



United States
Department of
Agriculture

Forest
Service

September 2006



Record of Decision and Final Environmental Impact Statement

Maury Mountains Allotment Management Plan

Lookout Mountain Ranger District
Ochoco National Forest

Crook County, Oregon

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Maury Mountains Allotment Management Plan Draft Environmental Impact Statement

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Abstract: This Final EIS describes the effects of implementing or eliminating livestock grazing in six allotments in the Maury Mountains of the Ochoco National Forest. The project area is located 25-30 miles southeast of Prineville, Oregon and encompasses approximately 62,000 acres. Continuation of livestock grazing is proposed to meet the demand for livestock forage while improving stream shade and bank stability along streams.

Alternative 4 is the preferred alternative for the Double Cabin, East Maury, Klootchman, and Sherwood Allotments and would continue grazing on these four allotments. Alternative 2 is the preferred alternative for the Shotgun Allotment and would continue grazing on this allotment.

Alternative 1 is the no action alternative and would eliminate livestock grazing. Alternative 2 is the proposed action and would continue grazing on five allotments; however, the amount and season would change. Alternative 3 would continue the current amount and season of livestock grazing on six allotments. Alternative 4 would continue livestock grazing on five allotments and change the amount and season of livestock grazing. Seven alternatives were considered but eliminated from detailed study.

Record of Decision

Maury Mountains Allotment Management Plan

**USDA Forest Service
Lookout Mountain Ranger District
Ochoco National Forest**

Crook County, Oregon

Decision and Reasons for the Decision

Background

There is a long history of livestock grazing in the Maury Mountains. The Forest Plan allows for and encourages livestock use and recognizes that ranching is an important lifestyle in surrounding communities. It is Forest Service policy to make forage available for livestock grazing on lands that are suitable for grazing and consistent with land and resource management plans (FSM 2203.1 and 36 CFR 222.2). There continues to be a demand for forage from the Ochoco National Forest and these allotments. All five current permit holders have indicated their interest in continuing to graze livestock on the National Forest.

The need for modifying grazing practices arose during the development of the Maury Mountains Watershed Analysis. The watershed analysis recommended that livestock management be changed or that riparian pastures/exclosures be constructed along streams that have greater than 10 percent cutbank. It also recommends that watering troughs in riparian areas be relocated or removed to reduce the loss of riparian vegetation and bank trampling. Along with the watershed analysis, stream surveys indicated that many portions of streams in the project area do not meet the desired condition for shade or bank stability.

The purpose of this proposal is to authorize livestock grazing in a manner that is consistent with the Ochoco National Forest Plan, as amended. This action is needed because there continues to be a demand for livestock forage in the six allotments in the Maury Mountains and resource conditions related to stream shade and bank stability need to be improved. This proposal would authorize livestock grazing in a manner that promotes the recovery of vegetation in riparian areas to increase the amount of stream shade and to protect stream banks from erosion. This proposal

addresses the goals and objectives outlined in the Forest Plan, as amended, and moves the project area towards desired conditions described in that plan (USDA Forest Service 1989a).

The final environmental impact statement (EIS) documents the analysis of four alternatives to meet this purpose and need.

Decision

Based upon my review of all alternatives, I have decided to implement Alternative 2 for the Shotgun Allotment and Alternative 4 for the Double Cabin, East Maury, Klootchman, and Sherwood Allotments. This combination was identified as the preferred alternative during the comment period on the Draft EIS. This preferred alternative includes reauthorizing grazing in five allotments along with authorizing several structural range improvements. The West Maury Allotment will be eliminated as a separate allotment. The pastures from the West Maury Allotment will be assigned to the Klootchman and Sherwood Allotments.

My decision also adopts the design elements and monitoring referenced on pages 27-33 in Chapter 2 of the Final EIS. This decision will allow continued livestock grazing on the Double Cabin, East Maury, Klootchman, Sherwood, and Shotgun Allotments under revised allotment management plans. As noted in the Final EIS (pp. 18 and 24), the actual season for livestock use may be less than permitted in order to meet Forest Plan goals and objectives/desired conditions. The number of days livestock spend on each allotment may be adjusted annually based on variations in weather and range readiness or unpredictable events such as wildfire and drought. The earliest livestock will be allowed to graze is May 1. With the exception of the East Maury Allotment, livestock will not be grazed after August 15. The dates identified below are target dates for grazing.

The Double Cabin Allotment will consist of 9,345 acres in five pastures. The East Pasture will be eliminated from this allotment. Grazing of 220 cow/calf pairs will be permitted between May 14 and July 31 for a maximum of 765 animal unit months (AUMs). A more detailed description of this allotment is found on pages 24-25 of the Final EIS.

Livestock grazing on the East Maury Allotment will be reauthorized on 9,444 acres in four pastures. After 10 years of rest, grazing of 241 cow/calf pairs will be allowed between May 1 and August 30, for a maximum of 1,294 AUMs. A more detailed description of this allotment is found on page 25 of the Final EIS.

The Klootchman Allotment will consist of 15,380 acres in 10 pastures. The Hamer Pasture from the West Maury Allotment will be assigned to this allotment. Grazing of 300 cow/calf pairs will be permitted between May 14 and August 7, for a maximum 1,139 AUMs. A more detailed description of this allotment is found on pages 25-26 of the Final EIS.

The Sherwood Allotment will consist of 16,112 acres in four pastures. The Gibson Pasture from the West Maury Allotment and the West Pine Pasture from the Shotgun Allotment will be assigned to this allotment. Grazing of 300 cow/calf pairs will be authorized between May 14 and

July 3, for a maximum 673 AUMs. A more detailed description of this allotment is found on page 26 of the Final EIS.

The Shotgun Allotment will consist of 9,582 acres in one pasture. Grazing of 200 cow/calf pairs will be permitted between May 15 and July 16, for a maximum 554 AUMs. A more detailed description of this allotment is found on page 21 of the Final EIS.

When compared to the other alternatives the selected alternative strikes the best balance between meeting the demand for livestock forage and moving resource conditions toward desired conditions in the Forest Plan, as amended. The selected alternative provides 4,425 AUMs of forage to local ranchers to meet the demand for forage while modifying grazing practices to meet the needs for increasing stream shade and increasing bank stability. The selected alternative includes mechanisms to improve livestock distribution; these mechanisms include additional water developments, additional fences, early-season grazing, and daily management.

For the Double Cabin Allotment, Alternative 4 is the selected alternative. Alternatives 2 and 4 for this allotment are similar with the exception of Alternative 2 splitting the herd 2 out of 4 years to allow rest in the Center and West Pastures. Both alternatives include relocating eight water troughs, improving their water holding capability, and constructing four new water developments to reduce livestock concentration in riparian areas. The grazing system will be changed from the current deferred rotation to rest rotation to allow vegetation periodic rest from grazing. Both alternatives require daily management when livestock are in the Center and West Pastures to improve distribution. Alternative 4 was preferred over Alternative 2 because it does not split the herd and impose unnecessary management constraints on the permit holder. Resource objectives for stream shade and bank stability can be met under both Alternatives 2 and 4 as described in Chapter 3 of the Final EIS. Alternative 3 was not selected because it would not result in improved livestock distribution and forage in riparian areas would continue to be over utilized. Under Alternative 3, livestock are expected to continue concentrating in areas along Bear, Double Cabin, Faught, Parrish, and Wiley Creeks. Parrish Creek has low levels of shade and is in a static trend. Double Cabin Creek is in a downward trend for stream shade and that trend would continue. Under Alternative 3 conditions are not expected to improve, while they would improve under Alternative 4. Under Alternative 4, riparian vegetation would increase and expand along these streams resulting in additional stream shade and more stable streambanks. Alternative 1 was not selected because it would not meet the demand for livestock forage.

For the East Maury Allotment, Alternative 4 is the selected alternative. Alternatives 2 and 4 for this allotment were identical. Under Alternative 4, the East Maury Allotment would be rested for 10 years allowing riparian vegetation and streambank conditions along Cottonwood, Maury, Pine, and Stewart Creeks to improve. After 10 years, grazing would resume; at that time, new structural improvements would be in place, four troughs would have been relocated away from riparian areas, and seven ponds would have been maintained to improve their water holding capability. The number of AUMs will remain the same as the existing AUMs, but the season of use would be 1 month earlier. This will allow the riparian areas to improve more quickly. When livestock are grazed after the 10-year rest, distribution will be better and the amount of time cattle spend in riparian areas seeking water will be less. Alternative 3 was not selected because structural improvements would not be constructed and would not aid in improving livestock

distribution. In addition, Alternative 3 would authorize grazing until September 30, well into the hot and dry period when cattle tend to congregate in riparian areas and change their dietary preference to woody riparian vegetation. Alternative 1 was not selected because it would not meet the demand for livestock forage.

For the Klootchman Allotment, Alternative 4 is the selected alternative. Alternatives 2 and 4 for this allotment are similar with the exception of a temporary reduction of AUMs under Alternative 4 while new improvements are constructed and a permanent reduction of AUMs under Alternative 2. Both alternatives include new fences to divide pastures, 7 new water developments, and relocating 12 troughs out of riparian areas to improve livestock distribution and reduce livestock concentration in riparian areas. The grazing system will be changed from the current deferred rotation to rest rotation to allow vegetation periodic rest from grazing. Alternative 4 was preferred over Alternative 2 because it does not permanently reduce AUMs. During public involvement efforts, several comments suggested that AUMs should not be reduced. After the new improvements are in place, resource objectives related to stream shade and bank stability can be met while maintaining AUMs because these new improvements will aid in ensuring that livestock are adequately distributed. Alternative 3 was not selected because it would not result in improved livestock distribution and forage in riparian areas would continue to be over utilized. Under Alternative 3, livestock are expected to continue concentrating in areas along streams. Portions of Bear, Cow, Deer, Ferguson, Florida, Friday, Klootchman, Sherwood, and Newsome Creeks within the Klootchman Allotment have less than 80 percent shade and shade would not be expected to increase. Portions of Klootchman Creek that have more than 20 percent cutbank would not be expected to improve. The headcut enclosure on Sherwood Creek would not be constructed under Alternative 3; this portion of Sherwood Creek would continue to exceed Forest Plan standards for cutbank. Alternative 1 was not selected for the Klootchman Allotment because it would not meet the demand for livestock forage.

For the Sherwood Allotment, Alternative 4 is the selected alternative. Alternatives 2 and 4 for this allotment were identical. Under Alternative 4, a rest-rotation system using four pastures would be implemented. Twelve existing troughs will be relocated and 15 new water developments will be constructed to improve livestock distribution and reduce the time livestock spend in riparian areas. The rest-rotation system will allow vegetation periodic rest from grazing. Alternative 3 was not selected because livestock would continue to concentrate in areas along Florida, Newsome, and Sherwood Creeks. Portions of these streams exceed Forest Plan standards for cutbank and conditions would not improve. Shade levels are less than desired along Florida, East, Gibson, Newsome, Sanford, and Sherwood Creeks; shade levels are not expected to improve. Alternative 1 was not selected for the Sherwood Allotment because it would not meet the demand for livestock forage.

For the Shotgun Allotment, Alternative 2 is the selected alternative. Under Alternative 2, this allotment would be a single pasture with the requirement to manage daily, move livestock as needed to ensure distribution is adequate, and vary the areas where cattle are placed on the allotment each year. Six existing water troughs will be relocated outside of riparian areas. Ten new water developments would be constructed. This alternative will result in improving riparian areas. The amount of riparian vegetation will increase which will result in more stream shade and increase the amount of stable streambanks. The permittee has used this grazing strategy for

the last two grazing seasons and there are noticeable improvements in the amount of riparian vegetation. Alternative 4 contains the same water developments and relocation of water troughs outside of riparian areas. Alternative 4 differs from Alternative 2 because it requires the construction of fences to divide the allotment into three pastures. Alternative 4 was not selected because building several miles of fence to split the allotment into pastures is not needed to meet resource objectives. Alternative 4 would impose unnecessary constraints on the permit holder by requiring construction and maintenance of approximately 7 miles of fence. Alternative 3 was not selected because areas along Tom Vawn, Drake, Shotgun, and Wildcat Creeks do not meet Forest Plan standards for bank stability and stream shade and conditions would not improve. Existing troughs that are located in riparian areas would not be relocated and would continue to draw cattle into these areas. New water developments would not be constructed and cattle would continue to congregate in riparian areas. Alternative 1 was not selected for the Shotgun Allotment because it would not meet the demand for livestock forage.

Alternatives Considered

I considered four alternatives in detail. These alternatives are briefly discussed below. Alternative 1 was the environmentally preferred alternative. A detailed comparison of these alternatives can be found in the Final EIS on pages 36-44.

Alternative 1 (No Action)

Under the No Action alternative, grazing would not be reauthorized and the current permit holders would be notified that their term grazing permits would be cancelled. All Term Grazing Permits would be cancelled after 2 years, pursuant to 36 CFR (Code of Federal Regulations) 222.4(a)(1). This alternative would close six allotments, eliminating livestock grazing from 61,165 acres of Forest Service administered lands in the Maury Mountains. Permits would not be issued for any of the six affected allotments unless a subsequent decision to re-stock the allotments was made.

Alternative 2

Alternative 2 is the proposed action. Livestock grazing would be reauthorized and term grazing permits would be issued for five allotments. The West Maury Allotment would be eliminated as a separate allotment and the pastures would be assigned to the Klootchman and Sherwood Allotments. A detailed description of Alternative 2 is contained in the Final EIS on pages 18-21.

The Double Cabin Allotment would consist of 9,345 acres split between five pastures. Grazing of 220 cow/calf pairs will be permitted between May 14 and July 31, for a maximum of 765 AUMs.

The East Maury Allotment would consist of 9,444 acres split between four pastures. Grazing of 241 cow/calf pairs will be permitted between May 1 and August 30, for a maximum of 1,294 AUMs.

The Klootchman Allotment would consist of 15,380 acres in 10 pastures. The Hamer Pasture from the West Maury Allotment will be assigned to this allotment. Grazing of 300 cow/calf pairs will be permitted between May 14 and July 21, for a maximum 911 AUMs.

The Sherwood Allotment would consist of 16,112 acres in four pastures. The Gibson Pasture from the West Maury Allotment and the West Pine Pasture from the Shotgun Allotment will be assigned to this allotment. Grazing of 300 cow/calf pairs will be authorized between May 14 and July 3, for a maximum 673 AUMs.

The Shotgun Allotment would consist of 9,582 acres in one pasture. Grazing of 200 cow/calf pairs will be permitted between May 15 and July 16, for a maximum 554 AUMs.

Alternative 3

Alternative 3 would reauthorize grazing on all six allotments. Permits would be issued under the same terms and conditions as the existing permits. A detailed description of Alternative 3 is contained in the Final EIS on pages 21-24.

The Double Cabin Allotment consists of 10,891 acres split between six pastures. Grazing of 220 cow/calf pairs would be permitted between May 24 and August 30, for a maximum 958 AUMs.

The East Maury Allotment consists of 9,444 acres split between five pastures. Grazing of 241 cow/calf pairs would be permitted between June 1 and September 30, for a maximum of 1,294 AUMs.

The Klootchman Allotment consists of 10,631 acres split between four pastures. Grazing of 288 cow/calf pairs would be permitted between May 15 and July 21, for a maximum of 862 AUMs. This permit also includes the Hamer Pasture of the West Maury Allotment which authorizes 300 cow/calf pairs from May 15 to June 4 for an additional 277 AUMs.

The Sherwood Allotment consists of 6,097 acres split between two pastures. Grazing of 300 cow/calf pairs would be permitted between May 14 and July 3, for a maximum 488 AUMs. This permit also includes the Gibson Pasture of the West Maury Allotment which authorizes an additional 185 AUMs.

The Shotgun Allotment consists of 16,594 acres split between two pastures. Grazing of 216 cow/calf pairs would be permitted between June 16 and September 30, for a maximum 1,017 AUMs. Two permits, one for 135 cow/calf pairs and the other for 81 cow/calf pairs, would be issued.

The West Maury Allotment consists of 7,512 acres split between two pastures: Gibson and Hamer. Grazing of 300 cow/calf pairs between May 14 and July 3 would be reauthorized on the Gibson Pasture, for a maximum 185 AUMs. The Gibson Pasture would continue to be used with the Sherwood Allotment. Grazing of 288 cow/calf pairs between May 15 and July 21 would be authorized on the Hamer Pasture, for a maximum of 277 AUMs. The Hamer Pasture would continue to be used with the Klootchman Allotment.

Alternative 4

Livestock grazing would be reauthorized and term grazing permits would be issued for five allotments. The West Maury Allotment would be eliminated as a separate allotment. A detailed description of Alternative 4 is contained in the Final EIS on pages 24-27.

The Double Cabin Allotment would consist of 9,345 acres split between five pastures. Grazing of 220 cow/calf pairs would be permitted between May 14 and July 31 for a maximum of 765 AUMs. The East Pasture would be eliminated. This alternative is the same as Alternative 2, except the herd would not be split 2 out of 4 years.

Livestock grazing on the East Maury Allotment would be the same as Alternative 2.

The Klootchman Allotment would consist of 15,380 acres in ten pastures. The Hamer Pasture from the West Maury Allotment would be assigned to this allotment. Grazing of 300 cow/calf pairs would be permitted between May 14 and August 7, for a maximum 1,139 AUMs. This alternative is the same as Alternative 2, except the number of AUMs would be increased from 911 to 1,139 as fences and water developments are constructed.

Livestock grazing on the Sherwood Allotment would be the same as Alternative 2.

The Shotgun Allotment would consist of 9,582 acres in three pastures. Grazing of 200 cow/calf pairs would be permitted between May 15 and July 16, for a maximum 554 AUMs. This alternative is the same as Alternative 2, except the single pasture would be divided into three pastures and the grazing system would change from an early on/off system to a rest-rotation system.

Public Involvement

Prior to developing the proposed action and initiating public involvement efforts, the Forest Service met with affected livestock permittees to discuss possible changes. Information and recommendations obtained during these meetings were used to develop the proposed action.

On March 15, 2005, the agency sent letters requesting comments to 41 potentially interested or affected individuals, groups, organizations, and tribes. The agency also published a Notice of Intent (NOI) to prepare an EIS in the Federal Register. The NOI was published on April 13, 2005. In response to these requests for input, several letters, telephone calls, and e-mails were received. At the request of the Oregon Department of Fish and Wildlife (ODFW), members of the Interdisciplinary Team met with staff from ODFW on June 28, 2005. Members of the IDT also participated in a field trip with the permittees and the county extension agent on August 28, 2005. Another meeting was held with three adjacent landowners. A meeting was also held with the county extension agent at his request.

Results from scoping are described in Chapter 1 of the Final EIS on pages 11-14. The main concerns that were revealed during scoping efforts relate to (1) the level of livestock grazing,

(2) factors that affect stream shade and cutbank, (3) restricting other uses that affect stream conditions, (4) results of stream surveys, and (5) the capability and suitability of the area to support livestock grazing. To address these concerns, the Forest Service (1) created two alternatives to the proposed action, (2) included information in the Draft EIS recognizing that there are several factors that affect stream shade and cutbanks, (3) explained that the scope of the analysis was limited to meeting the demand for livestock grazing and acknowledged that other actions are occurring in the project area to improve stream conditions, (4) disclosed results of stream surveys in the Draft EIS, and (5) explained that the area was determined to be capable and suitable for livestock grazing.

Copies of the Draft EIS were provided to potentially interested or affected individuals, groups, organizations, and tribes in June and July 2006. The Notice of Availability for the Draft EIS for the Maury Mountains Allotment Management Plan Project was published in the Federal Register on July 7, 2006 (Vol. 71, No. 130). A legal notice inviting comments on the Draft EIS was published in *The Bulletin* newspaper, Bend, Oregon, on July 14, 2006.

Results from the comment period are described in Chapter 1 of the Final EIS on pages 11-14 and in Appendix A. The main concerns revealed during the comment period relate to (1) the level of livestock grazing, (2) compliance with INFISH Riparian Management Objectives and standards and guidelines, (3) alternatives considered in the Draft EIS, and (4) monitoring to ensure compliance with the goals and objectives in the Forest Plan.

To address these concerns, the Forest Service (1) better explained the changes made in the level of livestock grazing, (2) updated the EIS to clarify the intent of RMOs and describe how modifying grazing practices in Alternatives 2 and 4 help to move conditions toward RMOs, (3) clarified that the alternatives do allow flexibility in livestock management based on annual conditions and range readiness, and (4) explained the intent of the effectiveness monitoring described in the Draft EIS.

Findings Required by Other Laws and Regulations

National Forest Management Act: To ensure consistency with the National Forest Management Act, the Ochoco National Forest Land and Resource Management Plan, as amended, was consulted. The Forest Plan contains several standards and guidelines that apply forest-wide or to specific management areas. Both forest-wide and management area specific standards and guidelines were reviewed. Table 16 in the Final EIS briefly identifies the relevant standards and guidelines and provides a brief explanation of how the selected alternative is consistent. The selected alternative is consistent with all applicable Forest Plan direction. This decision to reauthorize livestock grazing on five allotments in the Maury Mountains is consistent with the intent of the Forest Plan's long term goals and objectives identified in Chapter 4, Section 1 (pp. 4-1 to 4-39). In addition, the requirements at USC (United States Code) 1604(g)(3) were reviewed and the selected activities are consistent.

In reviewing the Final EIS and the activities included in the selected alternative, I have concluded that my decision is consistent with the following laws, requirements, and policies.

National Environmental Policy Act: The National Environmental Policy Act (NEPA) establishes the format and content requirements of environmental analysis and documentation. The entire process of preparing this environmental impact statement was undertaken to comply with NEPA.

Clean Water Act: To carry out this law, the State of Oregon has established state water quality standards for factors such as water temperature, sedimentation, habitat modification and pH, and an anti-degradation policy to protect water quality conditions. Under the anti-degradation policy in Section 303(d), water bodies that do not meet water quality standards are designated as “water quality limited.” The project area contains six streams that are currently on the 2002 303(d) list for exceeding the average of the 7-day maximum stream temperature standard (64.4° F or 18° C) for fish rearing. The streams within the project area on the 303(d) list are: Bear, Cow, Deer, Klootchman, Shotgun, and Wildcat Creeks. The selected alternative would result in more riparian vegetation that in time would provide shade and reduce stream temperatures, which would lead to restoring water quality. The selected alternative complies with the Clean Water Act and state water quality standards.

Endangered Species Act: Biological Evaluations (BEs) have been prepared to document possible effects of proposed activities on threatened and endangered species in the project area. There are no endangered species known or suspected to occur on the Ochoco National Forest. Threatened species that are known or suspected to occur on the Ochoco National Forest include bull trout, mid-Columbia River steelhead, northern bald eagle, and Canada lynx. Potential effects to these species were analyzed and the analysis is summarized in the BEs (January 2006 Resource Report for Wildlife and January 2006 Resource Report and Biological Evaluation for Aquatic Species). There would be no effect to bull trout or mid-Columbia River steelhead because there is no habitat within the project area. The project is not likely to adversely affect Canada lynx because it is not expected to occur in the project area or on the Ochoco National Forest. The project may affect, but is not likely to adversely affect northern bald eagle because fence construction and maintenance activities will be restricted during the nesting season. Consultation with the U.S. Fish and Wildlife Service has been completed.

National Historic Preservation Act: Consultation with the State Historic Preservation Office has been completed. Locations of new fences and new water developments have been surveyed for heritage resources and no new sites were discovered. If new sites are discovered during construction activities, the water developments would be modified to avoid adverse effects to the sites or the water development would not be constructed. The selected alternative avoids known sites or protects the qualities which make these sites eligible to the National Register of Historic Places. The selected alternative complies with the National Historic Preservation Act.

Implementation

Implementation Date

If no appeals are filed within the 45-day time period, implementation of the decision may occur on, but not before, 5 business days from the close of the appeal filing period. When appeals are

filed, implementation may occur on, but not before, the 15th business day following the date of the last appeal disposition.

Administrative Review or Appeal Opportunities

This decision is subject to administrative review (appeal) pursuant to 36 CFR Part 215. Any notice of appeal must meet the appeal content requirements at 36 CFR 215.14.

Any appeal must be filed (regular mail, fax, e-mail, hand-delivery, or express delivery) with the Regional Forester, USDA Forest Service, Pacific Northwest Region, ATTN: 1570 Appeals, 333 SW First Avenue, P.O. Box 3623, Portland, Oregon 97208-3623. Appeals submitted via fax should be sent to (503) 808-2255. Appeals can be filed electronically at: *appeals-pacificnorthwest-regional-office@fs.fed.us*.

The office hours for those submitting hand-delivered appeals are 8:00 am - 4:30 pm Monday through Friday, excluding holidays.

Appeals, including attachments, must be filed within 45 days from the publication date of the legal notice announcing this decision in *The Bulletin* newspaper, Bend, Oregon. Attachments received after the 45-day appeal period will not be considered. The publication date in *The Bulletin* is the exclusive means for calculating the time to file an appeal. Those wishing to appeal this decision should not rely upon dates or timeframe information provided by any other source.

Electronic appeals must be submitted as part of the actual e-mail message, or as an attachment in plain text (.txt), Microsoft Word (.doc), rich text format (.rtf), or portable document format (.pdf). E-mails submitted to e-mail addresses other than the one listed above, or in formats other than those listed, or containing viruses, will be rejected. It is the responsibility of the appellant to confirm receipt of appeals submitted by electronic mail.

Contact Person

For additional information concerning this decision or the Forest Service appeal process, contact Kevin Keown, Project Leader, Lookout Mountain Ranger District, at 3160 NE Third Street, Prineville, OR 97754 or (541) 416-6500.

/s/ Jeff Walter

JEFF WALTER

Forest Supervisor

Ochoco National Forest

10/26/06

DATE

Final Environmental Impact Statement

Maury Mountains Allotment Management Plan

**USDA Forest Service
Lookout Mountain Ranger District
Ochoco National Forest**

Crook County, Oregon



SUMMARY

The Ochoco National Forest is proposing to reauthorize livestock grazing on five allotments in the Maury Mountains. In addition to reauthorizing livestock grazing, the Forest Service is proposing to authorize construction of 46 new water developments and several miles of fence to improve distribution of livestock. The area affected by the proposal includes approximately 62,000 acres of National Forest System lands in the Maury Mountains.

This action is needed, because there continues to be a demand for livestock forage in the six allotments in the Maury Mountains and resource conditions related to stream shade and bank stability need to be improved. Approximately 55 miles of the 85 miles of Class II and III streams have been surveyed in the Maury Mountains. Eighty-nine (89) percent of the streams surveyed do not meet the desired condition for total shade. The desired condition for stream shade in the Forest Plan is to provide greater than 80 percent stream shade. Stream survey data indicates that of the 55 miles of stream surveyed, approximately 7 miles or 13 percent do not meet the Forest Plan desired condition of 80 percent bank stability. Another 5.5 miles or 10 percent of the area surveyed had between 10-20 percent unstable banks. Map 1 displays the amount of streams with more than 10 percent cutbank (or unstable banks) and displays the streams with less than 80 percent shade. All maps are located at the end of this document.

In 2000, the Lookout Mountain Ranger District of the Ochoco National Forest completed the Maury Mountains Watershed Analysis. The Watershed Analysis recommends that livestock management be changed or that riparian pastures/exclosures be constructed along streams that have greater than 10 percent cutbank (p. 162). The Watershed Analysis noted that grazing pressure was limiting the growth of aspen and willow and was causing a loss of vegetation on streambanks. It recommends that watering troughs in riparian areas should be relocated or removed to reduce the potential for loss of riparian vegetation and reduce bank trampling. The proposed action would modify grazing practices to limit livestock use in riparian areas to reduce the amount of grazing on aspen, willow, and other streamside vegetation. The proposed action would relocate many watering troughs away from riparian areas to reduce trampling.

Public involvement efforts began when a scoping letter was mailed to potentially interested or affected individuals, organizations, and agencies in March 2005. A Notice of Intent to prepare an Environmental Impact Statement (EIS) was published in the Federal Register in April 2005 and also invited public comments. Comments were received from a wide variety of interest including individuals, organizations, business, and governmental agencies. The major issues raised related to riparian vegetation, stream shade, and bank stability, which are all components of the purpose and need for action. A few comments were utilized in the development of Alternatives 3 and 4. These comments related to the level of livestock grazing and livestock distribution. Public involvement efforts and issues are described in Chapter 1 of the Final EIS.

Four alternatives were considered in detail, three that would reauthorize livestock grazing and one that would eliminate livestock grazing. All four of these alternatives are described in detail in Chapter 2 of the Final EIS. Alternative 1 is the no action alternative and would eliminate

livestock grazing. Structural range improvements (such as pasture fences, and water developments) would be removed.

Alternative 2 is the proposed action and would reauthorize livestock grazing in five allotments. Under Alternative 2, the season of use would generally change to earlier season grazing. Alternative 2 also authorizes construction of new fences and new water developments. Several existing water developments would be relocated. Alternative 2 would result in an overall reduction in the amount of livestock grazing authorized, when compared to current levels.

Alternative 3 would continue livestock grazing as it occurs today on six allotments. The season of use would not change. No new fences or water developments would be constructed. Existing water developments in riparian areas would remain.

Alternative 4 would reauthorize livestock grazing in five allotments and is similar to Alternative 2. This alternative was developed to respond to concerns about reducing the overall amount of livestock use. Under Alternative 4, the season of use would generally change to earlier season grazing. Alternative 4 authorizes construction of new fences (more than Alternative 2) and new water developments (the same as Alternative 2). The same water developments that would be relocated in Alternative 2 would be relocated under this alternative. Alternative 4 would also result in an overall reduction in the amount of livestock grazing authorized, when compared to current levels. Alternative 4 authorizes more livestock grazing than Alternative 2.

All three actions alternatives would meet the demand for livestock forage. Alternatives 2 and 4 were both developed to address the needs for increasing stream shade and increasing bank stability. Both Alternatives 2 and 4 would lead to increases in the amount and extent of riparian vegetation; however, Alternative 2 would result in increases more quickly than Alternative 4. More vegetation in riparian areas would lead to increased amounts of shade and cooler stream temperatures. More vegetation in riparian areas also means that streambanks would be more stable and there would be less cutbank. Alternatives 2 and 4 include activities (such as constructing new water developments or relocating existing water developments away from riparian areas) that would improve livestock distribution so that forage in upland areas is better utilized. Alternative 3 would reauthorize livestock grazing and would not modify any grazing practice. Alternative 3 would not lead to increases in the amount of and extent of riparian vegetation because the season of use would not change and no new fences or water development would be authorized. Both streambanks and the amount of shade would not be expected to improve. Under Alternative 3 forage utilization would still be uneven, with upland areas under-utilized and riparian areas over-utilized.

Alternative 1 is the no action alternative and would not meet the demand for livestock forage. The greatest increases in riparian vegetation would occur under Alternative 1 because livestock would no longer consume or trample vegetation in riparian areas. There would be no forage utilization by livestock under this alternative.

Based upon the effects of the alternatives, the Responsible Official will decide whether the livestock grazing will be reauthorized on six allotments in the Maury Mountains. In making his decision, the Forest Supervisor will consider how well the alternatives lead to increasing the

amount of stable streambanks, increasing the amount of stream shade, and distributing livestock throughout the allotments. The Forest Supervisor will also consider comments submitted by the public, including other agencies, individuals, organizations, adjacent landowners, and ranchers.

Table S-1 briefly summarizes the activities include in each alternative. Chapter 2 of the Final EIS includes a complete description of each of the four alternatives considered in detail. Table S-2 briefly summarizes the effects of implementing the alternatives as they related to the Purpose and Need for Action. The environmental consequences of each alternative are described in detail in Chapter 3.

Summary

Table S-1. Activities Included in each Alternative.

	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Current Permits)	Alternative 4	Preferred Alternative
Double Cabin Allotment					
Season of Use	-	May 14 - July 31	May 24 - Aug 30	May 14 - July 31	May 14 - July 31
Grazing System & Number of Pastures	-	early on/off, rest-rotation with 5 pastures	deferred rotation with 6 pastures	early on/off, rest-rotation with 5 pastures	early on/off, rest-rotation with 5 pastures
AUMs	-	765	958	765	765
Permitted Livestock	-	220	220	220	220
Acres	-	9,345	10,891	9,345	9,345
Water Developments	-	27	27	27	27
Fences (miles)	-	17.1	18.9	17.1	17.1
Manage Daily	-	Center and West Pastures	None	Center and West Pastures	Center and West Pastures
East Maury Allotment					
Season of Use	-	May 1 - Aug 30	June 1 - Sept 30	May 1 - Aug 30	May 1 - Aug 30
Grazing System & Number of Pastures	-	deferred rotation with 5 pastures	deferred rotation with 5 pastures	deferred rotation with 5 pastures	deferred rotation with 5 pastures
AUMs	-	1,294	1,294	1,294	1,294
Permitted Livestock	-	241	241	241	241
Acres	-	9,444	9,444	9,444	9,444
Water Developments	-	28	24	28	28
Fences (miles)	-	16.1	16.1	16.1	16.1
Manage Daily	-	None	None	None	None
Kloutchman Allotment*					
Season of Use	-	May 14 - July 21	May 15 - July 21 and May 15 - June 4*	May 14 - Aug 7	May 14 - Aug 7

Summary

Table S-1. Activities Included in each Alternative.

	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Current Permits)	Alternative 4	Preferred Alternative
Grazing System & Number of Pastures	-	early on/off, rest-rotation with 10 pastures	deferred rotation with 6 pastures	early on/off, rest-rotation with 10 pastures	early on/off, rest-rotation with 10 pastures
AUMs	-	911	862 + 277* = 1,139	1,139	1,139
Permitted Livestock	-	300	288 and 300*	300	300
Acres	-	15,380	10,871 + 4,509* = 15,380	15,380	15,380
Water Developments	-	35	28	35	35
Fences (miles)	-	22.9	15.6	22.9	22.9
Manage Daily	-	None	None	None	None
Sherwood Allotment*					
Season of Use	-	May 14 - July 3	May 14 - July 3	May 14 - July 3	May 14 - July 3
Grazing System & Number of Pastures	-	early on/off, rest-rotation with 4 pastures	deferred rotation with 3 pastures*	early on/off, rest-rotation with 4 pastures	early on/off, rest-rotation with 4 pastures
AUMs	-	673	488 + 185* = 673	673	673
Permitted Livestock	-	300	300	300	300
Acres	-	16,112	6,097 + 3,003* = 9,100	16,112	16,112
Water Developments	-	46	16	46	46
Fences (miles)	-	14.8	8.3	14.8	14.8
Manage Daily	-	all pastures	None	all pastures	all pastures
Shotgun Allotment					
Season of Use	-	May 15 - July 16	June 16 - Sept 30	May 15 - July 16	May 15 - July 16
Grazing System & Number of Pastures	-	early on/off with 1 pasture	deferred rotation with 2 pastures	rest-rotation with 3 pastures	early on/off with 1 pasture
AUMs	-	554	1,017	554	554
Permitted Livestock	-	200	216	200	200
Acres	-	9,582	16,594	9,582	9,582

Summary

Table S-1. Activities Included in each Alternative.

	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Current Permits)	Alternative 4	Preferred Alternative
Water Developments	-	28	33	28	28
Fences (miles)	-	5.9	11.4	13	5.9
Manage Daily	-	Drake Pasture	None	None	Drake Pasture

*Includes pasture from the West Maury Allotment. Under Alternatives 2 and 4 the West Maury Allotment would be eliminated as a separate allotment. Under Alternative 3 the West Maury Allotment would continue to be utilized with the Klootchman and Sherwood Allotments.

Table S-2. Effects of Implementing the Alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Demand for Livestock Forage (in AUMs)					
Double Cabin Allotment	0	765 Reduce AUMs by 20% compared to current permit.	958 No reduction in AUMs.	765 Reduce AUMs by 20% compared to current permit.	765 Reduce AUMs by 20% compared to current permit.
East Maury Allotment	0	1,294 No reduction in AUMs. 10-year rest.	1,294 No reduction in AUMs.	1,294 No reduction in AUMs. 10-year rest.	1,294 No reduction in AUMs. 10-year rest.
Klootchman Allotment	0	911 Reduce AUMs by 20% compared to current permit.	1,139 No reduction in AUMs.	1,139 Temporary reduction in AUMs while new improvements are constructed.	1,139 Temporary reduction in AUMs while new improvements are constructed.
Sherwood Allotment	0	673 No reduction in AUMs.	673 No reduction in AUMs.	673 No reduction in AUMs.	673 No reduction in AUMs.

Summary

Table S-2. Effects of Implementing the Alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Shotgun Allotment	0	554 Reduce AUMs by 45% compared to current permit.	1,017 No reduction in AUMs.	554 Reduce AUMs by 45% compared to current permit.	554 Reduce AUMs by 45% compared to current permit.
Stream Shade					
Double Cabin Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase; increases would be slower than Alt. 1. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease.	The amount of shade would increase; increases would be slower than Alt. 1. Measurable increases are expected in 10 years.	The amount of shade would increase; increases would be slower than Alt. 1. Measurable increases are expected in 10 years.
East Maury Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.
Kloutchman Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease.	The amount of shade would increase; increases would be slower than Alts. 1 and 2. Measurable increases are expected in 15 years.	The amount of shade would increase; increases would be slower than Alts. 1 and 2. Measurable increases are expected in 15 years.
Sherwood Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.

Table S-2. Effects of Implementing the Alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Shotgun Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease over time.	The amount of shade would increase; increases would be slower than Alts. 1 and 2. Measurable increases are expected in 15 years.	The amount of shade would increase. Measurable increases are expected in 10 years.
Bank Stability					
Double Cabin Allotment	No streambank alteration from livestock grazing.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	More than 20% streambank alteration annually and an increase in the amount of cutbank.	10% or less streambank alteration annually and no increase in the amount of cutbank.	10% or less streambank alteration annually and no increase in the amount of cutbank.
East Maury Allotment	No streambank alteration from livestock grazing.	No streambank alteration from livestock grazing because allotment would be rested for 10 years.	If rested, no streambank alteration from livestock grazing. If grazed, the amount of alteration is uncertain.	No streambank alteration from livestock grazing because allotment would be rested for 10 years.	No streambank alteration from livestock grazing because allotment would be rested for 10 years.
Kloutchman Allotment	No streambank alteration from livestock grazing.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	More than 10% streambank alteration annually and no increase in the amount of cutbank.	10% or less streambank alteration annually and no increase in the amount of cutbank.	10% or less streambank alteration annually and no increase in the amount of cutbank.

Table S-2. Effects of Implementing the Alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Sherwood Allotment	No streambank alteration from livestock grazing.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	More than 10% streambank alteration annually and no increase in the amount of cutbank.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.
Shotgun Allotment	No streambank alteration from livestock grazing.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	More than 10% streambank alteration annually and an increase in the amount of cutbank.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.
Livestock Distribution					
Double Cabin Allotment	Livestock would be removed.	Livestock distribution would increase as a result of earlier season grazing, and new or improved water developments.	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock distribution would increase as a result of earlier season grazing, and new or improved water developments.	Livestock distribution would increase as a result of earlier season grazing, and new or improved water developments.
East Maury Allotment	Livestock would be removed.	Livestock would not be present for 10 years.	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock would not be present for 10 years.	Livestock would not be present for 10 years.

