in the USFS Pacific Northwest (Region 6) Sensitive Species section of this analysis.

Limiting factors and threats for Redband trout are similar throughout their range on the Ochoco National Forest and Crooked River National Grassland. The predominate threats are increases in stream temperature due to channel degradation due to riparian area management issues and population fragmentation from upstream passage issues mostly related to culverts at road/stream crossings and a lack of summer stream flows.

Causal factors include legacy impacts from past heavy grazing, logging and road building in the 20th century. In most cases channels are currently recovering from these impacts, especially grazing and logging; however, road building issues that constricted floodplains continue to cause impacts to fish habitat. Road crossings on the Ochoco are being replaced on a yearly basis with over 60 culverts either removed or replaced in the last 16 years. This has increased the ability of Redband trout to move freely within and between watersheds.

Based on local science from Stuart et al. (1996) and the estimated habitats from the Inter-Columbia Basin Management Plan there appears to be appropriate habitat that is well distributed and available for Redband trout across the Ochoco National Forest. In conclusion, the viability assessment indicates that habitat of the Redband trout is still available in adequate amounts, distribution, and quality to maintain Redband trout viability on the Ochoco National Forest and Crooked River National Grassland. Based on the hydrology analysis, the project would not affect the viability of Redband trout within this watershed or across the Ochoco National Forest.

**Biological Evaluation for Threatened, Endangered, and Sensitive (TES) Species**

This Biological Evaluation (BE) documents the review and findings of the Forest Service planned programs and activities for possible effects on species (1) listed or proposed for listing by the USDI Fish and Wildlife Service (USFWS) as Threatened or Endangered; or (2) designated by the Pacific Northwest Regional Forester as Sensitive; or (3) required consultation with the National Marine Fisheries Service (NMFS) under the Magnuson-Stevens Fishery Conservation Act (MSA). It is prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4, and the Endangered Species Act of 1973, as amended (ESA) (Subpart B; 402.12, Section 7 Consultation).

The following analysis addresses the potential effects of recreation trails construction on threatened, endangered, and sensitive aquatic species. This determination, required by the Interagency Cooperation Regulations (Federal Register, January 4, 1978), ensures compliance with the ESA. Changes to the R-6 Regional Forester's Sensitive Species List were instituted in 2019 (USDA Forest Service 2019). Table 37 displays the species considered, their status and occurrence, as well as the effects determination summary.

Table 37: Threatened, endangered and sensitive (TES) species considered in the analysis of the project including effects determination.

| Species | Scientific Name | Status | Occurrence | Effects Determination |
|---|---|---|---|---|
| Bull Trout | *Salvelinus confluentes* | T | HN | NE |
| Mid-Columbia Steelhead Trout | *Oncorhynchus mykiss* ssp. | T | HN | NE |
| Interior Redband Trout | *Oncorhynchus mykiss gairdneri* | S | D | MIIH |
| Columbia Spotted Frog | *Rana luteiventris* | S | D | MIIH |
| Western Ridged Mussel | *Gonidea angulate* | S | HN | NI |
| Shortface Lanx | *Fisherola nuttalli* | S | HN | NI |
| Harney Basin Duskysnail | *Colligyrus depressus* | S | HN | NI |

| Species | Scientific Name | Status | Occurrence | Effects Determination |
|---|---|---|---|---|
| Dalles Mountainsnail | *Oreohelix variabilis* | S | HN | NI |
| Fir pinwheel | *Radiodiscus abietum* | S | HN | NI |

Table 37 Key:

**Status**

| | |
|---|---|
| E | Federally Endangered |
| T | Federally Threatened |
| S | Sensitive species from Regional Forester's list |
| C | Candidate species under Endangered Species Act |
| P | Proposed Critical Habitat |
| Ex | Experimental Population |

**Occurrence**

| | |
|---|---|
| HD | **Habitat Documented** or suspected within the project area or near enough to be impacted by project activities |
| HN | **Habitat Not** within the project area or affected by its activities |
| D | Species **Documented** in general vicinity of project activities |
| S | Species **Suspected** in general vicinity of project activities |
| N | Species **Not documented** and not suspected in general vicinity of project activities |

**Effects Determinations**

Threatened and Endangered Species

| | |
|---|---|
| NE | No Effect |
| NLAA | May Effect, Not Likely to Adversely Affect |
| LAA | May Effect, Likely to Adversely Affect |
| BE | Beneficial Effect |

Sensitive Species

| | |
|---|---|
| NI | No Impact |
| MIIH | May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species |
| 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 |

Mid-Columbia Steelhead Experimental Population

| | |
|---|---|
| NAE | No Adverse Effect |
| AE | Adverse Effect on Essential Fish Habitat |

### *Environmental Consequences - Redband Trout and Columbia Spotted Frog*

#### Alternative 1

Under Alternative 1, there would be 'No Impact' to the USFS Region 6 Sensitive species Redband trout and Columbia spotted frog and their habitat because there would be no direct actions taken. Alternative 1 serves as a baseline for comparison of the effects of all of the alternatives. Routine activities such as road maintenance and suppression of unplanned fires would continue. Activities authorized under separate decisions would also continue, including livestock grazing, noxious weed treatments, recreational use of the area, including camping, hunting and fishing and motorized and non-motorized use. Because of poor water quality and habitat conditions, Redband trout and Columbia spotted frogs would continue to have

depressed growth rates, depressed spawning and rearing survival rates, and depressed population densities at the project and Forest-scale (ODFW 1996, Rife 2011, and Stuart et al. 1996).

**Effects Common to All Action Alternatives**

We looked at the potential for effects to fish passage, sediment input and pool quality, and stream shade. Based on the following, we determined there will be no effect to the aquatic system that would result in adverse effects to Redband trout or Columbia spotted frog.

*Fish Passage* – Trails will not create barriers to fish passage. Adherence to Best Management Practices and resource protection measures will ensure that all trail crossings allow for adequate fish passage so that aquatic organisms can migrate throughout the watershed. Specific project design for trail building includes providing features such as spans, puncheons with drains, buried culverts, rocked fords, raised treads, and stone pitching.

*Sediment Input and Pool Quality* – Trail construction at stream crossings could result in a minor amount of sedimentation during implementation. However, following resource protection measures will reduce or eliminate the potential for sediment inputs to the stream system. Specific resource protection measures include identifying stable locations for crossings, including drain dips and outsloped treads for drainage, and avoiding work during times of excessive moisture. In the long-term, trail inspections and regular maintenance would prevent major erosion, and the trails within the RHCA are expected to be stable.

*Stream Shade* – Trail building will not require removal of larger trees or patches of vegetation that provide shade to stream channels; therefore there will be no measurable effect to shade and therefore no effect to stream temperature.

*Cumulative Effects* – The Mill Creek Dry Forest Restoration Project will include thinning and riparian restoration activities in the RHCAs of the Mill Creek watershed, including the Lemon Creek drainage where trails would be built. The EA for the Mill Creek Dry Forest Restoration Project anticipates long-term beneficial effects in the watershed from increased hardwood growth, reduced sedimentation, and improved pool quantity and quality. Because the minor potential for fine sediment input from trail building would be reduced or eliminated due to resource protection measures, there would be no cumulative impact with seasonal livestock grazing or the beneficial impacts of riparian restoration activities in the Mill Creek Dry Forest Restoration Project. Additionally, the addition of large woody debris to the stream network along with floodplain reconnection through the variety of stream restoration actions will enable more natural and effective processing of any sediment that reaches the stream system.

**Determination**

Alternatives 2 – 6 “May Impact Individuals or their Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species” for Redband trout and Columbia spotted frog (Forest Service R6 Sensitive Species).

Limiting factors and threats for Redband trout are similar throughout their range on the Ochoco National Forest and Crooked River National Grassland. The predominate threats are increases in stream temperature due to channel degradation due to riparian area management issues and population fragmentation from upstream passage issues mostly related to culverts at stream crossings. The project will not change the baseline conditions for Redband trout in regard to subpopulation size and characteristics.

Based on the estimated habitats from the Inter Columbia Basin Management Plan there appears to be appropriate habitat that is well distributed and available for Redband trout across the Ochoco National Forest. In conclusion, the viability assessment indicates that habitat of the Redband trout is still available in adequate amounts, distribution, and quality to maintain Redband trout viability on the Ochoco National Forest and Crooked River National Grassland.

Given the project design and mitigations and the positive change in site specific locations from the existing condition (especially relative to the scale of the Forest or overall subwatersheds included in this

project), the continued viability of Redband trout is expected to occur on the Ochoco National Forest. In conclusion, the project may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species for Redband trout or Columbia Spotted Frog.

---

## Botany

This Biological Evaluation (BE) discusses the existing condition and analyzes the effects of the proposed action and Alternatives on sensitive plants within the project area. This report outlines the steps of the BE conducted for plant species that are currently identified as sensitive by the R6 Regional Forester of the Pacific Northwest Region, collectively called Threatened Endangered and Sensitive (TES) species, within the project area, and provides rationale for the determination of effects. This BE analyzes sensitive plant species that are documented or suspected to occur within the project area. Furthermore, only those species which may possibly be directly, indirectly, or cumulatively affected by the proposed actions are considered. Species that are not suspected to occur within the analysis area, or are eliminated from consideration due to other factors, are not described and are not considered in the detailed effects analysis [as per 40 CFR 1500.4, 40 CFR 1500.1(b)]. However, information on these species is available at the district office of the Ochoco National Forest (OCH), upon request.

Sensitive plants are to be managed with standards and guidelines to ensure population viability and prevent downward trends that would lead toward federal listing (USDA, FSM 2672.1, 1995). The desired future condition for sensitive plant species analyzed in this report is to ultimately remove them from the US Fish &Wildlife Service Species of Concern List, and from the Regional Forester's Sensitive Species List (USDA, 2019). Ensuring that the species are well distributed with viable, increasing populations within the OCH can contribute to this effort.

### *Methodology*

There are three steps in a plant biological evaluation which fulfill the requirements dictated by FSM (2672.4): pre-field review, field reconnaissance, and analysis of effects. A pre-field review is used to determine the probability that TES species or their respective habitats are located within or adjacent to the project area; to determine the extent and intensity of previous survey efforts; and determine the need and intensity of field surveys.

**Pre-field Review**

Each area to be affected by management actions is investigated for sensitive plant habitat and previously documented populations in the pre-field review. The following sources were consulted to determine whether potential habitat and known populations exist: Regional Forester's R6 Sensitive Species List (February, 2019); Oregon Biodiversity Information Center (ORBIC) Rare, Threatened and Endangered Species of Oregon (July, 2019); The Forest Service's Geographic Information System (GIS) corporate database: Natural Resource Manager (NRM)-Natural Resources Invasive Species-Threatened, Endangered, and Sensitive Plants-Invasive Species (NRIS-TESP-IS); existing vegetation maps-Plant Association Groups (PAG) and Potential Natural Vegetation (PNV) spatial data layers; existing Ochoco fen layer; the US Fish & Wildlife Service's National Wetland Inventory (NWI) layer; Species Fact Sheets provided by the Interagency Special Status Sensitive Species Program (ISSSSP) website (http://www.fs.fed.us/r6/sfpnw/issssp/) of the Pacific Northwest Region; USFS District botany records, and knowledge provided by individuals familiar with the area.

**Field Reconnaissance**

The purpose of field reconnaissance is to conduct sensitive and rare plant surveys within the affected area, produce accurate sensitive plant habitat maps, and determine the extent and condition of any TES species that are encountered. The Ochoco National Forest/CRNG Strategic and Sensitive Plant Species List can be found in Appendix A of the Botany Report along with each species habitat description, probability of

occurrence, and rationale. Areas identified in the pre-field analysis as having potential sensitive plant habitat were the primary focus of the surveys and generally included the following: riparian areas/meadows/wetlands/springs/fens; upland forest; juniper woodland/sagebrush-steppe/scablands; and rock cliffs. Surveys were conducted according to standardized procedures with varying degrees of survey intensity: general, intuitive controlled, or incidental, depending on the quality of the habitat. Field reconnaissance was completed in the summers (May-October) of 2020-2021. Surveys revealed no R6 sensitive plant species present in suitable habitat.

**Information Sources**

The sensitive riparian plant habitat map used for analysis consists of a combination of wet/dry meadows, shrub and forb wetlands, deciduous hardwood communities, Groundwater Dependent Ecosystems (GDEs), fens/springs from the PNV layer, PAG layer, Riparian Habitat Conservation Areas (RHCAs) layer, NWI wetland layer, fen layer, and NRIS-TESP.

### *Affected Environment*

There are no known occurrences of federally listed endangered or threatened plants within the Lemon Gulch Trails Project Area. The OCH has no habitat recognized as essential for listed or proposed plant species recovery under the ESA. There are 47 sensitive species on the 2019 Regional Forester's Sensitive Species List that are known or suspected to occur on the OCH (Appendix A of Botany Report). Based on occurrence records and habitat information, each species listed was ranked with a probability of occurrence as high, moderate, or low. Species were ranked with a high probability of occurrence if there was a documented population within the project area; moderate probability of occurrence if habitat is present and the species may occur on the OCH; and a low probability if habitat is not present within the analysis area or species are not suspected to occur in the project area. Of the 47 sensitive species, 8 have suitable habitat within the project area, although none were found.

Analysis of effects is bounded in space by the project area boundary. Being rooted in the ground, most effects to sensitive plants take place where project actions overlap with habitat or populations. Many sensitive plant species may be rare due to dispersal limitations or rare habitat and maintaining viable populations at the watershed level helps contribute to viability across the range of the species. Analysis of effects is bounded in time by 20 years into the future.

Table 38: Summary of the resource indicators and measures used to quantify effects.

| Resource Indicator | Measure | Source (Forest Plan, law, policy, etc.) |
|---|---|---|
| Sensitive Riparian/wet meadow/GDE Plants or Habitats | Acres of habitat affected. Minimal potential for measurable effects. Addressed with mitigations. | FSM 2670 |
| Sensitive Upland Forest Plants or Habitats | Acres of habitat affected. Minimal potential for measurable effects. Addressed with mitigations. | FSM 2670 |
| Sensitive Juniper woodland/ Sagebrush Steppe/Scabland Plants or Habitats | Acres of habitat affected. Minimal potential for measurable effects. Addressed with mitigations. | FSM 2670 |

### *Existing Condition*

**Riparian Habitats/Wet Meadows/GDE**

Riparian habitats in the project area include RHCAs, deciduous hardwoods, wet meadows, and GDEs. Past management in the analysis area, including timber harvest, a century of historic livestock use, the lack of beavers in riparian systems, stream channeling, fire suppression, wildfires, and road construction, have resulted in areas of degraded riparian conditions, shifting hydrologic regimes, altering competitive advantages between species, and changing canopy closure. The 1964 flood and subsequent channelization, along with the previous events, altered the fluvial landforms within valley bottoms. This caused a change in potential vegetation types within riparian areas, and the amount of sedge-dominated, mesic meadow, and woody deciduous vegetation has significantly reduced while conifer encroachment has increased. Many stream channels have widened and incised, thus losing floodplain area and the associated vegetation that depends on wet conditions. Stream banks have become exposed from the loss of soil holding root masses provided by willows and sedges. As stream channel morphology has changed and degraded over time, some habitat has already been compromised.

Riparian plant communities in the project area have also been altered by non-native plants, including smooth brome (*Bromus inermis*), orchard grass (*Dactylis glomerata*), Kentucky bluegrass (*Poa pratensis*), and oxeye daisy (*Leucanthemum vulgare*). Oxeye daisy is a perennial herbaceous invasive plant with shallow, branched rhizomes and adventitious roots that aggressively invades fields, meadows, overgrazed pastures, waste areas, and roadsides where it forms dense populations and decreases native plant diversity. Canada thistle (*Cirsium arvense*) is an invasive plant of concern because it readily establishes in riparian zones and could form large patches of rhizomatous growth. Treatment and control options for these species are limited due to the rhizomatous growth form, proximity to water, and the large extent of infestations. The annual invasive grass, North Africa grass (*Ventenata dubia)*, is also present along some roadways and intermittent streams. Other non-native invasive plants are present in the project area outside of riparian areas. These plants are discussed further in the Non-Native Invasive Plants and Risk Assessment portion of this report.