Table S-2. Effects of Implementing the Alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Kloutchman Allotment	Livestock would be removed.	Livestock distribution would increase as a result of earlier season grazing, new water developments, and changes to pasture fences.	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock distribution would increase as a result of earlier season grazing, new water developments, and changes to pasture fences.	Livestock distribution would increase as a result of earlier season grazing, new water developments, and changes to pasture fences.
Sherwood Allotment	Livestock would be removed.	Livestock distribution would increase as a result of earlier season grazing, new or improved water developments, and adding the West Pine Pasture.	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock distribution would increase as a result of earlier season grazing, new or improved water developments, and adding the West Pine Pasture.	Livestock distribution would increase as a result of earlier season grazing, new or improved water developments, and adding the West Pine Pasture.
Shotgun Allotment	Livestock would be removed.	Livestock distribution would increase as a result of earlier season grazing and new water developments,	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock distribution would increase as a result of earlier season grazing, new water developments, and changes to pasture fences.	Livestock distribution would increase as a result of earlier season grazing and new water developments.

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CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

Changes between Draft and Final EIS

The Purpose and Need for Action section has been updated to include information on demand for livestock forage.

The Public Involvement section has been updated to include information from the 45-day comment period.

Minor typographical errors were corrected.

Document Structure

The Forest Service has prepared this Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Impact Statement (EIS) discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

Chapter 1. Purpose and Need for Action: The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Chapter 2. Alternatives, including the Proposed Action: This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

Chapter 3. Affected Environment and Environmental Consequences: This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area followed by required disclosures.

Chapter 4. Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the EIS.

Index: The index provides page numbers by document topic.

Maps: All maps referenced throughout the EIS appear at the end of this document.

Additional documentation, including more detailed analyses of project area resources, may be found in the project record located at the Lookout Mountain Ranger District office in Prineville, Oregon.

Purpose and Need for Action

There is a long history of livestock grazing in the Maury Mountains. The Forest Plan allows for and encourages livestock use and recognizes that ranching is an important lifestyle in surrounding communities. It is Forest Service policy to make forage available for livestock grazing on lands that are suitable for grazing and consistent with land and resource management plans (FSM 2203.1 and 36 CFR 222.2). There continues to be a demand for forage from the Ochoco National Forest and these allotments. All five current permit holders have indicated their interest in continuing to graze livestock on the National Forest.

The Maury Mountains Watershed Analysis was completed in 2000 and recommends that livestock management be changed or that riparian pastures/exclosures be constructed along streams that have greater than 10 percent cutbank (p. 162). The Watershed Analysis notes that present grazing pressure limits the growth of aspen and willow and is causing loss of vegetation on streambanks. It also recommends that watering troughs in riparian areas be relocated or removed to reduce the loss of riparian vegetation and bank trampling.

The purpose of this proposal is to authorize livestock grazing in a manner that is consistent with the Ochoco National Forest Plan, as amended. This action is needed because there continues to be a demand for livestock forage in the six allotments in the Maury Mountains and resource conditions related to stream shade and bank stability need to be improved. This proposal would authorize livestock grazing so that the resource conditions that are not satisfactory and are affected by livestock grazing would move towards desired conditions described in the Forest Plan, as amended. Livestock distribution also needs to be improved. This proposal addresses the goals and objectives outlined in the Forest Plan, as amended, and moves the project area towards desired conditions described in that plan (USDA Forest Service 1989a).

Stream shade

There is a need to adjust livestock management to promote the recovery of vegetation in riparian areas to increase the amount of stream shade. The desired condition for stream shade is to provide greater than 80 percent shaded surface, or 100 percent of the site potential (Forest Plan, p. 4-240). Approximately 55 miles of the 85 miles of Class II and III streams have been surveyed in the Maury Mountains. Eighty-nine percent of the streams surveyed do not meet the desired condition for total shade. Ninety percent of these streams have hardwood shade values less than 5 percent. Vegetative cover (i.e. shade) is inversely correlated to stream temperatures (i.e. less stream cover results in higher stream temperatures). Livestock grazing is a contributing factor. Map 1 displays stream reaches that have less than 80 percent shade. All maps are located at the end of this document.

Bank stability

There is a need to alter grazing practices to promote the recovery of deep-rooted vegetation including willows and sedges to protect banks from erosion, capture sediment, and control stream channel pattern, profile, and dimension. Buckhouse and Bohn (1987) found streambank retreat (erosion) to be statistically different between ungrazed and grazed treatments. Kauffman et al. (1983) measured significantly greater streambank losses in grazed areas compared to ungrazed areas in northeastern Oregon. The desired condition is to have greater than 80 percent bank stability (INFISH DN, p. A-4). Stream survey data indicates that of the 55 miles of stream surveyed, approximately 7 miles or 13 percent do not meet the desired condition of 80 percent bank stability. Another 5.5 miles or 10 percent of the area surveyed had between 10-20 percent unstable banks. Map 1 displays stream reaches that have high levels of bank erosion or headcuts.

In addition, the Maury Watershed Analysis which was completed in 2000 indicates that loss of aspen, cottonwood, and riparian vegetation, in part due to livestock grazing, has contributed to channel instability.

Livestock distribution

There is a need to develop grazing systems and improvements that will provide for better distribution of livestock, allowing recovery of riparian vegetation and greater utilization of forage throughout the pastures. Range permit administration and general observations indicate that livestock spend a disproportionate amount of time in the riparian areas. The result has been that utilization thresholds are reached in the riparian areas while use in upland areas is often less than allocated.

Proposed Action

The action proposed by the Forest Service to meet the purpose and need is to modify livestock grazing on six allotments in the Maury Mountains of the Ochoco National Forest. The proposed action would reauthorize livestock grazing on five allotments, eliminate one allotment as a separate allotment, and modify the grazing system from a deferred rotation system to an early-on, rest-rotation system for three allotments. The proposed action is described in detail Chapter 2. Alternative 2 is the proposed action.

Project Area

The project area encompasses the Maury Mountains of the Ochoco National Forest and is approximately 62,000 acres in size. The climate of the project area is characterized by a prolonged cool and wet period from November through May, followed by a hot and dry season, which normally extends from June through October. Average annual precipitation within the project area ranges from 13 inches in the lower elevations to 25 inches on Drake Butte and Mule Deer Ridge. Elevation ranges from about 4,000 feet at Sherwood Creek and the National Forest boundary to approximately 6,270 feet on Drake Butte. A vicinity map can be found on Map 2 at the end of this document.

The Crooked River valley forms the northern boundary of the Maury Mountains. The large broad ridge running west-to-east that forms the Maury Mountains creates aspects dominated by steeper north-facing slopes and more gradual south-facing slopes. Streams drain generally to the north into the Crooked River or south into Bear and Camp Creeks and then into the Crooked River. The project area includes portions of the Bear, Upper Crooked River, Camp Creek, Upper North Fork, and Prineville Reservoir fifth-field watersheds.

The south side of the Maury Mountains is dominated by ponderosa pine and western juniper. Northerly aspects tend to have an overstory of ponderosa pine and understories with variable mixtures of Douglas-fir, grand fir, and ponderosa pine. Western larch was historically more common but is shade intolerant and does not compete well in dense stands.

Forest Plan Direction

The Land and Resource Management Plan (aka Forest Plan) was approved in 1989 and has been amended several times. The Forest Plan for the Ochoco National Forest was completed in 1989 and determined that the Maury Mountains area was suitable for livestock grazing. The Forest Plan as amended provides guidance for management activities on the Ochoco National Forest. The Forest Plan established goals, objectives, and desired future conditions. Goals are generalized statements that provide broad direction. Objectives represent projected, potential outputs in support of the goals. Desired future conditions summarize the anticipated physical changes that are likely to occur over time. The Forest Plan also identified standards and guidelines and emphasis statements for each specific management area of the National Forest, as well as Forest-wide standards and guidelines.

Management areas and associated standards and guidelines are described in Chapter 4 of the Forest Plan and are summarized below. Table 16 near the end of Chapter 3 describes the specific standards and guidelines from the Forest Plan as amended that are relevant to this proposal. This proposal is tiered to the Final Environmental Impact Statement (FEIS) for the Forest Plan.

In 1995, the Inland Native Fish Strategy Decision Notice (INFISH) amended the Forest Plan. INFISH added goals and objectives for inland native fish habitat condition and function, and identified Riparian Habitat Conservation Areas (RHCAs) where management activities will meet interim standards and guidelines.

The Maury Mountains Allotment Management Plan (AMP) project area includes several land allocations. Map 3 at the end of this document displays the Forest Plan management allocations (aka management areas) in the project area. The following section identifies the management area and briefly restates its emphasis, desired condition, and key standards and guidelines related to livestock grazing.

MA-F6 Old Growth - The goal for this allocation is to provide stands of old growth throughout the National Forest for wildlife habitat, ecosystem diversity, and aesthetic diversity. The emphasis is to provide habitat for wildlife species dependent on old-growth stands. The desired condition for these areas is stands of mixed conifer and ponderosa pine with multi-layered canopy with shaded conditions, and high levels of snag habitat. The Forest Plan (p. 4-58) also identifies that additional acres of pileated woodpecker “feeding areas” averaging 300 acres in size be located in areas adjacent to allocated old growth areas. There are six allocated old growth areas within the project area.

Livestock grazing is allowed. Up to 50 percent of the annual forage production is allocated to livestock. Both structural (e.g. fences) and nonstructural (burning or seeding) improvements are allowed unless they conflict with the emphasis to provide habitat for old-growth dependant species. The use of motorized equipment for maintenance of improvements is not allowed.

MA-F12 Eagle Roosting Areas - The emphasis for this allocation is to provide winter roosting habitat for migrating bald eagles from December through April. The desired condition for these

areas are uneven-aged stands which contain large trees at least 22 inches in diameter and a few trees which are 36-40 inches in diameter. Roost trees are generally 22 inches in diameter and larger with an open structure allowing eagles to land easily. Roost trees in use will be preserved (Forest Plan, p. 4-70).

Livestock grazing is allowed. Up to 50 percent of the annual forage production is allocated to livestock. Both structural and nonstructural improvements are allowed unless they conflict with the emphasis to provide winter roosting habitat for migrating bald eagles. The use of motorized equipment is prohibited from December 1 to May 1.

MA-F13 Developed Recreation - The objective for developed recreation areas is to manage, improve, modernize, and expand developed recreation sites based on use and needs (Forest Plan, p. 4-22). The emphasis is to provide safe, healthful, and aesthetic facilities for people to utilize while they are pursuing a variety of recreational experiences within a relatively natural outdoor setting. The desired condition for these areas is natural-appearing areas with obvious man-made controls and structures (Forest Plan, p. 4-71).

Livestock grazing is not allowed in Core Areas. There are five developed recreation sites in the project area and the core areas are all fenced.

MA-F14 Dispersed Recreation - The objective for dispersed recreation areas is to provide for a wide variety of recreational opportunities (Forest Plan, p. 4-22). The emphasis is to maintain a near-natural setting for people to utilize while pursuing outdoor recreation experiences (Forest Plan, p. 4-72).

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

MA-F15 Riparian Areas and Riparian Habitat Conservation Areas (RHCAs) - The emphasis in MA-F15 areas is to manage streamside vegetation and habitat to maintain or improve water quality. Another emphasis is to meet temperature and turbidity levels as required by state standards under the Clean Water Act (Forest Plan, p. 4-74). INFISH (pp. A-1 to A-2) established goals to maintain or restore (1) water quality to a degree that provides for stable and productive riparian and aquatic ecosystems; (2) stream channel integrity, channel processes, and the sediment regime under which the riparian and aquatic ecosystems developed; (3) instream flows to support healthy riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges; (4) natural timing and variability of the water table elevation in meadows and wetlands; (5) diversity and productivity of native and desired non-native plant communities in riparian zones; (6) riparian vegetation; (7) riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific geo-climatic region; and (8) habitat to support populations of well-distributed native and desired non-native plant, vertebrate, and invertebrate populations that contribute to the viability of riparian-dependent communities. INFISH (p. A-4) also established Interim Riparian Management Objectives (RMOs) for pool frequency, water temperature, large woody debris, bank stability, lower bank angle, and width/depth ratio.

Livestock grazing is allowed. Up to 50 percent of the annual forage production is allocated to livestock. Both structural and nonstructural improvements are allowed unless they conflict with the management emphasis for the area. Structural improvements are encouraged to disperse livestock away from riparian areas. INFISH (p. A-9) indicates that grazing practices that retard or prevent attainment of RMOs should be modified (GM-1 standard and guideline). INFISH indicates that new livestock handling or management facilities will be located outside RHCAs and that existing facilities that prevent attainment of RMOs will be closed or relocated (GM-2 standard and guideline). INFISH also indicates that livestock trailing, bedding, watering, salting, loading, and other handling efforts would be limited to areas and times that will not retard or prevent attainment of RMOs (GM-3 standard and guideline) .

MA-F18 Hammer Creek Wildlife/Recreation Area - The emphasis for this area is to provide and maintain habitat diversity for a variety of wildlife species where open road density is minimal. In addition, the area also provides a scenic, semi-natural or natural-appearing setting for nonmotorized recreational opportunities (Forest Plan, p. 4-80).

Livestock grazing is allowed. Fall green-up after the regularly scheduled grazing season is reserved for big game (i.e. deer and elk) and grazing extensions generally are not permitted. Both structural (e.g. fences) and nonstructural (burning or seeding) improvements are allowed unless they conflict with the management emphasis for the area. Use of motorized equipment is restricted to open roads from December 1 to May 1.

MA-F20 Winter Range - The emphasis for the area is to manage for big game winter range habitat.

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

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

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

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

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

MA-F26 Visual Management Corridors - The emphasis in this area is to maintain the natural-appearing character of the forest along major travel routes. Forest Roads 16 and 17 have been allocated as visual management corridors with a visual quality objective of partial retention. The outer boundary of this management area will generally not exceed 600 feet on either side of the road. Vegetation will appear manipulated and reflect a forest setting where stands of trees exist in multiple age classes in both uneven- and even-aged conditions, set in a more subdued background of rock outcrops, aspen clones, and native grass communities (Forest Plan, p. 4-94).

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

MA-F28 Facilities - The emphasis in this area is to provide a safe, efficient, and healthful working environment where structure design and layout of the site blend with the surrounding area (Forest Plan, p. 4-97).

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

Decision to be Made

Given the purpose and need, the Responsible Official will decide whether livestock grazing will be reauthorized on six allotments in the Maury Mountains. In making his decision, the Forest Supervisor will consider how well the alternatives lead to increasing the amount of stable streambanks, increasing the amount of stream shade, and distributing livestock throughout the allotments. The Forest Supervisor will also consider comments submitted by the public, including other agencies, individuals, organizations, adjacent landowners, and ranchers.

Public Involvement

Prior to developing the proposed action and initiating public involvement efforts, the Forest Service met with affected livestock permittees to discuss possible changes. Information and recommendations obtained during these meetings were used to develop the proposed action. For example, recommendations to relocate or construct new water developments were incorporated into the proposed action.

On March 15, 2005, as part of the public involvement process, the agency sent letters requesting comments to 41 potentially interested or affected individuals, groups, organizations, and tribes. The agency also published a Notice of Intent (NOI) to prepare an EIS in the Federal Register.

The NOI was published on April 13, 2005. The NOI indicated that comments concerning the scope of the analysis must be received by May 1, 2005.

In response to these requests for input, several letters, telephone calls, and e-mails were received. At the request of the Oregon Department of Fish and Wildlife (ODFW), members of the Interdisciplinary Team met with the staff from ODFW on June 28, 2005. Members of the IDT also participated in a field trip with the permittees and the county extension agent on August 28, 2005. Another meeting was held with three adjacent landowners. A meeting was also held with the county extension agent at his request.

The Draft EIS was made available to the public and a legal notice inviting comments was published in *The Bulletin* newspaper, Bend, Oregon, on July 14, 2006. In response to this invitation, twelve comment letters were received. Appendix A restates a variety of the comments, including all substantive comments, received during the 45-day comment period.

Using the comments from these public involvement efforts, the interdisciplinary team identified several issues that were considered during the analysis process. Consultations with tribal governments did not reveal any significant issues.

Issues

Issues are points of discussion, debate, or dispute about environmental effects that may occur as a result of the proposed action. Issues provide focus and influence alternative development, including development of mitigation measures to address potential environmental effects. Issues are also used to display differing effects between the proposed action and the alternatives regarding a specific resource element.

Significant Issues

The Council on Environmental Quality regulations (40 CFR 1501.7(a)) identify significant issues as issues to be analyzed in detail. The scoping efforts did not result any issues that were considered significant and were analyzed in detail.

Other Issues

The public involvement efforts revealed several issues that were considered during the analysis process. The following includes a brief discussion of issues that were raised or questions that were asked during the public involvement efforts and how they were considered. Two issues were raised that led to developing alternatives to the proposed action.

As a result of scoping efforts and again during the 45-day comment period, some commenters suggested that the level of livestock grazing (number of Animal Unit Months (AUMs)) should not be reduced. This comment was used in part to develop alternatives to the proposed action. Alternative 3 would reauthorize livestock grazing at the same level as today; there would be no reduction in the level of livestock grazing. The proposed action would reduce the number of

AUMs in both the Klootchman and Double Cabin Allotments. Alternative 4 would maintain the existing levels of livestock grazing in the Klootchman Allotment. In the Double Cabin Allotment, the East Pasture would no longer be grazed; so the level of livestock grazing was reduced from existing levels to account for the reduction of acres from the East Pasture. In the Shotgun Allotment, the West Pine Pasture would no longer be included and the level of livestock grazing was reduced commensurate with the reduction in acres available for grazing.

One commenter stated concerns that livestock distribution would not be improved in the Shotgun Allotment because it would only contain one pasture. In Alternative 4, pasture fences would be constructed in the Shotgun Allotment and result in three pastures instead of one.

Several comments during the public involvement efforts stated that livestock are not the only factor that is contributing to unstable streambanks and less than desired levels of stream shade. Those commenters are correct. Unstable streambanks can be exacerbated by roads and recreational use as well as livestock and wildlife use. There are also several factors that affect stream temperature, including amount of surface shading, solar input, depth of water, volume of flow, stream orientation, and air temperature. Stream shade is provided primarily by vegetation, including riparian vegetation. Livestock can and do effect the amount of riparian vegetation. The analysis contained in Chapter 3 focuses on the effects of livestock grazing; however, the analysis recognizes these other factors that contribute to streambank stability and shade and describes the cumulative effects of livestock combined with these other factors.

Some commenters suggested that the proposal should include restriction on other uses which also affect stream side conditions. Since the scope of this analysis was limited to meeting the demand for livestock forage and reauthorizing livestock, restricting other uses would be outside the scope. Other activities that affect stream side conditions were considered in the cumulative effects discussions contained in Chapter 3.

One commenter noted that a certain amount of unstable banks should be expected. A certain level of unstable banks is expected and is recognized by the Forest Service. The standard and guideline in the Forest Plan indicates that cutbanks should not exceed an average of 20 percent for any given stream drainage. In other words, streambanks should be at least 80 percent stable.

One commenter wanted to know if assessments had been conducted to determine appropriate channel pattern, profile, and dimension of streams and potential vegetation. Stream surveys have been completed on 55 miles of Class II and III streams in the project area. The results of those surveys were used to develop the Purpose and Need for Action. In addition, streams have been classified into channel types based on the Rosgen classification. Chapter 3 includes information on the results of streams surveys and channel typing.

One commenter wanted to know what livestock management techniques might be considered to realistically achieve objectives. As discussed in Chapter 3 in the section on Threatened, Endangered, and Sensitive Fish and Frog Species, several studies conclude that earlier season grazing, when upland vegetation is more succulent, results in less livestock use in riparian areas. Also, the availability of water outside of riparian areas should attract cattle away from riparian

areas. Both Alternatives 2 and 4 consider earlier season grazing and additional water developments.

Some commenters were concerned that the Maury Mountains may not be capable of or suitable for livestock grazing. The Forest Service Manual (FSM) 1905 indicates that capability refers to the potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at given levels of management intensity. All lands in the project area are capable of growing at least some forage. Approximately 80 acres throughout the Maury Mountains are considered incapable of grazing because the slope is greater than 60 percent (Holechek et al. 2000). Otherwise, the remaining acres in the project area are capable of livestock grazing.

FSM 1905 indicates that suitability is a determination of “[t]he appropriateness of applying certain resource management practices to a particular area of land as determined by an analysis of the economic and environmental consequences and the alternative uses forgone.” This analysis was done during the development of the Forest Plan. Suitability was determined based on Management Area Standards and Guidelines for forage (USDA Forest Service 1989a, p. 4-142 through 4-147). The Forest Plan determined that livestock grazing was “unsuitable” in two Management Areas: Research Natural Areas (MA-F5) and Developed Recreation Areas (MA-F13). Within the project area, the five campgrounds are deemed “unsuitable” for livestock grazing. These developed recreation areas are: Antelope Flat Reservoir, and Wiley, Elkhorn, Pine Creek, and Double Cabin Campgrounds. These developed recreation areas are fenced to exclude livestock.

Non-significant Issues

Many comments were: (1) outside the scope of the proposed action; (2) already decided by law, regulation, Forest Plan, or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) regulations explain this delineation in Sec. 1501.7, “...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3).” The following includes is a sample of comments that were considered to be non-significant and were not utilized during the analysis process.

One commenter simply stated that the EIS should discuss drinking water sources without providing any rationale. This issue was not considered because there are no municipal water sources in the project area.

One commenter stated that the proposed action would fail to achieve the stated goals unless a grass and forb species list was used. The proposal is to reauthorize livestock grazing, not achieve specific goals for grass and forb species. Therefore, a grass and forb list is not needed.

One commenter stated that rest, rest-rotations, and reductions in AUMs do not address the concerns for vegetation management. The concerns relate to stream shade, streambank stability, and livestock distribution. Changes in seasons of use, rest-rotations, and reductions in AUMs all

contribute to increasing the amount of vegetation in riparian areas. The environmental consequences of each alternative are described in Chapter 3.

One commenter stated they were opposed to constructing new fences. Simply stating opposition to an activity does not provide meaningful information.

Because alternatives must meet the purpose and need of the proposed action, suggested alternatives that would require completely reconsidering the purpose and need for action were not considered. These suggestions included eliminating logging, road building, and prescribed burning. Other suggestions identified themes for creating alternatives such as non-motorized recreation, wildlife enhancement, restoration, or reduction in grazing access. However, these suggestions did not include any information to assist in developing significant issues, nor did they provide any information that proposed livestock grazing would cause unnecessary environmental harm.

Some comments suggested that there is no information to support the claims that cottonwood and aspen galleries existed in the Maury Mountains. More than 100 aspen clones have been identified in the project area. The extent of aspen within the Maury Mountains was much greater in the past based on the dead aspen trees and clones that are declining. Cottonwood galleries probably did not exist and only a few remnant cottonwood trees are known to occur in the Maury Mountains.

One commenter stated that generalizations about aspen decline do not work well in characterizing the decline as livestock related. The decline of aspen is most likely related to entrenched stream channels and lowered water tables, which are a result of many past activities including livestock grazing, timber harvest, and road building. Livestock grazing, specifically browse and trampling of aspen sprouts, can contribute to aspen decline.

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Changes between Draft and Final EIS

The definition of daily management has been updated.

Tables 1, 2, and 3, have been updated to include information on the preferred alternative.

Two additional alternatives were considered, but eliminated from detailed study.

Introduction

This chapter describes and compares the alternatives considered for the Maury Mountains Allotment Management Plan Project. It includes a description of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Alternatives Considered in Detail

The Forest Service developed four alternatives, including the No Action and Proposed Action alternatives.

Alternative 1 - No Action

Alternative 1 is the no action alternative. Under this alternative, grazing would not be reauthorized and the current permit holders would be notified that their term grazing permits would be cancelled. Map 4 displays Alternative 1, including exterior boundary fences. All Term Grazing Permits would be cancelled after 2 years, pursuant to 36 CFR (Code of Federal Regulations) 222.4(a)(1). The CFR and Forest Service Handbook (FSH) 2209.13 part 16.24 indicate a 2-year notification is required to cancel a permit and devote lands to another public purpose, with the exception of emergency situations. This alternative would close six allotments, eliminating livestock grazing from 61,165 acres of Forest Service administered lands in the Maury Mountains. Permits would not be issued for any of the six affected allotments unless a subsequent NEPA analysis and decision to re-stock the allotments was made.

Maintenance of structural range improvements on the allotments would no longer be the responsibility of the permittees. Range improvements built to facilitate livestock management, including allotment and pasture fences, enclosure fences to prevent livestock from affecting resources such as aspen stands and springs, and water troughs would be removed. Stock water ponds built to assist in livestock distribution and management would be abandoned. Developments built to reduce wildlife effects to resources, such as water developments and big-game enclosures, would remain in place. Maintenance of exterior boundary fences would remain the responsibility of the adjacent private land owners.

Permittees would no longer be responsible for the maintenance of rangeland improvements on National Forest System (NFS) lands. The following structural improvements would be removed: (1) approximately 75 miles of interior pasture fence, (2) 105 metal and tire troughs, and (3) above ground pipes associated with water developments.

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

Abandoned water lines that are aboveground would be removed. Where practical, water from abandoned/removed water developments would be returned to its original channel.

Alternative 2 - Proposed Action

Alternative 2 is the proposed action. Livestock grazing would be reauthorized and term grazing permits would be issued for five allotments. The West Maury Allotment would be eliminated as a separate allotment; however, the pastures would be assigned to the Klootchman and Sherwood Allotments. Alternative 2 is displayed on two maps. Map 5 displays the proposed activities in the Klootchman and Sherwood Allotments, while Map 6 displays the proposed activities in the Double Cabin, East Maury, and Shotgun Allotments. Allotment specific information is contained below.

The actual season for livestock use may be less than permitted in order to meet Forest Plan goals and objectives/desired conditions described in Chapter 1. The number of days livestock spend on each allotment may be adjusted annually based on variations in weather and range readiness (see glossary for definitions of range readiness) or unpredictable events such as wildfire and drought. The actual season of use may also be adjusted annually based on variations in weather and range readiness. The dates listed in each allotment description are target dates for grazing. The season of use may occur sooner or later than indicated based on annual conditions. The earliest livestock will be “turned on” any of the five allotments is May 1. With the exception of the East Maury Allotment, livestock will not be grazed after August 15. The length of grazing also depends on meeting utilization standards or thresholds (triggers) for pasture moves. Implementation monitoring and triggers for pasture moves are described in the Monitoring section later in this chapter.

Maintenance to existing water developments at springs would continue and include activities such as cleaning out troughs, leveling troughs, cleaning existing water lines, cleaning spring boxes, and maintaining spring enclosure fences. Maintenance of existing ponds would continue and includes activities such as removing sediment and applying bentonite (a type of clay) to improve water holding capability. New water developments include constructing a pond or installing a spring box, pipes, troughs, and fences. Maintenance of existing fences would continue and include activities such as replacing or resetting fence posts and replacing or restringing wire.

Double Cabin Allotment

The Double Cabin Allotment will consist of 9,345 acres split between five pastures. Livestock grazing will be reauthorized. Grazing of 220 cow/calf pairs will be permitted between May 14 and July 31 for a maximum of 765 animal unit months (AUMs).

The grazing system will be an early on/off rest-rotation using five pastures: Rickman, Faught, West, Center, and Parrish Creek. The Rickman, Faught, and Parrish Creek Pastures will be used as early season pastures because they are the first to dry and water availability is limited. Grazing in the East Pasture will not be authorized. AUMs will be reduced from the current

stocking rate of 958 to 765 to account for the reduced land area resulting from the elimination of the East Pasture and implementation of the rest-rotation grazing system.

The herd will be split 2 out of 4 years to allow rest in the Center and West Pastures. The Center and West Pastures will be managed daily which means the permittee or his/her representative will be present on the allotment daily and, when needed, will be moving livestock to achieve adequate distribution.

The Double Cabin Allotment, excluding the East Pasture, contains 20 troughs, 3 stock ponds, and approximately 17.1 miles of fence. These existing structural improvements will be reauthorized. Eight existing troughs will be relocated to reduce livestock concentration in riparian areas. Two existing ponds will be maintained to improve their water holding capability. Four new structural improvements will be authorized to facilitate livestock distribution. They include developing one new pond and developing three springs to improve water availability.

In addition, a livestock enclosure fence will be constructed in the Rickman Pasture to reduce livestock grazing around Peck's mariposa lily. Grazing will be allowed within the enclosure 1 year out of every 4 years.

East Maury Allotment

The East Maury Allotment will consist of 9,444 acres. Livestock grazing will be reauthorized. Grazing of 241 cow/calf pairs will be permitted between May 1 and August 30, for a maximum of 1,294 AUMs.

The grazing system will be an early on, deferred rotation grazing system using four pastures: Maury, East Pine, Cottonwood, and Arrowwood. With the exception of the Arrowwood Pasture, pastures will be utilized at a different time each year. The Arrowwood Pasture may be grazed concurrently with other pastures. The Ned Pasture is a holding pasture and will be used for up to 7 days each year.

The East Maury Allotment contains 12 troughs, 11 stock ponds, and approximately 16.1 miles of fence. These existing structural improvements will be reauthorized. Four existing troughs will be relocated to reduce livestock concentration in riparian areas. Seven existing ponds will be maintained to improve their water holding capability. Four new structural improvements will be authorized. They include developing four new ponds to facilitate livestock distribution. In addition, an existing guzzler (water development) will be improved to provide water for both livestock and wildlife.

The East Maury Allotment will be rested from livestock grazing for 10 years. During this 10-year rest, structural improvements will be constructed, maintained, or relocated as mentioned in the preceding paragraph. After 10 years, livestock grazing will continue.

Klootchman Allotment

The Klootchman Allotment will consist of 15,380 acres. Livestock grazing will be reauthorized and the Hamer Pasture from the West Maury Allotment will be assigned to this allotment. Grazing of 300 cow/calf pairs will be permitted between May 14 and July 21 for a maximum 911 AUMs.

The grazing system will be an early on/off rest-rotation using eight pastures: Deer Creek, Ferguson, Florida, Friday, Hamer, Klootchman, Skelton, and Upper Klootchman. AUMs will be reduced from the current stocking rate of 1,139 to 911 to account for the reduced land area available to graze each year due to the implementation of the rest-rotation grazing system. The Lower Klootchman Riparian Pasture will be deferred; it will be used annually at a different time within the permitted season. The Pre-emption Pasture will be used only after July 15 to reduce potential effects to Peck's mariposa lily. The Pre-emption Pasture is used as a holding pasture and typically receives 2-3 days of use per year. The maximum days of use per year in the Pre-emption Pasture is 7.

The Klootchman Allotment, including the Hamer Pasture, contains 23 troughs, 5 stock ponds, and approximately 15.6 miles of fence. These existing structural improvements will be reauthorized. Twelve existing troughs will be relocated to reduce livestock concentration in riparian areas. Two interior pasture fences, approximately 2.5 miles, will be removed. Several new structural improvements will be authorized to facilitate livestock distribution. They include developing seven new ponds to improve water availability and constructing six new pasture fences, approximately 9.8 miles, to facilitate livestock movements. New fences include extending two separate enclosure fences in the Hamer Pasture to the National Forest boundary; one enclosure is for riparian and the other is for active headcuts. In addition, a livestock enclosure fence will be constructed around Sherwood Creek to reduce livestock grazing around active headcuts. A fence will be constructed to reduce livestock grazing around Peck's mariposa lily populations near the headwaters of Deer Creek. Livestock grazing would be allowed within the enclosure 1 year out of every 4.

Sherwood Allotment

The Sherwood Allotment will consist of 16,112 acres in four pastures. Livestock grazing will be reauthorized. Grazing of 300 cow/calf pairs will be authorized between May 14 and July 3 for a maximum 673 AUMs. The allotment will be managed daily to facilitate livestock distribution.

The grazing system will be an early on/off rest-rotation using four pastures: Gibson, Newsome, Hammer, and West Pine. The Gibson Pasture from the West Maury Allotment and the West Pine Pasture from the Shotgun Allotment will be assigned to this allotment. No pasture will be used at the same time 2 years in a row.

The West Pine Pasture contains Peck's mariposa lily. The West Pine Pasture will be grazed prior to July 15 twice every 4 years. One of the four years the pasture will be grazed after July

15 and one year it will be rested. Three livestock enclosure fences, approximately 1 mile, will be constructed around selected populations of Peck's mariposa lily in the West Pine Pasture to reduce livestock grazing around the selected populations. Grazing will be allowed within the enclosures 1 year out of every 4 years.

The Sherwood Allotment, including the Gibson and West Pine Pastures, contains 26 troughs, 5 ponds, and approximately 13.8 miles of fence. These existing structural improvements will be reauthorized. Twelve existing troughs will be relocated to reduce livestock concentration in riparian areas. One existing pond will be maintained to improve its water holding capability. Several new structural improvements will be authorized. They include developing nine new ponds and six springs to improve water availability.

Shotgun Allotment

The Shotgun Allotment will consist of 9,582 acres. Livestock grazing will be reauthorized. Grazing of 200 cow/calf pairs will be permitted between May 15 and July 16, for a maximum 554 AUMs. "Turn-on" will be in a different location every year to defer utilization in areas.

The grazing system will be an early on/off system using one pasture: Drake. The allotment will be managed daily to facilitate livestock distribution.

The Shotgun Allotment contains 17 troughs, 1 pond, and approximately 5.9 miles of fence. These existing structural improvements will be reauthorized. Six existing troughs will be relocated to reduce livestock concentration in riparian areas. The existing pond will be maintained to improve its water holding capability. Several new structural improvements will be authorized. They include developing seven new ponds and three springs to improve water availability and facilitate livestock distribution. In addition, three livestock enclosure fences will be constructed to reduce livestock grazing around Peck's mariposa lily. Grazing would be allowed within the enclosures 1 year out of every 4 years.

West Maury Allotment

The West Maury Allotment will be eliminated as a separate allotment. The West Maury Allotment is comprised of the Gibson and Hamer Pastures. The 3,003-acre Gibson Pasture will be reassigned to the Sherwood Allotment and the 3,309-acre Hamer Pasture will be reassigned to the Kloutchman Allotment.

Alternative 3

Alternative 3 will reauthorize grazing on all six allotments. Permits will be issued under the same terms and conditions as the existing permits. The permitted season and amount of use will not change. Structural range improvements will be maintained or reconstructed as scheduled or as they cease functioning. Alternative 3 is displayed on two maps. Map 7 displays the proposed activities in the Kloutchman, Sherwood, and West Maury Allotments, while Map 8 displays the proposed activities in the Double Cabin, East Maury, and Shotgun Allotments.

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

Double Cabin Allotment

The Double Cabin Allotment consists of 10,891 acres split between six pastures. Livestock grazing will be reauthorized. Grazing of 220 cow/calf pairs will be permitted between May 24 and August 30, for a maximum 958 AUMs. The “turn on” date will be adjusted annually based on range readiness.

The grazing system will be a deferred rotation system with six pastures: East, Parrish, Faught, Rickman, Center, and West.

The Double Cabin Allotment contains 20 troughs, 7 stock ponds, and approximately 18.9 miles of fence. The structural improvements will be reauthorized.

East Maury Allotment

The East Maury Allotment consists of 9,444 acres split between five pastures. Livestock grazing will be reauthorized. Grazing of 241 cow/calf pairs will be permitted between June 1 and September 30 for a maximum of 1,294 AUMs. The “turn on” date will be adjusted annually based on range readiness.

The grazing system will be a deferred rotation system with four pastures: Maury, East Pine, Cottonwood, and Arrowwood. The Ned Pasture is a holding pasture and will be used for up to 7 days each year.

The East Maury Allotment contains 12 troughs, 7 stock ponds, and approximately 16.1 miles of fence. These structural improvements will be reauthorized.

Kloutchman Allotment

The Kloutchman Allotment consists of 10,631 acres split between four pastures. Livestock grazing will be reauthorized. Grazing of 288 cow/calf pairs will be permitted between May 15 and July 21 for a maximum of 862 AUMs. The “turn on” date will be adjusted annually based on range readiness. This permit also includes the Hamer Pasture of the West Maury Allotment which authorizes 300 cow/calf pairs from May 15 to June 4 for an additional 277 AUMs.

The grazing system will be a deferred rotation system with five pastures: Florida, Friday, Kloutchman, Lower Kloutchman, and Hamer. The 4,509-acre Hamer Pasture from the West Maury Allotment has been used with the Kloutchman Allotment since 1997 and will continue to be used. Use of the Hamer Pasture has increased the AUMs from 862 to 1,139. The Pre-emption Pasture is used as a holding pasture and typically receives 2-3 days of use per year.

The Klootchman Allotment contains 17 troughs, 11 ponds, and approximately 15.6 miles of fence. The Hamer Pasture contains 10 troughs and 1 pond. These structural improvements will be reauthorized.

Sherwood Allotment

The Sherwood Allotment consists of 6,097 acres split between two pastures. Livestock grazing will be reauthorized on the Sherwood Allotment. Grazing of 300 cow/calf pairs will be permitted between May 14 and July 3, for a maximum 488 AUMs. The “turn on” date will be adjusted annually based on range readiness. This permit also includes the Gibson Pasture of the West Maury Allotment.

The grazing system will be a partial deferred rotation system with three pastures: Hammer, Newsome, and Gibson. The 3,003-acre Gibson Pasture from the West Maury Allotment has been used with the Sherwood Allotment since 1997 and will continue to be used. Use of the Gibson Pasture has increased the AUMs from 488 to 673.

The Sherwood Allotment contains 9 troughs, 2 stock ponds, and approximately 5.8 miles of fence. The Gibson Pasture contains 4 troughs, 1 pond, and approximately 2.5 miles of fence. These structural improvements will be reauthorized.

Shotgun Allotment

The Shotgun Allotment consists of 16,594 acres split between two pastures. Livestock grazing will be reauthorized on the Shotgun Allotment. Grazing of 216 cow/calf pairs will be permitted between June 16 and September 30, for a maximum 1,017 AUMs. The allotment has 2 permits, one for 135 cow/calf pairs and the other for 81 cow/calf pairs (currently vacant). The “turn on” date will be adjusted annually based on range readiness.

The grazing system will be a deferred rotation system with two pastures: Drake and West Pine.

The Shotgun Allotment contains 30 troughs, 1 stock pond, and approximately 11.9 miles of fence. These structural improvements will be reauthorized.

West Maury Allotment

The West Maury Allotment consists of 7,512 acres split between two pastures: Gibson and Hamer. Livestock grazing will be reauthorized on the West Maury Allotment. Livestock grazing will be permitted between May 14 and July 21.

Grazing of 300 cow/calf pairs between May 14 and July 3 would be reauthorized on the Gibson Pasture, for a maximum 185 AUMs. The Gibson Pasture would continue to be used with the Sherwood Allotment.

Grazing of 288 cow/calf pairs between May 15 and July 21 would be authorized on the Hamer Pasture, for a maximum of 277 AUMs. The Hamer Pasture would continue to be used with the Klootchman Allotment. The West Maury Allotment was last grazed as a separate allotment in 1996.

The West Maury Allotment contains 14 troughs, 2 stock ponds, and approximately 2.5 miles of fence. These structural improvements will be reauthorized.

Alternative 4

Livestock grazing would be reauthorized and term grazing permits would be issued for five allotments. The West Maury Allotment would be eliminated as a separate allotment. Alternative 4 is displayed on two maps. Map 9 displays the proposed activities in the Klootchman and Sherwood Allotments, while Map 10 displays the proposed activities in the Double Cabin, East Maury, and Shotgun Allotments. Allotment specific information is contained below.

The actual season for livestock use may be less than permitted in order to meet Forest Plan goals and objectives/desired conditions described in Chapter 1. The number of days livestock spend on each allotment may be adjusted annually based on variations in weather and range readiness (see glossary) or unpredictable events such as wildfire and drought. The actual season of use may be adjusted annually based on variations in weather and range readiness. The earliest livestock will be “turned on” any of the five allotments is May 1. With the exception of the East Maury Allotment, livestock will not be grazed after August 15. The length of grazing also depends on meeting utilization standards. The grazing season may be less than permitted, but will not be more.

Double Cabin Allotment

The Double Cabin Allotment will consist of 9,345 acres. Livestock grazing will be reauthorized. The current stocking rate of 220 cow/calf pairs will be permitted between May 14 and July 31 for a maximum of 765 AUMs. The “turn on” date will be adjusted annually based on range readiness.

The grazing system will be an early on/off rest-rotation using five pastures: Rickman, Faight, West, Center, and Parrish Creek. Grazing in the East Pasture will not be authorized. The Center and West Pastures will be managed daily to achieve adequate livestock distribution.

The Double Cabin Allotment contains 20 troughs, 3 ponds, and approximately 16.1 miles of fence. These existing structural improvements will be reauthorized. Eight existing troughs will be relocated to reduce livestock concentration in riparian areas. Two ponds will be maintained to improve their water holding capability. Four new structural improvements will be authorized. They include developing one new pond and three springs to improve water availability and facilitate livestock distribution.

In addition, a livestock enclosure fence will be constructed in the Rickman Pasture to reduce livestock grazing around Peck's mariposa lily. Grazing would be allowed within the enclosure no more than 1 year out of every 4.

East Maury Allotment

Livestock grazing on the East Maury Allotment will be reauthorized on 9,444 acres. Grazing of 241 cow/calf pairs will be permitted between May 1 and August 30 for a maximum of 1,294 AUMs. The "turn on" date will be adjusted annually based on range readiness.

The grazing system will be an early on deferred rotation grazing system using four pastures: Maury, East Pine, Cottonwood, and Arrowwood. With the exception of the Arrowwood Pasture, pastures will be utilized at a different time each year. The Arrowwood Pasture may be grazed concurrently with other pastures. The Ned Pasture is a holding pasture and will be used for up to 7 days each year.

The East Maury Allotment contains 12 troughs, 7 stock ponds, and approximately 16.1 miles of fence. These existing structural improvements will be reauthorized. Four existing troughs will be relocated to reduce livestock concentration in riparian areas. Seven existing ponds will be maintained to improve their water holding capability. Four new structural improvements will be authorized. They include developing four new ponds to facilitate livestock distribution. In addition, an existing guzzler (water development) will be improved to provide water for both livestock and wildlife.

The East Maury Allotment will be rested from livestock grazing for 10 years. During this 10-year rest, structural improvements will be constructed, maintained, or relocated as mentioned in the preceding paragraph. After 10 years, livestock grazing will continue.

This is the same as Alternative 2, the proposed action.

Kloutchman Allotment

The Kloutchman Allotment will consist of 15,380 acres in ten pastures. Livestock grazing on the Kloutchman Allotment will be reauthorized. Grazing of 300 cow/calf pairs will be permitted between May 14 and August 7 for a maximum 1,139 AUMs. The "turn on" date will be adjusted annually based on range readiness.

The grazing system will be an early on/off rest-rotation using eight pastures: Deer Creek, Ferguson, Florida, Friday, Hamer, Kloutchman, Skelton, and Upper Kloutchman. The Lower Kloutchman Riparian Pasture will be deferred; this means this pasture will be grazed annually at a different time each year within the permitted season. The Pre-emption Pasture will be used only after July 15 to reduce potential effects to Peck's mariposa lily. The Pre-emption Pasture is used as a holding pasture and typically receives 2-3 days of use per year. The maximum days of use per year in the Pre-emption Pasture is 7.

The Klootchman Allotment contains 27 troughs, 11 stock ponds, and approximately 15.6 miles of fence. These existing structural improvements will be reauthorized. Twelve existing troughs will be relocated to reduce livestock concentration in riparian areas. Two interior pasture fences, approximately 2.5 miles, will be removed. Several new structural improvements will be authorized. They include developing seven new ponds to improve water availability and facilitate livestock distribution and constructing six new pasture fences, approximately 9.9 miles, to facilitate livestock movements. New fences include extending two separate enclosure fences in the Hamer Pasture to the National Forest boundary; one enclosure is for aspen and the other is for active headcuts. In addition, a livestock enclosure fence will be constructed around Sherwood Creek to reduce livestock grazing around active headcuts. A fence will be constructed to reduce livestock grazing around Peck's mariposa lily populations near the headwaters of Deer Creek. Livestock grazing would be allowed within the enclosure 1 year out of every 4.

Initially, livestock grazing on the Klootchman Allotment will be for a maximum of 911 AUMs. As the new structural developments are installed, the number of AUMs will be increased concurrent with the new developments. Once all structural improvements are installed, the maximum allowable use will be 1,139 AUMs.

Sherwood Allotment

The Sherwood Allotment will consist of 16,112 acres in four pastures. The Gibson Pasture from the West Maury Allotment and the West Pine Pasture from the Shotgun Allotment will be assigned to this allotment. Livestock grazing on the Sherwood Allotment will be reauthorized. Grazing of 300 cow/calf pairs will be authorized between May 14 and July 3 for a maximum 673 AUMs. The "turn on" date will be adjusted annually based on range readiness. The allotment will be managed daily to facilitate livestock distribution.

The grazing system will be an early on/off rest-rotation using four pastures: Gibson, Newsome, Hammer, and West Pine. No pasture will be used at the same time 2 years in a row.

The Sherwood Allotment contains 26 troughs, 5 ponds, and approximately 13.8 miles of fence. These existing structural improvements will be reauthorized. Twelve existing troughs will be relocated to reduce livestock concentration in riparian areas. One existing pond will be maintained to improve its water holding capability. Several new structural improvements will be authorized. They include developing nine new ponds and six springs to improve water availability and facilitate livestock distribution. In addition, three livestock enclosure fences will be constructed in the West Pine Pasture to reduce livestock grazing around Peck's mariposa lily. Grazing would be allowed within the enclosures no more than 1 year out of every 4.

This is the same as Alternative 2, the proposed action.

Shotgun Allotment

The Shotgun Allotment will consist of 9,582 acres in three pastures. Livestock grazing on the Shotgun Allotment will be reauthorized. Grazing of 200 cow/calf pairs will be permitted between May 15 and July 16 for a maximum 554 AUMs. The “turn on” date will be adjusted annually based on range readiness.

The grazing system will be rest-rotation system using three pastures: Drake, Shotgun, and Tower.

The Shotgun Allotment contains 17 troughs, 1 pond, and approximately 5.9 miles of fence. These existing structural improvements will be reauthorized. Six existing troughs will be relocated to reduce livestock concentration in riparian areas. The existing pond will be maintained to improve its water holding capability. Several new structural improvements will be authorized. They include developing seven new ponds and three springs to improve water availability and facilitate livestock distribution. New pasture fences, approximately 7.1 miles, will be constructed. In addition, three livestock enclosure fences will be constructed to reduce livestock grazing around Peck’s mariposa lily.

West Maury Allotment

The West Maury Allotment will be eliminated as a separate allotment. The 3,003-acre Gibson Pasture will be reassigned to the Sherwood Allotment and the 3,309-acre Hamer Pasture will be reassigned to the Klootchman Allotment.

This is the same as Alternative 2.

Design Elements Common to Alternatives 2, 3, and 4

The Forest Service also developed the following design elements to reduce the effects of livestock grazing. These design elements are part of each of the action alternatives and are listed here to avoid repeating them in the description of each alternative. Design elements listed below specific to new structural range improvements do not apply to Alternative 3.

Heritage Resources

New structural range improvements have been designed to protect or avoid heritage sites and features. For example, the locations of fences and water developments have been selected to avoid disturbing cultural/heritage sites. Coordinate with the archaeologist during installation of water developments.

Coordinate with the archaeologist and maintain water to log troughs, specifically for water developments 5, 12, 15, 17, 19, 32, 38, 67, 84, and 95. Install “Y” in water line if replacing log trough with metal trough. Maintaining water in log troughs ensures the log will remain saturated and intact since they deteriorate rapidly when dry. Retain log troughs and/or remains of log

trough. Where feasible, spring developments will include non-functional log troughs within enclosure areas.

Coordinate with the archaeologist during construction or relocation of spring developments 5, 8/47, 13, 16, 22, 32, 33, 35, 36, 38, 48, 50, 53, 56, 58, 60, 61, 66, 67, 68, 69, 72, 79, 80, 82, 95, and 98 to ensure that heritage sites are avoided.

Coordinate with the archaeologist during construction of fence enclosures around Peck's mariposa lily.

Coordinate the removal of fence in the Klootchman Allotment to avoid damaging heritage sites.

If a cultural/heritage resource site were newly discovered during installation of structural improvements (water developments or fences) efforts would be made to avoid any further disturbance. Site-specific mitigation would be determined if sites could not be avoided, and consultation with the SHPO would occur prior to resuming activities.

Salting locations and protein blocks would be located away from known high value or complex cultural/heritage resource sites. Actual locations would be coordinated between the archaeologist and rangeland management specialist.

Areas where traditional root crops are identified (bitterroot and a variety of lomatium species) would be managed to retain plant populations and provide root gathering opportunities to members of Confederated Tribes of the Warm Springs Reservation and The Burns Paiute. Management prescriptions may include grazing exclusion while plants are harvestable (March through May) and this could be accomplished through pasture rotation or resting.

Noxious Weeds

Conduct a weed identification workshop for project-level personnel. Personnel would be able to recognize noxious weeds and report infestations to the District Noxious Weed Coordinator.

Salting locations and protein blocks would be located away from known infestations of noxious weeds.

The District Noxious Weed Coordinator will provide a noxious weed locator map to facilitate avoidance. The locator map will be updated on a regular basis (e.g., annually or bi-annually).

Mineral material (i.e. gravel) used for reinforcement around troughs or ponds would be obtained from a weed-free source to reduce potential for weed spread.

To reduce the potential for introduction of noxious weeds, all heavy equipment (such as backhoes) will be cleaned of all soil and plants parts prior to entering National Forest System lands.

Range Resources

Prior to livestock grazing each year, Forest Service representatives will meet with permittees to establish the actual season of use and number of cattle to be grazed each year. The season of use and number of cattle will be documented in the annual operating instructions (AOI).

New range improvements will be implemented over the next 10 years. The annual maintenance and construction schedules will be included in the annual operating instructions.

Salt and protein blocks would be used to improve livestock distribution. Preferred salt and protein block locations include old roads, mature timber stands, skid trails, landings, and low-use grazing areas. Actual locations would be coordinated between the rangeland management specialist, other resource specialists, and the grazing permittees.

Implementation of logging, thinning, burning, and road closure activities within the project area will be coordinated with livestock permittees as needed. Efforts would be made to minimize conflicts between livestock use and logging, thinning, burning, and road closures. This coordination would occur annually during the preparation of the AOI.

Sensitive Plant Species

To protect sensitive species associated with riparian areas, new fences and water developments (or modifications to existing water developments) would be field reviewed prior to construction. Where possible, fences and water developments would be located away from sensitive plants. Exceptions may occur on a case-by-case basis after review by the District botanist.

To protect sensitive species associated with riparian areas, salting locations and protein blocks would not be placed within 500 feet of RHCAs.

To protect sensitive species associated with scabland habitats, no new fences and water developments would be constructed on scablands. Scabland habitats are defined by low sage (*Artemisia arbuscula*)/Sandberg bluegrass (*Poa secunda*) and rigid sage (*Artemisia rigida*)/Sandberg bluegrass plant communities.

To protect sensitive species associated with scabland habitats, no salt or protein blocks would be placed within 500 feet of scabland habitat.

Water Quality

Salting locations and protein blocks would be located at least 1/4 mile away from perennial water. Salt and protein blocks would be located at least 500 feet away from other riparian areas, eroding areas, stream channels, and water sources.

Spring developments consist of installing a spring box, pipes, a trough, and an enclosure fence.

Wildlife

Grazing extensions will not be permitted in the Hammer Creek Wildlife/Recreation Area (MA-F18), Winter Range Management Area (MA-F20), or General Forest Winter Range Area (MA-F21).

In the Hammer Creek Wildlife/Recreation Area, Winter Range Management Area, and General Forest Winter Range Management Area, use of motorized equipment is restricted to open roads from December 1 to May 1.

In Eagle Roosting Areas, use of motorized equipment is prohibited from December 1 to May 1.

Fence maintenance and new fence construction will be seasonally restricted within 1/2 mile line of sight of a bald eagle nest or 1/4 mile non-line of sight. Fence maintenance will only occur between September 1 and December 1, unless monitoring indicates bald eagles are not nesting or no young are present. This restriction applies to maintenance of the fence on the north side of Antelope Reservoir in the Faught Pasture of the Double Cabin Allotment and the fence location on the south side of Antelope Reservoir in the Rickman Pasture. The new fence construction is located in Sections 23 and 26 near Miller Lake in the Drake Pasture of the Shotgun Allotment.

Fences will be constructed to wildlife friendly standards. New fences will be a 3 or 4-strand fence with a smooth bottom strand 18 inches above ground, and the top strand no more than 42 inches high.

All new water developments would be constructed with wildlife escapement ramps. As existing water developments are maintained, wildlife escapement ramps will be installed.

Monitoring

Implementation

Implementation monitoring consists of spot checks of permittee maintenance, checks of all pastures to ensure compliance with the AOI rotation schedule, monitoring of stubble heights (by permittee as checked by the Forest Service), and monitoring of utilization. Implementation monitoring will continue to take place annually.

Stubble Height, Bank Alteration, and Hardwood Utilization

Monitoring will include taking photos and measuring stubble height, bank alteration, and hardwood utilization at Designated Monitoring Areas (DMAs). All pastures in the project area are Category 2. Monitoring will occur on 35 percent of Category 2 pastures and those pastures that did not meet standards the previous year. Monitoring will continue to occur twice a year (once mid-season and once end-season).

DMA's have been identified in each pasture of each allotment. DMA's are areas that get utilized more than the rest of the pasture, so utilization in the rest of the pasture should be less than in the DMA (Burton 2004). Some of the criteria for selecting DMA's include: (1) selecting areas that are representative of grazing use specific to riparian areas; (2) measuring actual use of riparian areas, not an average use; and (3) avoiding sites that are resistant to disturbance or concentrate livestock use like water gaps.

Pasture moves will occur before the alteration condition threshold (trigger) is reached or before the forage stubble height threshold is reached. This means that the stubble height should be 2, 3, or 4 inches (see below) when all cattle have been removed. However, the DMA is just one location; moves can be initiated based on other areas of concerns within a pasture. These thresholds are:

(a) Terraces/Dry Meadows (species other than Kentucky bluegrass (*Poa pratensis*)): The stubble height standard on these sites is 3-inch stubble height when livestock are moved by June 30 or 4-inch stubble height when grazing is scheduled after July 1. Where a stream is not in satisfactory condition, a minimum 4-inch stubble height standard will be used. Based on site-specific criteria, this standard will be 4 inches or greater for pastures in an unsatisfactory condition or for allotments that did not meet the above criteria the previous year.

(b) Kentucky bluegrass-dominated terraces and dry meadows: The stubble height standard is 2-inch stubble height. If the DMA is located on a Kentucky bluegrass terrace, monitoring of the greenline and streambank trampling will also occur to ensure the conditions needed to maintain streams and aquatic habitats are met. There may be cases where streambank trampling and greenline utilization may trigger a move before the 2-inch stubble height criteria on Kentucky bluegrass is met. Whichever threshold (trigger) is reached first will indicate that livestock should be moved.

(c) Greenline vegetation: The stubble height standard for greenline vegetation is 4-inch stubble height on grasses (where grasses will be used as measured triggers), as long as the stream exhibits desired conditions. If the stream does not exhibit desired conditions, the stubble height standard for grasses should be adjusted to 5 or 6-inch (or more) residual stubble height, depending on site conditions. If the chosen DMA has a greenline, then that would be the preferred threshold or trigger to be used. For sites that have rushes and sedges, maximum utilization is 6-inch stubble height. (If cows start showing preference for sedges, this will trigger a move from the pasture).

(d) Wet and Moist Meadows: Conduct stubble height monitoring of wet and moist meadow herbaceous vegetation (sedges and rushes) to ensure retention of a minimum of 6-inch residual herbaceous vegetation stubble heights.

Pasture moves will also be triggered if streambank alteration by livestock is approaching 10 percent within the DMA. If this condition occurs then streambank alteration will be measured, documented, and livestock will be moved from the pasture. Some examples of common indicators of streambank alteration include: (1) bare soil exposed to flowing water as a result of hoof action; (2) roots of bank stabilizing vegetation exposed as a result of hoof shearing; or (3) pedestals exist along or adjacent to the streambank (USDA Forest Service 2003a). Pastures moves will be triggered if livestock change their preference from herbaceous to woody vegetation.

Utilization

At least one utilization monitoring plot will be established in each allotment. Monitoring plots will be identified in “key areas.” The “key area” concept is based on the premise that key areas are places where excessive use first becomes evident. They reflect trends earlier than other portions of the allotment but reasonably indicate conditions throughout the allotment. The key area concept also uses the assumption that if key areas are satisfactory, the remainder of the allotment is likely to be satisfactory as well. End of season utilization monitoring will be completed annually at selected key areas.

Monitoring protocols will follow established or accepted protocols such as those described in the interagency technical reference “Utilization Studies and Residual Measurements” which was developed in 1996 and revised in 1997 and 1999.

In the key areas, the paired-plot method will be used. This method involves installing a cage or enclosure at each area to protect vegetation from grazing by livestock and wildlife. This ungrazed area will provide the baseline to measure use outside the enclosure in the grazed portion of the area. Vegetation in both the ungrazed and grazed sites is then clipped and weighed to determine the percent of utilization by weight.

Outside of key areas ocular estimates will be used to estimate utilization. Protocols may be modified if the existing method is not effective or if new methodologies are developed and the results continue to provide information to determine consistency with standards.

Other

Several existing structural range improvements overlap known heritage sites. Develop a monitoring plan for 11 selected sites that includes site visits that record information to add to site records (OHIMS database and Heritage Files). Monitoring would focus on site condition and identify the types and degree of impacts from cattle grazing. Monitoring could result in recommendations to modify grazing practices at specific sites.

Effectiveness

Effectiveness monitoring consists of periodically completing surveys to determine if planned actions are effective in meeting or moving toward desired conditions.

Effectiveness monitoring will occur at DMAs that have been established in each allotment. At least two DMAs within each allotment will be monitored every 3-5 years. DMAs that are located along Rosgen C- and E-type channels will be preferred, because these channel types are most sensitive to cattle disturbance (Rosgen 1996). The most prevalent channel type in the project area is the B-type channels. B-type channels will be included in the monitoring sample.

Key questions to be answered by this effectiveness monitoring are:

What is the effect of the selected grazing strategy on riparian vegetation species and growth over time?

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

Monitoring will occur on the downstream side of the selected DMA stake and include surveying three different permanent cross-sections (at 0, 50, and 100 feet), using a modified Winward (2000) sampling, and taking photos. The Winward sampling method will be modified to measure three cross-sections instead of five.

Three permanent cross-sections will be established along three different riffle sections of the stream with a metal rebar stake on each side of the stream. A measuring tape will be stretched across the stream at a width that includes the flood-prone area. A survey rod and level will be used to survey elevations in each cross section. Once surveyed, the cross-section data will reveal maximum bankfull width and depth and flood-prone area, which will allow the calculation of width-to-depth and entrenchment ratios. These calculations will aid the National Forest in understanding how and if channel morphology is changing. Over time, the National Forest will be able to identify if the stream channel is narrowing, widening, getting more entrenched, or building a new channel. Permanent cross-sections will be measured at the end of the growing season (September/October) every 3-5 years.

The sampling will include three vegetative cross-section compositions, a greenline composition, and woody species regeneration. The vegetative cross-sections will occur at the same locations as the stream cross-sections. These cross-sections will allow the National Forest to measure the amount of change in community type composition over time.

The greenline composition sampling will measure the amount of change in community type composition and will follow the protocol procedures outlined by Winward (2000). However, 100 feet (instead of 363 feet) of greenline on each side of the stream will be sampled. The greenline sampling will provide an indication of a streambank's ability to buffer the hydrologic forces of moving water, depending on the type and successional stage of vegetation (Winward 2000).

Woody species regeneration sampling will follow the protocol outlined by Winward (2000); however, sampling will be done on 100 feet instead of 363 feet. This will allow the National Forest to quantify the relative amounts of each age class of woody species in the sampling area, and how woody species may be changing over time. Not all riparian areas are suited for growing woody species; woody species regeneration monitoring will not occur if the DMA is not suited for growing woody species.

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

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Alternatives studied in detail must meet the

purpose and need of the original proposal. Some public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives were duplicative of the alternatives considered in detail, while others were outside the scope of reauthorizing livestock grazing. Six alternatives were considered, but eliminated from detailed study for the reasons summarized below.

1. Several commenters suggested that alternatives should be considered that allow for recovery by removing all grazing from these allotments. An alternative that would halt grazing immediately was considered but eliminated from detailed study. This alternative was eliminated because the effects would be similar to Alternative 1, the no action alternative. Alternative 1 would eliminate livestock grazing after 2 years. The Forest Service Handbook (FSH) 2209.13 part 16.24, and 36 CFR (Code of Federal Regulations) 222.4(a)(1) require that grazing permittees be given a 2-year notification before canceling term grazing permits. Halting grazing immediately would not be consistent with management requirements. Finally, eliminating all livestock grazing would be inconsistent with the Forest Plan goal of providing forage for domestic livestock and the purpose and need of this project for meeting the demand for livestock grazing.

2. Several comments suggested an alternative that considered “active” restoration of streams and other resource conditions was needed. The need for this proposal is to meet the demand for livestock grazing while reducing the effects of livestock grazing on streambanks and stream shade. The Forest Service recognizes that livestock grazing does affect streams and the proposed action does alter grazing practices. Including active restoration of streams is beyond the scope of this proposal.

Separate from this proposal the Forest Service has recognized the need for improving stream conditions through active management. As disclosed in the cumulative effects discussions in Chapter 3, some projects designed to improve streams are occurring within the project area. In February 2005 a decision was made to repair headcuts and plant riparian vegetation along streams. The decision included work to actively restore sections of Gibson, Klootchman, West Fork Shotgun, and Drake Creeks. This stream restoration work is ongoing. The Forest Service has also recognized the need to enhance the growth and vigor of aspen and signed a decision authorizing conifer thinning in aspen stands in August 2005.

3. One commenter suggested that the requirement to “manage daily” should be incorporated into all allotments. The proposed action includes a requirement to “manage daily” in certain areas to improve livestock distribution. There are several methods to improve livestock distribution including fencing, water developments, salting locations, protein blocks, and requiring a rider. Many of these methods are included in the proposed action. This alternative was considered but eliminated from detailed study because the range of alternatives considered in detail already includes multiple methods to achieve livestock distribution.

4. Some comments suggested that the goals, objectives, and standards and guidelines for some management areas should be changed to emphasize wildlife and that AUMS should be reduced within the Shotgun Allotment so the area could be changed to emphasize wildlife. An alternative that would modify the Forest Plan was eliminated from detailed study. Decisions on goals,

objectives, and standards and guidelines were made in the Forest Plan and there is no requirement to reconsider decisions that have already been made. The need for this proposal is to meet the demand for livestock grazing. Changing the emphasis of management areas in the Forest Plan is outside the scope of this proposal. Eliminating livestock grazing in old growth (MA-F6) and winter range (MA-F20 and MA-F21) areas is not consistent with meeting the demand for livestock forage. Additionally, livestock grazing does not preclude meeting Forest Plan goals and objectives in old growth or winter range areas.

5. One commenter stated the proposal did not include restrictions on other uses which also affect stream side conditions. The commenter stated the proposal needs to adequately address all uses which affect streambanks, including camping, motorized vehicles, horses, off-road motorcycling, or recreational riding. An alternative that would include restrictions on the mentioned activities was considered but eliminated from detailed study because it is outside the scope of the proposal. The need for the proposal is to meet the demand for forage by reauthorizing livestock grazing, not restricting all activities to improve stream side conditions. The analysis considers the cumulative effects of all activities that affect streambanks.

6. One commenter suggested that an alternative be considered that changes the season of use, but leaves the existing grazing system in place. This alternative would be similar to Alternative 3, except the season of use would be 2 to 6 weeks earlier. This alternative was considered but eliminated from detailed study because the effects would be similar to Alternative 3, with minor differences. This alternative would have effects that are intermediate between Alternatives 2 and 3.

7. One commenter suggested that an alternative be considered that retains the current grazing system with modifications in livestock distribution (deferred rotation with proposed water developments included). This alternative would be similar to Alternative 3, but would include additional water developments to aid in livestock distribution. This alternative was considered but eliminated from detailed study because the effects would be similar to Alternative 3, with minor differences. Varra et al. (1993) indicated a rest-rotation grazing strategy rated higher than a deferred rotation strategy for restoring riparian and watershed systems. Howery and others (2000) reported that rest provides a chance for vegetation around water to recover. Bohn and Buckhouse (1985) found that deferred rotation “did little to enhance, and sometimes hindered, hydrologic expression.” Rest-rotation has also been reported to favor recovery in increasing water infiltration rates, decreasing compaction, and decreasing sediment production (Bohn and Buckhouse 1985). A rest-rotation grazing system would also provide for increased seed bank storage and plant vigor from improved root growth and carbohydrate storage. The rest-rotation grazing strategy better meets the purpose and need of increasing stream shade provided by riparian vegetation (grass, sedges, and hardwoods) and increased bank stability provided by deep-rooted vegetation including willows and sedges. Under a deferred rotation system, the purpose and need of improving bank stability and stream shade would be similar to Alternative 3.

Comparison of Alternatives

This section provides a summary of each alternative and a summary of the effects of implementing each alternative. Information in Table 1 is focused on the differences in the activities included in each alternative. Table 2 focused on the total amount of structural range improvements in the project area. Table 3 is focused on the purpose and need for action and the different levels of effects or outputs that can be distinguished quantitatively or qualitatively among alternatives. Table 3 does not summarize the effects of every resource considered during the analysis; the effects to all resources considered is contained in Chapter 3.

Table 1. Summary and Comparison of Activities Included in Each Alternative.

	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Current Permits)	Alternative 4	Preferred Alternative
Double Cabin Allotment					
Season of Use	-	May 14 - July 31	May 24 - Aug 30	May 14 - July 31	May 14 - July 31
Grazing System & Number of Pastures	-	early on/off, rest-rotation with 5 pastures	deferred rotation with 6 pastures	early on/off, rest-rotation with 5 pastures	early on/off, rest-rotation with 5 pastures
AUMs	-	765	958	765	765
Permitted Livestock	-	220	220	220	220
Acres	-	9,345	10,891	9,345	9,345
Water Developments	-	27	27	27	27
Fences (miles)	-	17.1	18.9	17.1	17.1
Manage Daily	-	Center and West Pastures	None	Center and West Pastures	Center and West Pastures
East Maury Allotment					
Season of Use	-	May 1 - Aug 30	June 1 - Sept 30	May 1 - Aug 30	May 1 - Aug 30
Grazing System & Number of Pastures	-	deferred rotation with 5 pastures	deferred rotation with 5 pastures	deferred rotation with 5 pastures	deferred rotation with 5 pastures
AUMs	-	1,294	1,294	1,294	1,294
Permitted Livestock	-	241	241	241	241
Acres	-	9,444	9,444	9,444	9,444
Water Developments	-	28	24	28	28
Fences (miles)	-	16.1	16.1	16.1	16.1
Manage Daily	-	None	None	None	None

Table 1. Summary and Comparison of Activities Included in Each Alternative.

	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Current Permits)	Alternative 4	Preferred Alternative
Kloutchman Allotment*					
Season of Use	-	May 14 - July 21	May 15 - July 21 and May 15 - June 4*	May 14 - Aug 7	May 14 - Aug 7
Grazing System & Number of Pastures	-	early on/off, rest- rotation with 10 pastures	deferred rotation with 6 pastures	early on/off, rest- rotation with 10 pastures	early on/off, rest- rotation with 10 pastures
AUMs	-	911	862 + 277* = 1,139	1,139	1,139
Permitted Livestock	-	300	288 and 300*	300	300
Acres	-	15,380	10,871 + 4,509* = 15,380	15,380	15,380
Water Developments	-	35	28	35	35
Fences (miles)	-	22.9	15.6	22.9	22.9
Manage Daily	-	None	None	None	None
Sherwood Allotment*					
Season of Use	-	May 14 - July 3	May 14 - July 3	May 14 - July 3	May 14 - July 3
Grazing System & Number of Pastures	-	early on/off, rest- rotation with 4 pastures	deferred rotation with 3 pastures*	early on/off, rest- rotation with 4 pastures	early on/off, rest- rotation with 4 pastures
AUMs	-	673	488 + 185* = 673	673	673
Permitted Livestock	-	300	300	300	300
Acres	-	16,112	6,097 + 3,003* = 9,100	16,112	16,112
Water Developments	-	46	16	46	46
Fences (miles)	-	14.8	8.3	14.8	14.8
Manage Daily	-	all pastures	None	all pastures	all pastures

Table 1. Summary and Comparison of Activities Included in Each Alternative.

	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Current Permits)	Alternative 4	Preferred Alternative
Shotgun Allotment					
Season of Use	-	May 15 - July 16	June 16 - Sept 30	May 15 - July 16	May 15 - July 16
Grazing System & Number of Pastures	-	early on/off with 1 pasture	deferred rotation with 2 pastures	rest-rotation with 3 pastures	early on/off with 1 pasture
AUMs	-	554	1,017	554	554
Permitted Livestock	-	200	216	200	200
Acres	-	9,582	16,594	9,582	9,582
Water Developments	-	28	33	28	28
Fences (miles)	-	5.9	11.4	13	5.9
Manage Daily	-	Drake Pasture	None	None	Drake Pasture

*The West Maury Allotment will be eliminated in Alternatives 2 and 4 and the preferred alternative. In Alternative 3, the West Maury Allotment has been grazed as part of the Sherwood and Klootchman Allotments and is included in the description of those allotments. See alternative descriptions for specific information.

Table 2. Summary of All Livestock Grazing and Structural Improvements.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Number of Water Developments	-	169	128	169	169
Miles of Fence	-	76.8	70.3	83.9	76.8
Authorize AUMs	-	4,197	5,081	4,425	4,425
Acres Grazed	-	59,757	61,169	59,757	59,757

Table 3. Comparison of the Effects of Implementing the Alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Demand for Livestock Forage (in AUMs)					
Double Cabin Allotment	0	765 Reduce AUMs by 20% compared to current permit.	958 No reduction in AUMs.	765 Reduce AUMs by 20% compared to current permit.	765 Reduce AUMs by 20% compared to current permit.
East Maury Allotment	0	1,294 No reduction in AUMs. 10-year rest.	1,294 No reduction in AUMs.	1,294 No reduction in AUMs. 10-year rest.	1,294 No reduction in AUMs. 10-year rest.
Kloutchman Allotment	0	911 Reduce AUMs by 20% compared to current permit.	1,139 No reduction in AUMs.	1,139 Temporary reduction in AUMs while new improvements are constructed.	1,139 Temporary reduction in AUMs while new improvements are constructed.
Sherwood Allotment	0	673 No reduction in AUMs.	673 No reduction in AUMs.	673 No reduction in AUMs.	673 No reduction in AUMs.
Shotgun Allotment	0	554 Reduce AUMs by 45% compared to current permit.	1,017 No reduction in AUMs.	554 Reduce AUMs by 45% compared to current permit.	554 Reduce AUMs by 45% compared to current permit.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Stream Shade					
Double Cabin Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase; increases would be slower than Alt. 1. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease.	The amount of shade would increase; increases would be slower than Alt. 1. Measurable increases are expected in 10 years.	The amount of shade would increase; increases would be slower than Alt. 1. Measurable increases are expected in 10 years.
East Maury Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.
Klootchman Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease.	The amount of shade would increase; increases would be slower than Alts. 1 and 2. Measurable increases are expected in 15 years.	The amount of shade would increase; increases would be slower than Alts. 1 and 2. Measurable increases are expected in 15 years.
Sherwood Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.

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Shotgun Allotment	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade would increase. Measurable increases are expected in 10 years.	The amount of shade is expected to remain the same or decrease over time.	The amount of shade would increase; increases would be slower than Alts. 1 and 2. Measurable increases are expected in 15 years.	The amount of shade would increase. Measurable increases are expected in 10 years.
Bank Stability					
Double Cabin Allotment	No streambank alteration from livestock grazing.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	More than 20% streambank alteration annually and an increase in the amount of cutbank.	10% or less streambank alteration annually and no increase in the amount of cutbank.	10% or less streambank alteration annually and no increase in the amount of cutbank.
East Maury Allotment	No streambank alteration from livestock grazing.	No streambank alteration from livestock grazing because allotment would be rested for 10 years.	If rested, no streambank alteration from livestock grazing. If grazed, the amount of alteration is uncertain.	No streambank alteration from livestock grazing because allotment would be rested for 10 years.	No streambank alteration from livestock grazing because allotment would be rested for 10 years.
Kloutchman Allotment	No streambank alteration from livestock grazing.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	More than 10% streambank alteration annually and no increase in the amount of cutbank.	10% or less streambank alteration annually and no increase in the amount of cutbank.	10% or less streambank alteration annually and no increase in the amount of cutbank.
Sherwood Allotment	No streambank alteration from livestock grazing.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	More than 10% streambank alteration annually and no increase in the amount of cutbank.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.

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Shotgun Allotment	No streambank alteration from livestock grazing.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	More than 10% streambank alteration annually and an increase in the amount of cutbank.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.	Less than 10% streambank alteration annually. The amount of cutbank would decrease over time.
Livestock Distribution					
Double Cabin Allotment	Livestock would be removed.	Livestock distribution would increase as a result of earlier season grazing, and new or improved water developments.	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock distribution would increase as a result of earlier season grazing, and new or improved water developments.	Livestock distribution would increase as a result of earlier season grazing, and new or improved water developments.
East Maury Allotment	Livestock would be removed.	Livestock would not be present for 10 years.	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock would not be present for 10 years.	Livestock would not be present for 10 years.
Kloutchman Allotment	Livestock would be removed.	Livestock distribution would increase as a result of earlier season grazing, new water developments, and changes to pasture fences.	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock distribution would increase as a result of earlier season grazing, new water developments, and changes to pasture fences.	Livestock distribution would increase as a result of earlier season grazing, new water developments, and changes to pasture fences.

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Sherwood Allotment	Livestock would be removed.	Livestock distribution would increase as a result of earlier season grazing, new or improved water developments, and adding the West Pine Pasture.	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock distribution would increase as a result of earlier season grazing, new or improved water developments, and adding the West Pine Pasture.	Livestock distribution would increase as a result of earlier season grazing, new or improved water developments, and adding the West Pine Pasture.
Shotgun Allotment	Livestock would be removed.	Livestock distribution would increase as a result of earlier season grazing and new water developments,	Livestock distribution would continue to be problematic and livestock would continue to concentrate in riparian areas.	Livestock distribution would increase as a result of earlier season grazing, new water developments, and changes to pasture fences.	Livestock distribution would increase as a result of earlier season grazing and new water developments,

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Changes between Draft and Final EIS

The section on Water Quality has been updated to acknowledge that many factors, not just livestock grazing, affect stream shade.

The section on Threatened, Endangered, and Sensitive Aquatic Species has been updated to include more information on Riparian Management Objectives.

Table 16 has been updated to include information on the preferred alternative.

Minor typographical errors were corrected.

This chapter summarizes the physical and biological environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives.

Three key assumptions were used to determine the environmental consequences of the proposed action and alternatives. These assumptions are:

1. Alternatives would be implemented as written. New structural range improvements would be phased in over the next 10 years.
2. Term grazing permits would contain standard terms and conditions contained on USDA Forest Service Form FS-2200-10 (12/99).
3. The IMM (implementation monitoring module) standards for stubble height, bank trampling, and preference for woody vegetation would be used as thresholds/triggers for moving livestock from one pasture to the next or removing livestock from the allotment after the pasture rotation is complete.

Vegetation (Forage)

Affected Environment

The current forage conditions in the Maury Mountains reflect historical grazing practices and vegetation management, including timber harvest and fire. According to Hall (2004), the herbaceous vegetation rates are poor to very poor in the Maury Mountains. Hall (2005 pers. comm.) indicates that historical grazing practices on the Maury Mountains were intense. Typically, the Maury Mountains were grazed first in the spring and the livestock including thousands of sheep would move to the Ochoco Mountains once all the forage was gone. This type of grazing decreased the herbaceous plant populations and seedbeds so that even if livestock were removed from the Maury Mountains, natural recovery to conditions that occurred prior to historic settlement in the latter half of the 19th century would not occur (Hall 2005 pers. comm.).

Major changes in forests across the northwest have occurred in the past century which are largely attributed to fire suppression and changing timber harvest (Peek et al. 2001). According to Peek and others (2001), "These changes typically reduce understory productivity as canopies progressively close and shade out understories." The changes in forests described by Peek and others (2001) are evident in the project area. The increase in canopy cover has shaded the understory and reduced the amount of understory vegetation. According to the Maury Mountains Watershed Analysis, harvest methods changed by the decade, for example, in the 1980's timber harvest was focused on even-aged management systems with treatments like overstory removal and clearcutting. In the 1990's, timber sales focused on both even-aged and uneven-aged systems. Clearcutting and overstory removal treatments resulted in more resources to the understory and a greater vegetation cover. However, according to Hall, because of past management, even removal of the overstory will not return vegetation to pre-settlement conditions and in some areas little seed bank exists to create an understory without seeding (Hall pers. comm.).

Fire disturbance has changed over the last century as well. According to the Maury Mountains Watershed Analysis, a fire regime, which is a generalized description of the role fire plays in an ecosystem, were different then they are today. Historically, 73 percent of the acres in the Maury Mountains were under a nonlethal, very frequent regime, usually having a fire interval of less than 25 years. Today, only 33 percent of the acres fall into the nonlethal, very frequent fire regime; the remainder is either a mixed or stand replacement fire occurring less frequent (USDA Forest Service 2000). This change in fire disturbance has affected understory vegetation; because there has been less disturbance, there are fewer openings in the canopy and less vegetation has been established in the understory.

Grazing practices have changed over time and stocking rates have decreased. Grazing management in the Maury Mountains has gone from season-long grazing to deferred grazing (see glossary). Livestock numbers and the amount of use have decreased from what they were early in the century. Table 4 is a comparative look at the amount of grazing over time.

Table 4. Comparative Change in Grazing over Time.