**Species Associated with Riparian Habitat**

*Calochortus longebarbatus* S. Watson *var. peckii* Ownbey Pecks Mariposa Lily
Natural Heritage Program: G4T3/S3; ORBIC: List 1; R-6 Sensitive Species List 1

Peck's mariposa lily is a restricted local endemic, known only from the blue mountains of central and eastern Oregon. It is currently on the ORBIC 2019 List 1, meaning this taxon is threatened with extinction throughout its range. There are approximately 3404 acres of Peck's mariposa lily throughout its range, with 2,964ac. mapped acres on the OCH, 290 ac. on the Malheur National Forest, and 150ac. Prineville Bureau of Land Management (BLM), although none occur in the project area. Peck's mariposa lily reproduces through asexual reproduction of bulblets that form at the base of the plant and are presumably dispersed downstream (Dewey 2011). Moisture levels determine the level of flowering within the population and there is significant variation in phenology from year to year which makes inventory and monitoring of the species difficult (Fredricks 1989).

The primary habitat of this species is open meadows and partially shaded to open riparian edges along seasonal and perennial streams in stringer forests. These habitats have been altered in several ways over the last 150 years including: Effects of road construction; stream down-cutting and disconnection from floodplains; lowered water tables; reduced water storage in floodplains and meadows; soil compaction and displacement; direct destruction of plants from heavy equipment and grazing; livestock hoof action; camping; increased conifer tree density in riparian areas; decreased stream discharge due to interception by dense conifers; changes in plant composition due to overgrazing of riparian vegetation; seeding of exotic grasses for soil retention and forage; and displacement of native riparian species by non-native and invasive plants. The Conservation Strategy for *C. longebartus* var *peckii* (Dewey 2011) recommends maintaining or improving riparian habitats to address the habitat needs, along with later-season grazing to

protect plants from grazing and trampling. Long-term drought associated with climate change is also a threat. Dewey (2011) notes that the species is highly sensitive to shifts in moisture and appears to have moisture requirements, thus lack of water may have and vast impact on populations compared to other plants. Conversely, the drying of wet meadows/RHCAs resulting from habitat alteration may have contributed to an expansion of moderately moist conditions suitable for Peck's mariposa lily. Drought and dewatering can favor invasive plants and trigger shifts in the species composition of plant communities as well.

*Rorippa columbiae Columbia cress*

Natural Heritage Program G3/S3; ORBIC: List 1; R-6 Sensitive Species List

Columbia cress is a perennial forb growing prostrate and can be found in moist to wet, sandy habitat types including playas and dry lakebeds. There are no documented occurrences on the OCH, but habitat is present in the analysis area.

**Upland Forest Habitat**

The most common upland forest plant associations include Moist Grand fir, Dry Grand fir, Douglas fir, Mesic Ponderosa Pine, and Dry Ponderosa Pine. While often associated with riparian areas, small aspen stands are also scattered in moister upland sites. Upland forest habitat constitutes most of the proposed trail area and has not been mapped separately as a sensitive plant habitat, as upland forest is a broad category that includes large areas that are likely not suitable for sensitive plant species. There are no habitat models and limited occurrence records that could inform a more accurate approach to identifying sensitive upland forest plant habitat.

Upland forest habitat has been influenced by human activities and associated impacts over the last 150 years including: logging, road building, livestock grazing, fire suppression, recreation, and non-native invasive plant infestation. Grazing, and particularly, fire suppression, have altered the species composition and tree density of upland forests, resulting in increased density of fire intolerant conifers such as grand fir and Douglas-fir and reduced density of understory vegetation (Arno 2000). Habitat for many plant species adapted to frequent, low severity surface fire has been degraded due to fire suppression and succession to higher density forest. Upland forest has also been negatively impacted by roads, recreation, and non-native invasive plant infestations. Roads and trails alter runoff patterns, can contribute to soil erosion, interrupt, and fragment the continuity of native plant communities, and provide corridors for non-native invasive plant introduction and spread. To support past timber harvest activities, many roads were in upland forest habitat and many of these roads remain on the landscape as open system roads.

**Species Associated with Upland Forest Habitat**

*Astragalus tegetarioides* Bastard milkvetch

Natural Heritage Program: G3/S3; ORBIC: List 1; R-6 Sensitive Species List

Astragalus tegetarioides is associated with upland forest habitats and does not occur in the project area but has habitat present. It occurs in openings, swales, and canyon bottoms in ponderosa pine forests and open stands of juniper with low and big sagebrush. There is one 14.2ac documented population on the OCH outside of the project area and is the northernmost documented population in its range which is primarily the John Day drainage. On the Malheur National Forest, this species occurs in generally open mountain sagebrush flats or large 'swales' within a continuous PIPO/FEID matrix, where the soil is clay but not rocky. It can also occur on compacted, gravely or clay surfaces, usually linear in nature such as native surface roads (active or closed), and less commonly game and cattle trails.

**Juniper Woodland/Sagebrush Steppe/Scabland Habitat**

Scablands are one of the few sensitive plant habitats recognized with specific direction in the Ochoco Forest Plan. Both the OCH Land and Resource Management Plan (USFS 1989a) and Forest Plan emphasize protection and provide direction regarding scablands including minimizing disturbance, as

mitigation and revegetation are nearly impossible (USFS 1989a). Scabland habitat is characterized by composed of heavy clay to gravely soils, usually shallow and sparsely vegetated. Plant lithosols communities are often composed of soil biocrusts of mosses and lichens, as well as rigid or low sage, (Artemesia rigida, and Artemesia arbuscula) Sandburg's bluegrass (Poa secunda) and one-spike oatgrass (Danthonia unispicata), although the gravelly soils are frequently bare. Scablands are commonly found on topographic high ground and are particularly subjected to summer heat and dryness. During winter and early spring, the shallow scabland soils are subject to severe water saturation and frost heaving. Only plant species tolerant to the harsh environment can grow on scablands. In some cases, endemic plant species have adapted to scablands and their habitat is largely confined to scabland. Soil biocrusts are known to be a key component of these arid scabland habitats because they retain soil moisture, release nutrients, prevent sedimentation and erosion, and impede invasion of annual grasses (Belnap et al. 2001, 2006, Deines 2007).

Scabland habitat has been degraded primarily by logging operations, road building, localized disturbances such as mineral sources, fire suppression, livestock grazing, loss of soil biocrust, and especially by exotic annual grasses such as Japanese brome and similar invasive annual brome species, medusahead, and ventenata. Ventenata has formed large, nearly monocultural stands on some scablands on the OCH, while other scablands have scattered or patchy ventenata populations or are free of infestations. Scablands have been used as landing piles for past logging operations, scraped for rock for road construction and roads built through them, and some accidently plowed while completing wildland fire operations, all of which have left long-lasting impacts. Grazing in this habitat has also resulted in degradation including the loss of soil biocrust, soil erosion, increased susceptibility to non-native invasive annual grasses, and hoof action in wet soils.

It is believed that fire was not a fundamental process historically in scablands, as they have very little in the way of fuels capable of carrying wildfire. Scablands may have functioned as natural fuel breaks, influencing the disturbance patch size and burn patterns on the landscape. There is growing concern that scablands with high density of invasive annual grasses could contribute to the spread of uncharacteristic wildfire. Both the high density of these species and the higher burn severity could be very detrimental to sensitive scabland plant species.

**Species Associated with Juniper Woodland/Sagebrush Steppe/Scabland Habitat**

***Achnatherum hendersonii Vasey*** Henderson's ricegrass
Natural Heritage Program: G3S2; ORBIC: List 1; R-6 Sensitive Species List; ODA-Candidate
***Achnatherum wallowaensis Maze & K.A.Robson*** Wallowa ricegrass
Natural Heritage Program: G2G3S2S3; ORBIC: List 1; R-6 Sensitive Species List

Henderson's ricegrass and Wallowa ricegrass were split from one former species *Oryzopsis hendersonii* and named *Achnatherum hendersonii* and *Achnatherum wallowensis*, which are now described as needlegrasses (Maze and Robson 1996). These perennial grasses are regional endemic species and considered threatened with extinction throughout their entire range. They are found on exclusively in central and north-central Oregon scablands (Dewey 2013). There are 47 *Achnatherum hendersonii* sites and 9 *Achnatherum wallowaensis* sites documented on the OCH. Both have habitat in the project area, but do not have documented sites within it. Non-native invasive annual grasses such as ventenata and medusahead rye are considered the biggest threat to maintaining viable populations of these sensitive needlegrasses, followed by livestock grazing. Recent studies have shown that soil bio-crusts inhibit the invasion of annual grasses (Belnap et al. 2001, 2006) and that physical disturbances, including trampling by livestock damage delicate bio-crusts, and recovery is slow (Belnap et al. 2001; Warren 2001; 2013).

*Eriogonum cusickii M.E. Jones* Cusick's buckwheat
Natural Heritage Program: G2S2; ORBIC: List 1; R-6 Sensitive Species List; ODA-Candidate

Cusick's buckwheat has been documented in Harney and Lake Counties and can be found in sagebrush scablands, sandy volcanic flats, and mixed grasslands. There is uncertainty whether this taxon occurs in

Central Oregon; as these collections may have been misidentified (R. Halvorson, pers. comm. 2008). There are no known occurrences within the OCH, but habitat is present in the project area.

**Rock Cliff Habitat**

Rock cliff habitat and other rock formations may be found throughout the project area. Generally, rock cliff habitat has been well-protected from past management activity and are generally in good condition. Threats include severe wildfire that could scorch or burn sensitive plants and habitat, although fire behavior could be moderated by the cooling mass of the rock, or cliffs may be perched above flames. The area around cliffs/outcrops often burned very hot in the Desolation Fire (2017) and Hash Rock Fire (2000) due to the larger accumulations of dead and down trees and shrubby vegetation.

**Species Associated with Rock Cliff Habitat**

*Tortula mucronifolia* Schwagr. mucronate screw moss
Natural Heritage Program: G5/S2; ORBIC List 2; R-6 Sensitive Species

Mucronate screw moss has been documented in Southwest Oregon and in two sites in eastern Oregon (Christy 2006). It forms on small turfs or cushions on soil, tree roots, and sheltered ledges and crevices of rock outcrops and cliffs ranging from 5000-7000ft. It is distributed widely across North America. The closest known site is located on the Malheur National Forest. There are no documented occurrences on the OCH, but habitat is present in the project area. Largest threats include livestock bedding and trampling as well as quarrying and road construction.

*Tritomaria exsecta,* liverwort
Natural Heritage Program: G5/S1; ORBIC List 2; R-6 Sensitive Species

Tritomaria exsecta can be found in mesic to somewhat xeric wooded habitats from 0-6500ft. on humic soil over rock, or in rock crevices, rotten wood, and tree trunks. There are no documented occurrences on the OCH, but habitat is present.

### *Environmental Consequences*

**Riparian/Wet Meadows/GDE, Upland Forest, Juniper/Sagebrush Steppe/Scabland, & Rock Cliff Habitats**

**Direct and Indirect Effects**

**Alternative 1**

No disturbances from land clearing and trail building would occur under the no action alternative, leaving suitable habitat for potential sensitive plants unchanged. Other recurring management activities, including livestock grazing, fire suppression, treatment of non-native invasive plants using chemical, manual, or biological controls, and public recreational use would continue.

**Alternatives 2, 3, 4, 5, 6**

The disturbances from trail building and land clearing activities for trailheads and parking including soil displacement, soil compaction, and erosion will have short-term impacts (1-5yrs) to any unknown sensitive plant species and habitat. Some of these actions can render habitat unsuitable or change hydrologic patterns in riparian habitat thus resulting in potentially occupied microsites becoming too wet or too dry as well as burying small unknown plants in soil or sediment deposits. Areas of exposed soil resulting from these activities also increase the potential for further non-native invasive plant introduction and spread, with particular concern to fragile scabland habitat. Rock cliff habitat is generally protected from management actions and has not experienced the extensive modification that other sensitive plant habitats have undergone due to the inaccessibility and/or inoperable ground, therefore the effects are limited in scope and scale.

**Cumulative Effects**

The cumulative effects of past management are reflected in the discussion of Existing Condition, and the above effects analysis with respect to various proposed activities. Present and foreseeable actions impacting riparian areas, upland forest, scabland habitat, and rock cliff habitat in the Lemon gulch trails project include livestock grazing, the Mill Creek dry forest restoration project, public uses such as recreation, dispersed camping, firewood gathering, OHV use, road maintenance, and non-native invasive plant treatments.

In most areas where Lemon Gulch trails activities would have impacts on sensitive plant habitat, livestock grazing would also be occurring. The combination of livestock impacts, which include trampling, utilization of native plants, and habitat degradation due to hoof impacts along stream banks and moist areas as well as scabland areas, would overlap with the disturbances and impacts from trail building and land clearing.

While many past management activities contributed to a departure from historic conditions and ecological processes, such as loss of frequent, low severity wildfire and periodic flooding in meadows connected to stream channels and higher water tables, current and foreseeable management (vegetation, fuels, and aquatic restoration) actions have been primarily designed to restore these processes to some extent and again, overlap with the proposed ground disturbing activities.

Non-native invasive plant treatments outside the road corridors within the project area have been minimal within the last 5 years, but existing infestations of priority weed species would be treated as appropriate through chemical herbicide application and/or manual treatment in advance of project activities. Soil displacement, compaction, and erosion effects have short-term negative effects associated with ground disturbance and removal of native vegetation and the potential longer-term negative effects associated with slow recovery of disturbance on scabland and increased vulnerability to infestation by non-native invasive plant species, with particular concern to invasive annual grasses.

### *Effects Determination*

The determination for Alt 1 is No Impact (NI) for sensitive plant species Calochortus longebartus var peckii,,Rorippa columbiae, Astragalus tegetarioides, Achnatherum hendersonii, Achnatherum wallowaensis, Eriogonum cusickii, Tortula mucronifolia, and Tritomaria exsecta. Under Alt 1, there would be no proposed activities negatively impacting potential sensitive plant habitat. The determination for Alts. 2, 3, 4 and 5 is May Impact Individuals or Habitat, but not likely to result in loss of viability or a trend toward federal listing (MIIH) for all sensitive plant species. Under all action Alts, proposed trail building may negatively impact unknown sensitive plant populations and habitat. Alt 2 would have the most detrimental effects due to the most acres of ground disturbing activities, followed by Alt 5, Alt 3, and lastly Alt 4 with the least amount of ground disturbance. Most of the effects are limited in scale and time to local effects that would decrease over 3-5yrs. See Table 39.

**Summary of Environmental Effects to Sensitive Plant Species by Alternative**

Table 39: These determinations that all the elements in the proposed action are implemented, and design criteria and proper coordination at implementation is completed.

| Species | Alternative 1 | Alternatives 2, 3, 4, 5, 6 |
|---|---|---|
| *Achnatherum hendersonii* Henderson's needlegrass | NI | MIIH |
| *Achnatherum wallowaensis* Wallowa needlegrass | NI | MIIH |
| *Astragalus tegetarioides* bastard kentrophtya | NI | MIIH |

| Species | Alternative 1 | Alternatives 2, 3, 4, 5, 6 |
|---|---|---|
| *Calochortus longebarbatus* var. *peckii* Peck's mariposa lily | NI | MIIH |
| *Eriogonum cusickii* Cusick's buckwheat | NI | MIIH |
| *Rorippa columbiae* Columbia yellowcress | NI | MIIH |
| *Tortula mucronifolia* sharp tipped moss | NI | MIIH |
| *Tritomaria exsecta* liverwort | NI | MIIH |

NI = No impact; MIIH = May impact individuals or habitat but will not likely contribute to a trend towards federal listing or a loss of viability to the population or species; BI = Beneficial impact; WIFV* = Will impact individuals or habitat with a consequence that the action may contribute to a trend toward federal listing or cause a loss of viability to the population or species; *Trigger for a significant action as defined in NEPA.