Year	Number of Permittees	Permitted Livestock Numbers	Permitted AUMs*
1919	53	2223 cattle + 106 horses	12,297
1938	23	1806 cattle	9,536
1948	15	1503 cattle	7,936
1978	7	1161 cattle	5,569
2004	5	1565 cattle	5,081

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

Today, the Forest Plan allocates up to 50 percent of forage to livestock based on existing conditions. The Forest Service monitors vegetation utilization and residual stubble height based on criteria prescribed by the Forest Plan and the Implementation Monitoring Program for Pacfish, INFISH, and the 1998 Biological Opinions for Salmon, Steelhead, and Bull Trout (USDA Forest Service 2003a).

Utilization in riparian areas is based primarily on stubble height residue on key species in Designated Monitoring Areas (DMAs) in each pasture; selected key species are reasonably palatable and abundant vegetation within the monitoring area that represents overall use of the area (Smith et al. 2005). All the DMAs in the project area are in riparian areas either on terraces or greenlines. These locations were selected because they are the most sensitive spots in the pasture. It is also assumed that “if proper management occurs on the [DMA], the remainder of the pasture or use area will also be managed within requirements” (Burton 2004). Typically, the DMAs in the Maury Mountains will reach standards while the uplands have not been equally utilized. This is due to distribution reflected on current vegetation conditions, upland water developments, season of use, and range improvements. Triggers that cause livestock to be removed early from pastures are: (1) meeting stubble height standards, (2) streambank alteration by livestock approaching 10 percent within the DMA, or (3) livestock changes in preference from herbaceous to woody vegetation.

Conditions in upland areas are based primarily of Condition & Trend (C&T) surveys. Twenty-one C&T sites were located and re-read in 2003 throughout the Maury Mountains. These sites were established between 1959 and 1961. The general tendency at the C&T sites is an increase in litter, a decrease in perennial plants, and an increase in canopy cover. Of the 21 sites read, all of them showed an increase in litter and 18 sites showed a decrease of plant hits. There is an average increase of 22 litter hits and of the 18 sites that showed a decrease in plant hits, the average was 18. All of the sites but one that had tree canopy cover data showed an increase in tree canopy cover from 1961 to 2003.

Since 1999, the Lookout Mountain Ranger District has measured stubble height in the DMAs. To calculate utilization, stubble height data was converted to utilization with some assumptions. Stubble height and utilization are not the same. “Utilization (use) is the proportion of current year’s forage production that is consumed or destroyed by grazing animals” while “Stubble is the basal portion of herbaceous plants remaining after the top portion has been harvested either artificially or by grazing animals” (Bedell 1998). For management, utilization is geared towards plant physiology making sure that grazing does not recess the plant health; stubble height is geared towards improving riparian conditions by providing protection from water and wind erosion. However, height-weight curves have been created to convert stubble height to percent utilization. Although utilization is based on a certain year’s growth and stubble height is based on what remains, the basic relationship of height to weight is similar (Smith et al. 2005). The three height-weight curves used to determine utilization in the Maury Mountains were Cowley 1999, Kingery et al. 1992, and Kinney and Clary 1994. Table 5 displays the results of stubble height monitoring over the last several years and also displays whether utilization standards were met based on the conversion of stubble height data to utilization.

Based on the Forest Plan and the condition of riparian communities, allowable use in riparian areas in the Maury Mountains is 0-40 percent. Forage utilization in riparian communities was determined by whether forage conditions are in satisfactory or unsatisfactory condition. Satisfactory conditions are areas where the forage condition is at least fair with a stable trend. Unsatisfactory condition is defined as forage condition less than fair with unstable trends. Riparian areas with less than fair forage condition and unstable trends do not contain sufficient perennial plants to capture sediment and slow water flow or to protect the soil from raindrop impacts like displacement. Based on stream surveys, C&T surveys in meadows, photo points, and the 2004 Evaluation of Livestock Grazing on the Ochoco National Forest (Hall 2004), it was determined that overall forage conditions in riparian areas are in an unsatisfactory condition within the project area, even though some areas are in satisfactory condition. The C&T surveys in the meadows (there was at least one in each allotment) rate forage condition as poor to very poor to fair with five of the eight sites in downward or static trends. Three sites were in an upward trend. Stream surveys and photo points show mainly downward or static trends with observations of poor riparian vegetation.

Table 5. Utilization and Stubble Height Standards

Allotment and Pasture	Utilization and Stubble Height	Utilization And Stubble Height Standard Achievement						
		1999	2000	2001	2002	2003	2004	2005
Double Cabin Allotment								
Center	Utilization	N	N	N	N	Rest	N	N
	Stubble Height	N	N	N	N	Rest	N	Y
Faight	Utilization	N	-	N	N	Rest	Rest	Rest
	Stubble Height	N	-	N	N	Rest	Rest	Rest
Parrish	Utilization	N	-	N	N	Rest	-	N
	Stubble Height	N	-	Y	N	Rest	-	Y
Rickman	Utilization	N	-	N	N	Rest	Rest	Rest
	Stubble Height	N	-	N	Y	Rest	Rest	Rest
West	Utilization	N	N	N	N	Rest	N	N
	Stubble Height	N	N	N	N	Rest	Y	N
East Maury Allotment								
Arrowwood	Utilization	-	Rest	Rest	Rest	Rest	Rest	Rest
	Stubble Height	-	Rest	Rest	Rest	Rest	Rest	Rest
Cottonwood	Utilization	-	Rest	Rest	Rest	Rest	Rest	Rest
	Stubble Height	-	Rest	Rest	Rest	Rest	Rest	Rest
East Pine	Utilization	-	Rest	Rest	Rest	Rest	Rest	Rest
	Stubble Height	-	Rest	Rest	Rest	Rest	Rest	Rest
Maury	Utilization	N	Rest	Rest	Rest	Rest	Rest	Rest
	Stubble Height	N	Rest	Rest	Rest	Rest	Rest	Rest
Ned	Utilization	-	Rest	Rest	Rest	Rest	Rest	Rest
	Stubble Height	-	Rest	Rest	Rest	Rest	Rest	Rest
Kloutchman Allotment								
Florida	Utilization	Y	N	N	Y	-	Rest	Y
	Stubble Height	N	N	N	N	-	Rest	Y
Friday	Utilization	N	N	-	N	-	N	Rest
	Stubble Height	N	N	-	N	-	N	Rest
Lower Kloutchman	Utilization	-	-	-	N	-	N	N
	Stubble Height	-	-	-	Y	-	Y	Y
Kloutchman	Utilization	Y	Y	Y	N	-	N	N
	Stubble Height	Y	Y	Y	Y	-	Y	Y
Pre-Emption	Utilization	NA	NA	NA	N	N	-	Rest
	Stubble Height	NA	NA	NA	Y	Y	-	Rest
Sherwood Allotment								
Hammer	Utilization	-	-	Rest	N	Rest	Rest	Rest
	Stubble Height	-	-	Rest	Y	Rest	Rest	Rest
Newsome	Utilization	N	N	N	N	Rest	Rest	Rest
	Stubble Height	Y	N	N	Y	Rest	Rest	Rest
Shotgun Allotment								
Drake	Utilization	N	N	N	N	N	N	Y
	Stubble Height	N	N	N	N	Y	Y	Y
West Pine	Utilization	N	N	N	N	N	Rest	Rest
	Stubble Height	Y	Y	Y	Y	Y	Rest	Rest
West Maury Allotment								
Gibson	Utilization	N	N	N	N	Rest	Rest	Rest
	Stubble Height	N	N	N	Y	Rest	Rest	Rest
Hamer	Utilization	N	N	N	N	-	Rest	N
	Stubble Height	N	N	Y	Y	-	Rest	N

Y=standards were met
N=standards were not met

Rest=pasture was not used that year.

- = pasture not measured.
NA=pasture did not exist

Based on the Forest Plan and primary range communities, the allowable use is 0-40 percent in upland areas. Forage utilization in primary range communities was determined by whether forage conditions are in satisfactory or unsatisfactory condition. Satisfactory conditions are areas where the forage condition is at least fair with a stable trend. Unsatisfactory condition is defined as forage condition less than fair with unstable trends. The project area was determined to be in unsatisfactory condition overall based on Hall (2004) rating the condition of the Maury Mountains as poor to very poor, and the C&T surveys in the uplands, which rated most areas in poor to very poor conditions. Some areas are in satisfactory condition; 5 of the 13 C&T surveys rated areas as fair or good in the uplands.

The information contained here has been summarized from the May 10, 2006, Resource Report for Range. The report contains additional information on C&T surveys, range conditions, forage utilization, and livestock distribution.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

All livestock grazing in the Maury Mountains would be eliminated after 2 years. After 2 years, there would be no utilization of forage by livestock. Current permittees would need to find different forage sources for their livestock. Range improvements would no longer be maintained and would be abandoned or removed. Water from water developments would be returned to its original channel where practical. Bank alteration and grazing of hardwood species by livestock would not occur. The amount of hardwood species are expected to increase in the absence of livestock grazing.

Vegetation not grazed by wildlife would complete its annual lifecycle, allowing more vegetation to seed and reproduce. Natural patterns of succession would set in and because of fire suppression, minimum disturbance would occur. Plant succession is depicted in a linear cycle where early-seral vegetation is replaced by later seral vegetation till finally a climax plant community or potential natural community is established. This would continue until some form of disturbance occurs.

If a climax plant community were achieved with no disturbance like prescribed fire, only certain types of biotic communities would exist; livestock grazing is a form of disturbance that maintains different levels of plant communities. Studies (Courtois et al. 2004 and Green and Kauffman 1995) have found that species richness and diversity were lower in areas that were excluded from grazing. Also, species composition, cover, density, and production were indifferent between grazed and ungrazed areas. If no grazing or other form of disturbance occurred in the Maury Mountains, over time species richness and diversity would be less and the plant community would be more of a climax plant community and the fauna attracted would be limited.

Cumulative Effects

Past actions that affect the current forage conditions include historical grazing practices, vegetation management including timber harvest and prescribed fire, fire suppression, and seeding non-native species, such as intermediate wheatgrass, which changes herbaceous species composition. Other past activities affecting forage condition include aspen and stream restoration projects including riparian planting, grade control structures such as check dams, and headcut repair structures. Table 15 later in this chapter describes the kinds and amounts of past activities throughout the project area. Furthermore, there is no evidence that simply removing livestock from an area will bring vegetation back (Stolzenburg 2000). Historical grazing practices, vegetation management, and fire suppression have created a different ecosystem that does not have the seed bank and conditions to grow the vegetation that might once have occurred in the project area.

Present actions affecting forage condition include the West Maurys Fuels and Vegetation Management Project, the Maury Aspen Restoration Project, the Sherwood Wildlife Prescribed Burn, and headcut repairs on West Fork Shotgun Creek and Drake Creek. Table 15 later in this chapter identifies the amount of activities by allotment. The West Maurys project authorized a variety of commercial harvest, non-commercial thinning, and fuels reduction activities across the western portion of the Maury Mountains. This project would increase the amount of the transitory range by reducing canopy cover. Within 5 years, resources such as water and sunlight will be available to the understory and would temporarily improve the abundance and condition of herbaceous species in the uplands until the tree canopy closes again after 20 to 50 years. The Sherwood Wildlife Burn would reduce fuels on the ground and would stimulate the growth of grasses and shrubs. The Maury Aspen Restoration Project will enhance the growth and vigor of 14 aspen stands totaling approximately 46 acres in the Maury Mountains. Thinning conifer trees in these stands will maintain a vigorous understory of grasses, forbs, and shrubs. Headcut repairs on West Fork Shotgun and Drake Creeks will prevent further advancement and downcutting of existing headcuts, reduce sediment supply to creeks, protect meadows and riparian vegetation, and ensure that water tables remain at the same level, which will allow existing vegetation to continue to exist.

Reasonably foreseeable actions include the East Maurys Fuels and Vegetation Management Project. The East Maurys project would have similar effects as the West Maury project. The abundance and condition of herbaceous species is expected to improve as a result of opening up tree canopy and decreasing competition for resources such as sunlight and water.

The cumulative effects of the past, present, and reasonably foreseeable activities combined with removal of livestock would be result in more abundant understory and riparian vegetation.

Alternative 2

Direct and Indirect Effects

Livestock will be turned into all allotments in May, based on range readiness. Turning livestock on earlier would generate better distribution and less need for livestock to seek water in riparian

areas because the upland vegetation will have more water content in it. Also, with the new water developments, livestock would be able to retrieve water in more areas away from riparian areas, decreasing streambank alteration and grazing in riparian areas including grazing of hardwoods. With the exception of the East Maury Allotment, livestock would be out of the allotments prior to August 15. This would also reduce streambank alteration and utilization of hardwoods because less grazing will occur in the riparian areas. Where applicable, rest-rotation rather than deferred-rotation will be implemented to allow vegetation to complete a lifecycle and set seed every few years.

Parsons et al. (2003) found that during early summer (mid-June to mid-July) cattle were further from the stream than late summer (mid-August to mid-September). This study was conducted on the Eastern Oregon Agricultural Research Center's Hall Ranch located in the Willowa Mountains in northeastern Oregon. Conditions in the study area are similar to conditions in the project area. The results of the study indicated that season of use affected livestock distribution and during early summer, cattle were consistently observed further away from streams. Similar results would be expected in the project area because of similar conditions. Clary and Webster (1989) noted that spring grazing of riparian areas has several advantages. Grazing early usually results in a better distribution of use between the riparian area and adjacent uplands. This is likely due to more similarity in vegetation succulence between riparian and upland areas than would be the case later in the season, cooler temperatures in the early season, and in some cases livestock may avoid streamside areas that are often wet in the spring. Early grazing, followed by complete livestock removal, allows riparian plants to regrow before the dormant period in the fall.

Utilization and stubble height standards would be easier to meet because distribution would improve and riparian areas would be visited less often. Most utilization data is collected in the DMAs in riparian areas because those are usually the most sensitive areas. The earlier season of use would keep the cows out of this area longer and distributed across the pastures more evenly. Improving and increasing the water developments would relieve pressure on streams because more watering options would be available resulting in better distribution because water is usually the driving factor for cows and they tend to stay within 1 mile of a water source (Holechek et al. 2000).

Rest-rotation grazing systems would be implemented on the Double Cabin, Klootchman, and Sherwood Allotments. The combination of rest rotation, improved distribution, and better utilization would improve the trend towards high seral vegetation, primarily in the riparian areas. Livestock would spend less time grazing in these areas allowing more plants to reproduce and improving the overall condition of the plants. Furthermore, a rest-rotation system would allow vegetation in each pasture to set seed once every 3 years in the Double Cabin and Sherwood Allotments and once every 8 years in the Klootchman Allotment. This would improve the seed bank allowing more vegetation to set seed and would allow for improved root growth and carbohydrate storage. This is because when the plant is rested, the plant does not need to reuse energy to try and produce seed after it has been grazed and can send energy to root growth and have more energy left at the end of the growing season for storage next year. Rest also provides a chance for vegetation around water to recover (Howery et al. 2000) including hardwoods to establish and grow above browse height.

Rest rotation also favors recovery in increasing infiltration rates, decreasing compaction, and decreasing sediment production (Bohn and Buckhouse 1985). Livestock can cause compaction and decrease infiltration by grazing protective plant cover, reducing organic matter, or trampling (Bohn and Buckhouse 1985). An increase in infiltration rates would provide more water for vegetation as well as longer water availability through the summer. Decreased compaction would allow more water to infiltrate into the soils providing the same benefits. Finally, a decrease in sediment would improve water quality in streams. A rest rotation grazing system would allow the vegetation to grow and improve watershed health with an increase in infiltration and decrease in compaction and sedimentation.

Double Cabin Allotment - A rest-rotation grazing system would be implemented on this allotment with 193 fewer AUMs than currently permitted. Rest-rotation would allow vegetation in each pasture to set seed once every 4 years, improving the seed bank and providing for improved root growth and carbohydrate storage. With rest, plants do not need to use energy to produce seed after it has been grazed and energy is diverted to root growth and storage for growth in the following year. Rest also provides a chance for vegetation around water to recover (Howery et al. 2000) and for hardwoods to establish and grow above browse height.

Livestock distribution would improve because of the earlier season of use, upland water developments, and daily management in the Center and West Pastures. Livestock would usually be removed from this allotment by July 31. This would reduce streambank alteration and grazing of hardwoods because less grazing would occur in the riparian areas. In addition, upland vegetation in the early summer has a higher water content and can meet some of the livestock's need for water. The West and Center Pastures would require daily management, which is defined as being present on the allotment daily and, when needed, moving livestock to achieve adequate distribution. Two out of 4 years the herd will be split to utilize the drier pastures (Parrish Creek, Faught, and Rickman) that have limited water earlier in the season; the other 2 years Parrish Creek would be rested once and Faught and Rickman would be rested once so that grazing only occurs in the latter part of the season once out of every 4 years.

Four new water developments would be constructed, one in the West Pasture and three in the Center Pasture. These are the two largest pastures and encompass almost 70 percent of the allotment. These new developments are spread out and would draw livestock to areas that previously did not have water. Daily management in the Center and West Pastures would ensure that livestock are adequately distributed. Ten of the 30 existing water developments would be modified to increase water holding capacity and reduce damage in riparian areas. These modifications would improve distribution because they allow more livestock to use the area and decrease the amount of time livestock are in riparian areas seeking water.

In the past, stubble height and bank alteration standards have been difficult to meet, especially in the Center and West Pastures because of the size of the pastures and the lack of available water; both pastures have only met standards once in the last 6 years of use. With the proposed water developments, earlier season of use, and daily management standards are expected to be met.

Utilization of forage in both riparian and upland areas is expected to be 40 percent. In the past, utilization has been uneven and more use has occurred in riparian areas. In 2004, the West Pasture had an estimated utilization of 80 percent in one DMA (that is within a riparian area), while the adjacent upland area was estimated at 30 percent. In 2005, the Center Pasture had 65 percent utilization in one DMA. Because of the earlier season of use, daily management, and new and improved water developments, livestock are expected to spend more time in the uplands and away from the riparian areas so that upland areas would show more utilization, while riparian areas would show less utilization than in the past. Monitoring and pasture moves based on stubble height, bank alteration, and preference for woody species would also contribute to meeting utilization standards. Pasture moves would be initiated when any of the three triggers are reached.

East Maury Allotment - The allotment would be rested for 10 years to provide recovery of vegetation and allow time to construct additional water developments. Ten years of rest would allow vegetation to recover, set seed, and build up a seed bank, increasing root growth and carbohydrate storage.

The construction of four new water developments would improve water availability in upland areas, increasing the amount of useable acres and vegetation for forage. At least one new development would occur in each pasture, increasing the opportunity for livestock to attain water and improve livestock distribution. Livestock movement is usually limited by water and they tend to stay within 1 mile of water (Holechek et al. 2000).

When grazing resumes, the grazing season would be a month earlier with livestock off the allotment by August 30. The earlier season of use would reduce streambank alteration and utilization of hardwoods because less grazing would occur in the riparian areas keeping livestock off the banks and allowing hardwoods to grow more during the season. Removing livestock earlier in the year would allow vegetation to grow more during the season.

In the past, utilization standards have been difficult to meet on this allotment in years prior to 1999. Stubble heights were measured in the Maury Pasture in 1999 and did not meet stubble height or utilization standards. The allotment has been rested ever since.

When grazing resumes, utilization of forage in both riparian and upland areas is expected to be 40 percent. The earlier season of use and new water developments would make standards easier to meet. In addition, pasture moves would be triggered based on stubble height, bank alteration, and preference for woody species thresholds. If any threshold is reached, livestock would be moved to the next pasture or would be removed from the allotment once the annual pasture rotation is complete. Based on triggers for pasture moves and utilization standards, it is likely that livestock would be removed from the allotment before the end of the scheduled grazing season.

Kloutchman Allotment - A rest-rotation grazing system would be implemented on this allotment with 228 fewer AUMs than currently permitted. Rest-rotation would allow vegetation in each pasture to set seed once every 8 years. This would improve the seed bank allowing more vegetation to set seed and would allow for improved root growth and carbohydrate storage. With

rest the plant does not need to reuse energy to try and produce seed after it has been grazed and can send energy to root growth and have more energy left at the end of the growing season for growth in the following year. Rest also provides a chance for vegetation around water to recover (Howery et al. 2000) including hardwoods to establish and grow above browse height.

Livestock distribution would improve because of the earlier season of use and water developments. Livestock would not be on this allotment after August 15. This would reduce streambank alteration and utilization of hardwoods because less grazing would occur in the riparian areas keeping livestock off the banks and allowing hardwoods to grow more during the season. In addition, upland vegetation in the early summer has lower dry matter and can actually provide some water in the vegetation, meeting some of the livestock's need for water.

Swanson (1988 pers. comm.) noted that early season grazing on the Klootchman Allotment in the past was consistent with studies on early season grazing. The Florida Pasture was used one month earlier, livestock were turned on May 17 instead of June 16 and were removed by mid-June. During the time the livestock were in the pasture, Swanson noted that "cows flat stayed out of the bottom, until it started to warm up/dry out." Swanson said that it took 2-1/2 weeks to get 5 percent utilization in the riparian areas where before it took 10 days to get 50 percent utilization. Swanson also noted during a visit to Florida Creek in August to see how things looked, "it would be very difficult for the untrained eye to see that Florida Creek had ever been grazed." He also commented that the "grass plants have 3-6 inch leaf lengths-many with seed heads; bank trampling is basically non-existent; we will have robust grass/shrub plants to absorb raindrop impact when thunderstorms hit..." (Swanson 1988, pers. comm.).

Seven new water developments would be constructed in this allotment. Most water developments are located in areas where water has not been available to livestock. These developments are spread out and would result in livestock utilizing areas that did not have water. In addition, 12 of the 27 existing water developments are going to be improved to increase water holding capacity and reduce damage in riparian areas. These developments would improve distribution because it would allow more livestock to use the area and would decrease the amount time livestock spend in riparian areas.

In the past stubble height and bank alteration standards have been difficult to meet in the Florida and Friday Pastures. One of the DMAs in the Florida Pasture is a wet meadow that would be fenced to exclude livestock. Both the Florida and Friday Pastures would be split into smaller pastures to improve livestock distribution. Four water developments in the Florida and Ferguson Pastures would be relocated and improved to increase their water holding capacity. This would draw livestock away from riparian areas in those pastures. The Friday Pasture would be separated into two smaller pastures, Friday and Deer Creek. There would be one new water development in the smaller Friday Pasture and two new water developments in the newly formed Deer Creek Pasture. These actions would improve livestock distribution and ensure more even utilization. The Hamer and Klootchman Pastures would also be split into smaller pastures to improve distribution. Different DMAs would be located in the each of the 8 pastures that are used in the rest-rotation system to represent the vegetation in those pastures.

Utilization of forage in both riparian and upland areas is expected to be 40 percent. New structural range improvements would improve distribution so that utilization levels are more

consistent throughout this allotment. In the past, utilization has been uneven and more use has occurred in riparian areas. In 2002, use in the DMA in the Florida Pasture was measured at 60 percent while there was little use in the uplands. Because of the pasture splits and water developments, livestock would be better distributed and are expected to spend more time in the uplands and away from the riparian areas so that upland areas would show more utilization, while riparian areas would show less utilization than in the past. Monitoring and pasture moves based on stubble height, bank alteration, and preference for woody species would also contribute to meeting utilization standards. Pasture moves would be initiated when any of the three triggers are reached.

Sherwood Allotment - A rest-rotation grazing system would be implemented with four pastures. The size of the allotment would increase by 7,012 acres because the West Pine Pasture would be added. Rest-rotation would allow vegetation in each pasture to set seed once every 4 years. This would improve the seed bank by allowing more vegetation to set seed and would allow for increased root growth and carbohydrate storage. With rest the plant does not need to reuse energy to try and produce seed after it has been grazed and can send energy to root growth and have more energy left at the end of the growing season for growth in the following year. Rest also provides a chance for vegetation around water to recover (Howery et al. 2000) and for hardwoods to establish and grow above browse height.

Livestock distribution would improve because of the earlier season of use, upland water developments, and daily management. By grazing earlier in the season, livestock would utilize uplands more and in conjunction with water developments, better distribution would occur on the allotment. Livestock would not be on this allotment after August 15. This would reduce streambank alteration and utilization of hardwoods because less grazing would occur in the riparian areas. Upland vegetation in the early summer has lower dry matter and can provide some water in the vegetation, meeting some of the livestock's need for water. Use of vegetation in riparian areas would be lower and utilization of upland vegetation greater during early summer (Parsons et al. 2003).

Fifteen new water developments would be constructed. Eleven are in the West Pine Pasture, the largest pasture in the allotment. These new developments are distributed across the pasture and would attract livestock to areas that did not previously have water. Furthermore, daily management is required in this allotment and would ensure that livestock are adequately distributed. Twelve of the 31 existing water developments would be improved to increase water holding capacity and reduce damage in riparian areas. These developments would improve distribution because it would allow more livestock to use the area and would decrease the amount of use in riparian areas.

Standards, including stubble height have been difficult to meet in the Sherwood Allotment, particularly in the Gibson Pasture. Increasing the size of the allotment by adding the West Pine Pasture and converting the grazing system to a rest-rotation system instead of a deferred rotation system would improve vegetation and lead toward meeting utilization standards. Increasing the number of water development would improve distribution, decrease the time livestock spend in riparian areas, and lead to more even utilization. Daily management would also improve distribution and decrease the amount of time livestock spend in riparian areas.

Utilization of forage in both riparian and upland areas is expected to be 40 percent. Adding the West Pine Pasture and constructing new water developments would improve distribution so that utilization levels are more consistent throughout this allotment. Monitoring and pasture moves based on stubble height, bank alteration, and preference for woody species would also contribute to meeting utilization standards. Pasture moves would be initiated when any of the three triggers are reached.

Shotgun Allotment - There is only one pasture in this allotment, so no rest would occur. Deferment would be achieved by turning livestock into different areas each year. Cows are often creatures of habit and tend to visit the same areas every year, having a favorite spot as well as favorite vegetation they would consume. Typically, the favorite vegetation is the most palatable grasses and would be consumed repeatedly throughout the growing season. With daily management, livestock would be moved out of their favorite areas and introduced to new areas with palatable vegetation, minimizing continuous consumption on preferred vegetation.

Livestock distribution would improve because of the earlier season of use, upland water developments, and daily management. Ten new developments would be constructed in this allotment. Most new developments are located in areas where water is not easily available. These new developments are spread out and would encourage livestock to utilize areas that currently do not have water. Six of the 14 existing water developments would be modified to increase water holding capacity and reduce use in riparian areas. These developments would improve distribution because it would allow livestock to use the area and would decrease the amount of time livestock spend in riparian areas seeking water. The new developments coupled with the earlier season of use, which would keep livestock in uplands more and daily management that require moving livestock for adequate distribution, would result in good distribution.

From 1999 to 2002 the Drake Pasture did not meet standards. In 2004 and 2005, an early on/off grazing system in the Drake Pasture was implemented to determine effectiveness. In both 2004 and 2005 the stubble height standards were met and livestock appeared to be well distributed. With the additional water developments and daily management, distribution and utilization would improve. Utilization of forage in both riparian and upland areas is expected to be 40 percent.

Cumulative Effects

The West Maurys and East Maurys projects propose a variety of commercial harvest, non-commercial thinning, and fuels reduction treatments across the Maury Mountains and in all allotments. Table 15 later in this chapter lists the projects and the amounts and kinds of activities included in those projects by allotment. In the Double Cabin and Shotgun Allotments, the East and West Maurys projects combined would treat a total of 6,583 acres and 10,072 acres, respectively. In the East Maurys Allotment, the proposed East Maurys project would treat approximately 4,400 acres, while in the Klootchman and Sherwood Allotments the West Maurys project would treat 7,642 and 3,586 acres respectively. The Sherwood Wildlife Prescribed Burn includes burning on approximately 1,300 acres in the Sherwood Allotment. These projects

would improve transitory range by increasing the abundance and condition of upland vegetation. As a result of these activities, within 5 years, more water and sunlight will be available and improve forage conditions. Livestock would be able to more easily access these areas when thickets of small trees are removed and slash is piled and/or burned. Livestock would then seek out vegetation in these upland areas resulting in less use in riparian areas.

Early season rest-rotation grazing in the Double Cabin, Klootchman, and Sherwood Allotments would also contribute to improved transitory range conditions. Rest-rotation would allow vegetation in each pasture to set seed once every 4 years in the Double Cabin and Sherwood Allotments and once every 8 years in the Klootchman Allotment, improving the seed bank and providing for improved root growth and carbohydrate storage.

Forage condition in riparian areas would improve as well. Past projects to maintain or improve riparian areas include riparian planting at various locations in all allotments; check dams in Klootchman Creek in the Klootchman Allotment and Newsome Creek in the Sherwood Allotment; and headcut repairs in Klootchman and Pre-emption Creeks in the Klootchman Allotment, Newsome, and Sherwood Creeks in the Sherwood Allotment, and Drake Creek in the Shotgun Allotment. The Maury Mountains Stream Reclamation project will install rock step-pool headcut repair structures and recontour vertical side-slopes at headcut locations on Drake and West Shotgun Creeks to prevent further advancement and downcutting of existing headcuts, reduce sediment supply to creeks, and protect meadows and riparian vegetation. These projects will improve vegetation conditions by ensuring that water tables remain at the same level. Because of the earlier season of use and water developments that will attract livestock to the uplands, livestock use in these areas is not expected to increase concurrent with the increase in riparian vegetation. Daily management of the Sherwood and Shotgun Allotments and Center and West Pastures of the Double Cabin Allotment would also help to ensure that livestock are distributed throughout these areas and do not spend a disproportionate amount of time in riparian areas.

The Maury Aspen Restoration project includes thinning around aspen on approximately 5 acres in the Double Cabin Allotment, 20 acres in the Klootchman Allotment, and 21 acres in the Shotgun Allotment. Reducing conifers around aspen in this project would enhance the growth and vigor of the aspen and maintain a vigorous understory of grasses, forbs, and shrubs in affected areas. These aspen restoration projects include fencing or piling slash to discourage livestock use of these areas. Even though areas around these aspen stands will be thinned of conifers, the amount of livestock browse and trampling of aspen sprouts is expected to decrease because of the fences and slash barriers.

The cumulative effect of the past, present, and reasonably foreseeable projects combined with early season grazing, new water developments, and daily management would be improved forage conditions in upland and riparian areas, and improved livestock distribution. Utilization and stubble height standards would be easier to meet because livestock would forage more in the uplands where vegetation and water would be available. Streambank alteration and hardwood utilization would be less because livestock would be spending more time in the uplands.

Alternative 3

Direct and Indirect Effects

Grazing would be reauthorized on six allotments under the current stocking rates and season. Typically the season extends later in the year and the stocking levels are higher when compared to Alternatives 2 and 4. All of the allotments are managed under a deferred-rotation system.

A deferred-rotation grazing system does not work as well as rest-rotation for restoring riparian and watershed systems (Varra et al. 1993). Bohn and Buckhouse (1985) also found that deferred rotation “did little to enhance, and sometimes hindered, hydrologic expression.”

Livestock distribution would not improve beyond the existing distribution patterns. The most limiting factor for livestock distribution is water and without providing more watering opportunities, livestock use in riparian areas would be greater than in the uplands.

Double Cabin Allotment - Under this system, end of the season utilization standards were not met from 1999-2005. Plant health could have been decreased because of reduced leaf mass to capture sunlight and create energy for the plant to grow, reproduce, and store energy for future needs. End of the season stubble height standards were met five times from 1999-2005; seventeen times end of the season standards were not met. When standards are not met in a key area, either grasses were grazed to less than 4 inches or sedges were grazed to less than 6 inches, leaving less above ground biomass to protect from wind and water erosion. Standards, including bank alteration, were the most difficult to meet in the Center, West, and Faught Pastures. All the key areas are located in riparian areas. Over time and without rest, grazing plants to less than standards would decrease the vigor of the vegetation, root mass, and seedbeds which eventually would allow more competitive vegetation to replace desired vegetation. Typically the competitive vegetation is either non-native vegetation or early-seral vegetation that does not provide capturing water and slow overland flow to decrease erosion. A decrease in root mass would be caused by a limit in energy of the vegetation; the vegetation would be spending more energy growing leaves and trying to produce seed heads. This decrease in root mass would not capture water as well as plants with proper utilization nor slow underground water movement, nor hold soil together during a rain event. All these can lead to a decrease in vegetation.

Stubble height monitoring records for this allotment indicate disproportional use of riparian areas in relation to uplands. For example, in 2004 the West Pasture showed an 80 percent utilization level in the DMA with an ocular estimate of 30 percent in the adjacent uplands. In 2005 the Center Pasture showed a 65 percent utilization level in the DMA with an ocular estimate of 40 percent in the uplands. In the Faught Pasture, monitoring records indicated that uplands had very light use. With the current grazing system, it is expected that there would continue to be disproportionate use of the riparian areas in relation to upland use. Utilization of forage in riparian and upland areas is expected to be 75 percent and 35 percent respectively.

East Maury Allotment - Past monitoring records for this allotment indicate that at the current stocking level it has been difficult to meet utilization standards. Most years stocking levels were less, averaging 884 AUMs. Monitoring indicates that livestock grazing is not meeting standards,

excessive use is occurring, and bank trampling is occurring (East Maury allotment file at Lookout Mountain Ranger District). The allotment has been rested since 1999.

Plant health could have been decreased because of reduced leaf mass to capture sunlight and create energy for the plant to grow, reproduce, and store energy for future needs. Stubble heights less than standards leave less above ground biomass to protect from wind and water erosion. Continued grazing at this level would decrease the vigor of the vegetation, root mass and seedbeds. A decrease in vigor and seedbeds would eventually allow more competitive vegetation to replace desired vegetation; typically the competitive vegetation is either non-native vegetation or early seral vegetation that does not capture water or slow overland flow to decrease erosion. A decrease in root mass would be caused by less energy in the vegetation; the vegetation would be spending more energy growing leaves and trying to produce seed heads. This decrease in root mass would not capture water as well as plants with proper utilization nor slow down water moving underground or hold soil together during a rain event. All these can lead to a decrease in vegetation condition.

Livestock distribution would not change. The later season of use would increase pressure on riparian areas because livestock would be drawn to water, cooler temperatures, and more palatable vegetation. Utilization of forage in riparian and upland areas is expected to be 55 percent and 25 percent, respectively.

Klootchman Allotment - Under this system, end of the season utilization standards were met six times from 1999-2005; 14 times end of the season standards were not met. Plant health could have decreased because of reduced leaf mass to capture sunlight and create energy for the plant to grow, reproduce, and store energy for future needs. End of the season stubble height standards were met 12 times from 1999-2005; 8 times end of the season standards were not met. Eight of the 11 times stubble height standards were not met occurred in the Friday or Florida Pastures; bank alteration was also difficult to meet. When standards are not met in a key area, either grasses were grazed to less than 4 inches or sedges were grazed to less than 6 inches, leaving less above ground biomass to protect from wind and water erosion. All the key areas are located in riparian areas. Over time and without rest, grazing plants to less than standards would decrease the vigor of the vegetation, root mass, and seedbeds which eventually would allow more competitive vegetation to replace desired vegetation. Typically the competitive vegetation is either non-native vegetation or early seral vegetation that does not capture water or slow overland flow to decrease erosion. A decrease in root mass would be caused by a limit in energy of the vegetation; the vegetation would be spending more energy growing leaves and trying to produce seed heads. A decrease in root mass would not capture water nor slow down water moving underground or hold soil together during a rain event. All these can lead to a decrease in vegetation condition.

Stubble height monitoring records for this allotment indicate disproportional use of riparian areas in relation to uplands in the Florida Pasture. In 2002, use was measured at 60 percent in the DMA located in the riparian area with comments of little upland use. With the current grazing system, it is expected that there would continue to be disproportionate use of the riparian areas in relation to upland use. Utilization of forage in riparian and upland areas is expected to be 60 percent and 30 percent, respectively.

Sherwood Allotment - Under this system, end of the season utilization standards were not met from 1999-2002. The allotment has been rested since 2003. Plant health could have decreased because of reduced leaf mass to capture sunlight and create energy for the plant to grow, reproduce, and store energy for future needs. End of the season stubble height standards were met three times from 1999-2002; two times end of the season standards were not met. Three of the 4 years stubble height standards were not met in the Gibson Pasture. When standards are not met in a key area, either grasses were grazed to less than 4 inches or sedges were grazed to less than 6 inches, leaving less above ground biomass to protect from wind and water erosion. Over time and without rest, grazing plants to less than standards would decrease the vigor of the vegetation, root mass, and seedbeds which eventually would allow more competitive vegetation to replace desired vegetation. Typically, the competitive vegetation is either non-native vegetation or early-seral vegetation that does not capture water or slow overland flow to decrease erosion. A decrease in root mass would be caused by a limit in energy of the vegetation; the vegetation would be spending more energy growing leaves and trying to produce seed heads. This decrease in root mass would not capture water as well as plants with proper utilization nor slow down water moving underground or hold soil together during a rain event. All these can lead to a decrease in vegetation condition.

Stubble height monitoring records for this allotment indicate disproportional use of riparian areas in relation to uplands in the Gibson Pasture. In 2002, monitoring indicated 70 percent use in the meadow DMA while utilization of the terrace was 50 percent. With the current grazing system it is expected that there would continue to be disproportionate use of the riparian areas in relation to upland use. Utilization of forage in riparian and upland areas is expected to be 60 percent and 50 percent, respectively.

Shotgun Allotment - Under this system, end of the season utilization standards were met once from 1999-2005; 11 times end of the season standards were not met. When standards are not met, plant health could decrease because there would be less leaf mass to capture sunlight and create energy for the plant to grow, reproduce, and store energy for future needs. End of the season stubble height standards were met 8 times from 1999-2005; 4 times end of the season standards were not met. Utilization of forage in riparian and upland areas is expected to be 65 percent and 30 percent, respectively. When standards are not met over time, this would decrease the vigor of the vegetation, root mass, and seedbeds. A decrease in vigor and seedbeds would eventually allow more competitive vegetation to replace desired vegetation. Typically, the competitive vegetation does not capture water or slow overflow to decrease erosion. A decrease in root mass would be caused by a limit in energy of the vegetation; the vegetation would be spending more energy growing leaves and trying to produce seed heads. This decrease in root mass would not capture water as well as plants with proper utilization nor slow down water moving underground or hold soil together during a rain event. All these can lead to a decrease in vegetation condition.

With the current grazing system livestock distribution will not change. The later season of use will increase use of riparian areas because livestock will be drawn to water, cooler temperatures, and more palatable vegetation.

West Maury Allotment - The West Maury allotment contains two pastures and will be managed under a deferred-rotation system. The Gibson Pasture is used with the Sherwood Allotment increasing the stocking rate in the Sherwood Allotment from 488 AUMs to 673 AUMs. The Hamer Pasture is used with the Klootchman Allotment increasing the stocking rate from 862 AUMs to 1,139 AUMs.