---

## Invasive Plants

### *Introduction*

Non-native invasive plants are species that can spread into natural habitats where they can alter plant communities by displacing native species. Non-native invasive plant species are introduced into the United States from other geographic regions, so there are no native biological agents to control their populations. "Noxious weeds" are non-native invasive plants designated by state and county weed laws that are injurious to public health, agriculture, recreation, wildlife or any public or private property. In sufficient numbers, they can reduce biological diversity; increase fire risk; poison humans, wild horses, wildlife, and livestock; and reduce the quality of forage.

See Appendix B of the Botany Report for the Crook County and Ochoco National Forest Invasive Plant List. Invasive plant species included in the inventory are generally those on this list, although some C list weeds are selectively or only occasionally recorded. Other weed species on the C list or unlisted weeds that are so widespread that economic control is not feasible are typically not included in inventory or treatment programs. While not actively controlled, widespread weeds can cause substantial ecological impacts and many of these weeds have not occupied all potential sites. Therefore, prevention practices, such as annual inspection of mineral sources and equipment cleaning, designed to limit the spread of these species as well as those of higher management concern, can help limit the extent and impact of widespread non-native invasive plants.

### *Regulatory Framework*

Management of invasive plants is regulated by:

- The Federal Noxious Weed Act of 1974, as amended (7 U.S.C 2801 et seq.) requires cooperation with state, local, and other federal agencies in the application and enforcement of all laws and regulations relating to management and control of noxious weeds.
- FSM 2080 directs the Forest Service to use an integrated weed management approach to control and contain the spread of invasive plants on National Forest System (NFS) lands and from NFS lands to adjacent lands.
- Executive Order 13112 (1999) directs federal agencies to reduce the spread of invasive plants.

- In October 2004, the Chief of the Forest Service released a National Strategy and Implementation Plan for Invasive Plant Species Management-part of the President's Healthy Forest Initiative and includes preventing invasive species before they arrive; finding new infestations before they spread and become established; containing and reducing existing infestations; and rehabilitating and restoring native habitats and ecosystems.
- Invasive plant management direction contained in the LRMP of the OCH was amended by the Pacific Northwest Region Invasive Plant Program-Preventing and Managing Invasive Plants Record of Decision (ROD) (USDA Forest Service, 2005). This site-specific FEIS follows new Standards and Guidelines as outlined in the regional document. The regional ROD also releases the USDA FS from direction provided by the 1988 Environmental Impact Statement and 1988 ROD for Competing and Unwanted Vegetation, and the associated 1989 Mediated Agreement for invasive plant management. The R6 2005 ROD added goals, objectives, and standards for invasive plant management by amending the OCH LRMP (see Appendix C of the botany report).
- Local prevention measures are outlined in the "Deschutes and Ochoco National Forests and Crooked River National Grassland Invasive Plant Prevention Practices" dated January 2006 (see Appendix C of the Botany Report). The non-native invasive plant prevention practices are provided to minimize the introduction of non-native invasive plants; minimize conditions that favor the establishment or spread of invasive plants; and to facilitate the integration of invasive plant management practices into resource programs.
- Treatment of non-native invasive plants are authorized by the 2012 Ochoco and Deschutes National Forests Invasive Plant Treatments FSEIS. (USDA Forest Service 2012).

### *Methodology*

The information below is the Invasive Plant Risk Assessment and presents an analysis of the impacts of the proposed project with respect to the risk of introduction and spread of non-native invasive plants. The risk assessment is calculated based on an estimate of the amount of ground disturbance and/or exposure of soil caused by the project activity and the proximity to existing invasive plant infestations. Ground disturbance would not directly translate into additional invasive plant infestations; however, it is used as an estimate of the amount of intact vegetation that would be disturbed or removed thus leaving a site vulnerable to non-native invasive plants. Non-native invasive plants may also move into undisturbed plant communities, but this is less likely to be a result of the proposed actions. Factors including the species of non-native invasive plant, size of infestation, life history characteristics, as well as reproductive and dispersal characteristics are incorporated into the risk assessment. Effectiveness of treatment and control measures available for different invasive plant species is also considered. The results from the pre-field review, field reconnaissance, and the factors mentioned above form the rationale for analyzing effects.

**Pre-field review**

The pre-field review is used to determine where currently documented non-native invasive plant populations are located within or adjacent to the project area; to determine the extent and intensity of previous survey efforts in the project area; and determine the need and intensity of further field surveys.

**Field Reconnaissance**

The purpose of field reconnaissance is to conduct non-native invasive plant surveys within the project area and determine the extent and condition of non-native invasive plants encountered to produce occurrence maps to more properly assess risk. Areas identified in the pre-field review as having potential habitat were the primary focus of surveys. Intuitive controlled surveys were conducted according to standardized procedures. Surveys for non-native invasive plants were conducted in the Lemon Gulch Trails project area by Jennifer Carson, Susan Geer (detailed botanist) and seasonal/invasive plant staff over the course of several years, in connection with prior projects such as the 2012 Invasive Plant

Treatments EIS for the Deschutes and Ochoco National Forests and Crooked River National Grassland, and survey and revisits of known infestations in connection with the Mill Creek project during April-October of 2019-2021. Mineral material sources located within or adjacent to the project area have been inspected and treated for invasive plants annually as well. Infestations and treatments are tracked in the NRIS-Invasive Species database, the Forest Service corporate geospatial database for such records.

**Information Sources**

This analysis draws on notes and field data collected during the 2019-2021 field seasons and surveys from prior projects. Field observations and local knowledge of non-native invasive plants and their particular response to disturbance also form an important basis of this risk assessment. Formal data sources consulted include: NRM TESP-IS Database; Surveys from previous and current projects including the 2012 Invasive Plant Treatments Environmental Impact Statement (EIS) for the Deschutes and Ochoco National Forests and Crooked River National Grassland, Mill Creek Environmental Assessment (EA), surveys conducted after the Desolation fire(2017) and Hash Rock Fire(2000); and Forest Service Corporate GIS layers-FACTS (Forest Activities Database), LiDAR, and transportation/roads layers, fire history, and vegetation; and Other references (scientific literature).

### *Affected Environment*

The Lemon Gulch Trails project area contains several known populations of non-native invasive plants including those listed in Appendix D of the Botany Report and depicted in the map in Appendix E of the Botany Report. Non-native invasive plants of highest management concern are inventoried in the NRIS-IS database. The level of currently inventoried invasive plant infestation within the project area is moderate, occupying approximately 43 acres, spread across 93 locations. Most current infestations are associated with major roads and trails, roads used in prior vegetation and fuels activities, and recreation sites. These invasive plant sites range from a few individual plants to many acres of scattered plants, and some sites that have very few or no plants have been kept in the current inventory so that they can be more easily monitored.

Most effects from non-native invasive plants take place where project actions overlap with these populations; however, many non-native invasive plants are introduced and spread by a variety of vectors at the watershed level. The watershed level was considered for spatial bounding since non-native invasive plant populations can cross ownership boundaries and are often managed at a watershed scale. However, the further the distance from the project area boundary, the less effects are anticipated. Therefore, analysis of effects within the project boundary is sufficient to assess risk and effects with respect to non-native invasive plants. Analysis of effects is bounded in time by 20 years into the future. Cumulative effects are analyzed in respect to past, ongoing, and reasonably foreseeable future activities that overlap in both time and space.

**Resource Indicators and Measures**

The resource indicators and measures used to quantify effects are summarized in Table 40. The definition and applicability of each resource indicator is discussed in the respective Existing Condition section below.

Table 40: Resource indicators and measures for assessing effects to invasive plants.

| Resource Indicator | Measure | Source (Forest Plan, law, policy, etc.) |
|---|---|---|
| Ground Disturbance | Estimated acres of soil/ground disturbance | Forest Plan, as amended by 2005 and 2012 invasive plant RODs |

### *Existing Condition*

The total amount of current soil disturbance within the analysis area is unknown. Numerous past and current management activities contribute to present soil exposure and ground disturbance levels. Historic invasive plant vectors in the project area include wildlife, livestock, past timber harvest, forest fires, prescribed burning, recreation, firewood collecting, dispersed camping, OHV use, and road building activities. Wildlife and livestock grazing contribute to soil disturbance, but generally the disturbance is small in extent. Soil disturbance from past timber harvest, forest fires, and prescribed burning has largely revegetated with only localized soil disturbance remaining at prescribed burn pile areas. Larger burn piles, such as those created at landings, tend to take much longer to recover than surrounding areas. Public uses such as recreation, firewood collecting, dispersed camping, and OHV use contribute to present levels of soil disturbance and can create patches of exposed soil. Dispersed camping is often located in riparian areas and leaves riparian vegetation at higher risk of infestation by non-native invasive plants. Unauthorized OHV use and road building create disturbed soil and can connect weed infestations with the surrounding landscape, creating corridors that place native vegetation at higher risk of infestation.

All species list in Appendix D of the Botany Report along with habitats and vegetation types susceptible to these non-native invasive species have the potential to spread within the project area. Moister habitats with deeper, more developed soils are more likely habitat for Canada and bull thistle, Hounds tongue, scotch broom, whitetop, knapweeds, and ox eye daisy. Upland forest and scablands are more vulnerable to common mullein, leafy spurge, St. Johns wort, ventenata, medusahead, and cheatgrass. NFS lands adjacent to the forest boundary on the south side of the project area by the road are also more vulnerable to spread from infestations on other land ownerships, and likewise, those lands are at risk from infestations on NFS lands. The rate of spread is dependent on weather conditions as well as on the amount of disturbance resulting from natural processes and ongoing management activities including from proposed activities. Some non-native invasive plant populations in the project area have been treated effectively, either through manual or chemical herbicide methods, and have been reduced to low levels. Other populations have increased or have been recently detected in the project area. While not systematically inventoried or controlled, widespread non-native invasive plants can cause substantial ecological impacts and many of these have not occupied all potential sites in the project area. Non-native invasive plants on the C list or unlisted in the project area include bull thistle, mullein, Ventenata, teasel, ox-eye daisy, cheatgrass, and other exotic annual bromes. Where populations are a management concern, some species listed have been treated at MS so that population presence and spread can be monitored. Annual inspections and some treatments occur at all MS in the project area.

Sensitive riparian plant habitat throughout the project area has been degraded by non-native plant populations. Canada thistle and ox eye daisy are of concern because they establish in riparian zones and can form large patches of rhizomatous growth. It is likely that both are more extensive in the project area than is reflected by current inventory data, especially ox-eye daisy. Treatment and control options are limited due to the rhizomatous growth form and proximity to water. Riparian habitats in the project area also have extensive stands of non-native grasses, including timothy grass, Kentucky bluegrass, and smooth brome. These grasses typically occur in open meadows which are habitat for sensitive riparian plants and sensitive wildlife species. Non-native, rhizomatous grasses have likely increased their extent in drying riparian areas because of stream down cutting and lowered water tables. These grasses have been seeded in some areas in the past, as seeding with cultivars was a common management practice.

Sensitive scabland plant habitat in the project area has been degraded by exotic annual grasses, including Japanese brome, cheatgrass, ventenata, and medusahead. Medusahead is currently of limited extent within the project area but poses a substantial threat to this habitat, due to the following: its ability to spread rapidly; compete with native plants for early season moisture; exclude native plants with thatch build up and possibly allelopathic effects; and alter fire regimes through the production of fine fuels. These grasses green up early in the spring, use moisture and nutrients that would otherwise be available to native vegetation, and have not occupied all potential habitat within the project area, thus having more potential to spread.

### *Environmental Consequences*

The 2005 Pacific Northwest Region Invasive Plant Treatments EIS (USFS 2005) and the 2012 Deschutes and Ochoco National Forests and Crooked River National Grassland Invasive Plant EIS (USFS 2012*c*) amended the Forest Plan. Forest Plan amendments include the application of relevant invasive plant prevention measures, such as the use of weed-free rock and gravel sources and cleaning and inspection of off-road equipment. This analysis assumes the effective application of relevant non-native invasive plant prevention measures to all proposed activities.

**Alternative 1**

Under Alt 1, no proposed activities would take place, thus the risk of non-native invasive plant introduction and spread would not exist from these actions. Areas that would be disturbed by these proposed activities would remain intact, keeping invasive plant risk low. Some portions of degraded, down-cut floodplains and riparian areas have been invaded by exotic species and would remain at elevated risk for further invasion by knapweeds, ox eye daisy, and exotic rhizomatous grasses. Non-native invasive plant risk would not be eliminated under any Alternative, and risk resulting from ongoing activity is considered in the cumulative effects analysis.

**Alternatives 2, 3, 4, 5, 6**

Under all action Alts, disturbances from trail building and land clearing activities for trailheads and parking including soil displacement, soil compaction, and erosion will have potential for short and long-term increases in non-native invasive plant establishment and spread. Alt 2 would have the most detrimental effects due to the most acres of ground disturbing activities, followed by Alt 5, Alt 3, and lastly Alt 4 with the least amount of ground disturbance. Most of the effects are limited in scale and time to local effects that would decrease over 3-5yrs. Project design features include invasive plant prevention measures that reduce the introduction and spread of invasive plants (Appendix B). Even with the invasive plant prevention practices, the educational material and boot brush stations at trailheads, and the best intentions, there is always the potential for non-native invasive plant seeds remaining in the soil seedbank to be spread. Following initial trail building, there will be longer term effects of weed spread due to trail use by mountain bikes, hikers, and horse riders. Trailhead use including use by motorized vehicles will also be a factor in long-term detrimental effects of non-native invasive plant spread. This project is expected to have a reduced risk for introduction and spread of non-native invasive plants if the project design criteria are followed including the following:  minimizing disturbance within existing non-native invasive plant infestations; enduring any equipment used on site is free of soil or plant material that could introduce or spread invasive plants; and monitor and treat any new Early Detection/Rapid Response sites post-ground disturbing activity.

**Cumulative Effects**

The cumulative effects of past management are reflected in the discussion of Existing Condition, and the above effects analysis with respect to various proposed activities. Present and foreseeable actions in the Lemon gulch trails project area include livestock grazing, the Mill Creek dry forest restoration project, public uses such as recreation, dispersed camping, firewood gathering, OHV use, road maintenance, and non-native invasive plant treatments.

In most areas where Lemon Gulch trails activities would have soil displacement, soil compaction, and erosion, livestock grazing would also be occurring. The combination of livestock impacts, which include trampling, utilization of native plants, and habitat degradation due to hoof impacts along stream banks and moist areas as well as scabland areas, would overlap with the disturbances and impacts from trail building and land clearing.

Non-native invasive plant treatments outside the road corridors within the project area have been minimal within the last 5 years, but existing infestations of priority weed species would be treated as appropriate through chemical herbicide application and/or manual treatment in advance of project activities. Soil

displacement, compaction, and erosion effects have short-term negative effects associated with ground disturbance and removal of native vegetation and the potential longer-term negative effects associated with slow recovery of disturbance on scabland and increased vulnerability to infestation by non-native invasive plant species, with particular concern to invasive annual grasses.

**Summary of Environmental Effects**

All Alternatives present some level of non-native invasive plant risk, even the No Action Alternative that would have the least number of detrimental effects. All action Alts create conditions that are conducive to the introduction and spread of non-native invasive plants. Alt 2 would have the most detrimental effects due to the most acres of ground disturbing activities, followed by Alt 5, Alt 3, and lastly Alt 4 with the least amount of ground disturbance. Most of the effects are limited in scale and time to local effects that would decrease over 3-5yrs. Forest plan standards, resource protection measures, and invasive plant prevention measures would help to prevent non-native invasive plant introduction and spread under all Alternatives.

The FSM and Ochoco National Forest Land and Resource Management Plan was reviewed for the standards and guidelines for non-native invasive plant species. The project was determined to be consistent with relevant standards and guidelines.

---

## Wildfire Risk

Risk is defined by the likelihood and severity of a hazard, so increased recreators technically can increase risk. Most human-caused wildfire starts are related to camping.

Most of the project area falls within the wildland-urban interface (WUI) as defined by Crook County's Community Wildfire Protection Plan (CWPP) (Figure 29). WUI is an area within or adjacent to an at-risk community that has been identified by a community in its wildfire protection plan. The CWPP provides general recommendations to residents within the WUI such as installing fire-resistant roofs and establishing defensible space around structures. Residents are encouraged to become Firewise Communities which is a program that empowers neighbors to work together in reducing their wildfire risk. The WUI is also priority for fuels reduction work on National Forest System lands.

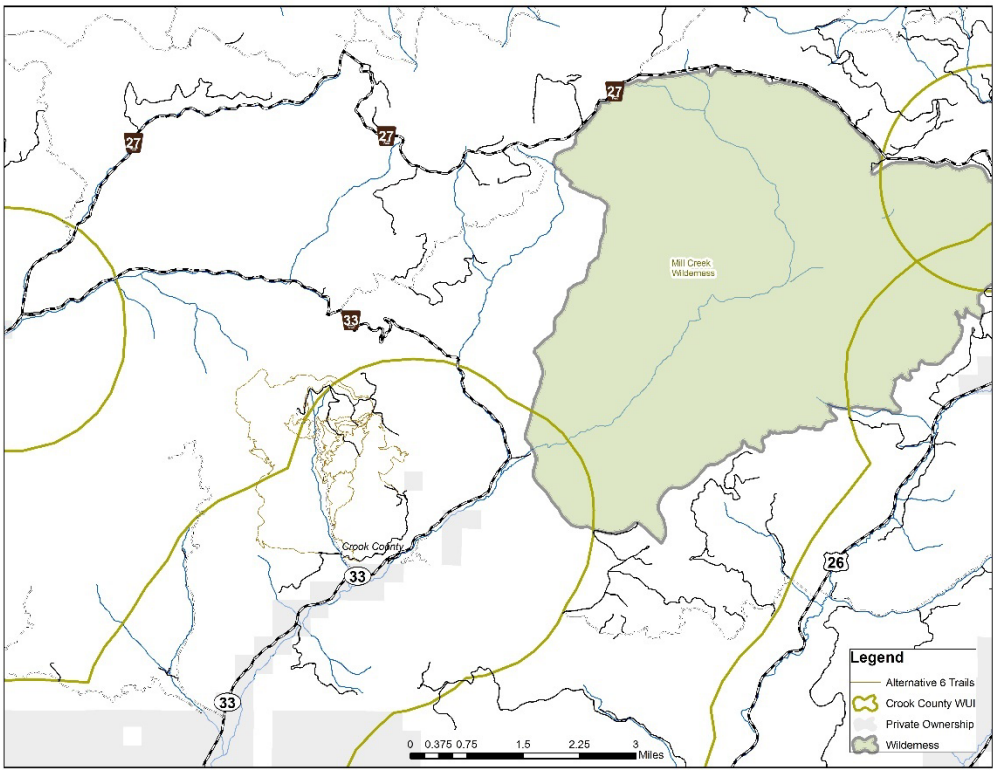



Figure 29: All but the northwest corner of the proposed trail system falls within wildland-urban interface (WUI) as defined in the Crook County Community Wildfire Protection Plan.

### *Environmental Consequences*

The FEIS for the Ochoco Forest Plan considered the potential effects of increased recreation that is called for in the Plan. The FEIS disclosed that all of the increased recreation use called for in the Plan if implemented would increase human-caused wildfire on the Forest (LRMP FEIS 4-18). Most human-caused wildfires are related to camping. Though trail users may choose to camp in the Forest either at dispersed sites or developed campgrounds, those camping opportunities are already available to and used by the public.

Fire prevention activities are used to mitigate the risks presented by humans being in the Forest. The Central Oregon Fire Management Service (COFMS) conducts a regular analysis to support wildfire prevention strategies in Central Oregon and documents this in the Central Oregon Fire Management Prevention Plan (USDA Forest Service 2019a). The project area is close to the McKay Creek Corridor Hazard Area (identified in the Prevention Plan due to high density of human-caused wildfires). A number of mitigations are in place to address the increased hazard; these mitigations fall within the categories of administration, education, engineering, and enforcement. Because of proximity to Prineville, the area has a greater concentration of visitors. Many resources are available to respond to this area through Cooperative Agreements with Crook County Fire and Rescue District, Oregon Department of Forestry, Prineville BLM, and the Forest Service. As with all recreation sites on the Forest, increased patrols and communication/education with visitors to the area are a top priority for COFMS. The Forest Service reduces the risk of a wildfire starting when fire danger is extreme by implementing public use restrictions such as banning campfires.

Increased incidence of wildfire specifically from trail users is not anticipated. Ongoing fire risk from campfires is expected to continue. Under any action alternative, the Fire Prevention, Education, and

Mitigation Plan (COFMS 2022) for the area would be updated, and prevention activities such as patrols, signage, public outreach, and education in the area would increase.

The Forest Service is currently planning landscape-scale thinning and fuels reduction activities in the project area as part of the Mill Creek Dry Forest Restoration Project. Implementation of the vegetation management is likely to occur prior to most of the trails being built. Analysis underway for that project shows that the fire risk in the area will be reduced from thinning and fuels treatments. Modeling shows a reduction in potential flame length, crown fire potential, and rate of fire spread. These changes in fire behavior potential improve initial attack of wildfire whether caused by humans or lightening. Proposed thinning, fuels reduction, and prescribed fire are expected to reduce wildfire behavior in the area, regardless of ignition source.

---

## Transportation System

### Travel Analysis

Each road in the project area was reviewed as part of the Travel Analysis for the Mill Creek Dry Forest Restoration Project which overlaps the Lemon Gulch planning area. As part of the concurrent analysis of the Mill Creek Dry Forest Restoration Project, the ID Team evaluated each road in the project area in depth and recommended road maintenance level changes where needed to meet management and restoration needs, improve forest and stream conditions, increase functional wildlife habitat, eliminate redundant roads, and update the Motor Vehicle Use Map (MVUM) to be consistent with what is on the landscape. Evaluations were completed through GIS analysis of Forest Service Corporate GIS layers and collection of field data from multiple IDT resource specialists. Proposed changes to the maintenance level on roads located in the Lemon Gulch project area are addressed in the cumulative effects analysis. No additional road maintenance level changes are being proposed as part of the Lemon Gulch Trails project.

#### Information Sources

This analysis draws heavily on notes and field data collected during the 2022 field season and professional knowledge of the project area. Discussion with timber staff, silviculturists, hydrologists, wildlife biologists, and other forest resource specialists also supplemented this work. Other formal data source consulted included Mill Creek draft EA (2022), and Forest Service Corporate GIS layers – FACTS (Forest Activities Database), INFRA, LiDAR Hillshade and Digital Elevation Models (and derivatives thereof), transportation/roads layers, wildlife layers, invasive species layers, botany layers, heritage layers, and vegetation layers.

#### *Existing Condition – Maintenance Levels*

*Maintenance Level Descriptions*

Maintenance levels define the degree of maintenance required for a specific road and the level of service which the road provides, consistent with road management objectives and maintenance criteria (FSH 7709.59, Ch 60 – Road System Operations and Maintenance). Roads in the project area are Maintenance Level 1 and 2:

*Level 1:* These are roads that have been placed in storage between intermittent uses (closed). Basic custodial maintenance is performed to prevent damage to adjacent resources and to perpetuate the road for future resource management needs. Emphasis is normally given to maintaining drainage facilities and runoff patterns. *Level 2:* Assigned to roads open for use by high clearance vehicles. Passenger car traffic, user comfort, and user convenience are not considerations. Warning signs and traffic control devices are not provided with the exception that some signing, such as W-18-1 "No Traffic Signs," may be posted at intersections. Motorists should have no expectations of being alerted to potential hazards while driving these roads. *Level 2 Admin Use:* Roads closed to public motor vehicle use, but which receive Forest Service administrative traffic, are constant service roads and are thus not level 1. The need to maintain a

road for the effects of traffic is not a function of vehicle ownership.

The current distribution of roads by maintenance level within the project area is displayed in Table 41.

Table 41: Current distribution of roads by maintenance level in the project area.

| Maintenance Level | Forest Service (Miles) |
|---|---|
| 1 – Basic Custodial Care (Closed) | 4.38 |
| 2 – High Clearance Vehicles | 11.17 |
| **Total** | **15.55** |

### *Environmental Consequences – Maintenance Levels*

**Direct and Indirect Effects**

*Alternative 1, 2, 3, 4, 5, and 6*

Under Alternative 1, 2, 3, 4 and 5, the existing road system would experience no changes in its current status and condition as a result of the Lemon Gulch project. Roads that are currently in custodial status (Level 1) would remain closed and open roads would continue to provide access for recreational, commercial, and administrative functions in the same manner that they currently do.

**Cumulative Effects**

Proposed changes to the transportation system maintenance levels are being analyzed as part of the Mill Creek Dry Forest Restoration Project. If the proposals are approved in that project's decision notice, the following changes would take place in the Lemon Gulch project area: currently open segments of the 3360-100, 3360-120, and 3360-130 roads would be closed; currently closed segments of the 3360-050, 3360-061, 3360-150, and 3360-302 would be decommissioned; currently decommissioned segments of the 3360-051 would be opened. The resource conditions improved by these changes are addressed under the wildlife and hydrology sections.

### *Existing Condition – Road Maintenance and Reconstruction*

The majority of roads within the Lemon Gulch Trails project area, approximately 44% are categorized as native surface roads under Forest Service jurisdiction. Most of these roads are managed as either being open for high clearance vehicle traffic (Level 2) or as being closed to motor vehicle use (Level 1). The Level 2 native surface roads are not maintained on a recurring basis but are instead periodically reviewed to determine whether maintenance is needed to protect adjacent resource values.

Due to the maintenance criteria for Level 2 roads, the road surface is not consistent and is not always smooth, there may be rutting, damaged drainage facilities (dips, cross drains and culverts), and encroaching vegetation on the shoulder. Generally, no work is required unless necessary to control resource / environmental damaged such as significant erosion, rutting or widening since they're maintained for use by high-clearance vehicles and not suitable for passenger cars.

The remaining 56% of the roads are either categorized as improved native or crushed aggregate surface under Forest Service jurisdiction. These roads are managed as open for high clearance vehicle traffic (Level 2).

The distribution of roads by surface type within the analysis is displayed in Table 42.

Table 42: Miles of road by surface type and maintenance level.

| Surface Type | Unit of Measure | Crushed Aggregate | Improved Native | Native |
|---|---|---|---|---|
| 1 – Basic Custodial Care (Closed) | Miles | 1.10 | 0.34 | 2.94 |
| 2 – High Clearance Vehicles | Miles | 4.58 | 2.64 | 3.95 |
| **Total** | **Miles** | **5.68** | **2.98** | **6.89** |

From Highway 26 at T.14 S., R.17 E., Sec 34, NE Mill Creek Road runs north about 10.1 miles before reaching the National Forest boundary. This section is under the jurisdiction of Crook County. The road then becomes National Forest Service Road 33 which continues to the northeast for 1.44 miles through the National Forest until it ends at the Wildcat Campground. The public uses the road to access private residences as well as many amenities of the National Forest, including Wildcat Campground, Dry Creek Campground, Steins Pillar Trailhead, and Green Mountain Trailhead in the Mill Creek drainage. It receives an average of 300 vehicle trip per day. Ochoco National Forest has an agreement with Crook County on blading a segment of Mill Creek Road at milepost 9 from Highway 26 (at the Forest Service boundary) to National Forest Service Road 33 once every year in spring. The current budget and Road Crew capacity allows for blading that segment of road once every year. Crook County blade their section twice a year.

### *Environmental Consequences – Road Maintenance and Reconstruction*

**Direct and Indirect Effects – All Alternatives**

There would be no road maintenance or reconstruction work in association with the trails project. Proposed trailheads would be located along existing open roads which as stated above, are periodically reviewed for maintenance needs for the protection of adjacent resource values.

Additional vehicles at the level expected may not noticeably contribute to degraded road conditions. Warning signs on maintenance level 2 roads in the project area may be used. For example, “not suitable for passenger cars” or “narrow rough road, trailers and campers not recommended beyond this point” to notify the public. The County could choose to conduct maintenance activities more frequently on the Mill Creek Road if they determine a need.

**Cumulative Effects**

Road maintenance and reconstruction work will take place as a connected action to the Mill Creek Dry Forest Restoration Project. Commercial thinning activities proposed in the Mill Creek project would require commercial haul on approximately 90% of National Forest System Roads in Lemon Gulch Trails project area. During the course of treatment activities, approximately 95% of roads currently closed and in custodial status as Level 1 roads would be opened and then closed at the end of those treatment activities. The majority of maintenance work would be performed on 60% of Level 1 and Level 2 roads for commercial activities, in particular blading and brushing.

As a function of use during harvest activities, road maintenance activities would be conducted on roads designated for use. Some roads that do not receive recurring maintenance, primarily low standard roads in the Level 2 category, would see some improvements in both safe drivability and in their ability to handle surface runoff and the resultant sediment. Native surface Level 2 roads, as a result of use and infrequent blade maintenance, tend to develop shallow ruts in their wheel tracks, which can concentrate surface flow and lead to increased sediment rates (Flotz, 1991). Post-haul maintenance that would occur on these roads would restore flat roads surface (without ruts) that would be capable of producing less sediment than their rutted counterparts; post-haul waterbarring would also remove surface runoff from the erosive road surfaces.

Road maintenance may include one or more of the following: surface blading, dust abatement, roadside brushing and cleaning of drainage structures. Commensurate share road maintenance work is governed by road maintenance specifications included as part of timber sale appraisals. Work exceeding the requirement or intent of commensurate share road maintenance can be included in contract as reconstruction items, even though such work does not improve a given road beyond its intended level of service and is still considered by definition to be maintenance. Reconstruction road maintenance work provides for public safety on joint use haul routes, protection of road travel surfaces, sediment mitigation to protect adjacent resources, and travel way surface that can be maintained during commercial hauling. The majority of this work is considered moderate level road reconstruction, including such items as placing additional crushed aggregate on major haul roads that have exposed soft soils, installation of drainage features in areas that show erosional problems or have stream crossings, roadside brushing beyond that intended to be performed with maintenance specifications, and placing spot rock in heavily rutted sections or soft spots in local roads to provide for roadbed stabilization.

---

## Cultural Resources

Cultural resources on public lands are protected by a series of federal laws, executive orders, directives and policies, foremost among them the National Historic Preservation Act (NHPA). The Lemon Gulch Trails Project (Lemon Gulch project) has been evaluated under Section 106 of the NHPA. The project's Area of Potential Effect (APE) has been defined as a 6 ft. buffer around all proposed trails and all proposed trailheads and parking areas, covering approximately 80 acres.

### *Methodology*

To comply with the laws, executive orders, and directives governing the management of cultural resources on federal land, archaeological sites in the Lemon Gulch project area were identified through a combination of research and intensive pedestrian survey.

Cultural compliance for this project included an extensive literature review of Forest Service records, archives, and databases, as well as historic maps, ethnographies, the Bureau of Land Management's (BLM) General Land Office records (GLO), and the Oregon State Historic Preservation Office's (SHPO) Oregon Archaeological Records Remote Access (OARRA) site and survey database. The Ochoco National Forest also initiated consultation with the Burns Paiute and Confederated Tribes of the Warm Springs.