Under this system, end of the season utilization standards for the Gibson Pasture were never met from 1999-2002; 4 times end of the season standards were not met. For the Hamer Pasture, end of the season utilization standards were never met from 1999-2005; 5 times the end of the season standards was not met. When standards are not met, plant health could decrease because there would be less leaf mass to capture sunlight and create energy for the plant to grow, reproduce, and store energy for future needs. End of the season stubble height standards were met once for the Gibson Pasture from 1999-2002; 3 times end of the season standards were not met from 1999-2002. For the Hamer Pasture, end of the season stubble height standards were met twice from 1999-2005; 3 times end of the season standards were not met. When standards are not met, either grasses were grazed lower than four inches or sedges were grazed lower than six inches, leaving less above ground biomass to protect from wind and water erosion. All these key areas are located in riparian areas. Over time and without rest, this would decrease the vigor of the vegetation, root mass, and seedbeds. A decrease in vigor and seedbeds would eventually allow more competitive vegetation to replace desired vegetation; typically the competitive vegetation does not provide the functions that desired vegetation such as capturing water and slowing overflow to decrease erosion. A decrease in root mass would be caused by a limit in energy of the vegetation; the vegetation would be spending more energy growing leaves and trying to produce seed heads. This decrease in root mass would not capture water as well as plants with proper utilization nor slow down water moving underground or hold soil together during a rain event. All these can lead to a decrease in vegetation condition.

Cumulative Effects

The West Maurys and East Maurys projects include a variety of commercial harvest, non-commercial thinning, and fuels reduction treatments across the Maury Mountains in all allotments. Table 15 later in this chapter lists the projects and the amounts and kinds of activities included in those projects by allotment. In the Double Cabin and Shotgun Allotments, the East and West Maurys projects combined would treat a total of 6,583 acres and 10,072 acres, respectively. In the East Maury Allotment, the East Maurys project would treat approximately 4,436 acres, while in the Klootchman and Sherwood Allotments the West Maurys project would treat 7,642 and 3,586 acres, respectively. The Sherwood Wildlife Prescribed Burn will burn approximately 1,300 acres in the Sherwood Allotment. These projects would increase transitory range by increasing the abundance and condition of upland vegetation. Within 5 years new resources such as water and sunlight would be available and improve forage conditions. Livestock would be able to access these areas when thickets of small trees are removed and slash is piled and/or burned. As the transitory range increases, livestock would utilize some of this vegetation. Livestock would then seek out vegetation in these upland areas resulting in less use in riparian areas.

Riparian vegetation would increase as some livestock grazing shifts to upland areas when the transitory range increases. Riparian vegetation would also increase from aspen and riparian enhancement projects including riparian planting, check dams, and headcut repairs. The Maury Aspen Restoration project includes thinning around aspen on approximately 5 acres in the Double Cabin Allotment, 20 acres in the Klootchman Allotment, and 21 acres in the Shotgun Allotment. Reducing conifers around aspen in this project would enhance the growth and vigor of the aspen and maintain a vigorous understory of grasses, forbs, and shrubs in affected areas. These aspen restoration projects include fencing or piling slash to discourage livestock use of these areas. Even though areas around these aspen stands will be thinned of conifers, the amount of livestock browse and trampling of aspen sprouts in these areas is expected to decrease because of the fences and slash barriers.

Despite the riparian planting and headcut repair projects, the later season of use in the Double Cabin, East Maury, and Shotgun Allotments would increase the potential for streambank alteration and hardwood utilization. Utilization and stubble height standards could be met sooner in the season because livestock would move to riparian areas, triggering an early pasture move.

Alternative 4

Livestock grazing would be re-authorized on five allotments. The West Maury Allotment would be eliminated. Livestock will be turned into all allotments in May, based on range readiness. Turning livestock on earlier would generate better distribution and less need for livestock to seek water in riparian areas because the upland vegetation will have more water content in it. Also, with the new water developments, livestock would be able to retrieve water in more areas away from riparian areas, decreasing streambank alteration and grazing in riparian areas including grazing of hardwoods. With the exception of the East Maury Allotment, livestock would be out of the allotments prior to August 15. This would also reduce streambank alteration and utilization of hardwoods because less grazing will occur in the riparian areas. Where applicable, rest-rotation rather than deferred-rotation will be implemented to allow vegetation to complete a lifecycle and set seed every few years.

Parsons et al. (2003) found that during early summer (mid-June to mid-July) cattle were further from the stream than late summer (mid-August to mid-September). This study was conducted on the Eastern Oregon Agricultural Research Center's Hall Ranch located in the Wallowa Mountains in northeastern Oregon. Conditions in the study area are similar to conditions in the project area. The results of the study indicated that season of use affected livestock distribution and during early summer, cattle were consistently observed further away from streams. Similar results would be expected in the project area because of similar conditions. Clary and Webster (1989) noted that spring grazing of riparian areas has several advantages. Grazing early usually results in a better distribution of use between the riparian area and adjacent uplands. This is likely due to more similarity in vegetation succulence between riparian and upland areas than would be the case later in the season, cooler temperatures in the early season, and in some cases livestock may avoid streamside areas that are often wet in the spring. Early grazing, followed by complete livestock removal, allows riparian plants to regrow before the dormant period in the fall.

Utilization and stubble height standards would be easier to meet because distribution would improve and riparian areas would be visited less often. Most utilization data is collected in the DMAs in riparian areas because those are usually the most sensitive areas. The earlier season of use would keep the cows out of this area longer and distributed across the pastures more evenly. Improving and increasing the water developments would relieve pressure on streams because more watering options would be available resulting in better distribution because water is usually the driving factor for cows and they tend to stay within 1 mile of a water source (Holechek et al. 2000).

Rest-rotation grazing systems would be implemented on the Double Cabin, Klootchman, Sherwood, and Shotgun Allotments. The combination of rest rotation, improved distribution, and better utilization would improve the trend towards high seral vegetation, primarily in the riparian areas. Livestock would spend less time grazing in these areas allowing more plants to reproduce and improving the overall condition of the plants. Furthermore, a rest-rotation system would allow vegetation in each pasture to set seed once every 2 years in the Shotgun Allotment, once every 3 years in the Double Cabin and Sherwood Allotments, and once every 8 years in the Klootchman Allotment. This would improve the seed bank allowing more vegetation to set seed and would allow for improved root growth and carbohydrate storage. This is because when the plant is rested, the plant does not need to reuse energy to try and produce seed after it has been grazed and can send energy to root growth and have more energy left at the end of the growing season for storage next year. Rest also provides a chance for vegetation around water to recover (Howery et al. 2000) including hardwoods to establish and grow above browse height.

Rest rotation also favors recovery in increasing infiltration rates, decreasing compaction, and decreasing sediment production (Bohn and Buckhouse 1985). Livestock can cause compaction and decrease infiltration by grazing protective plant cover, reducing organic matter, or trampling (Bohn and Buckhouse 1985). An increase in infiltration rates would provide more water for vegetation as well as longer water availability through the summer. Decreased compaction would allow more water to infiltrate into the soils providing the same benefits. Finally, a decrease in sediment would improve water quality in streams. A rest rotation grazing system would allow the vegetation to grow and improve watershed health with an increase in infiltration and decrease in compaction and sedimentation.

Direct and Indirect Effects

Double Cabin Allotment - The grazing system would be changed to rest-rotation with a stocking rate of 765 AUMs. Rest-rotation would allow vegetation in each pasture to set seed once every 4 years. This would result in increasing the seed bank because more vegetation would set seed. There would also be improved root growth and carbohydrate storage. With rest, the plant does not need to reuse energy to try and produce seed after it has been grazed and can send energy to root growth and have more energy left at the end of the growing season for growth in the following year. Rest also provides a chance for vegetation around water to recover (Howery et al. 2000) and for hardwoods to establish and grow above browse height.

Livestock distribution in relation to water developments would be the same as described in Alternative 2. The same water developments would be constructed and would have the same

effect on distribution, increasing livestock use of areas that previously did not have water. Daily management in the Center and West Pastures would ensure that livestock are adequately distributed. The herd would not be split 2 out of 4 years similar to Alternative 2. In the 2 of 4 years that the drier pastures (Parrish Creek, Faught, and Rickman) are grazed later in the season, livestock would be more likely to move into the riparian areas seeking water, palatable vegetations, and cooler temperatures. It is likely that triggers for streambank alteration and hardwood utilization would be met and cause livestock to be moved early in the 2 out of 4 years that the drier pastures are grazed later in the season.

Utilization of forage in both riparian and upland areas is expected to be 40 percent. In the past, utilization has been uneven and more use has occurred in riparian areas. In 2004, the West Pasture had an estimated utilization of 80 percent in one DMA (that is within a riparian area), while the adjacent upland area was estimated at 30 percent. In 2005, the Center Pasture had 65 percent utilization in one DMA. Because of the earlier season of use, daily management, and new and improved water developments, livestock are expected to spend more time in the uplands and away from the riparian areas so that upland areas would show more utilization, while riparian areas would show less utilization than in the past. Monitoring and pasture moves based on stubble height, bank alteration, and preference for woody species would also contribute to meeting utilization standards. Pasture moves would be initiated when any of the three triggers are reached.

East Maury Allotment - The direct and indirect effects of Alternative 4 are the same as Alternative 2.

Klootchman Allotment - The allotment would be managed under a rest-rotation grazing system. All pastures would be used under this rotation except for the Lower Klootchman Pasture, which would be deferred and the Pre-emption Pasture, which would only be used after July 15 to reduce potential impacts to Peck's mariposa lily. These eight smaller pastures used as part of the rest-rotation system would allow for better distribution and more even use throughout the allotment. Utilization patterns would be different than what exists and use would be more even throughout the allotment because of the smaller areas and more water availability. Livestock on the allotment later in the summer could move into the riparian areas seeking water, palatable vegetation, and cooler temperatures creating potential for streambank alteration and hardwood utilization. This could trigger an early pasture move. Riparian vegetation trends would improve, but slower than Alternative 2 because of the later season. Upland trends might not change much from current trends because they would be utilized more than current use.

Livestock distribution in relation to water developments would be the same as described in Alternative 2. The same improvements and water developments would be constructed so they would have the same effect on distribution and would encourage livestock to utilize areas that currently do not have water.

Even with the higher level of AUMs, utilization of forage in both riparian and upland areas is expected to be 40 percent. New structural range improvements would improve distribution so that utilization levels are more consistent throughout this allotment. In the past, utilization has been uneven and more use has occurred in riparian areas. In 2002, use in the DMA in the

Florida Pasture was measured at 60 percent while there was little use in the uplands. Because of the pasture splits and water developments, livestock would be better distributed and are expected to spend more time in the uplands and away from the riparian areas so that upland areas would show more utilization, while riparian areas would show less utilization than in the past.

Monitoring and pasture moves based on stubble height, bank alteration, and preference for woody species would also contribute to meeting utilization standards. Pasture moves would be initiated when any of the three triggers are reached. Based on triggers for pasture moves and utilization standards, it is likely that livestock may be removed from the allotment before the end of the scheduled grazing season.

Sherwood Allotment - The direct and indirect effects of Alternative 4 are the same as Alternative 2.

Shotgun Allotment - The Shotgun Allotment would be split into three pastures, instead of just one pasture as in Alternative 2. The new fences would improve distribution, and would be similar to daily management.

By maintaining the same stocking rate as Alternative 2 and decreasing the useable area of the allotment, utilization standards would be met quicker because there would be more pressure on available vegetation including hardwoods and streambanks. When stubble height or streambank alteration standards are met, livestock would be moved to a different pasture. Changing the management system to a rest-rotation would decrease the useable acreage every year because each year a different pasture would be rested. Heavy vegetation use because of the decrease in acreage but maintained stocking rate could reduce the frequency of native bunchgrasses as well as the basal-area growth of them (Eckert and Spencer 1987). It could also decrease the vigor of the vegetation and root growth of the vegetation. Vegetation trends are expected to improve, but at a much slower rate than Alternative 2.

Livestock distribution in relation to water developments would be the same as described in Alternative 2. The same improvements and water developments would be constructed and would have the same effect on distribution.

Utilization of forage in both riparian and upland areas is expected to be 50 percent. The Forest Plan allows up to 50 percent utilization in both riparian and upland areas when allotments are in satisfactory condition. The Forest Plan (p. 4-141) also allows allotment management plans to include higher utilization standards associated with intensive grazing systems and specific management objectives that meet other resource objectives. The Shotgun Allotment has been determined to be in unsatisfactory condition; however, splitting the single Drake Pasture into three smaller pastures and resting one pasture every year is expected to result in improved vegetation condition because plants would be allowed to set seed every third year and would be able to devote more energy to root growth and carbohydrate storage when rested. Therefore, a higher utilization level is permissible because other resources objectives can still be met, while meeting the objective of providing forage for livestock. Other resource objectives such as improving bank stability and improving stream shade would still be met because triggers for pasture moves would apply as described under implementation monitoring in Chapter 2 and livestock would be moved when thresholds are reached.

Cumulative Effects

The cumulative effects of Alternative 4 would be similar to Alternative 2. However, the degree of cumulative effects would differ in the Klootchman and Shotgun Allotments.

Throughout all allotments upland and riparian range conditions are expected to improve. The vegetation management activities approved in the West Maurys and Sherwood Wildlife Prescribed Burn projects, and proposed in the East Maurys project would improve transitory range conditions by increasing the abundance and condition of upland vegetation. Within 5 years new resources such as water and sunlight would be available and improve forage conditions. Livestock would be able to more easily access these areas when thickets of small trees are removed and slash is piled and/or burned. Livestock would then seek out vegetation in these upland areas resulting in less use in riparian areas.

Early season rest-rotation grazing in the Double Cabin, Klootchman, Sherwood, and Shotgun Allotments would also contribute to improved transitory range conditions. Rest-rotation would allow vegetation in each pasture to set seed once every 3 years in the Shotgun Allotment, once every 4 years in the Double Cabin and Sherwood Allotments, and once every 8 years in the Klootchman Allotment, improving the seed bank and providing for improved root growth and carbohydrate storage.

Forage condition in riparian areas would improve as well. Past projects to maintain or improve riparian areas include riparian planting at various locations in all allotments; check dams in Klootchman Creek in the Klootchman Allotment and Newsome Creek in the Sherwood Allotment; and headcut repairs in Klootchman and Pre-emption Creeks in the Klootchman Allotment, Newsome, and Sherwood Creeks in the Sherwood Allotment, and Drake Creek in the Shotgun Allotment. The Maury Mountains Stream Reclamation project will install rock step-pool headcut repair structures and recontour vertical side-slopes at headcut locations on Drake and West Shotgun Creeks to prevent further advancement and downcutting of existing headcuts, reduce sediment supply to creeks, and protect meadows and riparian vegetation. These projects will improve vegetation conditions by ensuring that water tables remain at the same level. Because of the earlier season of use and water developments that will attract livestock to the uplands, livestock use in these areas is not expected to increase concurrent with the increase in riparian vegetation. Daily management of the Sherwood Allotment and Center and West Pastures of the Double Cabin Allotment would also help to ensure that livestock are distributed throughout these areas and do not spend a disproportionate amount of time in riparian areas. New fences in the Shotgun Allotment would also help to ensure livestock are distributed throughout the pasture.

The degree of effects would be different than Alternative 2 in the Klootchman Allotment because stocking rates would be maintained at current levels. Stocking rates would be maintained by extending the time on the allotment, not increasing the number of livestock. As with Alternative 2, the combination of early season grazing, new water developments, daily management, and the increased abundance and condition of vegetation resulting from the West Maurys projects is expected to improve forage conditions and improve livestock distribution. In the early part of the season, utilization and stubble height standards would be easier to meet because livestock

would be foraging more in the uplands where vegetation and water would be available. Livestock on the allotment later in the summer could move into the riparian areas seeking water, palatable vegetation, and cooler temperatures creating potential for streambank alteration and hardwood utilization.

In the Klootchman Allotment, utilization patterns would change resulting in more even use throughout the allotment because of the smaller pastures, more upland vegetation, and more water availability. Trends would improve at a slower rate once full stocking rates are instituted because livestock would be distributed throughout the entire smaller pasture.

In the Shotgun Allotment, the Drake Pasture would be divided into three new pastures and stocking rates would remain the same as the proposed action. The early season of use would make utilization and stubble height standards easier to meet because livestock would be foraging more in the uplands where vegetation and water would be available because of the West and East Maurys projects and would not need to seek out the amenities in riparian areas. The increased stocking rates tied with the less land area because of the rest-rotation would create quicker consumption of vegetation and create potential for streambank alteration and hardwood utilization, triggering an early pasture move. Trends would improve at a slower rate.

Water Quality

Bank Stability (Channel Morphology)

Affected Environment

Hydrology within the project area is primarily snow-melt driven with little to no base flow, depending on the annual climate conditions. Stream flow is characterized by large seasonal fluctuations; flows are abundant and flashy in the spring and then diminish rapidly to base flow levels or they dry up during the summer months. Summer precipitation usually occurs in high-intensity, short-duration, localized thunderstorms. Winter precipitation usually occurs as snow. Precipitation levels are highly variable, both within and between years.

Within the project area there are no Class I streams (see definitions below). There are approximately 60 miles of Class II streams, 25 miles of Class III streams, and 100 miles of Class IV streams (these numbers were derived from the Ochoco NF GIS system). Streams surveys have been completed on 55 miles of Class II and III streams within the project area. Formal surveys are not completed on Class IV streams because they usually dry up in the summer time.

Class I streams are perennial or intermittent streams with either high densities of fish, or use as a domestic water source, or enough water to be a major contributor to the quality of water in a downstream reach.

Class II streams are perennial or intermittent streams with moderate densities of fish or enough water to be a moderate contributor to the quality of water in a downstream reach.

Class III stream are perennial streams that do not contain fish.

Class IV streams are all other streams that do not meet the above criteria (i.e. intermittent streams).

The main streams within the project area have been classified into Rosgen channel types (Rosgen 1996). However, not all streams within the project area have been classified. Table 6 displays the Rosgen channel type and the amount of streams classified as that type. Map 11 displays the Rosgen channel type classification for the main streams in the project area.

Table 6. Rosgen Channel Types

Rosgen Channel Type	Length (miles)
A	1.0
B	44.7
B sub a	1.9
B within F	5.0
B within G	1.5
C	5.8
C sub b	5.7
C within F	0.9
E	3.3
E sub c	0.3
G	3.8

Rosgen type “A” streams are relatively steep (4-10%) and stream flows at the bankfull stage are typically described as step/pools, with attendant plunge or scour pools. Entrenchment ratios, or ratio of the width of the flood-prone area to the surface width of the bankfull channel, are generally less than 1.4, and width-to-depth ratios are less than 12 at bankfull stage. Sinuosity, or ratio of stream length to valley length, ranges from 1.0 to 1.2.

Type “B” streams exist primarily on moderately steep to gently sloped terrain (2-4%), with the predominant landform seen as a narrow and moderately sloping basin. These streams are moderately entrenched (1.4 to 2.2), have a width/depth ratio greater than 12, and display low channel sinuosity (>1.2). Bedform morphology typically produces scour pools and characteristic riffles. “B sub a” channels have “B” characteristics with the slope of an “A” channel.

Type “C” streams are located in narrow to wide valleys, constructed from alluvial deposition. The primary morphological features of the “C” stream type are the sinuous, low relief channel, the well developed floodplains built by the river, and characteristic “point bars” within the active channel. These streams have a well-developed floodplain (slightly entrenched), are relatively sinuous (>1.4) with a channel slope of 2 percent or less, and width-to-depth ratios generally exceed 12. Bedform morphology is indicative of a riffle/pool configuration. These streams can be significantly altered and rapidly de-stabilized when changes in bank stability, watershed condition, or flow regime are combined to exceed the channel stability threshold.

Type “D” and “Da” streams are configured as multiple channel systems exhibiting a braided pattern with channel slopes generally less than 4 percent. Bank erosion rates are characteristically high and aggradation and lateral extension are dominant channel adjustment processes. There are no streams in the project area classified as type “D” or “Da.”

Figure 1. Delineative Criteria and Characteristics for the Major Stream Types (Rosgen 1996).

Stream TYPE	A	B	C	D	DA	E	F	G	
Dominated Bed Material	1 Bedrock								
	2 Boulder								
	3 Cobble								
	4 Gravel								
	5 Sand								
	6 Silt-Clay								
Entrenchment	< 1.4	1.4 - 2.2	> 2.2	n/a	> 4.0	> 2.2	< 1.4	< 1.4	
W/D Ratio	< 12	> 12	> 12	> 40	< 40	< 12	> 12	< 12	
Sinuosity	1 - 1.2	> 1.2	> 1.2	n/a	variable	> 1.5	> 1.2	> 1.2	
Slope	.04-.099	.02-.039	< .02	< .04	< .005	< .02	< .02	.02-.039	

Type “E” streams represent the developmental “end-point” of channel stability and fluvial process efficiency, primarily because they have relatively large floodplains to dissipate erosive processes, have high sinuosities (>1.5), and occur on slopes less than 2 percent. The “E” type streams are slightly entrenched (>2.2) and exhibit low channel width/depth ratios (<12). Bedform features are predominantly a consistent series of riffle/pool reaches. While the “E” stream type is considered a highly stable system, they are sensitive to disturbance and can be rapidly adjusted and converted to other stream types in relatively short time periods.

Type “F” streams are entrenched (<1.4), broad, and deep with a low to moderate sinuosity (>1.2). Width-to-depth ratios are generally greater than 12, and slope is generally less than 2 percent. “F” channels generally have high bank erosion rates and a high sediment supply. Once a stream reaches the “F” stage, it is in recovery mode and starts to build a new channel within the “F” channel.

Type “G” or “gully” streams are entrenched (<1.4), narrow, and deep, step/pool channels with a low to moderate sinuosity (>1.2). Width-to-depth ratios are generally less than 12, and slope ranges from 2-4 percent, although channels may be associated with gentler slopes where they occur as “down-cut” gullies in meadows. With the exception of those channels containing bedrock and boulder materials, the “G” stream types have very high bank erosion rates and a high sediment supply.

Most streams within the project area appear to have physical stream and vegetative conditions that are in a static trend condition, with some reaches improving and others degrading. Primary factors that influenced the current condition of streams in the project area are beaver trapping, grazing, fire suppression, timber harvest, recreation, special uses, and road construction and use.

There are two hydrologic features that are directly and indirectly influenced by livestock grazing. These features are bank stability (which may lead to a change in channel morphology) and riparian vegetation (which may lead to a change in shade) (Armour et. al 1991, Clary and Webster 1990, Braun 1986, Clifton 1989, Skovlin 1984, and Platts 1990). “C” and “E” type channels are the most sensitive to disturbance and can be rapidly adjusted and converted to other stream types in relatively short time periods (Rosgen 1996). “G” and “F” channels are already entrenched and are adjusting. “G” and “F” channels are not as sensitive to disturbance.

Channel morphology is primarily affected by streambank alteration (from trampling, hoof shear, and/or post holing). Streambank alteration typically leads to the development of unstable banks, cutbank, alteration of width-to-depth ratios, entrenchment, lowering of the water table, and sediment input to the stream. Streambank alteration is the amount of streambank (within the active floodplain) which has been altered by hoof shear, trampling, and/or post holing and has the potential to result in a cutbank or altered channel morphology. Altered streambanks are more susceptible to the transport of fine soil particles from unvegetated banks to stream channels (i.e. higher sediment yield) than streams with vegetated banks (Skovlin 1984). Streambank alteration/percent cutbanks is a surrogate measure for alteration of channel morphology.

The Ochoco National Forest currently measures the percent of cutbank on selected streams each year within the Bottom Line Survey. Map 12 displays the amount of cutbanks recorded during stream surveys in the project area. The percent of cutbank is a measure of bank stability. The protocol states that a cutbank is an actively eroding surface that is greater than 6 inches in height, with an angle greater than 45 degrees (Platts et al. 1987 and Saltzman 1979). This protocol does not necessarily incorporate hoof shear, trampling, and/or post holing unless it meets the stated criterion. Field observations show that most hoof shear, trampling, and/or post holing do not meet the criterion for cutbank. Streambank alteration does account for hoof shear, trampling, and/or post holing, yet may not be visible from year to year. More than 10 percent streambank alteration typically leads to stream incisement and the development of cutbanks (Rhodes et al. 1994). Both cutbank and streambank alteration will be considered in this analysis. Higher levels of streambank alteration will lead to a faster development of cutbanks through incision. Streambank alteration is the short term (annual) measurement of cattle disturbance where percent cutbank is the longer term measurement that may result from many consecutive years of streambank alteration.

Streambank alteration is measured annually at Designated Monitoring Areas (DMAs). This method incorporates a paced assessment over approximately 100 feet of stream length. The Joint Aquatic and Terrestrial Programmatic Biological Assessment (2006) includes project design criteria for spotted frogs that suggests bank stability should be maintained at 90 percent; this number is not a standard or guideline. Rhodes et al. (1994) also recommends maintaining 90 percent bank stability (10 percent alteration) even in areas without spotted frogs. Appendix A of

the January 20, 2006 Resource Report for Hydrology contains a summary of the percent of streambank alteration at each DMA by date, allotment, and stream. Table 7 summarizes streambank alteration by allotment.

Table 7. DMA Streambank Alteration Measurements by Allotment.

Allotment	Number of DMAs with Bank Alteration Measurements	Measurements where Bank Alteration exceeded 10 %/Total Measurements
Double Cabin	6	13 / 18
East Maury	2	3 / 3
Shotgun	4	9 / 15
West Maury	5	10 / 14
Sherwood	4	4 / 5
Kloutchman	7	16 / 29

Sixty-five percent of the streambank alteration measurements exceeded 10 percent (see Table 7). The most recent surveys reveal that about 7 miles (of the 55 miles surveyed) exceed the 20 percent cutbank standard.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Streambank alteration as a result of cattle use would continue for 2 years and would then cease. Once livestock grazing is discontinued, there would be no direct effects from livestock grazing, trampling, or trailing that would occur on an annual basis. There would be no direct effects to streambanks in areas accessible to livestock. There would be no further effects to width-to-depth ratio, entrenchment, or sediment yield than what currently exists. Removal of livestock as a direct disturbance to riparian systems would facilitate an increase in the amount and diversity of riparian grasses, sedges, and rushes.

With the removal of livestock, it is expected that hoof action (i.e. trampling, hoof shear, post holing) from livestock would cease. The only hoof action to remain within the project area would be from wildlife.

Rates of recovery would vary across the project area. Most streambanks would be expected to stabilize with vegetation over the next 10-15 years, if some extent of riparian vegetation is already present. Studies of livestock exclusion from heavily grazed riparian areas have found that recovery of riparian vegetation occurred in 3-8 years, depending on existing conditions and strategies (Skovlin 1984). Altered sites that lack a riparian vegetation component would take longer for vegetation to recover and stabilize streambanks. Recovery of riparian vegetation may take 15 years or more in these sites; some sites may not produce riparian vegetation without some sort of active management such as timber harvest and some sites may never produce riparian vegetation due to physical conditions such as soil type. Streambanks with cutbanks would take several decades or more to adjust bank slopes and stabilize with vegetation, even

without livestock grazing. Areas that are currently entrenched (G and F-type channels) will remain entrenched until vertical side slopes naturally adjust and become vegetated. Sediment yield from these entrenched systems would continue, but would decline as streambanks adjust slope and become vegetated. The return to original conditions (pre-European) on some sites would be very slow or non-existent (Laycock 1989 and Winward 1991).

Although there are existing streambanks that are unvegetated and unstable from past activities (which are contributing fine sediment to streams), this alternative would result in no additional streambank alteration or cutbanks. This alternative would not cause additional sediment input to streams or result in turbidity levels that exceed State standards.

Overall, this alternative would have the least impacts to streambanks across all allotments and pastures. Livestock grazing would no longer cause more than 10 percent streambank alteration. With less streambank alteration, it is expected that less cutbank would develop and there would be less alteration of channel morphology through changes in width-to-depth ratios, entrenchment, and sediment yields (turbidity).

Cumulative Effects

Past activities such as beaver trapping, domestic livestock grazing (sheep and cattle), fire suppression and prescribed burning, timber harvest, road construction and maintenance, recreation, and special uses have produced much of today's hydrologic condition. These conditions include reduced riparian plant diversity, composition, and vigor; down cut and degraded stream channels; changes in upland vegetation; and altered stream flows. Although many of the historical practices have been halted or modified, streambanks still show evidence of these practices. Other past management activities have improved bank stability conditions. Recent headcut stabilization projects on Pre-emption, Gibson, Klootchman, Wildcat, and Double Cabin Creeks have improved streambank conditions and have reduced sediment yield to adjacent streams by halting upstream headcut migration. Headcut repairs are expected to continue over the next several years in West Shotgun and Drake Creeks. Other activities including cutbank stabilization, large wood placement, hardwood planting, and grade control structures have improved streambank conditions throughout the project area. See Table 15 later in this chapter for a specific list of activities by allotment.

Present activities within the project area include the West Maurys Fuels and Vegetation Management Project, Sherwood Wildlife Prescribed Burn, and Maury Aspen Restoration. The West Maurys Project includes 65 acres of commercial harvest, 1,294 acres of noncommercial thinning, and 572 acres of prescribed fire within RHCAs. Approximately 6.4 miles of road would be decommissioned within 400 feet of streams. The 65 acres of commercial harvest within RHCAs would occur in Shotgun, East Shotgun, Florida, Deer, and tributaries to Pine, Hamer, Klootchman, Deer, and Bear Creeks. Commercial harvest would reduce stocking levels to recommended levels to reduce risk of competition-related mortality. Approximately 82 percent of the harvested area within RHCAs will be in Shotgun, East Shotgun, and a tributary to Bear Creek. Commercial harvest activities in these areas would promote bank stabilization by reducing stocking levels to protect against wildfire and/or disease. Noncommercial thinning and prescribed fire activities would occur in portions of most streams in the West Maurys Project

Area. These activities would reduce stocking levels of small diameter trees and promote recovery of riparian vegetation by increasing the amount of sunlight available to these plants. Including all activities in the West Maurys Project, the Equivalent Harvest Area (EHA) model indicated that no watershed exceeded the threshold of 35 in the Forest Plan. The Sherwood Burn project is an underburn covering approximately 1,300 acres in the Sherwood Allotment. This burn would not alter streambanks, but would reduce the potential for a catastrophic wildfire that would result in adverse effects to hydrology. Aspen treatments are also not expected to alter streambanks, but instead promote healthier vegetative conditions within riparian areas by reducing competition between aspen and conifers.

Other activities that are currently ongoing and expected to continue into the future include road maintenance, noxious weed treatments, and recreational use. With the exception of Off Highway Vehicles (OHV) that are driven in sensitive areas and dispersed camping that occurs along and on streambanks, these activities are not expected to have adverse effects to streambank alteration.

Foreseeable projects include the East Maurys Fuels and Vegetation Management Project and headcut stabilization projects. The East Maurys Project is similar to the West Maurys Project and includes commercial and noncommercial thinning, fuels treatments (burning and piling of slash), and road management. Activities within RHCAs would indirectly promote bank stabilization by reducing stocking levels to protect against wildfire and/or disease. Noncommercial thinning and prescribed fire activities would occur in portions of most streams in the East Maurys Project. Activities in the East Maurys project are expected to reduce stocking levels of small diameter trees and promote recovery of riparian vegetation by reducing competition and increasing the amount of sunlight. The East Maurys project is expected to include design criteria that would mitigate potential adverse effects to streambanks, such as limiting heavy equipment in RHCAs.

Alternative 2

Direct and Indirect Effects

Alternative 2 includes early season grazing which has been shown to minimize effects on riparian vegetation. Platts and Nelson (1985) found that relative use of streamside vegetation was less during the early grazing period than during the late grazing period. This study selected 15 areas located in Idaho, Utah, and Nevada to provide a broad geographic distribution and diversity of geo-climatic, vegetation, and grazing conditions to determine differences in patterns of vegetation use between upland and riparian sites. Typically, livestock tend to avoid certain streamside zones early in the season when the soils and vegetation may be wet because of cold temperatures and forage immaturity (Platts and Nelson 1985 and Kovalchik 1987). Also, the vegetation on adjacent rangeland is generally more succulent during the early growing season, so livestock spend less time in riparian areas. In a study conducted in central Oregon, Elmore and Beschta (1987) state that spring grazing may be preferred in many situations to maintain proper streambank structure and function. Spring grazing in riparian areas allows the remainder of the growing season for plants to regrow. This results in vegetative cover for streambank protection during the following winter and early spring high stream flow events.

It is expected that early season grazing in this project area would result in less livestock use in riparian areas and more use in the uplands. Streambanks would be expected to experience less alteration in width-to-depth ratios, entrenchment, and sediment yield than current.

This alternative would also incorporate a rest-rotation grazing system in all allotments except the East Maury and Shotgun Allotments. A rest-rotation grazing system allows vegetative rest in one pasture each year. This strategy was designed to promote plant vigor, seed production, seedling establishment, root production, and litter accumulation for herbaceous plants in upland ecosystems (Elmore and Kauffman 1994). Holechek (1983) notes that the benefits from rest-rotation grazing may be nullified by the extra use that occurs on grazed pastures. The rest-rotation system described here is managed on triggers and used in conjunction with off-site salting, daily management, and off-site watering, so it is expected to allow more vegetative recovery in the uplands and riparian areas for additional streambank stabilization.

Alternative 2 includes new water developments which would improve water availability away from streams. This would improve livestock distribution and reduce streambank alteration due to livestock. Less streambank alteration would result in lower potential for alterations in width-to-depth ratios, entrenchment (cutbanks), and sediment yield.

Double Cabin Allotment - The combination of an early-season, rest-rotation grazing system, daily management in the Center and West Pastures, and water developments are expected to reduce streambank alteration and the development of cutbanks within this allotment. Map 12 displays that no streams within this allotment currently exceed 20 percent cutbank. However, there are some headcuts that could develop into cutbanks and a few areas with gullying that exhibit high erosion. Daily management is expected to improve cattle distribution and minimize the time cattle are concentrating in known locations along Double Cabin, Wiley, Faught, and Parrish Creeks. Because of the triggers for pasture moves and the daily management in the Center and West Pastures, streambank alteration levels are expected to be less than 10 percent, which would result in less development of cutbanks. Sediment yield levels are expected to decrease. Width-to-depth ratios are expected to decrease with vegetative recovery. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth (G and F-type channels) are expected to recover slowly over many decades, if they improve at all without active restoration. Areas with G and F channels in this allotment include reaches of Wiley, Double Cabin, Indian, and Pre-emption Creeks. Establishment of vegetation in these channels would be confined to a narrower area, and at a lower elevation within the entrenched channel.

East Maury Allotment - This allotment would be would be rested for 10 years. With 10 years of rest, it is expected that streambanks along Cottonwood, Maury, Stewart, and other creeks would improve. Map 12 displays that there are cutbanks along some streams within this allotment, but none that currently exceed 20 percent cutbank. There are some areas with gullying that exhibit high erosion. After 10 years, grazing would resume with an earlier season. Earlier season grazing is expected to improve streambank conditions in this allotment. During this 10-year period, water developments would be constructed, maintained, or relocated. Water developments and relocations would improve livestock distribution and decrease streambank

alteration/cutbanks and sediment yield. Width-to-depth ratios are expected to decrease with vegetative recovery. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth (G and F-type channels) are expected to recover slowly over many decades, if they improve at all without active restoration. Areas with G and F channels in this allotment include reaches of Cottonwood, Maury, Rimrock, Stewart, and Pine Creeks. Establishment of vegetation in these channels would be confined to a narrower area, and at a lower elevation within the entrenched channel.

Klootchman Allotment - The combination of an early-season, rest-rotation grazing system, reduction of AUMs, and water developments are expected to reduce streambank alteration and the development of cutbanks within this allotment. Better livestock distribution is expected with the relocation of 12 existing troughs, the construction of 7 new ponds, and the construction of approximately 9.9 miles of new pasture fence. Streambank alteration is expected to be reduced to less than 10 percent because of improved livestock distribution. In addition, a livestock enclosure fence would reduce livestock grazing around active headcuts in Sherwood Creek. All of these activities would reduce cattle impacts along known areas of Deer, Florida, Klootchman, and Sherwood Creeks. Map 12 displays that Deer, Florida, Newsome, and Sherwood Creeks all have areas that exceed 20 percent cutbank. Ferguson Creek also has numerous areas with cutbanks; however, there are no areas that exceed 20 percent. Bear, Cow, Friday, Klootchman, Newsome, and Sherwood Creeks all have areas with headcuts. New pastures and water developments would result in better livestock distribution and reduce livestock trampling in riparian areas. With less livestock use in riparian areas, cutbank development is expected to decrease. Sediment yield and width-to-depth ratios are expected to decrease with vegetative recovery. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth are expected to recover slowly over many decades, if they improve at all without active restoration. Areas with G and F channels in this allotment include reaches of Friday and Klootchman Creeks. Establishment of vegetation in these channels would be confined to a narrower area, and at a lower elevation within the entrenched channel.

Sherwood Allotment - The combination of an early-season, rest-rotation grazing system, daily management, and water developments are expected to reduce streambank alteration and the development of cutbanks within this allotment. Better livestock distribution is expected with the relocation of 12 existing troughs, the construction of 9 new ponds, 6 new springs, and the construction of 3 enclosure fences. All of these activities are expected to reduce livestock trampling, hoof shear, and post holing along streambanks, decreasing streambank alteration to less than 10 percent. This allotment would be managed daily to facilitate cattle distribution and reduce concentration in known riparian areas along Sherwood, Florida, and Newsome Creeks. Map 12 shows that there are high levels of cutbank along Florida, Hammer, Newsome, Pine, and Sherwood Creeks. There is also gullying along Gibson, Hammer, Newsome, and Sandford Creeks. There are also headcuts along Gibson, Newsome, Sandford, and Sherwood Creeks. Cutbank development is expected to decrease because improved livestock distribution would reduce the amount of time livestock spend in these areas. Sediment yield and width-to-depth ratios are expected to decrease with vegetative recovery. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth are expected to recover slowly over many decades, if they improve at all without active

restoration. Areas with G and F channels in the Sherwood Allotment include reaches of Gibson, Hammer, Hamer, Newsome, and Sherwood Creeks. Establishment of vegetation in these channels would be confined to a narrower area, and at a lower elevation within the entrenched channel.

Shotgun Allotment - The combination of an early-season grazing system, daily management, and water developments are expected to reduce streambank alteration and the development of cutbanks within this allotment. The allotment would be managed daily to facilitate cattle distribution and reduce concentration in known riparian areas along Shotgun, Drake, Wildcat, and Tom Vawn Creeks. Improved livestock distribution is expected with the relocation of six existing troughs, the construction of seven new ponds, three new springs, and the construction of three enclosure fences. Livestock trampling, hoof shear, and post holing along streams would be reduced. As a result, streambank alteration is expected to be less than 10 percent. Cutbank development is expected to decrease. There are cutbanks along Drake, Shotgun, and Wildcat Creeks; the amount of cutbank exceeds 20 percent on portions of Drake and Shotgun Creeks. Sediment yield and width-to-depth ratios are expected to decrease as vegetation increases. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth are expected to recover slowly over many decades, if they improve at all without active restoration. Areas with G and F channels in this allotment include reaches of Drake, Shotgun, Wildcat, and Tom Vawn Creeks. Establishment of vegetation in these channels would be confined to a narrower area, and at a lower elevation within the entrenched channel.