Twelve previous cultural resource surveys have been conducted within the Lemon Gulch project area. Although not all previous survey meets current adequate standards, these projects resulted in a review of 800 acres within the Lemon Creek drainage. These surveys resulted in the past discovery and documentation of one precontact and two historic archaeological sites near or within the project's Area of Potential Effect. New intensive pedestrian survey was targeted in accordance with the project's APE and the Forest's archaeological sensitivity model. All high sensitivity areas within the project APE and a sample of low sensitivity areas that had not previously received adequate survey were intensively surveyed with transects spaced at a maximum of 30-meter intervals. This resulted in 242 acres of survey in 2021 and 2022. Two new isolated finds were identified within the APE. All previously recorded archaeological sites were revisited and their records were updated to meet current standards.

Cultural resource surveys are designed to make a good faith effort to identify areas of high archaeological sensitivity through predictive modeling. The ability to identify archaeological sites can be limited by the predictive model, environmental factors, and ground visibility. The following assessment is made using the best available information at this time.

### *Environmental Consequences*

If previously undiscovered cultural materials are found during the course of project activities, all ground

disturbing work in the vicinity of the findings will cease and a Forest Service archaeologist will be immediately notified. Consultation will continue as outlined in 36 CFR800.13 and findings will not be disturbed until formally cleared by the Forest Service archaeologist.

**Alternative 1 – No Action**

The Lemon Gulch project's no action alternative, Alternative 1, could adversely affect cultural resources through indirect effects such as the creation or continued use of unsustainable, user-created trails, increasing the potential for ground disturbance, erosion and instability in known or undiscovered archaeological sites.

**Action Alternatives**

The Lemon Gulch project's proposed actions under Alternatives 2, 3, and 4 could adversely affect cultural resources through ground disturbance and artifact displacement or destruction resulting from the construction of parking areas, trailheads and trails, utilizing heavy equipment and/or hand tools. Increased use and access throughout the Lemon Gulch area may increase the potential for looting and vandalism within archaeological sites. These activities have the potential to alter or destroy the characteristics that make sites potentially eligible for inclusion on the National Register of Historic Places (NRHP).

Isolates and sites that were recommended Not Eligible for the NRHP and received SHPO concurrence to that effect received no further protection measures. Any sites found eligible or unevaluated and therefore potentially eligible to the NRHP received a 100 ft. buffer and avoidance measures that would protect the site's characteristics were established.

Project Design Criteria have been established to result in no direct or indirect effects to cultural resources. As such, there are no cumulative effects to cultural resources from the Lemon Gulch project.

In compliance with federal law and agency regulations, the Ochoco National Forest analyzed the potential effects of the Lemon Gulch project's proposed actions on cultural resources. A reasonable and good faith effort has been made to identify cultural resource sites eligible or potentially eligible for inclusion on the NRHP. Potential impacts to historic properties will be mitigated using project design criteria as described above. With implementation of the mitigation measures outlined in this report, there will be no adverse effects to historic properties. The Forest Service will consult with the Oregon SHPO and this project will not proceed until it has reached agreement with the Oregon SHPO on the proposed measures that will result in the protection of archaeological resources.

---

## Other Disclosures

*Inventoried Roadless Areas or Wilderness* – Neither of these land categories occur in the project area therefore, there would be no impact to the resources of values of those areas.

*Human Health and Safety* - Trail Contractors, USFS Staff and Volunteers would follow OSHA guidelines and Job Hazard Analyses to ensure safety of workers. Snags deemed a safety hazard for trail construction may be removed by qualified contractors or employees. Adequate cautionary signage would be installed at trailheads along trails to inform the public of shared use and which modes of travel are authorized. It is possible that some trails would be signed for direction of travel, such as "downhill use only." This type of signage has been effective to notify users of other modes of travel that can be expected when navigating the trail system. Signage at the bottom of the system would alert drivers to the fact that roads are not maintained for passenger vehicles and where narrow may require smaller vehicles to yield. This type of signage is commonly used on forest roads.

*Prime farm lands, range lands, and forest lands* – All alternatives are consistent with the Secretary of Agriculture Memorandum 1827 for the management of prime farmland. The project area does not contain any prime farmland or rangelands. Prime forest land is not applicable to lands within the National Forest System.

*Floodplains and wetlands* – Executive Order 11988 provides direction to avoid adverse impacts associated with occupancy and modification of floodplains. No modification of floodplains will occur with this project. Executive order 11990 provides direction to avoid adverse impacts associated with destruction or modification of wetlands. No wetlands would be impacted by this project.

*Potential for unusual expenditures of energy* – Under the action alternatives, fossil fuels would be expended for the use of vehicles and equipment. There would be no irregular energy requirements involved in implementation of any action alternative.

*Compatibility with state and local laws* – Implementation of all alternatives would be consistent with State and local laws, land use, and environmental policies. Action alternatives follow the State of Oregon requirements in accordance with the Clean Water Act for protection of waters.

*Americans with Disabilities Act of 1990, as amended* – All alternatives meet the Revised regulations for Titles II and III of the Americans with Disabilities Act of 1990 (ADA). ADA parking spaces have been designed into each action alternative. ADA access to both the informational kiosk and restroom facility are incorporated into the project design.

*Civil rights, minority groups, and women*; *environmental justice* - Civil Rights legislation and Executive Order 12898 direct an analysis of the proposed alternatives as they relate to specific subsets of the American population. The subsets of the general population include ethnic minorities, people with disabilities, and low-income groups.

There would be no effect civil rights, including those of minorities and women. The identified activities would not directly affect employment, would not provide consumer goods, and would not affect the civil rights, privileges, or status quo of consumers, minority groups, and women. With implementation of any alternative, there would be no disproportionately high and adverse human health or environmental effects on minority or low-income populations. Nearby communities would mainly be affected by economic impacts as related to visitors that may use the services provided within those communities.

The effects of the proposal on the social context of the protected groups are within those described in the Ochoco NF LRMP. The benefits and risks associated with implementation of the alternatives are provided to all members of the public. The action alternatives provide opportunities for all groups regardless of racial and economic composition.

---

## Tribal Government, Federal, State, and Local Government Agencies, and Persons Consulted

### Tribal Government

The following Tribes were notified and invited to participate in December 2020: Confederated Tribes of the Warm Springs, Burns Paiute Tribe, and the Klamath Tribes. The Forest Service received response from, and had follow up discussions with, the Confederated Tribes of the Warm Springs.

### U.S. Fish and Wildlife Service

Informal consultation with the USFWS on the determination of effects to the gray wolf has been initiated. The Forest Service has determined that the project May Affect, Not Likely to Adversely Affect (NLAA) for all action alternatives. There is no consultation requirement for any other species (terrestrial, aquatic, or botanical) within the project area.

### State Historic Preservation Office

The Forest has completed necessary reporting for the State Historic Preservation Office (SHPO) following guidelines in the Regional Programmatic Agreement among USDA-Forest Service, the

Advisory Council on Historic Preservation, and the Oregon SHPO. Consultation with SHPO is underway.

**Oregon Department of Fish and Wildlife**

The Forest Service and ODFW provided guidance during the development of Forest-wide trail proposals as part of the Ochoco Trails group. The Forest Service consulted with ODFW specifically on the trails proposal on July 11, 2019, and August 21, 2019. The Forest Service received scoping comments from ODFW on April 15, 2021. ODFW stated in their comments "ODFW appreciates the Ochoco National Forest's efforts to get early guidance on recreational development from stakeholders through the Ochoco Trails Group (OT). ODFW biologists have participated in OT meetings and offered input throughout the Project planning process. As a result, the proposed Project area and trail system design has potential to minimize negative impacts to wildlife by retaining habitat patches (i.e. cores) and seasonal trail closures in the Winter Range Management Area." An additional meeting occurred with the agency on January 25, 2022.

**Crook County Government**

The Ochoco Trails group presented information at a public meeting of the Crook County Court about their efforts to develop trail proposals for all user groups on the Ochoco National Forest on January 8, 2019 and then gave a presentation to the Crook County Natural Resources Advisory Committee (appointed by the Crook County Court) on May 8, 2019. Forest Service staff appeared at the Crook County Court meeting on July 7, 2021, to provide information and answer questions from Commissioners and the public. The Forest Supervisor also attended Crook County Natural Resource Advisory Committee Meeting on July 14, 2021. The Crook County Natural Resources Advisory Committee convened a Trails Subcommittee. Forest Service staff attended the Trails Subcommittee meetings on August 10, September 7, and September 24, 2021. Additionally, the Forest Supervisor has met regularly with members of the Crook County Court since the project was initiated.

**Individuals and Organizations**

The project was first listed on the Ochoco National Forest's Schedule of Proposed Actions in January 2021. The proposal was then announced to the public in March 2021 via letter distributed through email and postal mail to individuals subscribed to the Forest Service project mailing list that was subsequently updated for the project. The project was made available on the Forest Service web page beginning in March 2021 and posted to Forest Service social media accounts.

Forest Service staff and line officers met with the affected grazing permittees on May 27, June 14, October 25, November 9, and November 18, 2021, April 15, 2022, and August 4, 2022. Additionally, permittees were included in the Crook County Natural Resources Advisory Committee and Trails Subcommittee meetings listed above.

*30-day public comment period*

This project is subject to the project-level predecisional administrative review process described at 36 CFR 218. It is a project-level proposal not authorized under the Healthy Forests Restoration Act. Notification of the availability of the EA is being distributed to the project's mailing list of about 350 subscribers. A complete list of subscribed emails and postal mailing addresses are located in the project file. The Ochoco National Forest publishes legal notices of comment periods in the Bend Bulletin, which is the newspaper of record. A courtesy notice will also be published in the Central Oregonian. The date of publication of the legal notice in the Bend Bulletin is the official means of determining the beginning of the 30-day comment period.

## References Cited


Ager, A.A., Johnson, B.K., Kern, J.W., Kie, J.G., 2003. Daily and seasonal movements and habitat use by female Rocky Mountain elk and mule deer. Journal of Mammalogy 84: pp. 1076-1088.

Altman, B. 2000. Conservation strategy for landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington, Version 1.0. American Bird Conservancy and Oregon-Washington Partners in Flight.

Altman, B., and B. Bresson. 2017. Conservation of landbirds and associated habitats and ecosystems in the Northern Rocky Mountains of Oregon and Washington, Version 2.0. Oregon-Washington Partners in Flight (www.orwapif.org) and American Bird Conservancy and U.S. Forest Service/Bureau of Land Management.

Belnap, J., Kaltenecker, J. H., Rosentreter, R., Williams, J., Leonard, S., and Eldridge, D., 2001. Biological Soil Crusts: Ecology and Management. Technical Reference No. 1730-2. U.S. Department of the Interior, Bureau of Land Management, U.S. Geological Survey. Denver, Colorado. https://www.ars.usda.gov/ARSUserFiles/6112/biologicalSoilCrusts2.pdf

Belnap, J., Phillips, S.L., and Troxler, T. 2006. Soil lichen and moss cover and species richness can be highly dynamic: The effects of invasion by the annual exotic grass *Bromus tectorum*, precipitation, and temperature on biological soil crusts in SE Utah. Applied Soil Ecology 32: 63-76. https://www.sciencedirect.com/science/article/pii/S0929139305001824

Central Oregon Fire Management Services (COFMS). 2022. Ochoco and Deschutes National Forest, Crooked River National Grassland, and Prineville District BLM Fire Prevention, Education, and Mitigation Plan.

Central Oregon Intergovernmental Council (COIC). 2014. Crook County Community Wildfire Protection Plan.

Christy, J. 2006. Species Fact Sheet for *Tortula mucronifolia*. USDA Forest Service/USDI Bureau of Land Management. Interagency Special Status/Sensitive Species Program (ISSSSP), Oregon and Washington. http://www.fs.fed.us/r6/sfpnw/issssp/planning-documents/species-guides.shtml

Coe, P. K., B. K. Johnson, J. W. Kern, S. L. Findholt, J. G. Kie, and M. J. Wisdom. 2001. Responses of elk and mule deer to cattle in summer. Journal of Range Management 54:205, A51-A76.

Crook County. 2014. Crook County Wildfire Protection Plan.

Crook County Board of Commissioners. 2019. Crook County Oregon Natural Resources Policy. Prineville, Oregon.

Deines, L.,Rosentreter, R., Eldridge, D., Serpe, M. 2007. Germination and seedling establishment of two annual grasses on lichen-dominated biological soil crusts. Plant Soil. Springer B.V. http://www.aridecologylab.com.au/pubs/Deines_et_al_Plant_%26_Soil.pdf

Dewey, R. 2011. Conservation Strategy for *Calochortus longebarbatus* var. *peckii*. Ochoco National Forest. Prineville, OR. https://www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/cs-vp-calochortus-longebarbatus-2011-12.pdf

Dewey, R. 2013. Conservation Assessment for *Achantherum hendersonii* and *Achnatherum wallowaensis*. USDA Forest Service Region 6 and USDI Bureau of Land Management, Oregon Wahsington. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.fs.fed.us%2Fr6%2Fsfpnw%2Fissssp%2Fdocuments2%2Fca-va-achnatherum-species-2013-04.docx

DOGAMI, 2021. Jason D. McClaughry, Mark L. Ferns, and Caroline L. Gordon. Oregon Department of Geology and Mineral Industries Bulletin 108. Geology of the North Half of the Lower Crooked River Basin, Crook, Deschutes, Jefferson, and Wheeler Counties, Oregon.

Earth Economics. 2021. Oregon's Outdoor Recreation Economy. http://www.eartheconomics.org.

Economic Development of Central Oregon (EDCO) 2021. 2021 Prineville/Crook County Economic Profile. Prineville, Oregon.

Evans, E., Thorp, R.W., Jepsen, S., Black, S.H., 2008. Status review of three formerly common species of bumble bee in the subgenus Bombus. The Xerces Society. Available at: https://xerces.org/publications/scientific-reports/status-review-of-three-formerly-common-species-of-bumble-bee

Farris Lopez, Krista. 2013. Long Term Monitoring and Habitat Assessment of Henderson's and Wallowa Needlegrass populations. A report to the Interagency Special Status Sensitive Species Program. On file at Ochoco National Forest, Prineville, OR.

Headwaters Economics. 2021. Living Near Public Lands. Select Geographies: Crook County Oregon. https://headwaterseconomics.org/eps. (date accessed September 28, 2021)

Heartland Forward. 2022. Most Dynamic Micropolitans: 2022.

Hillis, J., M. Thompson, J. Canfield, L. Lyon, C, Marcum, P. Dolan, and D. McCleerey. 1991. Defining elk security: the Hillis paradigm. Pages 38-42 in A. Christensen, L. Lyon, and T. Lonner, editors. Proceedings of a Symposium on Elk Vulnerability. Bozeman, Montana, USA.

Johnson, B. K., A. A. Ager, J. H. Noyes, and N. J. Cimon. 2005. Elk and mule deer responses to variation in hunting pressure. Pages 127-138 *in* M. J. Wisdom, technical editor. The Starkey Project: a synthesis of long-term studies of elk and mule deer. Allen Press, Lawrence, Kansas, USA.

Kittelson & Associates. 2017. Crook County Transportation System Plan Update.

Korol, J.J., Hemstrom, M.A., Hann, W.J., Gravenmier, R., 2002. Snags and down wood in the Interior Columbia Basin Ecosystem Management Project. *In*: Laudenslayer, W.F. Jr., Valentine; B., Weatherspoon; C. P., Lisle; T.E., technical coordinators. Proceedings of the symposium on the ecology and management of dead wood in western forests. 1999 Nov. 2-4. Reno, NV. Gen. Tech. Rep. PSW-GTR-181. Albany, CA: USDA Forest Service, Pacific Southwest Research Station. http://www.fs.fed.us/psw/publications/documents/gtr-181/049_Korol.pdf

Lacey, J.R., R. Wallander, K. Olson-Rutz. 1992. Recovery, germinability, and viability of leafy spurge (Euphorbia esula) seeds ingested by sheep and goats. Weed Technology 6(3): pp. 599-602.

Landres, P.B., P. Morgan, and F.J. Swanson. 1999. Overview of the Use of Natural Variability Concepts in Managing Ecological Systems. Ecological Applications 9(4): pp. 1179-1188.

Lowrey, B., J. Devoe, K. Proffitt, R.A. Garrott. 2020. Hiding without cover? Defining elk security in a beetle-killed forest. Journal of Wildlife Management 84(1): pp. 138-149.

Lyon, L.J., 1979. Habitat effectiveness for elk as influenced by roads and cover. Journal of Forestry, 77: pp. 658-

Maze, J. and Robson, K.A. 1996. A new species of *Achnatherum (Oryzopsis)* from Oregon. Madrono 43:393-403. https://www.jstor.org/stable/41425151?refreqid=robotstxt-sitemaps:58d93c35e0e29961d508f2b123ce38c4&seq=1#page_scan_tab_contents

Miller, A.B., King, D., Rowland, M., Chapman, J., Tomosy, M., Liang, C., Abelson, E.S., Truex, R.L. 2020. Sustaining wildlife with recreation on public lands: a synthesis of research findings, management practices, and research needs. Gen. Tech. Rep. PNW-GTR-993. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 226 p.

Naylor, L.M., M.J. Wisdom, and R.G. Anthony. 2009. The Journal of Wildlife Management 73(3): pp. 328-338.

Oregon Biodiversity Information Center (ORBIC, formerly the Oregon Natural Heritage Program and Oregon Natural Heritage Information Center). 2016. Rare, Threatened, and Endangered Plants and Animals of Oregon. Portland, OR https://inr.oregonstate.edu/orbic

Oregon Department of Fish and Wildlife (ODFW). 1996. Crooked River Basin Plan. ODFW Ochoco District. Prineville, OR. https://www.dfw.state.or.us/.

Oregon Department of Fish and Wildlife (ODFW). 2016. Oregon Wolf Conservation and Management, 2015 Annual Report. Oregon Department of Fish and Wildlife, 4034 Fairview Industrial Drive SE. Salem, OR, 97302.

Oregon Department of Fish and Wildlife (ODFW). 2022*a*. Depredation Investigation Reports. Available at: https://dfw.state.or.us/wolves/depredation_investigations.asp. Accessed 20 June 2022.

Oregon Department of Fish and Wildlife (ODFW). 2022*b*. Mule deer population estimates, herd composition, and over-winter fawn survival in Oregon 2017-2021. Available at: https://myodfw.com/articles/big-game-population-survey-data

Oregon Department of Fish and Wildlife (ODFW). 2022c. Oregon Wolf Conservation and Management 2021 Annual Report. Oregon Department of Fish and Wildlife, 4034 Fairview Industrial Drive SE. Salem, OR, 97302.

Oregon Department of Fish and Wildlife (ODFW). 2022*d*. Rocky Mountain elk population estimates and herd composition in Oregon 2017-2021. Available at: https://myodfw.com/articles/big-game-population-survey-data

Orr, Elizabeth L., Orr, William N., Baldwin, and Ewart M. 1992. Geology of Oregon.

Paulson, Dale. 1977. Ochoco National Forest Soil Resource Inventory, USDA Forest Service

Peterson, E. 2013. Regional-scale relationship among biological soil crusts, invasive annual grasses, and disturbance. Ecological Processes: 2:2. https://link.springer.com/article/10.1186/2192-1709-2-2

Raedeke, K.J., J.J. Millspaugh, and P.E. Clark. 2002. Population characteristics. Pages 449–491. in Toweill, D. E. and J. W. Thomas. editors. North American elk: ecology and management. Smithsonian Institution Press. Washington, D.C., USA.

Ranglack, D., K. Proffitt, J. Canfield, J. Gude, J. Rotella, and B. Garrott. 2017. Security areas for elk during archery and rifle hunting seasons. Journal of Wildlife Management 81(5): pp. 778-791.

Rife, D., 2011. Ochoco National Forest and Crooked River National Grassland Aquatic MIS Analysis - Brook Trout. USDA Forest Service, Prineville, Oregon.

Rosenberger, Randall S.; White, Eric M.; Kline, Jeffrey D.; Cvitanovich, Claire. 2017. Recreation economic values for estimating outdoor recreation economic benefits from the National Forest System. Gen. Tech. Rep. PNW-GTR-957. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 33 p.

Rowland, M.M., Wisdom, M.J., Johnson, B.K., Kie, J.G., 2000. Elk distribution and modeling in relation to roads. Journal of Wildlife Management 64(3): pp. 672-684.

Rowland, M.M., Wisdom, M.J., Johnson, B.K., Penninger, M.A., 2005. Effects of roads on elk: Implications for management in forested ecosystems, pages 42-52. In: Wisdom, M. J., (Tech. Ed.) The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Alliance Communications Group, Lawrence, KN.

Sadleir, R. M. F. S. 1987. Reproduction of female cervids. Pages 123–144. In: C. M. Wemmer, editor. Biology and management of the Cervidae. Smithsonian Institution Press, Washington, D.C., USA.

Samson, F.B., F.L. Knopf, C.W. McCarthy, [and others]. 2003. Planning for population viability on Northern Great Plains national grasslands. Wildlife Society Bulletin. 31(4): pp. 986-999.

Simpson, M., D. Zalunardo, A. Eglitis, D.C. Wood, D.R. Roy, and S.J. Johnson. 1994. Viable Ecosystem Management Guide, Ochoco National Forest. USDA Forest Service.

Sorte, Bruce. 2004. Crook County's Economic Structure: An Input-Output Analysis. Department of Agriculture and Resource Economics, Oregon State University. OSU Extension Service Special Report 1051, May 2004. Corvallis Oregon.

Stewart, K. M., R. T. Bowyer, J. G. Kie, N. J. Cimon, and B. K. Johnson. 2002. Temporospatial distributions of elk, mule deer, and cattle: Resource partitioning and competitive displacement. Journal of Mammalogy 83:229-244.Suring, L.H., Gaines, W.L., Wales, B.C., Mellen-McLean, K., Begley, J.S., Mohoric, S., 2011. Maintaining populations of terrestrial wildlife through land management planning: a case study. Journal of Wildlife Management. 75(4): pp. 945-958.

Stuart, A.M., D. Grover, T.K. Nelson, and S.L. Thiesfeld. 1996. Redband Trout Investigations in the Crooked River Basin. Pages 76–91 in R.K. Schroeder and J.D. Hall, editors. Redband trout: resilience and challenge in a changing landscape. Oregon Chapter, American Fisheries Society, Corvallis.

Suring, L.H., Gaines, W.L., Wales, B.C., Mellen-McLean, K., Begley, J.S., Mohoric, S., 2011. Maintaining populations of terrestrial wildlife through land management planning: a case study. Journal of Wildlife Management. 75(4): pp. 945-958.

Thomas, J.W., Leckenby, D.A., Henjum, M., Pedersen, R.J., Bryant, L.D., 1988. Habitat-effectiveness index for elk on Blue Mountain Winter Ranges. General Technical Report PNW-GTR-218. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon.

U.S. Census Bureau. 2022. https://www.census.gov/quickfacts/prinevillecityoregon (accessed November 10, 2022).

USDA Forest Service (USFS). 1985. Aspen: Ecology and Management in the Western United States. Editors N.V. DeByle and R.P. Winokur. Gen. Tech. Rep. RM-119. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research and Range Experiment Station. Available at: https://www.fs.fed.us/rm/pubs_rm/rm_gtr119.pdf

USDA Forest Service (USFS). 1989a. Ochoco National Forest Land and Resource Management Plan. Reprinted 1991. Prineville, OR. On file at Ochoco National Forest, Prineville, OR.

USDA Forest Service (USFS). 1989b. Final Environmental Impact Statement, Land and Resource Management Plan, Ochoco National Forest and Crooked River National Grassland. Ochoco National Forest, Prineville, OR.

USDA Forest Service (USFS). 1990. HEI Tables – PIN #11. File Code 1920; September 13, 1990. USDA Forest Service, Ochoco National Forest, Prineville, Oregon.

USDA Forest Service. 1995. Inland Native Fish Strategy (INFISH) Environmental Assessment, Decision Notice and Finding of No Significant Impact. Intermountain, Northern, and Pacific Northwest Regions.

USDA Forest Service. 1997. Mill Creek Watershed Assessment Report. Ochoco National Forest, Prineville, OR.

USDA Forest Service. 2005. Final Environmental Impact Statement (DEIS) and Record of Decision for The Pacific Northwest Invasive Plant Program, Preventing and Managing Noxious Weeds. Pacific NW Regional Office. Portland, OR. On file at Ochoco National Forest, Prineville, OR.

USDA Forest Service (USFS). 2008. Memorandum of Understanding between the U.S. Department of Agriculture Forest Service and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds. MOU Num. 08-MU-1113-2400-264. USDA Forest Service, Arlington, Virginia.

USDA Forest Service. 2009. Forest Service Handbook 2309.18 – Trails Management Handbook, Chapter 10 – Trail Planning. National Headquarters, Washington, DC.

USDA Forest Service. 2010. Record of Decision and Final Environmental Impact Statement, Mill Creek Allotment Management Plans. Lookout Mountain Ranger District, Ochoco National Forest.

USDA Forest Service. 2012. Invasive Plant Treatments. Final Supplemental Environmental Impact Statement. Deschutes and Ochoco National Forests, Crooked River National Grassland. http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/613_FSPLT2_126693.pdf

USDA Forest Service. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide (FS 990-a). Washington Office, Washington D.C. 164 p.

USDA Forest Service (USFS). 2014. Addendum Memorandum of Understanding Between the U.S. Forest Service and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds. USDA Forest Service, Arlington, Virginia.

USDA Forest Service (USFS). 2016. Addendum Memorandum of Understanding Between the U.S. Forest Service and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds. USDA Forest Service, Arlington, Virginia.

USDA Forest Service. 2019a. Central Oregon Fire Management Prevention Analysis. Central Oregon Fire Management Service.

USDA Forest Service (USFS). 2021. Regional Forester's Transmittal Letter to Forest Supervisors; Updated Regional Forester's Special Status Species List; File Code 2670; November 16, 2021. USDA Forest Service, Pacific Northwest Region, Portland, OR. https://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/

USDI Fish and Wildlife Service. 1994. The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho: Final Environmental Impact Statement. U.S. Department of the Interior, Fish and Wildlife Service, Helena, Montana, USA.USDI Fish and Wildlife Service (USFWS). 2021. Birds of conservation concern 2021. USDI Fish and Wildlife Service. Migratory Birds, Falls Church, Virginia.

Wallander, R.T., B.E. Olson, J.R. Lacey. 1995. Spotted knapweed viability after passing through sheep and mule deer. Journal of Range Management 48(2). pp. 145-149.

Warren S.D. 2001. Synopsis: Influence of Biological Soil Crusts on Arid Land Hydrology and Soil Stability. In: Belnap J., Lange O.L. (eds) Biological Soil Crusts: Structure, Function, and Management. Ecological Studies (Analysis and Synthesis), vol 150. Springer, Berlin, Heidelberghttps://link.springer.com/chapter/10.1007/978-3-642-56475-8_26

Webel, S. 2007. Impacts of Trails and Trail Use. Retrieved January 2014 [Online] http://www.americantrails.org/resources/adjacent/sumadjacent.html

White, Eric M.; Bowker, J.M.; Askew, Ashley E.; Langner, Linda L.; Arnold, J. Ross; English, Donald B.K. 2016. Federal outdoor recreation trends: effects on economic opportunities. Gen. Tech. Rep. PNW-GTR-945. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Station. 46 p.

White, Eric M. 2017. Spending patterns of outdoor recreation visitors to national forests. Gen. Tech. Rep. PNW-GTR-961. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 70 p.

Wisdom, M.J., Holthausen, R.S., Wales, B.C., Hargis, C.D., Saab, V.A., Lee, D.C., Hann, W.J., Rich, T.D., Rowland, M.M., Murphy, W.J., Eames, M.R., 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia Basin: broad-scale trends and management implications. USDA Forest Service General Technical Report PNW-GTR-485. Pacific Northwest Region, Portland, Oregon.

Wisdom, M.J., H.K. Preisler, L.M. Naylor, R.G. Anthony, B.K. Johnson, and M.M. Rowland. 2018. Forest Ecology and Management 411: pp.223-233.

Walker G.W. 1990. Geology of the Blue Mountains region of Oregon, Idaho, and Washington; Cenozoic geology of the Blue Mountains region. USGS Professional Paper 1437.

Wolf, K.M., Baldwin, R.A., and Barry, S. 2017. Compatibility of Livestock Grazing and Recreational Use on Coastal California Public Lands: Importance, Interactions, and Management Solutions. Rangeland Ecology & Management. 70: 192-201.

# Appendices

Appendix A – Table of Trail Segments w/ Length and Priority by Alternative

Appendix B – Resource Protection Measures and Best Management Practices

Appendix C – Implementation Plan

## Appendix A – Trail List and Difficulty Map

The following table lists the trail segments under consideration and provides length, difficulty, feasibility of adaptive biking equipment, and alternative. Priority is used so that the first phase of implementation would include the core arterial component and a good mix of trail difficulty levels and options for adaptive mountain biking equipment. This priority rating was assigned considering the entire proposed action of 51 miles. The system follows the trail difficulty framework where the following symbols are used on trail signs: green circle = beginner, blue square = intermediate, and black diamond = advanced or expert. These difficulty levels are based on an initial assessment based on terrain, steepness, and initial design layout.