Under this alternative, structural water developments, daily management, and early-season, restoration grazing are expected to reduce trampling, hoof shear, and post holing along streambanks beyond the current levels. Livestock would still cause a certain level of streambank alteration; however, the amount of streambank alteration would be low enough that it is not expected to lead to cutbank development or sediment yield that would reduce water quality or exceed the State turbidity standard. Existing streambanks that are highly altered would continue to add sediment to adjacent streams.

Overall, the amount of streambank alteration across all allotments and pastures would be reduced. Streams that have been exceeding 10 percent streambank alteration would be expected to have less than 10 percent streambank alteration because livestock are expected to spend less time in riparian areas and when streambank alteration approaches 10 percent cattle would be moved. With less streambank alteration, there would be less cutbank development, and less alteration of channel morphology through changes in width-to-depth ratios, entrenchment, and sediment yield. Areas that are currently entrenched (G and F-type channels) would continue to adjust and may take several decades to become stable. Sediment yield from these entrenched systems would continue to exist, but would decline as streambanks adjust slope and become vegetated.

Cumulative Effects

Past activities such as beaver trapping, domestic livestock grazing (sheep and cattle), fire suppression and prescribed burning, timber harvest, road construction and maintenance,

recreation, and special uses have produced much of today's hydrologic condition. These conditions include reduced riparian plant diversity, composition and vigor, down cut and degraded stream channels, changes in upland vegetation, and altered stream flows. Although many of the historic practices have been halted or modified, streambanks still show evidence of these practices. Other past management activities have improved bank stability conditions. Recent headcut stabilization projects on Pre-emption, Gibson, Klootchman, Wildcat, and Double Cabin Creeks have improved streambank conditions and have reduced sediment yield to adjacent streams by halting upstream headcut migration. Headcut repairs are expected to continue over the next several years in West Shotgun and Drake Creeks. Other activities including cutbank stabilization, large wood placement, hardwood planting, and grade control structures have improved streambank conditions throughout the project area. See Table 15 later in this chapter for a specific list of activities by allotment.

Present activities within the project area include the West Maurys Fuels and Vegetation Management Project, Sherwood Wildlife Prescribed Burn, and Maury Aspen Restoration. The West Maurys Project includes 65 acres of commercial harvest, 1,294 acres of noncommercial thinning, and 572 acres of prescribed fire within RHCAs. Approximately 6.4 miles of road would be decommissioned within 400 feet of streams. The 65 acres of commercial harvest within RHCAs would occur in Shotgun, East Shotgun, Florida, Deer, and tributaries to Pine, Hamer, Klootchman, Deer, and Bear Creeks. Commercial harvest would reduce stocking levels to recommended levels to reduce risk of competition-related mortality. Approximately 82 percent of the harvested area within RHCAs will be in Shotgun, East Shotgun, and a tributary to Bear Creek. Commercial harvest activities in these areas would promote bank stabilization by reducing stocking levels to protect against wildfire and/or disease. Noncommercial thinning and prescribed fire activities would occur in portions of most streams in the West Maurys Project Area. These activities would reduce stocking levels of small diameter trees and promote recovery or riparian vegetation by increasing the amount of sunlight available to these plants. Including all activities in the West Maurys Project, the Equivalent Harvest Area (EHA) model indicated that no watershed exceeded the threshold of 35 in the Forest Plan. The Sherwood Burn project is an underburn covering approximately 1,300 acres in the Sherwood Allotment. This burn would not alter streambanks, but would reduce the potential for a catastrophic wildfire that would result in adverse effects to hydrology. Aspen treatments are also not expected to alter streambanks, but instead promote healthier vegetative conditions within riparian areas by reducing competition between aspen and conifers.

Other activities that are currently ongoing and expected to continue into the future include road maintenance, noxious weed treatments, and recreational use. With the exception of Off Highway Vehicles (OHV) that are driven in sensitive areas and dispersed camping that occurs along and on streambanks, these activities are not expected to have adverse effects to streambank alteration.

Foreseeable projects include the East Maurys Fuels and Vegetation Management Project and headcut stabilization projects. The East Maurys Project is similar to the West Maurys Project and includes commercial and noncommercial thinning, fuels treatments (burning and piling of slash), and road management. Activities within RHCAs would indirectly promote bank stabilization by reducing stocking levels to protect against wildfire and/or disease.

Noncommercial thinning and prescribed fire activities would occur in portions of most streams in the East Maurys Project. Activities in the East Maurys project are expected to reduce stocking levels of small diameter trees and promote recovery of riparian vegetation by reducing competition and increasing the amount of sunlight. The East Maurys project is expected to include design criteria that would mitigate potential adverse effects to streambanks, such as limiting heavy equipment in RHCAs.

Considering past, present, and foreseeable actions, including the activities under this alternative, streambank alteration and cutbanks are expected to improve. With approximately 10-20 years of maintaining bank alteration to 10 percent or less, streambanks that are not entrenched would be expected to stabilize. Although there are existing streambanks that are unvegetated and unstable from past activities (which are contributing fine sediment to streams), this alternative would result in streambank alteration/cutbank levels that would result in no additional sediment input to streams. Sediment delivery to adjacent streams, due to existing bank alteration, would be expected to decrease over time.

Alternative 3

Streambank alteration and cutbanks would be similar to what it is presently occurring or would be expected to increase.

Direct and Indirect Effects

Double Cabin Allotment - Streambank alteration is resulting in altered riparian conditions. Livestock would continue concentrating in areas along Double Cabin, Deer, Faught, Parrish, and Wiley Creeks. Streambank alteration, percent cutbank, and sediment yield within these areas are expected to remain static or increase. Width-to-depth ratios are expected to increase as streambank alteration continues in excess of 20 percent. Entrenchment ratios are expected to remain static or decrease (i.e. become more downcut). Areas with G and F channels include reaches within Double Cabin, Indian, Wiley, and Pre-emption Creeks. Establishment of riparian vegetation within these channels would be confined to a smaller area and at a lower elevation within the entrenched channel.

East Maury Allotment - This allotment is currently being rested, and is scheduled to be rested for 10 more years. However, this allotment may be grazed at any time, if agreed upon by the permittee and Forest Service. Streambank alteration, percent cutbank, and sediment yield would continue to decrease with no grazing and elimination of trespass cattle. Width-to-depth ratios are expected to decrease with vegetative recovery. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those that are in gullies (deeper than twice bankfull depth) are expected to recover slowly over many decades, if they improve at all without active restoration. Areas with G and F channels include reaches within Cottonwood, Maury, Pine, Rimrock, and Stewart Creeks. Establishment of riparian vegetation within these channels would be confined to a smaller area and at a lower elevation within the entrenched channel.

Klootchman Allotment - Streambank alteration, cutbank composition, and sediment yield would be expected to remain static or increase. Known cattle concentration areas within Florida, Deer,

Friday, and Sherwood Creeks would remain susceptible to livestock trampling, hoof shear, and post holing. Width-to-depth ratios are expected to remain static or increase slightly as streambank alteration continues in excess of 10 percent. Streams that exceed the 20 percent cutbank standard within the surveyed portion of Klootchman Creek and are not expected to improve. Entrenchment is expected to remain static or downcut further. Areas with G and F channels include reaches within Friday and Klootchman Creeks. Establishment of riparian vegetation within these channels would be confined to a smaller area and at a lower elevation within the entrenched channel.

Sherwood Allotment - Known cattle concentration areas within Florida, Newsome, and Sherwood Creeks would remain susceptible to livestock trampling, hoof shear, and post holing. Streambank alteration, cutbank disturbance and sediment yield within these areas is projected to remain static or increase, resulting in increased sediment into streams. Width-to-depth ratios are expected to increase as streambank alteration remains high (more than 10%). Entrenchment ratios are expected to remain low, indicating downcutting and cutbanks. Areas with G and F channels include reaches within Gibson, Hammer, and Sherwood Creeks. Establishment of riparian vegetation within these channels would be confined to a smaller area and at a lower elevation within the entrenched channel.

Shotgun Allotment - Livestock would continue to concentrate in riparian areas along Tom Vawn, Drake, Shotgun, and Wildcat Creeks. Streambank alteration, percent cutbank, and sediment yield are expected to remain static or increase. Width-to-depth ratios are expected to increase as streambank alteration from livestock continues in excess of 10 percent, resulting in higher sediment input to streams. Entrenchment ratios are expected to decrease, indicating downcutting. Areas with G and F channels include reaches within Drake, Shotgun, Tom Vawn, and Wildcat Creeks. Establishment of riparian vegetation within these channels would be confined to a smaller area and at a lower elevation within the entrenched channel.

West Maury Allotment - Livestock would continue to concentrate in riparian areas along Newsome, Hamer, and Cow Creeks. Streambank alteration and percent cutbank is expected to remain static or increase. Width-to-depth ratios are expected to increase as streambank alteration continues in excess of 10 percent and entrenchment ratios are expected to remain static or decrease. Sediment yield is expected to remain static or increase due to streambank alteration in excess of 10 percent. Areas with G and F channels include reaches within reaches of Hamer and Newsome Creeks. Establishment of riparian vegetation within these channels would be confined to a small area and at a lower elevation within the entrenched channel.

Overall, streams that have been showing more than 10 percent streambank alteration and the amount of cutbank along many streams is expected to remain about the same or increase slightly. Streambank alteration levels would continue to contribute to the development of cutbanks. Alteration of channel morphology through changes in width-to-depth ratios, entrenchment, and sediment yield are expected to continue to occur. Areas that are currently entrenched (G and F-type channels) will continue to adjust and may take several decades to become stable with vegetation. Sediment yield from these entrenched systems would continue to exist.

Cumulative Effects

Although many of the historical practices described under Alternative 2 have been halted or modified, streambanks still show evidence of these practices.

Under this alternative, livestock would continue to concentrate in riparian areas and would continue trampling streambanks. Streambank alteration and percentage of cutbanks is expected to remain at levels that lead to sediment input to streams and could lead to increased levels of cutbank. Combined with past practices, streambank conditions are not expected to improve. Streambank alteration is expected to be greater than 20 percent and cutbanks are expected to develop in new areas. The cumulative effect would be additional sediment yield to streams, which may lead to deposition (aggradation) in lower gradient streams/stream reaches such as the Crooked River. Aggradation can lead to higher width-to-depth ratios, higher stream temperatures, and braided channels. Aggradation is present today in locations of the project area and in the Crooked River. Unstable, unvegetated streambanks are the primary cause for excess sediment in these drainages. The majority of the sediment yield from bank erosion would occur between April and May (during spring flow) and during high-intensity summer thunderstorms. The duration of higher sediment yields would correlate with the duration of high flow which would typically be short (a few days). However, several high flow events could occur between April and May, hence several erosion events could occur between April and May. Unstable streambanks are also evident downstream of the project area along the Crooked River. The Upper Crooked River, Prineville Reservoir, Bear Creek, Camp Creek, and Crooked River above North Fork Watersheds currently have eroding streambanks and evidence of excess sediment in the stream system (aggradation). Effects from this alternative, combined with existing effects, could potentially extend to Prineville Reservoir (approximately 13 miles downstream).

Present and reasonably foreseeable activities, with the exception of OHV use and dispersed recreation adjacent to streams, are not expected to increase the amount of cutbank in the project area.

Alternative 4

Direct and Indirect Effects

The effects of Alternative 4 are the same as Alternative 2, with a few exceptions. Season of use would be similar to Alternative 2, with an exception in the Klootchman Allotment which would extend the season of use into August. The Shotgun Allotment would be split into three pastures. New water developments in all allotments would occur the same as in Alternative 2. This would improve livestock distribution and reduce streambank alteration due to livestock. Less streambank alteration would result in lower potential for alterations in width-to-depth ratios, entrenchment (cutbanks), and sediment yield.

Alternative 4 incorporates early season grazing which has been shown to minimize effects on riparian vegetation. Platts and Nelson (1985) found that relative use of streamside vegetation was less during the early grazing period than during the late grazing period. Typically, livestock tend to avoid certain streamside zones early in the season when the soils and vegetation may be

wet (Platts and Nelson 1985 and Kovalchik 1987). Also, the vegetation on adjacent rangeland is generally more succulent during the early growing season, so livestock spend less time in riparian areas. Elmore and Beschta (1987) state that spring grazing may be preferred in many situations to maintain proper streambank structure and function. Spring grazing in riparian areas allows the remainder of the growing season for plants to regrow. This provides vegetative cover for streambank protection during the following winter and early spring high stream flow periods.

It is expected that early season grazing in this project area would result in less livestock use in riparian areas and more use in the uplands. Conditions in the project area are similar to conditions in the Elmore and Beschta (1987) study area. Streambanks would be expected to experience less alteration in width-to-depth ratios, entrenchment, and sediment yield. Marlow and others (1989) found that decreasing the length of time cattle have access to a stream reach and adjusting the grazing period to coincide with low streambank moisture levels (could be early or late season grazing) shows promise of the improvement of riparian zone condition.

Double Cabin Allotment - The combination of early-season, rest-rotation grazing, reduction of AUMs, daily management, and water developments are expected to reduce streambank alteration and the development of cutbanks. Daily management in the Center and West Pastures would improve cattle distribution and reduce cattle from concentrating in locations along Double Cabin, Wiley, and Parrish Creeks. Water developments are expected to improve streambank conditions on Parrish, Double Cabin, Wiley, Pre-emption, Faught, Bear, and other unnamed creeks due to improved livestock distribution. Streambank alteration levels are expected to be 10 percent or less, which would result in less development of cutbanks. Sediment yield levels are expected to decrease. Width-to-depth ratios are expected to decrease with vegetative recovery. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth (G and F-type channels) are expected to recover slowly over many decades, if they improve at all without active restoration. Areas with G and F channels include reaches within Double Cabin, Indian, Wiley, and Pre-emption Creeks. Establishment of riparian vegetation within these channels would be confined to a smaller area and at a lower elevation within the entrenched channel.

East Maury Allotment - The direct and indirect effects of Alternative 4 are the same as Alternative 2.

Klootchman Allotment - The combination of an early-season, rest-rotation grazing system, temporary reduction of AUMs while new improvements are constructed, and water developments are expected to reduce streambank alteration and the development of cutbanks. Better livestock distribution is expected with the relocation of 12 existing troughs, the construction of 7 new ponds, and the construction of an estimated 9.9 miles of new pasture fence. In addition, a livestock enclosure fence would reduce livestock grazing around active headcuts in Sherwood Creek. All of these activities would reduce cattle impacts along known areas of Sherwood, Florida, Klootchman, and Deer Creeks. Streambank alteration levels are expected to be 10 percent upon completion of the water developments and new pasture fences. Cutbank development is expected to decrease. Sediment yield and width-to-depth ratios are expected to decrease with vegetative recovery. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth are

expected to recover slowly over many decades, if they improve at all without active restoration. Areas with G and F channels include reaches within Friday and Klootchman Creeks. Establishment of riparian vegetation within these channels would be confined to a smaller area and at a lower elevation within the entrenched channel.

Sherwood Allotment - The direct and indirect effects of Alternative 4 are the same as Alternative 2.

Shotgun Allotment - The combination of an early-season, rest-rotation grazing system and fencing would facilitate cattle distribution and reduce concentration in areas along Drake, Shotgun, Wildcat, and Tom Vawn Creeks. Improved livestock distribution is expected with the relocation of six existing troughs, the construction of seven new ponds, three new springs, the construction of three enclosure fences, and the construction of new pasture fences. Streambank alteration is expected to be about 10 percent because cattle would be concentrated to smaller pastures. Cutbank development is expected to decrease. Sediment yield and width-to-depth ratios are expected to decrease as vegetation increases. Entrenchment is expected to recover in streams that are not deeper than twice bankfull depth, while those deeper than twice bankfull depth are expected to recover slowly over many decades, if they improve at all without active restoration. Areas with G and F channels include reaches within Drake, Shotgun, Wildcat, and Tom Vawn Creeks. Establishment of riparian vegetation within these areas would be confined to a narrower area and at a lower elevation within the entrenched channel.

Overall, the amount of streambank alteration would be reduced from the current condition. Streams within the Klootchman and Double Cabin Allotments would be expected to have higher bank alteration/cutbank values than in Alternative 2 because of the longer and later season of use, while the other allotments would be similar to Alternative 2

Cumulative Effects

The effects of past, present, and reasonably foreseeable future actions are described in detail under Alternative 2 and are applicable to this alternative as well. Although many of the historical practices have been halted or modified, streambanks still show evidence of these practices.

Under this alternative, livestock are still expected to cause a certain level of streambank alteration; however, this alternative was developed in part to minimize bank alteration to a level which minimizes effects to bank stability and streamside vegetation. Existing streambanks that are highly altered would continue to add sediment to adjacent streams because of past activities.

Overall, streambank alteration is expected to improve over the existing condition. However, streambanks would not recover as fast in the Klootchman and Double Cabin Allotments as in Alternatives 1 or 2. With approximately 10-20 years of maintaining bank alteration to 10 percent or less, streambanks that are not entrenched would be expected to stabilize. However, entrenched streams with cutbanks would be expected to take many decades, if at all, to recover without active management.

Although there are existing streambanks that are unvegetated and unstable from past activities (which are contributing fine sediment to streams), this alternative would result in streambank alteration/cutbank levels that would result in no additional sediment input to streams. Sediment delivery to adjacent streams, due to existing streambank alteration would be expected to decrease over time.

Present and reasonably foreseeable activities, with the exception of OHV use and dispersed recreation adjacent to streams, are not expected to increase the amount of cutbank in the project area.

Riparian Vegetation and Stream Shade

Affected Environment

Livestock primarily affect riparian vegetation by removing (i.e. eating) and trampling. Livestock use reduces vegetation and leads to less shade/cover (and indirectly higher stream temperatures). The effect may be a direct reduction in shade, or a longer-term reduction in plant vigor, species composition, diversity, and abundance which over time may result in less shade and changes in channel morphology. The Forest Plan (p. 240) contains a standard and guideline for temperature that states “The requirement for shade along streams will generally correspond to provisions for more than 80 percent of the surface shaded. Where this can not be attained, 100 percent of the potential for shade is the standard.” The INFISH (p. A-4) amended the Forest Plan in 1995 and includes an interim objective that states there would be “No measurable increase in maximum water temperature (7-day moving average of daily maximum temperatures measured as the average of the maximum daily temperature of the warmest consecutive 7-day period).” The INFISH does not contain any standards or objectives for stream shade.

There are many factors that affect stream temperature, including amount of surface shading, solar input, depth of water, volume of flow, stream orientation, and air temperature. The analysis focused on stream shade because (1) the desired condition for stream shade in the Forest Plan is not currently being met and (2) livestock grazing affects stream shade by reducing riparian vegetation.

Riparian vegetation is imperative in building stable physical conditions in the stream environment. Healthy riparian vegetation tends to stabilize streambanks, provide shade and cooler stream temperatures with more vegetative cover, determine bank morphology, and can reduce streambank damage from ice, log debris, and animal trampling (Platts 1979 and Swanson et al. 1982). Riparian vegetation also acts as a roughness element that reduces the velocity and erosive energy of flows during floods. Roots provide cohesiveness to protect streambanks from eroding.

Within the project area, approximately 6 miles of stream or 11 percent of surveyed stream miles have average vegetative cover (shade) values that meet or exceed the Forest Plan standard of 80 percent. Approximately 16.5 miles or 30 percent of the stream miles surveyed have shade values that range from 60 to 80 percent and approximately 39 percent or 21.5 miles of stream have shade values that range from 40 to 59 percent. The remaining 20 percent or 11 miles of stream

have shade values less than 40 percent. Map 13 displays levels of total shade and hardwood shade on stream reaches that have been surveyed.

The project area contains six streams that are currently on the 2002 303(d) list for exceeding the average of the 7-day maximum stream temperature standard (18.0°C or 64.4°F) for rearing (Table 8). Bear, Cow, Deer, Klootchman, Shotgun, and Wildcat Creeks are on the 303(d) list from mouth to headwaters. The Crooked River does not flow through the project area; however, the portion of the Crooked River that is directly downstream of the project area is on the 303(d) list for stream temperature and pH.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

There would be no grazing of riparian shrubs by livestock after 2 years. The removal of livestock would result in increased growth, vigor, and expansion of willow, alder, sedges, rushes, and other riparian vegetation. Removing range developments, such as fences and abandoning or removing water developments, could result in trampling and damaging vegetation while activities are ongoing.

Studies of livestock exclusion from riparian areas have found that recovery of riparian vegetation occurred in 3-8 years, depending on site location and condition (Skovlin 1984). Rates of recovery would vary across this project area, depending on site capability including soil type, availability of water, overstory canopy cover, stream type, elevation, aspect, and departure from historic means. However, where riparian vegetation is present, vegetative cover is expected to show measurable increases in approximately 10 years. Where riparian vegetation is not present, but once was, vegetation may or may not re-establish itself. Re-establishment would depend on the previously mentioned local factors. It is expected that re-establishment with some riparian shade would be noticeable after 15 years. In the long-term (15+ years) desirable riparian vegetation, such as grasses, sedges, rushes, and woody species, would out-compete and replace undesirable species, such as shallow rooted annuals. Recovery of hardwoods in areas with conifer encroachment would be dependant upon active vegetative management (i.e. burning or thinning to remove conifers).

In entrenched streams (G and F-type channels) recovery of riparian vegetation is expected to take decades to recover, if at all. The return to original conditions (pre-European) on some sites would be slow or non-existent (Laycock 1989 and Winward 1991). Some of these entrenched systems may need active restoration to have vegetative recovery. Recovery of vegetation is expected to be at a lower elevation, because the water table generally lowers with entrenchment.

Table 8. Stream Temperature Monitoring Data within the Project Area.

Allotment	Pasture	Stream Monitoring Location	Maximum 7-Day Average of Daily Maximum Stream Temperatures (°C)											
			1991	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Double Cabin	Faught	Bear Creek below Faught Creek [^]	--	--	22.0	25.8	24.4	26.3	--	--	--	--	--	--
	Center	Double Cabin Creek @ FS Bdry	--	--	--	17.7	18.6	18.3	18.0	18.6	18.7	--	18.6	18.0
	Parrish Creek	Wiley Creek @ FS Bdry	--	--	--	--	--	21.6	19.7	--	--	--	--	--
East Maury	Maury	Maury Creek @ FS Bdry	--	--	22.9	--	26.0	--	21.8	21.1	20.3	--	--	--
Klootchman	Friday	Bear Creek below Friday Creek [^]	--	--	--	--	--	26.2	23.7	--	--	--	--	--
	Friday	Deer Creek @ FS Bdry [^]	--	--	21.3	25.9	23.2	24.0	20.3	22.2	24.9	--	25.7	--
	Friday	Deer Creek below 200 Rd [^]	--	--	--	--	--	--	--	--	--	--	--	23.2
	Lower Klootchman	Klootchman Creek @ FS Bdry [^]	--	28.3	21.6	22.4	22.0	22.7	19.9	17.3	24.1	--	25.6	22.2
	Klootchman	Klootchman Creek @ 1640 Road [^]	--	17.0	--	--	--	21.2	19.5	--	--	--	--	--
Sherwood	Newsome	Florida Creek @ mouth	--	16.6	--	--	--	16.1	19.4	--	--	--	--	--
	Newsome	Newsome Creek @ FS Bdry	--	16.8	14.9	--	15.1	14.7	14.2	16.0	17.3	--	15.4	14.8
	Newsome	Sherwood Creek @ FS Bdry	--	14.9	13.0	14.5	--	12.7	13.3	13.1	14.0	--	12.9	11.7
Shotgun	Drake	Drake Creek @ 1680 Rd	--	19.0	--	21.0	19.5	22.5	17.2	20.3	20.5	--	21.0	17.3
	Drake	Drake Creek below 650 Rd	--	--	--	--	--	--	24.4	--	--	--	--	--
	West Pine	Pine Creek @ 17 Rd	--	--	--	--	--	--	--	--	--	--	16.4	16.0
	West Pine	Pine Creek @ FS Bdry	--	23.2	--	17.8	--	17.8	16.5	17.2	18.2	--	--	--
	Drake	Shotgun Creek @ FS Bdry [^]	17.9	--	--	--	--	--	--	--	--	--	--	--
	Drake	Wildcat Creek @ 1680-050 Road [^]	--	--	20.0	19.6	18.9	19.8	17.2	18.8	18.9	--	19.9	19.8
West Maury	Hamer	Cow Creek @ FS Bdry [^]	--	--	--	--	--	--	--	--	--	--	--	13.9
	Gibson	Gibson Creek @ FS Bdry	--	--	--	--	--	--	--	--	--	--	11.1	--

[^] These streams are currently on the 303(d) list for exceeding the State temperature standard.

-- No data

Shaded boxes are temperatures that exceed the State standard (18°C).

Woody species (such as willow and alder) would likely expand their canopy cover providing more stream shade in both the short (0-15 years) and long term (15+ years). In areas capable of supporting woody species, increased amounts and age classes of these deeply rooted plants would stabilize streambanks, catch large woody debris, and filter sediment, which would all improve water quality.

As vegetation recovers, plants would expand and increase shade to streams; thus, stream temperatures would decrease. Streams currently on the 303(d) list are expected to have higher vegetative cover values and lower stream temperatures, with the exception of Bear Creek and those that are entrenched in gullies. Temperatures in Bear Creek are most likely influenced by Antelope Reservoir. However, increased vegetative shading in Bear Creek would reduce effects from the reservoir.

Cumulative Effects

The effects of past, present, and reasonably foreseeable future actions are described in detail under the Bank Stability section and are applicable here as well. Although many of the historical practices have been halted or modified, vegetative cover and stream temperatures still show evidence of these practices. The West and East Maurys Fuels and Vegetation Management Projects include activities to reduce conifer encroachment in areas with hardwoods; hardwoods would increase where conifer encroachment is reduced.

Streams currently on the 303(d) list for high stream temperatures are expected to experience slight decreases in temperatures with the recovery of riparian vegetation and shade. Decreases in temperatures would most likely be immeasurable for the first few years after the exclusion of cattle and annual climate conditions would likely mask small temperature changes.

Alternative 2

Direct and Indirect Effects

Early season grazing is expected to result in less livestock use in riparian areas and more use in the uplands. Typically, there is a tendency for cattle to avoid certain streamside zones early in the season when the soils and vegetation may be wet (Platts and Nelson 1985 and Kovalchik 1987). Also, the vegetation on adjacent rangeland is generally more succulent during the early growing season, so livestock spend less time in the riparian areas. Streamside vegetation would be expected to increase and provide more vegetative cover for shade and cooler stream temperatures. Early season grazing allows vegetation in the riparian areas more time during the growing season to regrow. This provides vegetative cover for shade and streambank protection during the following winter and early spring high stream flow events.

This alternative incorporates a rest-rotation grazing system in the Double Cabin, Klootchman, and Sherwood Allotments. A rest-rotation grazing system allows vegetative rest in one pasture each year. This strategy was designed to promote plant vigor, seed production, seedling establishment, root production, and litter accumulation for herbaceous plants in upland ecosystems (Elmore and Kauffman 1994). Holechek (1983) indicates that rest-rotation grazing

can result in extra use on the grazed pastures. However, a rest-rotation system managed on triggers and used in conjunction with off-site salting, daily management, and off-site watering is expected to allow more vegetative recovery for stream shade.

Water developments are expected to improve water availability away from streams and draw cattle away from riparian areas. Improving livestock distribution will reduce the disturbance to vegetation that provides shade to streams.

Double Cabin Allotment - Riparian vegetation is expected to increase over time. An early season rest-rotation grazing system would allow vegetation time to regrow near the end of the growing season. Daily management in the Center and West Pastures is expected to disperse livestock throughout the pastures which will result in less consumption and trampling of riparian vegetation and allow vegetative growth to provide more shade in riparian areas. Water developments are expected to draw livestock away from and reduce use in riparian areas. Double Cabin and Wiley Creeks are currently not on the 303(d) list; however, these two streams have temperatures that are at or above the State temperature standard. Vegetative cover/shade conditions around these streams are expected to improve over the existing conditions. Bear Creek is on the 303(d) list and is expected to see slight decreases in stream temperatures; however, Antelope Reservoir will continue to be a heat source and continue to influence temperatures in Bear Creek.

East Maury Allotment - This allotment is currently being rested and would be rested an additional 10 years. With this rest and off-site water developments, riparian vegetation is expected to be more vigorous and abundant. Much of this allotment lacks perennial flowing water. Where perennial flow exists, stream temperatures are expected to decrease as riparian vegetation becomes more abundant and provides stream shade. Lower portions of Cottonwood and Pine Creeks, as well as Maury Creek, are expected to show the largest increase in vegetative cover due to water availability. Maury Creek is not on the 303(d) list; however, it exhibits high stream temperatures. Increases in vegetative cover would potentially keep this stream from 303(d) listing.

Klootchman Allotment - The combination of an early-season, rest-rotation grazing system, reduction of AUMs, and water developments are expected to improve livestock distribution. Since livestock will be better dispersed, riparian vegetation is expected to expand where capable and stream temperatures are expected to decrease over time. In addition, a livestock enclosure fence around active headcuts in Sherwood Creek would allow vegetative rest from cattle grazing. This allotment has four streams that are on the 303(d) list: Bear, Cow, Deer, and Klootchman Creeks. Vegetative cover conditions around these streams are expected to improve and stream temperatures are expected to decrease.

Sherwood Allotment - The combination of an early-season, rest-rotation grazing system, daily management, and water developments are expected to improve livestock distribution. Better livestock distribution is expected with the relocation of 12 existing troughs, the construction of 9 new ponds, 6 new springs, and the construction of 3 enclosure fences. This allotment would be managed daily to facilitate cattle distribution and reduce concentration in known riparian areas along Sherwood, Florida, and Newsome Creeks. With improved livestock distribution, riparian

vegetation is expected to expand and stream temperatures are expected to decrease. There are currently no streams on the 303(d) list within this allotment. Florida Creek has one year of data that exceeded the State standard. Sherwood and Newsome Creeks currently meet the stream temperature standard based on stream temperature data (Table 8).

Shotgun Allotment - The combination of an early-season, rest-rotation grazing system, daily management, and water developments is expected to improve livestock distribution within this allotment. Riparian vegetation is expected to expand and stream temperatures are expected to decrease slowly because livestock are expected to spend less time in the riparian areas. Wildcat and Shotgun Creeks are currently on the 303(d) list for stream temperature. With expansion of riparian vegetation and higher vegetative shade values lower stream temperatures are expected over time. Pine and Drake Creeks are currently not on the 303(d) list; however both have shown high stream temperatures in the past (Table 8).

Overall, this alternative would result in increased growth, vigor, and expansion of willow, alder, sedges, rushes, and other riparian vegetation in wetlands and floodplains. Where riparian vegetation is present, vegetative cover is expected to show measurable increases in approximately 10 years. Where riparian vegetation is not present, but once was, vegetation may or may not re-establish itself. Re-establishment would depend on the local factors that were previously discussed. It is expected that re-establishment with some riparian shade would be noticeable after 15 years. In entrenched systems (G and F-type channels) recovery of riparian vegetation is expected to take decades to recover. Establishment of riparian vegetation in these systems would be confined to a narrower area and at a lower elevation within the entrenched channel. Some of these entrenched systems may need active restoration to have vegetative recovery.

As vegetative recovery occurs, plants are expected to expand and provide shade to streams. Thus, stream temperatures would decrease. Streams currently on the 303(d) list are expected to have more shade (i.e. higher vegetative cover) and lower stream temperatures.

Cumulative Effects

The effects of past, present, and reasonably foreseeable future actions are described in detail under the Bank Stability section and are applicable here as well. Although many of the historical practices have been halted or modified, vegetative cover and stream temperatures still show evidence of these practices. The West and East Maurys Fuels and Vegetation Management Projects include activities to reduce conifer encroachment in areas with hardwoods; hardwoods would increase where conifer encroachment is reduced.

Streams currently on the 303(d) list for high stream temperatures are expected to experience slight decreases in temperatures with the recovery of riparian vegetation and shade. Decreases in temperatures would most likely be immeasurable for the first few years and annual climate conditions would likely mask small temperature changes. Other activities in the project area are not expected to reduce stream shade with the exception of thinning in aspen stands. Aspen thinning is not expected to cause increases in stream temperatures because only small, localized reductions in shade would occur and would not be measurable.

Under this alternative, structural water developments, daily management of cattle, and early-season rest-rotation grazing are expected to reduce livestock use in riparian areas. Livestock would continue to eat and trample vegetation in riparian areas; however, this alternative was developed in part to reduce vegetative disturbance to a level at which sufficient vegetative cover would remain to provide stream shade and minimize potential effects to stream temperatures. Because of the earlier season of use and water developments, increases in riparian vegetation, including hardwoods, as a result of thinning in riparian areas is not expected to attract livestock because there would be succulent vegetation and water in the uplands during the scheduled grazing season.

There are no expected adverse effects to riparian vegetative cover (stream shade) from this alternative combined with past, present, and reasonably foreseeable future actions. This alternative is expected to increase stream shade and reduce stream temperatures as vegetative cover increases.

Alternative 3

Direct and Indirect Effects

Double Cabin Allotment - Currently, livestock are over utilizing riparian areas and meadows, resulting in low levels of shade. Livestock distribution would be expected to remain uneven, with cattle concentrating in riparian areas along Double Cabin, Deer, Fought, Parrish, and Wiley Creeks. Riparian vegetation and stream shade within these areas are expected to remain static or decline. Streams that have high stream temperatures such as Double Cabin and Wiley Creeks are not expected to improve and these streams have the potential to be added to the 303(d) list. Bear Creek is on the 303(d) list and is not expected to see measurable vegetative increases from this alternative.

East Maury Allotment - This allotment is currently being rested. However, the allotment may be grazed at any time if agreed upon by the permittee and Forest Service. Much of this allotment lacks perennial flowing water. Where perennial flow exists, stream temperatures are expected to decrease as riparian vegetation becomes more abundant and dense and provides stream shade. Lower portions of Cottonwood and Pine Creeks, as well as Maury Creek, are expected to show the largest increase in vegetative cover due to water availability. Maury Creek is not on the 303(d) list; however, it exhibits high stream temperatures. Increases in vegetative cover would potentially keep this stream from 303(d) listing.

Klootchman Allotment - Riparian vegetation and stream shade would be expected to remain static or decline in condition. Cattle would continue to concentrate in areas of Florida, Deer, Friday, and Sherwood Creeks. Vegetative shade conditions on 303(d) listed streams such as Bear, Deer, and Klootchman Creeks are not expected to improve.

Sherwood Allotment - Livestock distribution would be expected to remain at less than desired levels, with livestock concentrating in areas along Florida, Newsome, and Sherwood Creeks. Shade and stream temperatures within these areas are projected to remain static or decline.

There are currently no streams on the 303(d) list within this allotment. However, Florida Creek has one year of data that exceeded the State standard. Sherwood and Newsome Creeks currently meet the stream temperature standard based on stream temperature data (Table 8).

Shotgun Allotment - Livestock distribution would be expected to remain at less than desired levels, with livestock concentrating in areas along Tom Vawn, Drake, Shotgun, and Wildcat Creeks. Shade and stream temperatures within these areas are projected to remain static or decline. Wildcat and Shotgun Creeks would be expected to remain on the 303(d) list for temperature. Pine and Drake Creeks are currently not on the 303(d) list; however, both have shown high stream temperatures in the past and would potentially be added to the 303(d) list (Table 8).

West Maury Allotment - Livestock distribution would not change and livestock would be expected to continue concentrating in areas along Newsome, Hamer, and Cow Creeks. Shade and stream temperatures within these areas are projected to remain static or decline in condition. Cow Creek would remain on the 303(d) list.

Overall, riparian vegetative cover (i.e. shade) would remain at existing levels or decline. Livestock grazing within all allotments, except for East Maury, would continue to demonstrate high riparian vegetation disturbance, resulting in poor shading conditions and high stream temperatures. Livestock distribution would continue concentrating in riparian areas, due to lack of upland water and daily management. Streams listed on the state 303(d) list would not be expected to improve. Other streams that have relatively high temperatures would also not be expected to improve and could potentially be added to the 303(d) list in the future.

Cumulative Effects

Livestock would continue to concentrate in riparian areas. Cattle use in riparian areas would be expected to remain at levels that lead to little or no increases in riparian vegetation growth and no decrease in stream temperatures. Livestock would continue to decrease riparian vegetative cover. Where thinning from other activities such as the East and West Maurys Projects increase forage in riparian areas, livestock would be expected to use these areas and consume the forage. Cattle are not expected to forage and trample within aspen thinning projects because fences would be constructed around these areas. These effects, added to existing effects to vegetative cover from past activities, would result in less stream shade and higher stream temperatures. The Crooked River is currently on the 303(d) list for stream temperatures, so increases in stream temperature within the project area could potentially increase temperatures in the Crooked River. However, any increases would be diluted by the Crooked River, because flow volume in the Crooked River is much greater than the flow coming in from the project area. Outside the project area, stream temperatures are not expected to recover much. The duration of increased stream temperatures would primarily be seen in July, August, and September on an annual basis, when stream and air temperatures are the greatest. Effects of livestock grazing in the project area, when combined with existing effects, most likely would not be measurable once flows mix with the Crooked River.

Alternative 4

Direct and Indirect Effects

The effects of Alternative 4 are similar to Alternative 2, because the proposed activities are similar. The differences in proposed activities are the season of use would be longer in the Klootchman Allotment and the Shotgun Allotment would be split into three pastures.

Double Cabin Allotment - The direct and indirect effects of Alternative 4 are the same as Alternative 2.

East Maury Allotment - The direct and indirect effects of Alternative 4 are the same as Alternative 2.

Klootchman Allotment - The combination of an early season rest-rotation grazing system, new water developments, and construction of new pasture fences is expected to improve livestock distribution. In addition a livestock enclosure fence is proposed to reduce livestock grazing around active headcuts in Sherwood Creek. All of these activities are expected to reduce livestock trampling and consumption of riparian vegetation that reduces shade. Four streams within this allotment are currently on the 303(d) list: Bear, Cow, Deer, and Klootchman Creeks. Vegetative cover conditions around these streams are expected to improve and stream temperatures are expected to decrease. However, maintaining current AUMs and a longer season of use under this alternative would result in less shade values when compared to Alternatives 1 or 2.

Sherwood Allotment - The direct and indirect effects of Alternative 4 are the same as Alternative 2.

Shotgun Allotment - The combination of an early-season, rest-rotation grazing system, new fences, and water developments is expected to improve livestock distribution within this allotment. Riparian vegetation is expected to expand and stream temperatures are expected to decrease slowly because livestock are expected to spend less time in the riparian areas. Wildcat and Shotgun Creeks are currently on the 303(d) list for stream temperature and would be expected to have higher vegetative shade values and lower stream temperatures over time. Pine and Drake Creeks are currently not on the 303(d) list; however, both have shown high stream temperatures in the past. Recovery is expected to be similar to Alternative 2.

Overall, the effects of this alternative are similar to Alternative 2. This alternative would result in increased growth, vigor, and expansion of willow, alder, sedges, rushes, and other riparian vegetation. As vegetative recovery occurs, plants are expected to expand and vegetation cover conditions would increase and stream temperatures would decrease. The Klootchman and Shotgun Allotments are expected to recover at a slightly slower rate because of a longer and later season of use. Where riparian vegetation is present, vegetative cover is expected to show a measurable increase in about 15 years, rather than 10 as expected in Alternative 2.