Table A-1: Trail segments with length, difficulty, potential for adaptive mountain bike equipment use, and alternative.

| Trail ID | Miles | Model | Difficulty | Priority | ALT2 | ALT3 | ALT4 | ALT5 | ALT6 |
|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 0.15 | | Blue | FIRST | Y | Y | Y | N | Y |
| 1.1 | 4.68 | | Blue | FIRST | Y | Y | Y | N | N |
| 1.15 | 0.06 | | Blue | FIRST | Y | Y | Y | N | Y |
| 1.2 | 0.04 | | Blue | FIRST | Y | Y | Y | Y | Y |
| 1.3 | 0.10 | | Blue | FIRST | Y | Y | Y | Y | N |
| 1.4 | 0.09 | | Blue | FIRST | Y | Y | Y | Y | N |
| 1.5 | 1.44 | | Blue | FOURTH | N | Y | N | N | N |
| 1.6 | 0.19 | | Blue | FOURTH | N | Y | N | N | Y |
| 1.7 | 0.04 | | Blue | FIRST | N | N | N | N | Y |
| 10.0 | 0.32 | | Blue | SECOND | Y | Y | N | Y | N |
| 11.0 | 0.20 | | Blue | FIRST | Y | N | N | Y | N |
| 11.1 | 0.36 | | Blue | FIRST | Y | Y | N | Y | N |
| 11.2 | 0.08 | | Blue | FIRST | Y | N | N | Y | Y |
| 12.0 | 0.27 | | Blue | FIRST | Y | N | N | Y | N |
| 12.1 | 0.89 | | Blue | FIRST | Y | N | N | Y | N |
| 13.0 | 0.13 | | Black | FIRST | Y | Y | Y | Y | Y |
| 13.1 | 0.50 | | Black | SECOND | Y | Y | Y | Y | Y |
| 13.2 | 0.02 | | Black | SECOND | Y | N | Y | N | N |
| 13.3 | 0.76 | aMTB F | Green | FIRST | N | N | Y | N | Y |
| 13.4 | 0.28 | | Blue | FIRST | N | N | N | N | Y |
| 14.0 | 0.80 | | Green | SECOND | Y | Y | Y | N | N |
| 15.0 | 0.07 | | Black | FIRST | Y | Y | N | Y | Y |
| 15.1 | 0.24 | | Black | FIRST | Y | Y | Y | Y | Y |
| 15.2 | 0.71 | | Black | FIRST | Y | N | N | Y | N |
| 16.0 | 0.27 | aMTB | Green | FIRST | Y | Y | Y | Y | Y |
| 16.1 | 1.26 | aMTB | Green | SECOND | Y | Y | N | Y | Y |
| 16.2 | 0.46 | aMTB | Green | SECOND | Y | N | N | Y | Y |
| 16.3 | 0.39 | aMTB | Green | SECOND | Y | Y | N | Y | Y |
| 17.0 | 0.44 | aMTB | Blue | FIRST | Y | N | N | Y | Y |
| 17.1 | 0.49 | aMTB | Blue | FIRST | Y | N | N | Y | Y |
| 17.2 | 0.76 | aMTB | Blue | FIRST | Y | N | N | Y | Y |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 17.3 | 0.22 | aMTB | Blue | FIRST | Y | Y | Y | Y | Y |
| 18.0 | 0.74 | aMTB | Black | FIRST | Y | Y | Y | Y | Y |
| 18.1 | 0.55 | aMTB | Black | FIRST | Y | Y | Y | Y | Y |
| 18.2 | 0.11 | aMTB | Black | FIRST | Y | Y | Y | Y | Y |
| 18.3 | 0.19 | aMTB | Black | FIRST | Y | Y | Y | Y | Y |
| 19.0 | 0.26 | aMTB F | Green | FIRST | Y | Y | N | Y | Y |
| 19.1 | 1.38 | aMTB F | Green | FIRST | Y | Y | N | Y | Y |
| 19.2 | 0.37 | aMTB F | Green | FIRST | Y | Y | Y | Y | Y |
| 19.3 | 0.08 | aMTB F | Green | FIRST | Y | N | N | Y | Y |
| 19.4 | 0.40 | aMTB F | Green | FIRST | Y | N | N | Y | Y |
| 19.5 | 0.32 | aMTB F | Green | FIRST | Y | N | N | Y | Y |
| 2.0 | 2.54 | | Green | FOURTH | Y | N | N | N | Y |
| 2.1 | 0.15 | Rd to trail | Green | FOURTH | Y | N | N | N | Y |
| 20.0 | 0.21 | | Black | FOURTH | Y | Y | Y | Y | Y |
| 20.1 | 0.33 | | Black | FOURTH | Y | Y | Y | Y | Y |
| 21.0 | 0.04 | aMTB | Black | SECOND | Y | Y | N | Y | Y |
| 21.1 | 0.15 | aMTB | Black | SECOND | Y | Y | N | Y | Y |
| 21.2 | 0.66 | aMTB | Black | SECOND | Y | Y | N | Y | Y |
| 21.3 | 0.54 | aMTB | Black | SECOND | Y | Y | N | Y | Y |
| 21.4 | 0.05 | aMTB F | Green | FIRST | N | N | Y | N | N |
| 22.0 | 0.38 | aMTB F | Green | FIRST | Y | N | N | Y | Y |
| 22.1 | 0.71 | aMTB F | Green | FIRST | Y | Y | N | Y | Y |
| 22.2 | 0.23 | aMTB F | Green | FIRST | Y | Y | N | Y | N |
| 22.3 | 0.65 | aMTB F | Green | FIRST | Y | Y | N | Y | N |
| 22.4 | 0.28 | aMTB F | Green | FIRST | Y | Y | Y | Y | N |
| 23.0 | 0.78 | | Blue | THIRD | Y | N | N | Y | N |
| 23.1 | 2.87 | | Blue | THIRD | Y | N | N | Y | N |
| 23.2 | 0.87 | | Blue | THIRD | Y | N | N | Y | Y |
| 23.3 | 0.49 | | Blue | THIRD | Y | N | N | N | Y |
| 23.4 | 1.28 | | Blue | THIRD | Y | N | N | Y | Y |
| 23.5 | 1.14 | | Blue | THIRD | Y | N | N | Y | Y |
| 23.6 | 1.28 | | Blue | THIRD | Y | N | N | Y | Y |
| 24.0 | 0.57 | | Blue | FOURTH | Y | N | N | N | N |
| 24.1 | 0.11 | | Blue | FOURTH | Y | N | N | Y | Y |
| 25.0 | 1.39 | | Blue | THIRD | Y | N | N | N | N |
| 26.0 | 0.48 | | Black | THIRD | Y | N | N | Y | Y |
| 27.0 | 0.12 | | Blue | THIRD | Y | N | N | N | N |
| 27.1 | 2.55 | | Blue | THIRD | Y | N | N | N | N |
| 28.0 | 1.53 | | Black | FOURTH | Y | N | N | N | N |
| 28.1 | 0.02 | | Black | FOURTH | Y | N | N | N | N |
| 29.0 | 2.28 | | Black | THIRD | Y | N | N | N | N |
| 3.0 | 1.03 | | Blue | SECOND | Y | Y | Y | Y | Y |
| 3.1 | 1.03 | | Blue | SECOND | Y | N | Y | N | N |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 30.0 | 0.70 | | Blue | THIRD | N | N | N | N | Y |
| 4.0 | 1.42 | | Black | SECOND | Y | N | Y | N | N |
| 4.1 | 0.10 | | Black | SECOND | Y | Y | Y | Y | N |
| 4.2 | 0.09 | | Black | SECOND | Y | Y | Y | Y | Y |
| 4.3 | 0.01 | | Black | SECOND | Y | Y | Y | Y | Y |
| 5.0 | 0.33 | | Blue | SECOND | Y | N | Y | N | N |
| 5.1 | 0.19 | | Blue | SECOND | Y | N | Y | N | N |
| 5.2 | 0.20 | | Blue | SECOND | Y | N | Y | N | N |
| 5.3 | 0.60 | | Blue | SECOND | Y | N | Y | N | N |
| 5.4 | 0.56 | | Blue | SECOND | Y | N | Y | N | N |
| 5.5 | 0.30 | | Blue | FIRST | Y | N | Y | N | Y |
| 6.0 | 0.09 | | Black | SECOND | Y | N | Y | N | N |
| 7.0 | 0.27 | | Black | SECOND | Y | N | Y | N | N |
| 8.0 | 0.91 | | Black | SECOND | Y | N | Y | N | N |
| 9.0 | 0.11 | | Green | SECOND | Y | Y | Y | Y | N |
| 9.1 | 0.58 | | Black | SECOND | Y | Y | Y | Y | Y |
| 9.2 | 0.68 | | Black | FIRST | Y | Y | Y | Y | Y |
| 9.3 | 0.38 | | Black | SECOND | Y | Y | Y | Y | Y |

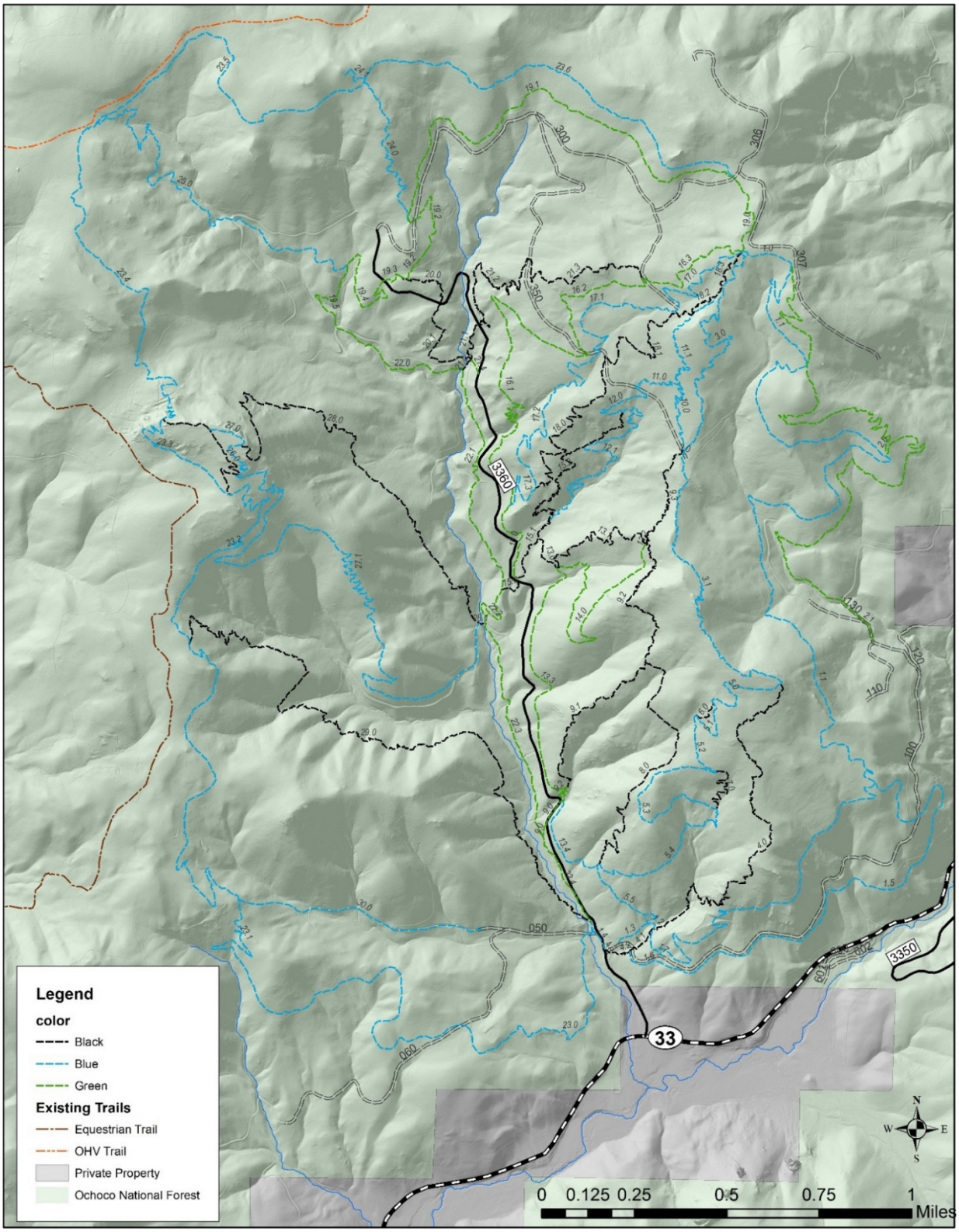



Figure A-1: Map displaying all trail segments colored by the difficulty level. These difficulty levels are based on an initial assessment based on terrain, steepness, and initial design layout.

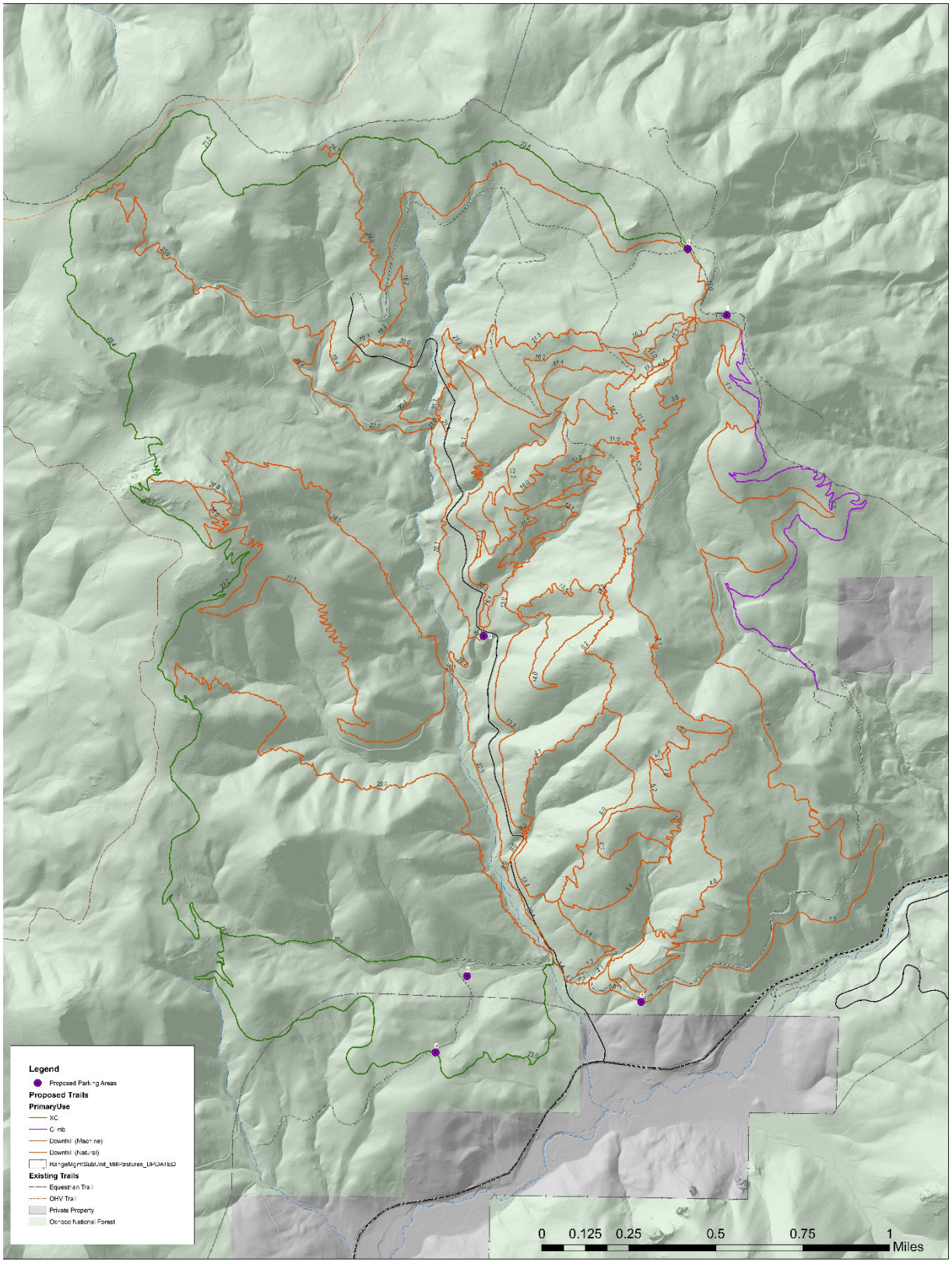



Figure A-2: Map displaying all trail segments colored by the type of trail/primary use, based on an initial assessment based on terrain, steepness, and initial design layout.

## Appendix B – Project Design and Resource Protection Measures

Trails would be built with a mini excavator and hand tools by contract, employee and volunteer labor and would allow design and construction to follow direction and guidelines in the Trails Management Handbook (FSH 2309.18), Forest Service Standard Specifications for Construction and Maintenance of Trails (EM-7720-103), and the Central Oregon Trail Alliance Trail Standards. Standards for adaptive trails can be referenced in the Kootenay Adaptive Sport Associations document "Adaptive Trail Standards" (2020).

Best Management Practices (BMPs) are standard conservation practices that have proven effective in protecting soil and water resource values during land management activities. BMPs from the National Best Management Practices for Water Quality Management of National Forest System Lands – Volume 1 (USDF 2012) relevant to the project are listed below and would be implemented as appropriate in the project area:

| | |
|---|---|
| Plan-3 Aquatic Management Zone Planning | Road-7 Stream Crossings |
| AqEco-2 Operations in Aquatic Ecosystems | Rec-3 Dispersed Use Recreation |
| Road-9 Parking and Staging Areas | Rec-4 Motorized and Non-Motorized Trails |
| Rec-1 Recreation Planning | Fac-4 Sanitation Systems |
| Rec-2 Developed Recreation Sites | Fac-5 Solid Waste Management |

### Soils and Hydrology

- Utilize physical features and slope gradients during layout and construction to maximize tread stability.
- Include drain dips and outsloped treads as drainage features to shed runoff from rainstorms and snow melt.
- Bench cut sections of trail that traverse steep slopes with sufficient width to provide stable tread. Support backslopes at approximate angles of repose.
- Include drainage features where bench cut trails cross mapped landslide deposits to alleviate the damming effect of these cuts to the downslope movement of subsurface water flow.
- Design switch backs with sufficient width, grade and support to maintain a sustainable trail tread (GQTE switchberm concept).
- Provide for water passage where trails cross ephemeral, intermittent or perennial drainages. Features can include spans, puncheons with drains, buried culverts, rocked fords, raised treads, stone pitching etc.
- Avoid machine construction of trails during periods of excessive moisture or freeze/thaw conditions
- Ensure that any work within the stream channel such as water crossings is coordinated at least 90 days in advance with the District Hydrologist or District Fisheries Biologist so proper coordination can be made with the requisite resource and regulatory agencies. Depending on the type of in-channel work, permits with Oregon Department of State Lands and the U.S. Army Corps of Engineers may be required. Additionally, all water crossings must enable aquatic organism passage.
- Any approved in-stream work must adhere to the Oregon Department of Fish and Wildlife (ODFW) in-stream water work period of July 1st- October 31st.

- Consult with the District Hydrologist or District Fisheries Biologist for construction or maintenance of any trail sections that cross through Riparian Habitat Conservation Areas (RHCAs).
- Consider the use of crossing material within the stream channel that will prevent riding of bikes across the channel, thus creating walkable crossings to reduce sediment disturbance and sediment input into the stream channel.

**Botany**

- All Threatened, Endangered, and Sensitive plant species will be protected (LRMP Chapter IV, pp. 4-246). If any species are found during project implementation, these species would be protected as described in the policy guidelines found in FSM 2670.

**Invasive Plant Prevention**

- Follow the non-native invasive plant prevention measures included in the non-native invasive plants report. Non-native invasive plant introduction and spread can be a threat to Sensitive plants and their habitat.
- Do not route trails within areas containing non-native invasive plants as much as possible. Existing invasive plant sites are prioritized for treatment.
- To avoid potential spread or introduction of non-native invasive plants, actions conducted or authorized by written permit require cleaning of all equipment (ex. trail dozers, excavators, and other construction or trail maintenance equipment) prior to entering Forest Service lands. This includes cleaning before moving to another location on FS land if equipment inadvertently enters a non-native invasive plant site.
- Use of weed-free gravel, fill, sand, or other quarry or borrow materials is required for construction and maintenance of trails, staging areas, trailheads, etc. A Forest Botanist will inspect any such material before implementation.
- Use of weed-free straw and mulch is required for all project activities if needed.
- Maintenance activities for the trail network that involve blading, brushing, ditch cleaning, etc. in areas with non-native invasive plants will be done in consultation with the District or Forest-level invasive plant specialist.
- Non-native invasive plants introduced on designated routes will be treated using the early detection/rapid response strategy; and given a high priority status for treatment.
- Trails, trailheads, parking areas, etc. that become infested with non-native invasive plants may be closed by the Responsible Official until the infestation is controlled.
- Native plant materials are the first choice in revegetation and rehabilitation where it may be necessary in areas of disturbance near trailheads.

**Wildlife**

- Retain primary cavity excavator habitat
    - Retain all snags. To reduce the likelihood of snags posing a hazard to operations place trails away from clumps of snags and identify hazards during layout so they can be avoided to the greatest extent possible. Applies to all trails and parking/staging areas within project area.
    - Trail construction or maintenance would not remove existing down logs but would move a section of the log for passage according to trail width specs. Down logs are defined as logs that are 12 inches in diameter or greater at the small end and greater than 6 feet in length. Applies to all trails.

- Protect active bird of prey nests from human disturbance until nesting, feeding, and fledging are completed.
    - Seasonal restrictions will be placed on trail construction and maintenance activities where applicable for the following raptor species (applies within 0.5 miles of discovered active nest locations. Currently no known sites where this would apply):
        - Bald and Golden Eagle: March 1 to August 15
        - Goshawk: March 1 to August 31
        - Other Raptors: March 1 to August 1
- Protect and maintain raptor habitat characteristics
    - Trail layout will not fall within the primary or secondary zone of known nesting habitat for raptors. Applies to all trails (currently no known raptor nest sites in project area).
- Minimize disturbance to elk during calving season
    - Trail construction or maintenance in riparian areas (e.g., RHCAs) that begin during calving season (May 15-June 30) would require surveys prior to implementation to determine if calving elk are present. If calving elk are present, project activities would be postponed until completion of calving season. Applies to trails that intersect Riparian areas (RHCAs) and/or upland trails where aspen occur.
- Minimize disturbance to rutting elk
    - Trail construction or maintenance that begin during rutting season (September 1-October 15) would require surveys prior to implementation to determine if any wallows are present. If wallows are located, they would be flagged, and no construction or maintenance activities would be permitted within 0.25 miles of the wallow during the rutting season. Applies to all trail.
- Minimize disturbance to wintering big game
    - Trail construction and maintenance will be seasonally restricted during the winter range season (December 1 to May 1).
    - Trails will be seasonally closed during the winter range period (December 1 to May 1).
- Protect known gray wolf denning or rendezvous sites.
    - If an active gray wolf den or rendezvous site is discovered during trail layout or during implementation of construction activities, the site would be flagged, and no construction activities would be permitted within one mile of an active den or rendezvous site from April 1st to July 15th. Applies to trails within 1 mile of discovered gray wolf active den or rendezvous site in project area. Currently there are no known wolf dens or rendezvous sites in the project area.

**Cultural Resources**

- Avoidance of cultural resources determined eligible or unevaluated for the National Register of Historic Places.
- Areas to be protected during implementation through avoidance will be flagged.

- Trail construction may be accomplished using a mini excavator and/or hand tools while avoiding contributing components of cultural resources determined eligible for the National Register of Historic Places.
- Use of existing Forest Service system roads that cross through specified archaeological sites is permitted provided no disturbance occurs outside the width of the roadbed as it existed at the time of site recording. No widening of the road is allowed. No maintenance activities that cause disturbance of sediment outside the existing width of the roadbed, such as the creation of ditches or other drainage features, are permitted within the site boundary.
- In the event that previously unknown sites or artifacts are discovered during project implementation, operations in the area will cease and the site flagged and avoided until an archaeologist is consulted. Implementers will receive briefing prior to work starting.

# Appendix C – Implementation Plan

## Phased Implementation and Monitoring

The trail system would be implemented in two or three construction phases, depending on the alternative. The availability of grants, funding, and volunteer and employee labor also affect the timing of implementation and therefore trails are prioritized for implementation. Additionally, implementation of the trail system will need to be coordinated with implementation of the Mill Creek Vegetation Management Project.

Prior to implementation, education and outreach efforts would take place (see Education and Notification section below). Construction of Phase 1 trails would begin after the decision is signed. Prior to constructing phase 2 and again prior to constructing phase 3, monitoring results would be assessed to determine if the next phase is warranted and/or if any modifications to the system are needed to address undesirable impacts.

For example:

| Year 1 | 2 | 3 | 4 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|
| Phase 1 Construction | Monitor | Monitor | Phase 2 Construction | Monitor | Monitor | Phase 3 Construction |

The first phase of implementation would include the core arterial component and a good mix of trail difficulty levels and options for adaptive mountain biking equipment which provides a combination of options to serve the widest array of people. Regardless of alternative selected, the first phase would likely include 8 to 10 miles of trail. Alternatives with the fewest miles could be completed in two phases rather than three.

Under the preferred alternative (Alt 6) the following trail segments would be built in the first phase: 1.0, 1.2, 1.7, 1.15, 5.5, 9.2, 11.2,13.0, 13.3, 13.4, 15.0, 15.1, 16.0, 17, 17.1, 17.2, 17.3, 18, 18.1, 18.2, 18.3, 19, 19.1, 19.2, 19.3, 19.4, 19.5, 22.0, 22.1. This is a total of 10.5 miles and approximately 38% of the total trail miles in Alternative 6.

Before moving from one phase to the next the following elements would be monitored and the results would be used to determine if any corrective actions are necessary or if the next phase of implementation is warranted:

- Implementation: Did trail construction followed the project design criteria and best management practices in the Lemon Gulch Environmental Assessment Appendix B – Project Design Criteria? A team review of trails, trailheads, and signs would determine if project design criteria were followed. Responsible persons: recreation planner, botanist, invasive plant specialist, rangeland management specialist, soils scientist, hydrologist, and fisheries biologist.
- Grazing Utilization: Are impacts to cattle distribution affecting the ability to meeting grazing standards? Specific utilization standards from the Forest Plan would be used to determine if standards are being met at established monitoring location (DMA) near Lemon Creek. If not, it could signify the cows are not moving in the way the permittee intends them to. Responsible persons: recreation planner, rangeland management specialist.
- Trail and Trailhead Use: What is the amount of use the new trails are receiving? By conducting vehicle counts, using trail counters, and/or conducting surveys, the Forest Service can determine the amount of use and interest in the trail system. This would inform whether or not the lower

trailhead should be enlarged from an initial capacity of 20 vehicles. Responsible person(s): recreation planner.

### Education and Notification

Numerous examples of educational materials have been developed for use in western states where multiple use of public lands occurs frequently.

- The Idaho Rangeland Resources Commission has an educational program called Care/Share (https://idrange.org/recreation. Materials include this video "Cattle Tips for Recreationists" https://youtu.be/hYz7wqQ0dV0 and "Range Tips for Recreationists" https://youtu.be/tEqeElX0fSE
- Colorado State University Extension Service video "Mountain Bikes and Cows" https://www.youtube.com/watch?v=5pF6cMaRtkE

The following bullet items are from USFS web page "Know before you go" and would be used in various public messaging materials. Also see Figures C-1 and C-2 on the following pages for examples of signage used to notify and educate the recreating public.

Stay on open forest roads

- Some roads could be closed temporarily or permanently to protect against further damage to wetland and aquatic resources and halt damage to soil, water and vegetation resources. The intent of road closures is to balance popular public use with the sustainability of natural resources.
- Closed roads will be posted. Not all bicycle trails are open to off-highway vehicle use. Go to your forest or grassland website for a map of bike trails.
- Wilderness areas are off-limits to all vehicles, including bicycles.
- Comply with signs and barriers, and leave gates as you found them.
- Some trails cross private property and are subject to deed restrictions, which prohibit vehicular travel of any kind.
- Respect public and private property by practicing minimum impact cycling.

Protect the environment

- Stay on trails and roads designated for use. Cutting switchbacks, creating hill climbs and riding in undesignated areas cause erosion, loss of wildlife habitat and other natural resource damage. Repairs cost tax dollars, and citations cost you dollars.
- Minimize erosion by staying on trails and not cutting switchbacks.
- Avoid wet, muddy areas as they are more susceptible to erosion. Meadows, lake shores, stream banks and vegetation are easily damaged.
- Do not ride on snow-covered roads!
- Do not disturb wildlife or livestock.
- Teach new riders trail etiquette—lead by example.
- Don't litter. Pack out more than your share.

Ride safely, stay in control

- The forest is for everyone. Be considerate of hikers and equestrians.
- Always wear a protective helmet and other gear.
- Ride single file in the middle of the trail to avoid widening the trail.
- Yield right-of-way to other trail users. Horses spook when they see an unfamiliar object, especially one that moves quickly and quietly.
- Slow down and use caution when passing others. If necessary, dismount your vehicle or bicycle on the downhill side and wait for horses and hikers to pass.

- Control your speed at all times and approach turns in anticipation of someone around the bend. Reckless riding and high downhill speeds are not appropriate.

<u>Be prepared</u>

- Be prepared for sudden changes in weather.
- Don't ride alone. Tell someone where you plan to ride and then stick to your plans.
- Don't take unnecessary chances—help for emergencies may be miles away.
- Make sure you have a first aid kit and other safety gear with you when riding in the forest.

Figure C-1: Example of signage used to notify and educate recreationists

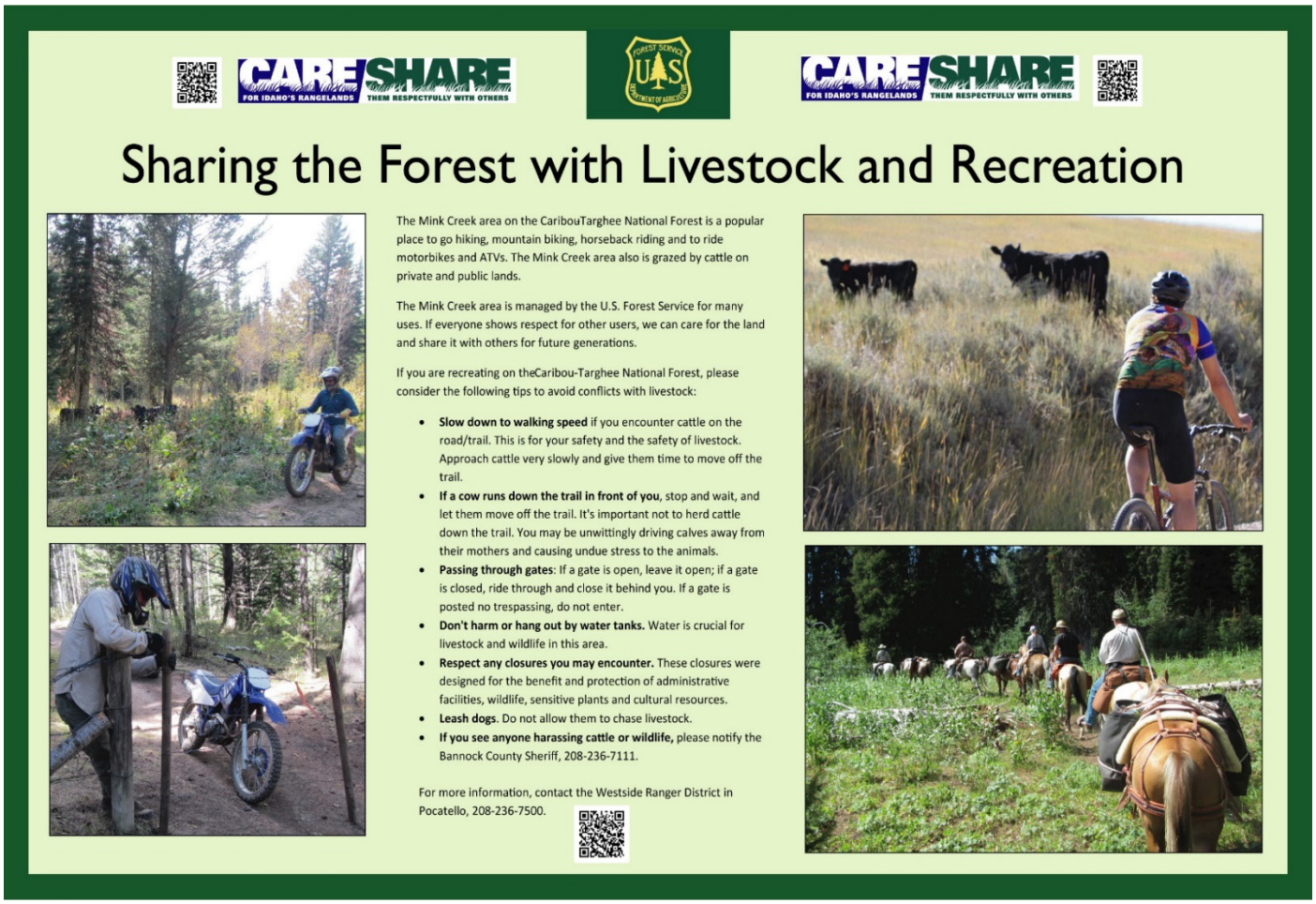


Figure C-2: Example of signage used to notify and educate recreationists