Cumulative Effects

The effects of past, present, and reasonably foreseeable future actions have previously been described under Alternative 1 and are applicable to this alternative as well. Like Alternative 2, new water developments and fences, along with early-season rest-rotation grazing are expected to reduce livestock use in riparian areas.

Under this alternative, cattle would continue to cause some bank alteration; however, this alternative was developed in part to reduce livestock use in riparian areas and allow for vegetative recovery. Overall, vegetative cover along streams, including those on the 303(d) list, is expected to improve over the existing condition. It is expected to take approximately 10-20 years before stream temperatures are expected to decrease with more vegetative cover.

Threatened, Endangered, and Sensitive Aquatic Species

Affected Environment

Two aquatic species, the bull trout (*Salvelinus confluentus*) and Mid-Columbia River steelhead trout (*Oncorhynchus mykiss* ssp.) are federally listed as threatened and are known to occur on the Ochoco National Forest and Crooked River National Grassland. There are no endangered aquatic species known or suspected to occur on the Ochoco National Forest. The Oregon and Columbia spotted frogs are both candidates for federal listing.

Five aquatic species from the R-6 Regional Forester's sensitive species list are known or suspected to occur on the Ochoco National Forest. They are: redband trout (*Oncorhynchus mykiss* ssp.), Malheur mottled sculpin (*Cottus bairdi*), west slope cutthroat trout (*Oncorhynchus clarki lewisi*), Columbia spotted frog (*Rana luteiventris*), and Mid-Columbia River spring chinook salmon (*Oncorhynchus tshawytscha*).

This project would have no effect to the bull trout, mid-Columbia River steelhead trout, Malheur mottled sculpin, west slope cutthroat trout, Oregon spotted frog, and mid-Columbia River spring chinook salmon, because these species are not present or there is no habitat in the project area. Summer steelhead and spring chinook may have occurred in the Maury Mountains before dams were built on the Deschutes and Crooked Rivers. Anadromous fish are not currently present in the project area because of downstream blockages at dams that do not provide fish passage facilities. Four dams that were constructed between 1921 and 1964 prevent anadromous fish from accessing the project area (Nehlsen 1995). They are: Opal Springs (constructed in 1921), Reregulating (constructed in 1950), Pelton (constructed in 1957), and Round Butte (constructed in 1964).

The February 15, 2006, Resource Report and Biological Evaluation for Aquatic Species is located in the project file and contains additional information on threatened and sensitive aquatic species.

Redband trout and Columbia spotted frog are both listed by the Regional Forester as sensitive and are known to occur on the Ochoco National Forest and within the project area. Effects to these species are described below.

Redband Trout

Redband trout (*Oncorhynchus mykiss* ssp.) is the only salmonid species currently present within the project area and can be found in streams throughout the Maury Mountains. Redband trout are primarily found in Class II streams; there are 60 miles of Class II streams in the project area. Class III streams are perennial and generally do not contain fish; there are 25 miles of Class III streams in the project area. Class IV streams are intermittent and usually dry up in the summer time; there are about 100 miles of Class IV streams in the project area. Redband trout may occasionally utilize Class III and Class IV streams but these areas are not considered important habitat at this time. Modification and loss of fish habitat has had an effect on redband trout density and condition throughout the project area.

Fish need in-stream cover (rocks, rubble, gravel), especially during juvenile stages and winter conditions, and depend on aquatic and terrestrial invertebrates for food. Fine sediments filling the spaces between gravel and rubble reduce the amount of protective cover and force young salmonids to live in surface waters where they are more exposed to winter conditions and predation. Large amounts of fine sediment impede inter-gravel water flow reducing oxygen supply to embryos and allowing toxic metabolic wastes to accumulate, thereby killing fish embryos incubating in the streambed (Phillips et al. 1975). Sedimentation in stream channels also depresses the food supply for fish by filling spaces in the channel and reducing the substrates potential to produce food (Platts 1981).

Temperatures of 60 degrees F are considered ideal for rapid growth of rainbow trout (Leitritz and Lewis 1980). Females are most productive when they are in water where temperatures do not exceed 56 degrees F for 6 months before spawning (Leitritz and Lewis 1980). Water temperatures in the high 70's, except under otherwise ideal conditions, may cause stress, which predisposes trout of all age classes to disease or in some cases death. It is generally understood that redband (inland rainbow) trout are most successful in habitats with temperatures of 70 degrees F or less. Redband trout are coldwater fish that typically experience stress when water temperatures rise above 71.6 degrees F. With gradual increases in temperature, 1 to 2 degrees per day, loss of equilibrium and death can be expected to occur at about 82.4 degrees F. Stream temperatures in the project area regularly exceed 70 degrees F (see Table 8).

Redband trout are stream spawners and normally spawn in the spring (March through June). The eggs usually hatch in 4-7 weeks and pre-emerging fish (alevins) take an additional 3-7 days to absorb the yolk before becoming free-swimming. The average age at first spawning is 2-3 years, but some wild populations do not spawn until they are age 5. Gravel embeddedness of less than 20 percent is essential to maintain healthy salmonid population, especially in those areas identified as potential or existing spawning areas (Bjornn and Reiser 1991).

Landscape-scale interim Riparian Management Objectives (RMOs) that describe good habitat for fish are identified in the Inland Native Fish Strategy (INFISH 1995). INFISH provides

management direction that is applicable to lands within the Maury Mountains. Habitat features (RMOs) identified include pool frequency, water temperature, large woody debris, bank stability, lower bank angle, and width-to-depth ratio. With the exception of large woody debris, livestock grazing affects, directly or indirectly, all the other RMOs. Livestock grazing does not directly or indirectly affect large woody debris so that habitat features is not addressed in this analysis. The interim RMOs provide goals toward which managers aim as they conduct resource management activities. It is not expected that the objectives would be met instantaneously, but rather would be achieved over time (INFISH 1995).

INFISH recognized that all habitat features may not be present in any specific stream segment, but that all of them should generally occur at the watershed scale. The fish habitat features described in the interim RMOs are all interconnected. Any change in one of the habitat features sets up an adjustment in the others. For example, reducing the amount and/or type of riparian vegetation, i.e. long rooted vegetation such as riparian hardwoods or sedges, may have indirect effects to bank stability by reducing root strength and soil binding ability, which in turn can result in cutbank and change lower bank angles and width-to-depth ratios. Reductions of riparian vegetation can also affect the amount of stream shade, which depending on the amount of vegetation affected, can result in increased water temperatures from direct solar input to the stream. Similarly, changes in the width-to-depth ratio or pool frequency can also have effects on stream temperature because increasing the width of a stream can increase the amount of water with direct solar input which in turn can increase the temperature.

Streambank alteration from trampling, hoof shear, and/or post holing affect bank stability. Reduced bank stability can lead to the development in cutbank, which in turn affects the other RMOs including pool frequency, lower bank angle, and width-to-depth ratios. Cutbanks also reduce the ability of woody species and long-rooted riparian plants to increase and expand; these species are important to maintaining bank stability. Long-rooted riparian vegetation provides root strength to stabilize streambanks. The Ochoco National Forest currently measures the percent of cutbank on selected streams. Assessing the amount of cutbank and the affects of livestock grazing on cutbanks will indicate the direct effects to the RMO for bank stability and indirect effects to pool frequency, lower bank angle, and width-to-depth ratio.

Livestock grazing and/or trampling also directly affects riparian vegetation, reducing stream shade which in turn indirectly affects stream temperature. Riparian vegetation provides shade to streams and helps regulate stream temperatures (USDA Forest Service 1995a). Assessing the amount of stream shade will indicate the effects to water temperature. In addition, the indirect effects to pool frequency and width-to-depth ratios influence stream temperature.

Columbia Spotted Frog

The Columbia spotted frog (*Rana luteiventris*) is an aquatic species; it is believed that this frog is much more dependent on water than other frogs (Dumas 1996). The spotted frog requires aquatic habitats for breeding, feeding, hibernation, and escape from predators (Turner 1960 and Morris and Tanner 1969). Site characteristics associated with the presence of the spotted frog indicates that they require open-canopy, pooled water with floating vegetation and some emergent vegetation for reproduction. Such pooled water may be in the form of oxbows along

stream courses, seeps in wet meadows, or beaver-created ponds (Reaser 1996). Spotted frogs generally breed in early to mid-spring (end of March to end of May) in very shallow water at the edge of ponds or streams, in flooded meadows, or in pooled water on top of flattened, dead vegetation at the edge of ponds. Spotted frogs deposit floating egg masses that are not dependent on the support of vegetation (Nussbaum et al. 1983). They are active during the day and may cross land areas in the spring and summer after breeding.

The Columbia spotted frog is present throughout the project area. Informal surveys have documented frogs in Florida, Klootchman, Newsome, Pine, Sherwood, Shotgun, and Wildcat Creeks. Spotted frog populations in the Maury Mountains appear to be fragmented, appearing in small populations in wet areas where riparian vegetation provides hiding cover and food (insects).

Livestock grazing may influence spotted frogs in several ways: (1) direct mortality from trampling; (2) indirect mortality from an increase in fecal coliform bacteria causing frogs to develop bacterial infections, especially when under stress from other environmental alterations; (3) growth rates may be reduced and indirect mortality be incurred if the invertebrate prey base is reduced as a result of soil compaction and changes in water quality; and (4) reproduction may be compromised through the destruction of pools through trampling, increases in water velocity and flooding as a result of deep channelization, and changes in water temperature and chemistry resulting from vegetative loss and soil erosion (Reaser 1996).

Livestock grazing can affect habitat features of the redband trout and the Columbia spotted frog by altering streambanks, which can lead to unstable streambanks, and consuming/trampling vegetation, which can lead to less stream shade.

Cutbanks along streams reduce the ability of woody species and long-rooted riparian plants to increase and expand (USDA Forest Service 1995a). Livestock trampling can cause areas along streambanks to become denuded of vegetation. These bare areas are chronic sediment sources and can develop into cutbanks. Habitat quality for aquatic species is considered degraded when cutbanks are 20 percent or greater.

Riparian vegetation provides shade to streams and can help regulate stream temperatures (USDA Forest Service 1995a). Activities, such as livestock trampling and consumption, can reduce the amount of riparian vegetation. In addition to providing shade, riparian vegetation provides root strength to stabilize streambanks, and vegetation that filters sediment as it comes from the uplands to the stream.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Removal of livestock grazing would allow riparian vegetation to increase in height and percent cover, resulting in more bank stability, more shade, and more organic inputs to the channel (Platts et al. 1983, Kauffman et al. 1983, Kauffman and Krueger 1984, and Elmore and Beschta 1987). With increased riparian vegetation, stream channel widths are expected to decrease and depths are expected to increase, resulting in lower width-to-depth ratios (Gunderson 1968, Platts et al. 1983, Stuber 1985, and Clifton 1989). Pools would increase in number and depth.

With removal of livestock grazing from the Maury Mountains, stream temperature would decrease as a result of increase in size and expansion of riparian vegetation. Streambanks would become more stable as long-rooted vegetation increases in size and expands. As vegetation increases in both height and percent cover, it would increase its filtering capacity and the amount of sediment entering and moving through stream channels would decrease. Less sediment in the substrate during spawning season allows for photosynthesis as the sunlight reaches plants that are no longer covered in sediment. Oxygenization of fish eggs in the gravels increases with less sedimentation in the gravels. Lower sediment levels would result in more available invertebrates, which are food for fish and frogs. Over time, the width-to-depth ratio of the stream channel would decrease (streams would become narrower and deeper) and cut banks would be become vegetated.

Rates of recovery will vary according to channel type (Rinne 1988). The time it takes for improvement of habitat for fish and frogs will vary in the Maury Mountains as there are varied channel types. For example, streams with relatively little fine sediment available for transport may require considerable time to achieve channel narrowing. Sites that do not support woody vegetation may take longer to show channel narrowing than sites with woody vegetation. In areas where vegetation has been lost as a result of downcutting and loss of water table, riparian vegetation would return when the progression of unstable channels such as G and F channel types begin to stabilize.

Removing livestock would improve spotted frog habitat and increase their population survival because there would be a reduction in trampling, improvement in water quality, and expansion of their habitat with increased riparian vegetation. The potential for direct mortality of frogs and frog egg masses resulting from livestock trampling would be removed from springs and riparian areas. Water quality would improve as fecal coliform bacteria levels decrease, reducing the potential for bacterial infections of frogs. Pooled water with floating and emergent vegetation needed for reproduction would increase as vegetation increases.

As a result of removing livestock, the amount of cutbank in the project area would decrease. There would no longer be any streambank alteration or consumption and trampling of riparian

vegetation by livestock. However, there would still be some cutbanks in the project area as a result of natural processes, wildlife use, and other factors such as recreation use.

As deep-rooted vegetation becomes established along streambanks, the streambanks would stabilize and begin rebuilding. As the streambanks stabilize, the channel width would narrow and the channel depth would increase; pools would form and provide hiding cover for fish. An increase in the depth of the water would also provide cooler water temperatures. As the streambanks rebuild and become narrower, there would be more cover for fish and frogs, more shade, and reduced solar radiation input. A reduction in width-to-depth ratio indicates other habitat features are also improving.

Shade would increase as long-rooted riparian vegetation (woody species and riparian grasses) become established. In areas where vegetation has been lost as a result of downcutting and loss of water table, riparian vegetation would return when the progression of channels such as F and G channel types (unstable) begin to stabilize.

After livestock are removed, riparian woody vegetation and grasses are expected to increase in both height and percent cover. Streambanks would become more stable as long-rooted vegetation expands. Vegetation would grow taller and provide more shade along the streambanks.

The more riparian vegetation is present, the more vegetation there is to filter out sediment. As riparian vegetation increases, the amount of sediment delivery to streams would be reduced. Insect populations, which are food sources for fish and frogs, would also increase as the amount of riparian vegetation increases. With improved habitat and an increased food base, populations of both redband trout and Columbia spotted frogs would be expected to increase.

Alternative 1 would result in a beneficial impact to the redband trout and Columbia spotted frog.

Alternative 1 would not retard or prevent attainment of the RMOs. After 2 years, livestock would no longer be grazed in any of the six allotments in the project area. As a result of removing livestock, streambank alteration from livestock would be eliminated and the amount of the cutbank in the project area is expected to decrease. Riparian vegetation would increase in height and percent cover, resulting in increased bank stability and increased amounts of shade. Stream channel widths are expected to decrease over time and water depths would increase, resulting in lower width-to-depth ratios. Pools are expected to increase in number and depth. Stream temperature would decrease as a result of the narrower and deeper streams and increased amounts of shade. The rate of recovery would vary across the project area by channel type and riparian condition. Most streambanks would be expected to stabilize with vegetation over the next 10-15 years, if some extent of riparian vegetation is present. Altered sites that lack riparian vegetation are expected to take more than 15 years to recover and may not recover without active management. Streams with more than 20 percent cutbanks would take several decades or more to adjust bank slopes and stabilize with vegetation. Areas that are currently entrenched (G and F-type channels) would remain entrenched until vertical side slopes naturally adjust and become vegetated.

Cumulative Effects

Past activities such as beaver trapping, domestic livestock grazing (sheep and cattle), fire suppression and prescribed burning, timber harvest, road construction and maintenance, and recreation and special uses have produced much of today's hydrologic condition. These conditions include reduced riparian plant composition and vigor, down cut and degraded stream channels, changes in upland vegetation, and altered stream flows. Although many of the historical practices have been halted or modified, streambanks and riparian vegetation still show evidence of these practices. Other past management activities have increased bank stability. Recent headcut stabilization projects on Pre-emption, Gibson, Klootchman, Wildcat, and Double Cabin Creeks have increased streambank stability and reduced sediment supply to the adjacent streams by halting upstream headcut migration. Headcut repairs are projected to continue over the next several years. Other activities including cutbank stabilization, large wood placement, hardwood planting, and grade control structures have improved streambank conditions throughout the project area.

Present activities within the project area include the West Maurys Fuels and Vegetation Management Project, Sherwood Wildlife Prescribed Burn, and Maury Aspen Restoration. The West Maurys Project includes 65 acres of commercial harvest, 1,294 acres of noncommercial thinning, and 572 acres of prescribed fire within RHCAs. Approximately 6.4 miles of road would be decommissioned within 400 feet of streams. The 65 acres of commercial harvest within RHCAs would occur in Shotgun, East Shotgun, Florida, Deer, and tributaries to Pine, Hamer, Klootchman, Deer, and Bear Creeks. Approximately 82 percent of the treated area within RHCAs will be in Shotgun, East Shotgun, and a tributary to Bear Creek. These activities would promote bank stabilization by reducing the stocking level of conifers to protect against wildfire and/or disease. Noncommercial thinning and prescribed fire treatments would occur in portions of most streams in the West Maurys Project. These activities would reduce the number of small diameter trees and promote recovery of riparian vegetation. The Sherwood Burn project is an underburn covering approximately 1,300 acres in the Sherwood Allotment. This burn would not alter streambanks, but would reduce the potential for a catastrophic wildfire that would result in adverse effects to streambanks and riparian vegetation. Aspen treatments would not alter streambanks, but would promote diversity of vegetation in riparian areas and increase aspen vigor and abundance by reducing competition with conifers.

Other activities that are ongoing and are expected to continue into the future include road maintenance, noxious weed treatments, and recreational use. With the exception of Off Highway Vehicles (OHV) that are driven in sensitive areas and dispersed camping that occur along and on streambanks, these activities are not expected to adversely affect shade and streambanks.

Foreseeable projects include the East Maurys Fuels and Vegetation Management Project. The effects of the East Maurys project would be similar to the West Maurys Fuels and Vegetation project. The East Maurys proposal includes commercial and noncommercial thinning, and fuel reduction activities. The East Maurys project would include design criteria that are expected to mitigate potential adverse effects to stream shade and cut bank.

Streambanks would be expected to become more stable as riparian vegetation increases. Wildlife use such as browsing and trampling would continue throughout the Maury Mountains. Removing livestock grazing would result in improved habitat for both redband trout and Columbia spotted frogs. As habitat improves, populations levels are expected to increase.

Alternative 2

Direct and Indirect Effects

Rest-rotation and early season grazing would lessen the impact on riparian vegetation and trampling of streambanks. The amount of time that livestock spend in riparian areas would be reduced, because grazing would not occur during the heat of the summer. In a study in Idaho, Platts and Nelson (1985) observed that cattle dispersal was good and cattle were more likely to use uplands during spring and early summer until upland forage plants became less succulent. Marlow and others (1989) also noted good dispersal of livestock from early May through early July; they noted the poorest dispersal was during the "hot season" (July to mid-September).

Clary and Webster (1989) noted spring grazing of riparian areas has several advantages. Grazing early usually results in a better distribution of use between the riparian area and adjacent uplands. This is likely because vegetation in upland areas is more succulent, temperatures are cooler, and, in some cases, livestock may avoid streamside areas that are often wet in the spring. Early grazing, followed by complete livestock removal, allows riparian plants to regrow before the dormant period in the fall.

The more riparian vegetation is present, the more vegetation there is to filter out sediment. As riparian vegetation increases, the amount of sediment delivery to streams would be reduced. Insect populations, which are food sources for fish and frogs, would also increase as the amount of riparian vegetation increases. Pooled water would increase as vegetation increased. With increased pooled water, floating and emergent vegetation needed for frog reproduction would increase.

Trampling in springs and riparian areas by livestock would decrease, reducing potential mortality of frogs, fish, and egg masses. Frogs live in the same aquatic habitats that serve as watering sites for livestock. Metamorphs (change in physical form) may be particularly susceptible to trampling because they are not able to swim well enough to escape to deep water and they occur only in moist areas next to water bodies, the same place that cattle are concentrated. As adults, spotted frogs depend heavily on riparian vegetation for cover and as a resource for their insect prey. Early season grazing along with rest and deferred rotation would improve spotted frog habitat and increase survival because there would be a reduction in trampling, improvement in water quality, and expansion of habitat with increased riparian vegetation. With improved habitat and an increased food base, populations of both redband trout and Columbia spotted frogs would be expected to increase.

As a result of reducing livestock use in riparian areas, the amount of cutbank in the project area would slowly decrease. On an annual basis, streambank alteration is expected to be less than 10 percent from livestock trampling because of triggers for pasture moves, off-site water

developments, and early season grazing. As deep-rooted vegetation becomes established along streambanks, the streambanks would stabilize and begin rebuilding. As the streambanks stabilize, the channel width would narrow and the channel depth would increase; pools would form and provide hiding cover for fish. An increase in the depth of the water would also provide cooler water temperatures. As the streambanks rebuild and become narrower, there would be more cover for fish and frogs, more shade, and reduced solar radiation input.

Shade would increase as long-rooted riparian vegetation (woody species and riparian grasses) expands where it exists and becomes established in some areas where it does not currently exist. Riparian woody vegetation and grasses are expected to increase in both height and percent cover. As vegetation grows taller, it provides more shade along the streambanks. In areas where vegetation has been lost as a result of downcutting and loss of water table, riparian vegetation would return when the progression of channels such as F and G channel types (unstable) begin to stabilize.

Overall, reductions of cutbank and increases in shade would take more than 5 years. Bank stability and cutbank reduction tend to lag behind vegetation response (Kondolf 1993). A minimum lag time has not yet been established, but for exclosures less than 5-10 years old, little difference in the amount of cutbank exists despite noticeable differences in riparian vegetation (Keller et al. 1979, Van Velson 1979, and Buckhouse et al. 1981).

Double Cabin Allotment - Changing the grazing season to early season (May 14 to July 31) would shift grazing to the uplands and away from streams during the early part of the season. The amount of riparian vegetation along Bear, Double Cabin, Faught, Parrish, and Wiley Creeks provides less than desired condition for stream shade. There are no streams within this allotment that currently have more than 20 percent cutbank. Riparian vegetation would have less browse and would increase and expand along streams because of the earlier season of use. Stream shade would increase as riparian vegetation increases. There would be less trampling of streambanks. Livestock would be less likely to trample redds (juvenile fish) and spotted frog egg masses. There would be less removal of riparian vegetation, bank trampling, post holing, and fecal coliform in the water. Daily management in the Center and West Pastures to facilitate livestock distribution throughout the pastures would reduce grazing along Double Cabin, Parrish, Faught, and Indian Creeks. Rest once every 4 years would allow riparian vegetation a complete growing cycle to establish, increase in size, and expand without livestock browse. As water developments are constructed, they would enhance livestock distribution and reduce livestock pressure on streambanks and riparian vegetation.

East Maury Allotment - The allotment would be rested for 10 years. Riparian vegetation would increase in size and expand along Cottonwood, Maury, Pine, and Stewart Creeks. This allotment has been rested since 1999 and the amount of riparian vegetation has increased, but not enough to provide 80 percent or greater stream shade. Following the 10-year rest, the grazing season would be 1 month earlier than the current season.

Kloutchman Allotment - Rest and decreasing AUMs would reduce grazing and trampling pressure on riparian vegetation. Riparian vegetation would increase in size and expand in area. Streams in this allotment with shade levels less than 80 percent include Bear, Cow, Deer,

Ferguson, Florida, Friday, Klootchman, Newsome, and Sherwood Creeks. This allotment would be divided into ten pastures which would also improve livestock distribution and reduce grazing and trampling pressure on riparian vegetation. Livestock would be less likely to trample redds and spotted frog egg masses or graze on riparian vegetation during the early part of the season. There would be less removal of riparian vegetation, bank trampling, post holing, and fecal coliform in the water. After construction, both pasture fences and water developments would enhance livestock distribution and reduce livestock pressure on streambanks and riparian vegetation. The amount of shade on the streams listed above is expected to increase.

Sherwood Allotment - The amount of stream shade on East Florida, Florida, Gibson, Newsome, Sanford, and Sherwood Creeks is less than the desired condition of 80 percent. The amount of riparian vegetation providing stream shade is expected to increase as a result of changing livestock grazing. Increasing the number of acres, daily management, and resting a pasture each year would result in increases in the size and amount of riparian vegetation. After construction, the new water developments would enhance livestock distribution by drawing cattle away from riparian areas and further reduce livestock use in riparian areas. Livestock would be less likely to trample redds and spotted frog egg masses or graze on riparian vegetation during the early part of the season. There would be less removal of riparian vegetation, bank trampling, post holing, and fecal coliform in the water.

Shotgun Allotment - The amount of stream shade on Keeney, Klootchman, Pine, Shotgun, Stewart, Tom Vawn, and Wildcat Creeks is less than the desired condition of 80 percent. An earlier season of use, shorter grazing season, and daily management would facilitate livestock distribution and utilization of upland vegetation. This would provide riparian vegetation the opportunity to increase in size and expand in areas along streams within this allotment. There would be less trampling of streambanks allowing recovery of riparian vegetation. Livestock would be less likely to trample redds and spotted frog egg masses or graze on riparian vegetation during the early part of the season. There would be less removal of riparian vegetation, bank trampling, post holing, and fecal coliform in the water. Removing livestock by mid-July would allow the remainder of the growing season for riparian vegetation to regrow. After construction, the new water developments would enhance livestock distribution and further reduce livestock use in riparian areas.

Alternative 2 may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability of the redband trout or Columbia spotted frog.

Alternative 2 would not retard or prevent attainment of RMOs. Early-season grazing, rest-rotation grazing systems, new water developments, relocated water developments, and daily management would reduce livestock use in riparian areas. As a result of reduced livestock use in riparian areas, streambank alteration would decrease. With less streambank alteration, there would be little or no cutbank development. Deep-rooted riparian vegetation would expand, increasing in height and percent cover stabilizing streambanks. As streambanks stabilize, the channel width would narrow and the channel depth would increase. Pools would also form. Shade would increase as riparian vegetation, such as woody species and sedges, increase in height and percent cover. The combination of narrower and deeper channels, increased pools, and increased shade would result in reduced water temperatures. The rate of recovery would

vary within the project area depending on site-specific conditions. Most streambanks would stabilize with vegetation over the next 10-15 years. Studies of livestock exclusion from heavily grazed riparian areas have found that recovery of riparian vegetation occurred in 3-8 years, depending on existing conditions and strategies (Skovlin 1984). Bank stability and cutbank reduction tend to lag behind vegetation response (Kondolf 1993). Altered sites that lack riparian vegetation would take longer for to recover and stabilize. Recovery of G and F-type channels would occur more slowly and may take many decades.

Cumulative Effects

Past activities such as beaver trapping, domestic livestock grazing (sheep and cattle), fire suppression and prescribed burning, timber harvest, road construction and maintenance, and recreation and special uses have resulted in the stream conditions in the project area. These conditions include reduced riparian plant composition and vigor, down cut and degraded stream channels, changes in upland vegetation, and altered stream flows. Although many of the historical practices have been halted or modified, streambanks and riparian vegetation still show evidence of these practices. Some past management activities have increased bank stability. Recent headcut stabilization projects on Pre-emption, Gibson, Klootchman, Wildcat, and Double Cabin Creeks have increased streambank stability and reduced sediment supply to the adjacent streams by halting upstream headcut migration. Headcut repairs are expected to continue over the next several years. Other activities including cutbank stabilization, large wood placement, hardwood planting, and grade control structures have improved streambank conditions throughout the project area.

Present activities within the project area include the West Maurys Fuels and Vegetation Management Project, Sherwood Wildlife Prescribed Burn, and Maury Aspen Restoration. The West Maurys Project includes 65 acres of commercial harvest, 1,294 acres of noncommercial thinning, and 572 acres of prescribed fire within RHCAs. Approximately 6.4 miles of road would be decommissioned within 400 feet of streams. The 65 acres of commercial harvest within RHCAs would occur in Shotgun, East Shotgun, Florida, Deer, and tributaries to Pine, Hamer, Klootchman, Deer, and Bear Creeks. Approximately 82 percent of the treated area within RHCAs will be in Shotgun, East Shotgun, and a tributary to Bear Creek. These activities would promote bank stabilization by reducing the stocking level of conifers to protect against wildfire and/or disease. Noncommercial thinning and prescribed fire treatments would occur in portions of most streams in the West Maurys Project. These activities would reduce the number of small diameter trees and promote recovery of riparian vegetation. The Sherwood Burn project is an underburn covering approximately 1,300 acres in the Sherwood Allotment. This burn would not alter streambanks, but would reduce the potential for a catastrophic wildfire that would result in adverse effects to streambanks and riparian vegetation. Aspen treatments would not alter streambanks, but would promote diversity of vegetation in riparian areas and increase aspen vigor and abundance by reducing competition with conifers. Combined with the changes in livestock grazing practices, these activities would result in more riparian vegetation, more stream shade, lower water temperatures, and lower amounts of cutbank.

Other activities that are ongoing and are expected to continue into the future include road maintenance, noxious weed treatments, and recreational use. With the exception of Off Highway

Vehicles (OHV) that are driven in sensitive areas and dispersed camping that occur along and on streambanks, these activities are not expected to adversely affect shade and streambanks.

Foreseeable projects include the East Maurys Fuels and Vegetation Management Project. The effects of the East Maurys project would be similar to the West Maurys Fuels and Vegetation project. The East Maurys proposal includes commercial and noncommercial thinning, and fuel reduction activities. The East Maurys project would include design criteria that are expected to mitigate potential adverse effects to stream shade and cutbank.

Streambanks would be expected to become more stable as riparian vegetation increases. Wildlife use such as browsing and trampling would continue throughout the Maury Mountains.

Overall, the quality of habitat for redband trout and Columbia spotted frogs is expected to improve as a result of increasing riparian vegetation and more stable streambanks. As habitat improves, populations levels are expected to increase.

Alternative 3

Direct and Indirect Effects

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

Renewing the existing permits would have a direct effect on riparian vegetation and bank stability. Stream survey data (see 2/15/2006 Resource Report and Biological Evaluation for aquatic species) does not show a trend towards improvement in riparian vegetation or cutbank along several streams. As a result, there would be indirect effects to pools, water temperature, and width-to-depth ratios.

Myers (1989) reported that livestock are less likely to disperse across a large grazing unit during the hot portion of the growing season than in the spring, particularly if the upland vegetation has ceased growing. The resulting concentrations of livestock use in the riparian zone during summer months becomes a key factor in severity of trampling and mechanical damage, soil compaction, and plant utilization. Marlow and others' (1989) observations of cattle indicated that utilization of deciduous woody species increased about late August and remained heavy through the fall period. Good dispersal of livestock was noted from early May through early July, and the poorest dispersal was noted during the "hot season" (July to mid-September) (Marlow et al. 1989).

Habitat of the Columbia spotted frog and redband trout would continue to be impacted by grazing, post holing, trampling streambanks, and removal of riparian vegetation. Trampling by livestock would continue as livestock seek cooler temperatures in springs and riparian areas during the hotter summer months potentially causing mortality to newly hatched fish and frogs. Spotted frog metamorphs may be particularly susceptible to trampling because they are not able

to swim well enough to escape to deep water, and they occur only in moist areas next to water bodies, the same place that cattle concentrate. As adults, spotted frogs depend heavily on riparian vegetation for cover and as a resource for their insect prey. Water would continue to be contaminated with fecal coliform bacteria. Habitat for fish and frogs and their populations would remain static or in a downward trend.

Double Cabin Allotment - The current condition of streams and trends would continue. Those streams that have low levels of shade and that are in a static trend would not improve. Parrish Creek is in a static trend, while Double Cabin Creek shows a downward trend for stream shade. Areas along Bear, Double Cabin, Faught, Parrish, and Wiley Creeks currently have less than 80 percent stream shade. Stream shade would not increase. Livestock concentrating in riparian areas during the summer months would result in excessive removal of riparian vegetation, bank trampling, post holing, and an increase in fecal coliform in the water. There would be continued trampling of streambanks and habitat for newly hatched fish and frogs during hot summer temperatures in August. During low flows during August, young fish and frogs are vulnerable to being trampled. Trampling increases sedimentation which covers gravels that are important for hiding cover for small fish and frogs and reduces oxygenation of eggs. Loss of oxygenation and increased water temperatures due to lack of riparian vegetation stress fish and frogs. Food availability provided by riparian vegetation where insects live would be reduced. With loss of cover, poor water quality, loss of insect populations, and trampling, there would be low reproductive success of frogs and fish.

East Maury Allotment - This allotment is currently being rested, and is scheduled to be rested for 10 more years. However, this allotment may be grazed at any time if agreed upon by the permittee and Forest Service. When this allotment is grazed, the permitted season of use extends to September 30, well into the dry and hot period. The current condition of streams and trends would continue. Stewart and Cottonwood Creeks are in a static trend. Maury, Stewart, Pine (east), and Cottonwood Creeks have less than desired levels for shade. None of the streams in this allotment have greater than 20 percent cutbank. Grazing later in the season would have similar effects to stream condition and habitat of the redband trout and Columbia spotted frog as described for the Double Cabin Allotment.

Kloutchman Allotment - In Alternative 3, there are no rested pastures, no new fences (6 pastures instead of 10), and no new water developments. The current condition of streams and trends would continue. Those streams that are in a static or downward trend would not improve. These streams are: Cow, Deer, Florida, Kloutchman, and Newsome Creeks. Bear, Cow, Deer, Ferguson, Florida, Friday, Kloutchman, Sherwood, and Newsome Creeks have less than 80 percent shade. The amount of shade on these streams would not increase. Deer, Florida, and Sherwood Creeks have cutbanks that exceed 20 percent. Livestock would continue trampling of streambanks when they seek cooler areas during the hot summer temperatures. Excessive removal of riparian vegetation, bank trampling, post holing, and an increase in fecal coliform in the water would result during the hot air temperatures when livestock concentrate within stream corridors, which could lead to increased in cutbank. Livestock would trample redds and young spotted frogs or graze on riparian vegetation. Trampling increases sedimentation that covers gravels important for hiding cover for small fish and frogs and reduces oxygenation. Loss of oxygenation and high water temperatures stress fish and frogs. Food availability provided by

riparian vegetation where insects live would be reduced. With loss of cover, poor water quality, loss of insect populations, and trampling, there would be low reproductive success of frogs and fish.

Sherwood Allotment - There would not be rest of a pasture, no new water developments, or daily management. The current stream condition and trends would continue. Shade is decreasing along Florida Creek and portions of Sherwood Creek. Shade levels are static along East Florida, Newsome, and portions of Sherwood Creek. The trend for cutbanks is increasing on Gibson Creek and is static on East Florida Creek. Florida, East, Gibson, Newsome, Sherwood, and Sanford Creeks have less than 80 percent shade. The amount of cutbank exceeds 20 percent on Florida, Newsome, and Sherwood Creeks. Livestock grazing and trampling along streams would continue to contribute to low shade levels and high levels of cutbank.

Shotgun Allotment - The current stream conditions and trends would continue. Klootchman Creek is in a downward trend for cutbank. The trend for Shotgun, Stewart, and Tom Vawn Creeks is static. Keeney, Klootchman, Pine (north), Shotgun, Stewart, Tom Vawn, and Wildcat Creeks currently have less than 80 percent shade. There would be continued trampling of streambanks when livestock seek cooler areas in the riparian areas during hot summer temperatures. The amount of cutbank exceeds 20 percent on Drake and Pine Creeks. Excessive removal of riparian vegetation, bank trampling, post holing, and an increase in fecal coliform in the water would result during the hot air temperatures when livestock concentrate within stream corridors. During low flows in August and September, young fish and frogs are vulnerable to being trampled. Livestock would trample redds and young spotted frogs or graze on riparian vegetation. Trampling increases sedimentation that covers gravels important for hiding cover for small fish and frogs and reduces oxygenation. Loss of oxygenation and high water temperatures stress fish and frogs. Food availability provided by riparian vegetation where insects live would be reduced. With loss of cover, poor water quality, loss of insect populations, and trampling, there would be low reproduction success of frogs and fish. Livestock grazing and trampling along streams would continue to contribute to low shade levels and high levels of cutbank.

Alternative 3 may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability of the redband trout or Columbia spotted frog.

Alternative 3 is expected to retard attainment of RMOs. Streambank alteration would continue and development of additional cutbanks would be expected. Without modifying grazing practices, trampling along streams would continue to contribute to low levels of stream shade and cutbanks. In areas where streambank alteration has exceeded 10 percent on an annual basis, the amount of cutbank would remain about the same or increase slightly. Alteration of channel morphology through changes to width-to-depth ratios, entrenchment, pool frequency, and lower bank angles are expected to continue to occur. Stream temperatures would not be expected to decrease.

Cumulative Effects

Past, present, and foreseeable future projects were described in detail in Alternative 2. These activities would be the same under Alternative 3; however, the effects of those activities

combined with this alternative would be different. Present and reasonably foreseeable projects that would improve habitat conditions for redband trout and Columbia spotted frogs may be negated by continued use of riparian areas by livestock. The Maury Aspen Restoration project includes fencing and piling slash to exclude cattle and livestock are not expected to negate the improvement in these small areas (most are less than 20 acres in size). The downward trend or static condition of shade and cutbank levels along streams would continue to be affected by livestock grazing and are not expected to improve. Off Highway Vehicles (OHV) that are driven in sensitive areas and dispersed camping that occur along and on streambanks, combined with livestock grazing, could increase the amount of cutbank because of removal of riparian vegetation.

Alternative 4

Direct and Indirect Effects

Rest-rotation and early season grazing would lessen the impact on riparian vegetation and trampling of streambanks. The amount of time that livestock spend in riparian areas would be reduced, because grazing would not occur during the heat of the summer. In a study in Idaho, Platts and Nelson (1985) observed that cattle dispersal was good and cattle were more likely to use uplands during spring and early summer until upland forage plants became less succulent. Marlow and others (1989) also noted good dispersal of livestock from early May through early July; they noted the poorest dispersal was during the "hot season" (July to mid-September).

Clary and Webster (1989) noted spring grazing of riparian areas has several advantages. Grazing early usually results in a better distribution of use between the riparian area and adjacent uplands. This is likely because vegetation in upland areas is more succulent, temperatures are cooler, and, in some cases, livestock may avoid streamside areas that are often wet in the spring. Early grazing, followed by complete livestock removal, allows riparian plants to regrow before the dormant period in the fall.

The more riparian vegetation is present, the more vegetation there is to filter out sediment. As riparian vegetation increases, the amount of sediment delivery to streams would be reduced. Insect populations, which are food sources for fish and frogs, would also increase as the amount of riparian vegetation increases. Pooled water would increase as vegetation increased. With increased pooled water, floating and emergent vegetation needed for frog reproduction would increase.

Trampling in springs and riparian areas by livestock would decrease, reducing potential mortality of frogs, fish, and egg masses. Frogs live in the same aquatic habitats that serve as watering sites for livestock. Metamorphs (change in physical form) may be particularly susceptible to trampling because they are not able to swim well enough to escape to deep water and they occur only in moist areas next to water bodies, the same place that cattle are concentrated. As adults, spotted frogs depend heavily on riparian vegetation for cover and as a resource for their insect prey. Early season grazing along with rest and deferred rotation would improve spotted frog habitat and increase survival because there would be a reduction in trampling, improvement in water quality, and expansion of habitat with increased riparian vegetation. With improved

habitat and an increased food base, populations of both redband trout and Columbia spotted frogs would be expected to increase.

As a result of reducing livestock use in riparian areas, the amount of cutbank in the project area would slowly decrease. On an annual basis, streambank alteration is expected to be less than 10 percent from livestock trampling because of triggers for pasture moves, off-site water developments, and early season grazing. As deep-rooted vegetation becomes established along streambanks, the streambanks would stabilize and begin rebuilding. As the streambanks stabilize, the channel width would narrow and the channel depth would increase; pools would form and provide hiding cover for fish. An increase in the depth of the water would also provide cooler water temperatures. As the streambanks rebuild and become narrower, there would be more cover for fish and frogs, more shade, and reduced solar radiation input.

Shade would increase as long-rooted riparian vegetation (woody species and riparian grasses) expands where it exists and becomes established in some areas where it does not currently exist. Riparian woody vegetation and grasses are expected to increase in both height and percent cover. As vegetation grows taller, it provides more shade along the streambanks. In areas where vegetation has been lost as a result of downcutting and loss of water table, riparian vegetation would return when the progression of channels such as F and G channel types (unstable) begin to stabilize.

Overall, reductions of cutbank and increases in shade would take more than 5 years. Bank stability and cutbank reduction tend to lag behind vegetation response (Kondolf 1993). A minimum lag time has not yet been established, but for exclosures less than 5-10 years old, little difference in the amount of cutbank exists despite noticeable differences in riparian vegetation (Keller et al. 1979, Van Velson 1979, and Buckhouse et al. 1981).

Double Cabin Allotment - Alternative 4 is the same as Alternative 2 in the Double Cabin Allotment in terms of the number of water developments, daily management in the Center and West Pastures, rest, and elimination of the East Pasture. In Alternative 4, the cattle herd would not be split 2 out of 4 years. The three drier pastures (Parrish Creek, Faught, and Rickman) would be grazed late in the season 2 out of 4 years.

Changing the grazing season to early season would shift grazing to the uplands and away from streams during the early part of the season. Riparian vegetation would have less browse and would increase and expand along streams. Stream shade would increase. Currently, Bear, Double Cabin, Faught, Parrish, and Wiley Creeks have less than the desired condition for stream shade. The amount of riparian vegetation and stream shade along these streams would be expected to increase. None of the streams in this allotment currently have more than 20 percent cutbank. There would be less trampling of streambanks. The amount of cutbank in this allotment is not expected to increase. Livestock would be less likely to trample redds (juvenile fish) and spotted frog egg masses. There would be less removal of riparian vegetation, bank trampling, post holing, and fecal coliform in the water. Daily management in the Center and West Pastures to facilitate livestock distribution throughout the pastures would reduce grazing along Double Cabin, Parrish, Faught, and Indian Creeks. Rest once every 4 years would allow riparian vegetation a complete growing cycle to establish, increase in size, and expand without

livestock browse. As water developments are constructed, they would enhance livestock distribution and reduce livestock pressure on streambanks and riparian vegetation.

Livestock are expected to spend more time in riparian areas in the three drier pastures 2 out of 4 years when they are grazed later in the season. Livestock would be expected to be taken off the range earlier than the established season of use because triggers for pasture moves would be met quicker when the uplands are dry. The amount of use in the Parrish Creek, Faught, and Rickman Pastures is expected to be higher than Alternative 2 when they are grazed later in the season. Riparian vegetation in these pastures is expected to increase, but at a slower rate than Alternative 2. Vegetative cover is expected to show a measurable increase in 10-15 years. The earlier season of grazing and new water developments (once they are constructed) are expected to enhance livestock distribution and reduce livestock trampling on streambanks and riparian vegetation.

East Maury Allotment - The direct and indirect effects of Alternative 4 are the same as Alternative 2.

Kloutchman Allotment - Alternative 4 would authorize the same number of AUMs as alternative 3. Construction of additional pasture fences to increase the number of pastures would disperse livestock more than current distribution. New water developments and relocation of existing developments would also reduce the time livestock spend in riparian areas. Livestock would be on the allotment earlier in the year when upland vegetation is still succulent. However, livestock would be on the allotment in August, when the hottest temperatures occur. When temperatures are hot and upland vegetation has dried out, livestock would congregate in riparian areas and would trample streambanks and consume riparian vegetation when there is less opportunity for it to regrow. Triggers for pasture moves would be met more quickly during the hot, dry season.

Alternative 4 would slightly reduce grazing of riparian vegetation and trampling of streambanks. Increases in riparian vegetation would be slow to occur. Vegetative cover is expected to show a measurable increase in about 15 years. As pasture fences and water developments are constructed, they would enhance livestock distribution and reduce livestock pressure on streambanks and riparian vegetation. Streams that have more than 20 percent cutbank or that have low levels of shade would improve more slowly than in Alternative 2.

Sherwood Allotment - The direct and indirect effects of Alternative 4 are the same as Alternative 2.

Shotgun Allotment - Alternative 4 is similar to Alternative 2. Alternative 4 would authorize the same number of AUMs and season of use. Alternative 4 differs by dividing the Drake Pasture into three smaller pastures and implementing a rest-rotation grazing system. With rest rotation, one pasture would be rested each year and use would be concentrated in two pastures. An earlier season of use and a shorter grazing season would increase utilization of upland vegetation. This would provide riparian vegetation the opportunity to increase in size and expand in area. There would be less trampling of streambanks, allowing recovery of riparian vegetation. Removing livestock earlier in the season would provide a longer time for plants to regrow after grazing. Livestock would be less likely to trample redds and spotted frog egg masses or graze on riparian

vegetation during the early part of the season. As water developments are constructed, they would enhance livestock distribution and reduce livestock pressure on streambanks and riparian vegetation.

Under Alternative 4, streams would not recover as quickly as Alternative 2; however, it would recover more quickly than Alternative 3. As a result of reducing cutbank and increasing shade, dimension, pattern, and profile of the stream channel are expected to stabilize except when grazing occurs during hot air temperatures on the Klootchman Allotment. As riparian vegetation (woody and long rooted grasses) recovers and streambanks stabilize, the amount of cutbank would decrease.

Alternative 4 may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability of the redband trout or Columbia spotted frog.

Alternative 4 would not retard or prevent attainment of RMOs. Early-season grazing, rest-rotation grazing systems, new water developments, relocated water developments, and daily management would improve livestock distribution and reduce livestock use in riparian areas. As a result of reduced livestock use in riparian areas, streambank alteration would decrease. With less streambank alteration, there would be little or no cutbank development. Deep-rooted riparian vegetation would expand and increase in height and percent cover which would result in more stable streambanks. As streambanks stabilize, the channel width would narrow and channel depth would increase. Pools would also form. Shade would increase as riparian vegetation, such as woody species and sedges, increase in height and percent cover. The combination of narrower and deeper channels, increased pools, and increased shade would result in reduced water temperatures. The rate of recovery would vary within the project area depending on site-specific conditions. In the Double Cabin, East Maury, and Sherwood Allotments most streambanks would stabilize with vegetation over the next 10-15 years. Studies of livestock exclusion from heavily grazed riparian areas have found that recovery of riparian vegetation occurred in 3-8 years, depending on existing conditions and strategies (Skovlin 1984). Bank stability and cutbank reduction tend to lag behind vegetation response (Kondolf 1993). Vegetative cover in the Klootchman and Shotgun Allotments is expected to show measurable increases within 15 years. In all the allotments, altered sites that lack riparian vegetation would take longer for to recover and stabilize. Recovery of G and F-type channels would occur more slowly and may take many decades.

Cumulative Effects

Past, present, and foreseeable future projects were described in detail in Alternative 2. These activities would be the same with Alternative 4; however, increase in riparian vegetation would be slower to occur.

Essential Fish Habitat

Mid-Columbia River spring chinook salmon and EFH (essential fish habitat) do not occur in the Maury Mountains (USDA Forest Service 2003b). Therefore, this project would have no effect on mid-Columbia River spring chinook or EFH.

Management Indicator Species

The Forest Plan identified Management Indicator Species (MIS) to determine the effects of management activities on fish and wildlife habitat. Management indicator species are species whose presence in a certain location or situation at a given population level indicates a particular environmental condition. Population changes are believed to indicate effects of management activities on a number of other species. Rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) were picked as indicators of riparian and aquatic habitat. In the past, these fish were stocked by the Oregon Department of Fish and Wildlife. They are no longer stocked in the streams in the project area. Brook and rainbow trout habitat requirements are similar to redband trout. If they were still stocked in the project area, these trout species would be found in the same streams where redband trout are found. Effects to brook and rainbow trout habitat would be the same as the effects described for redband trout habitat in the section on threatened, endangered, and sensitive species.

Affected Environment

Primary cavity excavators including the northern flicker and pileated woodpecker are MIS for snag and dead wood wildlife habitat. They are a group of species primarily dependent on dead wood habitat. The pileated woodpecker is a habitat specialist and is an indicator for late and old fir-dominated forest structure. Habitat features important to this species include high (>60%) canopy closure, stands dominated by fir species, sufficient snags for feeding and nesting, and abundant down logs for foraging. The pileated woodpecker does occur in the project area and is primarily associated with fir-dominated stands on the upper elevation north slopes. The flicker is an indicator of old-growth juniper habitats. The flicker is capable of excavating cavities in old-growth juniper trees which many primary excavators are not able to do. The flicker is also considered a habitat generalist and can occur in a variety of habitats as long as snags or hollow trees of appropriate dimensions are present. The flicker is a common species throughout the project area. The white-headed woodpecker is a habitat specialist that prefers areas with an open overstory of large ponderosa pine and snags (Frenzel 2001). The white-headed woodpecker feeds primarily on live tree insects and utilizes pine seeds. The white-headed woodpecker is infrequently observed in the project area. Snags, including snag densities, decay class, and diameter, are one of the best indicators of habitat quality and population viability for primary cavity excavators. Tree species and forest structure is also important in evaluating habitat quality. Livestock grazing does not create or destroy snags and as a result there would be no direct, indirect, or cumulative effects to species or habitat for a large number of primary cavity excavators that utilize coniferous habitats. The pileated woodpecker, common flicker, and white-headed woodpecker are species primarily associated with conifer forest types within the project area.

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

Representative primary cavity excavators are the downy woodpecker, red-naped sapsucker, and Lewis' woodpecker.

The red-naped sapsucker's preferred habitat is riparian, with a preference for aspen, as well as cottonwoods, alder, pine forests, and less frequently mixed conifer forests (Marshall et al. 2003). Marshall and others (2003) report that the population of red-naped sapsuckers are relatively stable in Oregon, although Dobkin and Rich (1995) report the widespread degradation of aspen through intensive grazing and fire suppression as a threat to the red-naped sapsucker. The Partners In Flight - Northern Rocky Mountains Bird Conservation Plan identifies the red-naped sapsucker as a focal species for aspen habitats. The conservation plan identifies livestock grazing and fire suppression as a conservation issue because of the lack of recruitment of young aspen. The conservation plan also identifies the encroachment of conifer trees into aspen stands as a conservation issue. There are no sightings of red-naped sapsucker within the project area.

The downy woodpecker also prefers riparian deciduous forests, or mixed deciduous/coniferous forests (Marshall et al. 2003). Marshall and others (2003) indicate the downy woodpecker in eastern Oregon is most often found in deciduous stands, specifically riparian areas composed of alder, cottonwood, willow, and aspen. It is less common in mixed conifer and ponderosa pine forests. Marshall and others (2003) also note that the species in Oregon appears to be stable or on a slight declining trend, but that replacement of hardwood habitats with conifers and grazing in riparian habitats appear to pose the greatest risk for this species in eastern Oregon. There are sightings of downy woodpecker within the project area. The sightings are primarily associated with aspen.

Lewis' woodpecker prefers open riparian woodland habitats dominated by cottonwoods, open ponderosa pine, and burned or logged ponderosa pine. Marshall and others (2003) indicate the preferred nest trees are cottonwoods although nests are also found in ponderosa pine, juniper, fir, and willow. Marshall and others (2003) indicate the Oregon distribution was formerly widespread, although it is currently only common in the white oak-ponderosa pine belt on the eastern slopes of the cascades east of Mt. Hood. It occurs in low numbers along the stream and river bottoms of eastern Oregon. This species is a weak cavity excavator and typically uses cavities excavated by other species. Marshall and others (2003) indicate a decline throughout its range due to loss of suitable habitat, primarily the destruction of oak woodlands. Competition from European starlings is also speculated as a reason for the decline. There are no sightings for Lewis' woodpecker within the project area.

Hardwood communities in the project area were more abundant historically than they are today. There is no numerical data on the historical distribution of hardwood communities, although historical accounts of the Crooked River, Camp Creek, and tributaries indicate hardwood communities were more abundant than what exists today (USDA Forest Service 2000). The current potential for supporting riparian hardwood communities and shrubs is much different today than the historical potential. Stream channel degradation has occurred throughout the project area and has reduced the potential to support riparian hardwoods in many areas. Even though the potential has been decreased, this is still potential for increased amounts and distributions of hardwood communities compared with what exists.

The Maury Watershed Analysis describes existing and potential riparian vegetation conditions for Hammer and Maury Creeks. The watershed analysis indicates these systems have the potential for supporting an increase in shrub communities compared to what currently exists. Channel types within these three streams are characteristic of the majority of streams that exist within the project area. Limiting factors for developing potential shrub communities are lowered water tables due to stream downcutting and the increased density of upland coniferous vegetation. District stream survey information also indicates a higher potential for riparian hardwoods and shrubs. A total of 55 miles of Class II and III streams have been surveyed within the project area. Of the 55 miles surveyed, 32.5 miles have less than 59 percent total shade. There is a potential for more than 59 percent shade in many areas, including increased shade from riparian hardwoods.

A variety of activities, including historical grazing, timber harvest, loss of beaver, road building, fire suppression, and climate change have reduced the size and distribution of hardwood habitats. Black cottonwood (two decadent trees) occurs at only one location within the project area, along Faught Creek. There is no indication that black cottonwood historically provided a significant habitat component, although a slight increase over present levels could be expected. Aspen are scattered throughout most of the project area. They are primarily associated with riparian areas, springs, and seeps. Aspen clones are currently small, usually less than 1 or 2 acres in size, with a few clones larger than 2 acres. Historically, aspen covered much larger areas than what exist today. Remnant decayed stems are still present within many riparian areas, especially the south flowing drainages of the project area. Within the project area, 124 aspen clones have been identified. The majority of clones are composed of one age class. Reproduction in the form of suckering is evident at most locations, although suckers are typically heavily browsed. Successful reproduction has primarily occurred within exclosures. There are currently 31 aspen exclosures. Of these exclosures, 14 are big game exclosures that exclude both big game and cattle and 17 only exclude cattle. Successful reproduction has occurred within both exclosure types, although big game exclosures are the most effective. In recent years, successful reproduction has occurred at a small number of locations outside exclosures. Examples include sites on Shotgun and Wildcat Creeks.

Hardwood communities dominated by willow, alder, birch, and red-osier dogwood are scattered along perennial streams throughout the area. Although, they occur only as remnant stands or scattered individuals.

Habitat conditions for species dependent on riparian associated hardwood communities are poorly represented within the project area. Aspen are the only hardwood species that is large enough to provide suitable sites for cavity excavation. Aspen clones likely do not provide suitable habitat alone because of the small size of the existing clones. Although, the remaining clones still provide habitat in combination with surrounding conifer habitat. Cottonwood are represented by a few individuals and likely never provided a significant habitat component within the project area. Historical grazing, stream channel degradation, loss of water tables, ungulate browsing, loss of beaver, road construction, fire suppression, and the expansion of conifer, have all contributed to the poor condition of hardwood communities that currently exists.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Alternative 1 would not result in direct effects to hardwood habitats and associated primary cavity excavators. The absence of livestock grazing would eliminate livestock browsing on riparian hardwood species. Browsing from mule deer and elk would continue. As previously mentioned, cottonwoods would not be expected to make up a significant habitat component. There is no indication that cottonwoods historically occupied a larger distribution than what currently exists. Species like Lewis' woodpecker would be expected to remain uncommon because of the lack of gallery cottonwood or other hardwood forests. Lewis' woodpecker is also associated with open ponderosa pine habitats and post-fire conditions. Both habitat conditions are underrepresented within the project area. Wildfires that would improve habitat conditions for Lewis' woodpecker are not predictable. Without grazing, successful regeneration of existing aspen clones is expected to slowly increase in the short term (10-20 years). There are numerous studies that indicate aspen will not successfully regenerate with high populations of deer or elk (Kay and Bartos 2000). Smith and others (1972) reported deer alone had little effect on the development of aspen reproduction, but with cattle and deer aspen regeneration was eliminated. Current elk and deer populations within the project area are not considered to be high.

Observations of exclosures within the project area indicate that total exclusion of all herbivores is the most effective way of ensuring regeneration, although successful regeneration has occurred in exclosures that only eliminated cattle use. Examples are exclosures on Faught and Pine Creeks. With time, the recovery and expansion of riparian associated species across the project area including aspen, alder, willow, dogwood, and birch, is expected. The extent of recovery is difficult to predict because of the amount of channel degradation that has occurred in the past and the difficulty in evaluating the site potential for any particular location. With the expansion of hardwood species across the project area, browsing by deer and elk would be expected to become less evident at any one location. Complete recovery to historical distributions in many areas is not possible because of channel down-cutting which has lowered the water table and decreased the site potential for supporting riparian associated species. Habitat for primary cavity excavators associated with aspen including the downy woodpecker and red-naped sapsucker would increase. However, habitat is not expected to increase over a large enough area to affect populations because the potential no longer exists for extensive riparian hardwood or riparian shrub communities.

Cumulative Effects

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

Several projects have been implemented or are planned in the future to improve riparian conditions and hardwood habitats. Headcut stabilization projects have occurred or are planned on Double Cabin, Little Deer, Klootchman, and Gibson Creeks. Loose rock check dams have been placed on Klootchman, Maury, and Newsome Creeks. Riparian planting has occurred on several streams within the project area. A total of 31 aspen stands have been protected with either big game fencing or cattle fencing. Conifers have been thinned from several stands. The Maury Aspen Restoration project will be implemented in the next year or two and includes both fencing and thinning encroaching conifers. The East and West Maurys Vegetation Management projects also include thinning conifers in aspen stands and additional riparian hardwood habitats within the project area. Prescribed fire associated with the East and West Maurys Vegetation Management projects is also expected to stimulate aspen regeneration.

Many projects have improved riparian habitat conditions by increasing hardwood communities through planting and exclosures. Aspen exclosures have been effective at ensuring the successful regeneration of aspen clones. Such activities have reduced and in some locations stopped the further degradation of stream channels. Hardwood habitats and species associated with them would increase.

Alternative 1 would not contribute to the cumulative effects of other actions that have and will continue to affect hardwood habitat, and habitat for hardwood-dependent cavity excavators. In absence of livestock, hardwood habitats are anticipated to increase across the project area. Because of the degradation in stream channels and associated riparian areas that has occurred, there are locations where complete recovery is not possible. Populations of deer and elk can fluctuate within the project area, and high population levels could affect increases of hardwood habitat from the termination of grazing. Currently, the population trends for deer and elk are down and they are not expected to reduce the increases in habitat that are a result of removing livestock grazing.

Alternative 2

Direct and Indirect Effects

There would be no direct effects to riparian associated primary cavity excavators by implementing Alternative 2. Indirect effects would result from continued livestock browsing of aspen suckers and other riparian associated hardwoods resulting in limited growth on riparian hardwoods. Activities under Alternative 2 that would improve the distribution of cattle and reduce use on riparian associated hardwoods include: (1) earlier season of use, (2) additional water developments and relocating existing troughs away from riparian areas, (3) daily management of cattle, and (4) rest-rotation grazing. These activities are expected to decrease the overall browsing that would occur on hardwood species. Cattle typically browse less on hardwood species when other succulent grass species are available. An earlier season of use would result in more succulent forage in the uplands for a longer period of time while cattle are present. Additional water developments would provide water in locations that currently do not have water or have a reduced availability and would make it more likely that cattle will use

vegetation in these areas. Moving existing water developments away from riparian areas and daily management would reduce the amount of time cattle concentrate in riparian areas.

Riparian associated hardwood habitats including aspen, alder, dogwood, and willow are expected to increase in both distribution and amount. The amount and extent of the recovery of hardwood habitats is difficult to predict because many locations likely would not support hardwood communities because of past degradation or soil and moisture conditions. Browsing by cattle is expected to continue, although at reduced levels. In the next 10-20 years, the majority of the successful regeneration of aspen is expected to occur primarily within exclosures, although there is expected to be an increase in successful regeneration outside exclosures. Because of the small size of the existing aspen clones and the poor distribution of riparian hardwoods across the project area, browsing is expected to continue suppressing regeneration. Over the long term, aspen suckers and other riparian hardwoods are expected to escape browse pressure and expand in size and distribution. With an increase in the successful regeneration of aspen, potential nesting habitat for species that utilize aspen and riparian hardwood habitats like the downy woodpecker and red-naped sapsucker would slowly increase. There are no sightings of red-naped sapsucker in the project area. Habitat is not expected to increase over a large enough area to affect populations because the potential no longer exists for extensive riparian hardwood or riparian shrub communities.

Under Alternative 2, an early on/off grazing system would be implemented on the Double Cabin, Sherwood, Shotgun, and Klootchman Allotments. The Double Cabin and Sherwood Allotments would also implement a rest-rotation grazing system.

Double Cabin Allotment - The Double Cabin Allotment was rested for the 2003 season and the Faught and Rickman Pastures were rested for the 2004 season. Observations of aspen suckers on Wiley and Faught Creeks indicated that seasonal rest periods resulted in increased growth of aspen as well as other riparian hardwood species. Poor cattle distribution was often noted on range reports for the Double Cabin Allotment, with monitoring indicating excessive riparian utilization. Alternative 2 would result in less browse on aspen and riparian associated hardwoods within the Double Cabin Allotment when compared to current use. Habitat for species like the downy woodpecker and red-naped sapsucker would slowly increase as aspen regenerates.

East Maury Allotment - This allotment would be rested for 10 years. After 10 years, a deferred rotation grazing system would be continued. Aspen primarily occur within the Maury Pasture. The East Maury Allotment has been rested for the last 6 years. There are aspen clones located along Stewart and Maury Creeks that have shown reduced browse pressure during the last 6 years when compared to when grazing occurred. An additional clone located adjacent to Durham Spring has also shown reduced browse pressure during the past 6 years. With an additional 10 years of rest, a minimum of 50 percent of the existing aspen clones within the East Maury Allotment are expected to have successfully regenerated. Successful regeneration has occurred when aspen suckers have reached a height where continued browsing would no longer limit growth. Because big game populations can effect the successful regeneration of aspen, big game populations were considered to remain at present levels. Following the 10 years of rest cattle grazing would again occur within the East Maury Allotment. Stocking rates would be at

the same levels as when rest began. Range records and personal knowledge of the allotment indicate that within the Maury Pasture aspen and riparian hardwoods were heavily browsed with stocking rates lower than what is expected to occur following the 10 years of rest. As a result, following the 10 years of rest aspen and riparian hardwoods are expected to decline.

Regeneration is expected again to be heavily browsed. The relocation of water developments and the development of additional water sources would redistribute use throughout the pastures, although there is no indication from the range records that distribution was problematic in the Maury Pasture.

Kloutchman Allotment - This allotment is currently implementing an early on/off grazing system and aspen clones do not appear to have successfully regenerated. Aspen clones along Kloutchman, Ferguson, Deer, and Friday Creeks continue to be browsed. Successful regeneration is confined to existing exclosures. The Kloutchman Allotment would be changed to an 8-pasture rest-rotation grazing system under Alternative 2. One year of rest for every 8 years of use would result in limited increases of aspen and other riparian hardwood species.

Sherwood Allotment - Sherwood Allotment has a low number of aspen clones in Gibson, Newsome, and Hammer Pastures. The majority of the remaining aspen clones are located in the east side of the Pine Pasture. Aspen and other riparian associated hardwoods would likely increase because of the rest as well as the early season of use. Range inspection records have indicated that distribution was not a problem within the Gibson and Newsome Pastures. The distribution of cattle was indicated as problematic in the Pine Pasture. Implementation of Alternative 2 would improve distribution. The lower section of Pine Creek has shown some recovery of riparian shrub species in the last 10 years, although this was primarily the result of cattle staying higher in the pasture. Additional riparian areas did not show similar result within the Sherwood Allotment.

Shotgun Allotment - There are aspen clones on Shotgun and Wildcat Creeks where successful regeneration has occurred under the current grazing system. Range inspection reports have indicated that the Shotgun Allotment has had poor cattle distribution in the past. Daily management and increased water distribution would improve the distribution of cattle. The number of aspen clones that successfully regenerate is expected to increase within the Shotgun Allotment.

Alternative 2 is expected to result in more increases to hardwood habitats when compared to Alternatives 3 and 4.

Cumulative Effects

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

Several projects have been implemented or are planned in the future to improve riparian conditions and hardwood habitats. Headcut stabilization projects have occurred or are planned on Double Cabin, Little Deer, Klootchman, and Gibson Creeks. Loose rock check dams have been placed on Klootchman, Maury, and Newsome Creeks. Riparian planting has occurred on several streams within the project area. A total of 31 aspen stands have been protected with either big game fencing or cattle fencing. Conifers have been thinned from several stands. The Maury Aspen Restoration project will be implemented in the next year or two and includes both fencing and thinning encroaching conifers. The East and West Maurys Vegetation Management projects also include thinning conifers in aspen stands and additional riparian hardwood habitats within the project area. Prescribed fire associated with the East and West Maurys Vegetation Management projects is also expected to stimulate aspen regeneration.

Many projects have improved riparian habitat conditions by increasing hardwood communities through planting and exclosures. Aspen exclosures have been effective at ensuring the successful regeneration of aspen clones. Such activities have reduced and in some locations stopped the further degradation of stream channels. Hardwood habitats and species associated with them would increase.

Alternative 2 would continue to contribute to the cumulative effects through continued browsing on hardwoods and their ability to expand and regenerate. Alternative 2 would contribute less cumulative effects than Alternative 3, because changes in season of use, improved distribution of water, implementing rest-rotation for certain allotments, and reduced stocking rates would result in improved distribution of cattle and reduced use within riparian areas. The result would be reduced browsing on hardwood species including aspen, alder, willow, dogwood, and birch. Riparian restoration projects previously mentioned are expected to continue. Habitat for species associated with hardwood habitats is expected to increase over time.

Alternative 3

Direct and Indirect Effects

Under Alternative 3, the current conditions and trends associated with hardwood habitats would continue. In general, aspen clones outside exclosures are expected to continue to decline in health except for isolated locations where successful regeneration has occurred. Aspen have successfully regenerated at a few locations in the Shotgun Allotment on Shotgun and Wildcat Creeks where grazing has occurred. There are additional locations where aspen suckers have shown increased growth in recent years, although indications are that the majority of this increase is associated with pastures that have been rested for multiple years. Examples include Stewart Creek in the East Maury Allotment and tributaries to Pine Creek in the Shotgun Allotment. Hardwoods including alder, dogwood, willow, and birch are expected to show minimal changes over existing conditions. There are also isolated locations where growth on riparian shrubs has improved in recent years. These locations include Klootchman Creek, and isolated locations along Florida Creek in the Klootchman Allotment.

All allotments will be managed under a deferred rotation grazing system with no scheduled rest of pastures. As previously mentioned, rested allotments or pastures have resulted in increased

growth of aspen suckers. There would be no new water developments or the re-location of existing water developments. The distribution of water is one of the limiting factors in maintaining cattle distribution. Poor cattle distribution has been documented for the Shotgun and Double Cabin Allotments. Poor cattle distribution within the Double Cabin Allotment has resulted in overuse of riparian vegetation along Double Cabin Creek. This trend is expected to continue. Continued poor cattle distribution is expected within the Double Cabin and Shotgun Allotments. Use in the uplands would remain low and riparian use would remain high.

The East Maury Allotment currently has limited water availability. Without improving the availability of water, continued pressure would be put on the existing water sources.

Cattle typically concentrate in riparian areas when grazing occurs later in the season, primarily being attracted to the cooler temperatures and greener vegetation. The majority of the upland ponds are dry later in the season which further concentrates cattle in riparian areas. The concentration of use later in the season can result in the increased browsing on hardwood species. Observations have indicated that late season browsing of aspen and other hardwood species by deer and elk appears to increase in pastures where riparian use appears high. A later season of use also decreases the amount of re-growth that can occur on grazed plants. Studies at Starkey experimental forest have shown that elk can shift preference from grasses and sedges to shrubs when pastures were heavily grazed by cattle. As a result, cattle may affect the distribution of deer and elk, especially elk, with the result being increased use of hardwood species. The Klootchman and Sherwood Allotments would maintain an early season of use under Alternative 3 which would allow a longer period of time where re-growth can occur on grazed plants.

Under Alternative 3, hardwood habitats are not expected to improve and would remain poor throughout the project area. Potential nesting habitat for species like the downy woodpecker and red-naped sapsucker would continue to decline as the result of the decline in aspen. Isolated locations would continue to show some recovery of hardwood species, although many areas would remain unchanged. Alternative 3 would have the highest potential for reducing hardwood habitats and species that are associated with them.

Cumulative Effects

Past, present, and reasonably foreseeable future actions affecting hardwood habitats within the project area are described under the cumulative effects section for Alternative 2. All of those actions are the same, though their effects would be different.

Alternative 3 would maintain the existing level of cumulative effects on hardwood communities. Actions that would improve the distribution of livestock including an earlier season of use, rest rotation grazing system, new water developments, the relocation of existing water developments, and the daily management would not occur. Higher use would continue in the riparian areas and lower use would occur in the uplands. The overall trend would be static or downward, with isolated locations showing improvements. Effects of activities such as East and West Maurys Vegetation Management Projects and continued riparian restoration projects would improve riparian conditions; these projects are expected to slow, but not change the current trends.

Where thinning occurs in riparian areas as part of the East and West Maurys Projects, livestock would be expected to slow improvement in riparian vegetation because of browsing and trampling. In the Maury Aspen project, livestock are not expected to slow improvement of the aspen regeneration because these areas would be fenced or slash would be piled to discourage livestock use.

Alternative 4

Direct and Indirect Effects

Alternative 4 would have no direct effects to cavity excavators associated with hardwood habitats. The indirect effects to hardwood habitats are the same between Alternatives 2 and 4 except for the Double Cabin, Klootchman, and Shotgun Allotments.

Double Cabin Allotment - The direct and indirect effects of Alternative 4 would be the same as Alternative 2.

East Maury Allotment - The direct and indirect effects of Alternative 4 would be the same as Alternative 2.

Klootchman Allotment - Aspen regeneration and recovery of hardwood habitats is expected to be slower than Alternative 2 because of the higher number of permitted AUMs. Hardwood habitats are expected to be maintained at the existing levels. The successful regeneration of aspen outside exclosures is expected to occur at isolated locations.

Sherwood Allotment - The direct and indirect effects of Alternative 4 would be the same as Alternative 2.

Shotgun Allotment - This allotment would be divided into three pastures and would be managed as a rest-rotation grazing system. Even though animal unit months would be the same under both alternatives, Alternative 4 would result in higher stocking rates on a per acre basis when compared to Alternative 2 because Alternative 4 would have one rested pasture with the same number of cattle as Alternative 2. The result would be higher densities of cattle within smaller pastures. Higher densities of cattle are expected to increase use across the entire Shotgun Allotment when compared to Alternative 2. Use of aspen and riparian associated shrubs is expected to increase under Alternative 4 when compared to Alternative 2. Successful regeneration of aspen would be confined to exclosures. Currently, livestock distribution is poor within the Shotgun Allotment. Distribution is expected to improve with the construction of additional water developments and pasture fences. Livestock would use riparian areas more in Alternative 4 when compared to Alternative 2.

Habitat for downy woodpecker and red-naped sapsucker is not expected to increase over a large enough area to affect populations because the potential no longer exists for extensive riparian hardwood or riparian shrub communities.

Cumulative Effects

Past, present, and reasonably foreseeable future actions affecting hardwood habitats within the project area are described under the cumulative effects section for Alternative 2.

Cumulative effects under Alternative 4 are similar to Alternative 2 except for three allotments. The cumulative effects associated with Alternative 4 for the Shotgun Allotment would result in no improvement from current conditions because use would be concentrated in two of the three pastures each year. Similar cumulative effects would be expected with Alternative 4 for the Klootchman and Double Cabin Allotments. There could be expected some improvement in the short term at isolated locations, although with implementation of the alternative the overall trend is expected to be static or downward.

Alternative 4 would continue to contribute to the cumulative effects through continued browsing on hardwoods and their ability to expand and regenerate. Alternative 4 would contribute less cumulative effects than Alternative 3, because changes in season of use, improved distribution of water, implementing rest-rotation for certain allotments, and reduced stocking rates would provide for the improved distribution of cattle and reduced use within riparian areas. The result would be reduced browsing on hardwood species including aspen, alder, willow, dogwood, and birch. Riparian restoration projects previously mentioned are expected to continue. Habitat for species associated with hardwood habitats is expected to increase over time in the Sherwood Allotment. When grazing resumes after 10 years in the East Maury Allotment, the change in trend of increased hardwood habitats is expected to change and revert downwards. In the Shotgun and Klootchman Allotments, higher use would continue in the riparian areas compared to Alternative 2. The overall trend for hardwood habitats in these three allotments would be static or downward, with isolated locations showing improvements. Effects of activities such as East and West Maurys Vegetation Management Projects and continued riparian restoration projects would improve riparian conditions; these projects are expected to slow, but not change these trends.

Threatened, Endangered, and Sensitive Wildlife Species

There are no endangered species known or expected to occur on the Ochoco National Forest. The northern bald eagle, a threatened species, is known to occur within the project area. The Canada lynx, a threatened species, is not expected to occur in the project area or on the Ochoco National Forest.

Of the eight wildlife species on the Regional Forester's list that are documented or suspected to occur on the Ochoco National Forest, four sensitive species appear to have potential or suitable habitat, within the area of influence for this project. These species are: California wolverine (*Gulo gulo*), gray flycatcher (*Empidonax wrightii*), bufflehead (*Bucephala albeola*), and western sage grouse (*Centrocercus urophasianus*).

The other four sensitive species do not have potential habitat within the area of influence for this project, and the proposed alternatives would have no effects to these species. They are:

Peregrine falcon (*Falco peregrinus anatum*), upland sandpiper (*Bartramia longicauda*), tricolored blackbird (*Agelaius tricolor*), and pygmy rabbit (*Brachylagus idahoensis*).

More information is contained in the January 2006 Resource Report for Wildlife.

Northern Bald Eagle

The Maury Mountains reside in the High Cascades Bald Eagle Recovery Zone described in the Pacific Bald Eagle Recovery Plan. Bald eagle population levels currently exceed recovery goals for the Central Oregon area.

There are three known bald eagle nest sites located in the project area within two Bald Eagle Management Areas (BEMAs). Two nest sites are located adjacent to Antelope Reservoir. One nest is the primary nest and one appears to be an alternate nest site. One nest is located within the Antelope Reservoir recreation area. No grazing occurs within the recreation area. The alternate nest site is located on the south side of Antelope Reservoir within the Rickman Pasture of the Double Cabin Allotment. The second BEMA is located at Miller Lake. The Miller Lake nest is located at the boundary of the Drake Pasture of the Shotgun Allotment and private land. The Miller Lake pair has not successfully nested for the last 2 years.

Four bald eagle winter roost sites have been identified within the project area. Two roost sites are identified in the Forest Plan and two additional winter roosts were identified within the project area because of the low numbers of suitable roost trees that exist in proximity to the Crooked River which is the primary foraging area for wintering bald eagles. The roost sites are located at the National Forest boundary on Pine, Shotgun, Wildcat, and Maury Creeks. The Pine Creek roost is located within the West Pine Pasture of the Shotgun Allotment. The Shotgun and Wildcat roost sites are located within the Drake Pasture. The Maury Creek roost site is located within the Maury Pasture of the East Maury Allotment. The Shotgun roost is primarily located on private land although a small portion is located on National Forest System lands. Winter roost sites have not been occupied by bald eagles. Bald eagles were seen flying in the direction of the Pine Creek roost in a 1987 survey, although the specific roost location has not been identified.

Bald eagles nesting in the Maury Mountains primarily forage on fish at adjacent lakes and reservoirs. The Crooked River also provides key foraging habitat for eagles nesting in the Maury Mountains. Several adjacent ranches provide high concentration forage areas where eagles utilize calving afterbirth and calf mortality and high-density small mammal populations associated with cultivated fields. Incidental foraging likely occurs within the forested habitat of the Maury Mountains where eagles take advantage of carrion and small mammals. The Maury Watershed Analysis identified that reproductive habitat was below the historic range of variability. The reason for this is that large diameter (> 21" dbh) ponderosa pine and Douglas-fir trees are deficient. These types of trees are preferred by eagles for roosting, nesting, and perching.

There are four fence lines that are located within 1/2 mile of the three bald eagle nest sites. One fence is located on the north side of Antelope Reservoir and is associated with the Faught Pasture

of the Double Cabin Allotment. Another fence is located within 1/2 mile of the bald eagle nest located on the south side of Antelope Reservoir. This fence is associated with the Rickman Pasture of the Double Cabin Allotment.

Forest boundary fences are located within 1/4 mile of the Miller Lake nest site and also within 1/4 mile of the bald eagle nest located on the south side of Antelope Reservoir. Maintenance activities associated with forest boundary fences are the responsibility of the adjacent landowner. Additional forest boundary fences are associated with the four winter roost sites. The majority of fence maintenance typically occurs during the spring or early summer which is typically outside of the winter roost use period November 1 to April 30. Since there is no known use of the winter roost sites and the majority of fence maintenance activities occur outside the winter use period there are no effects anticipated to winter roost sites.

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

Livestock grazing reduces vegetation which will also reduce potential food and cover for species that bald eagles may prey upon. The effects analysis focused on potential disturbance to nest sites by activities associated with grazing and effects to mammals a potential prey species.

Alternative 1

Direct and Indirect Effects

After 2 years, livestock grazing would no longer occur under this alternative, so the only reduction in grasses or shrubs would occur primarily from deer and elk. An improvement in the quality of habitat for small mammals and deer and elk is expected as a result of a reduced use of grasses and shrub species. There would be an increase in available cover for hiding, foraging, and denning. Increased cover would also make it more difficult to locate prey species. Fence maintenance would no longer be required and there would no longer be the potential for disturbance to nesting bald eagles. Alternative 1 would have no impact to northern bald eagles.

Alternative 2

Direct and Indirect Effects

Required fence maintenance activities would occur within 1/4 mile of two bald eagle nests at Antelope Reservoir. Maintenance activities associated with these fences would typically occur during the nesting season. However, to reduce the potential to disturb nesting bald eagles fence maintenance within 1/2 mile line of sight or 1/4 mile non-line of sight will be restricted to the dates September 1 through December 31. This seasonal restriction may be waived if monitoring determines a particular nest is not active or no young are present.

Alternative 2 is expected to result in increases in riparian vegetation because of the increases in the growth and densities of shrub species and desirable grass species when compared to Alternatives 3 and 4. Increases in riparian vegetation are expected as a result of improving the distribution of cattle by relocating water troughs away from riparian areas, providing upland water locations that currently do not exist, requiring daily management in specific pastures, and implementing an early-season, rest-rotation grazing system in the majority of the allotments. Increases in riparian vegetation would improve cover and forage for a variety of potential prey species for bald eagles. Alternative 2 would result in resting pastures within the Sherwood, Double Cabin, and Klootchman Allotments each year which would increase forage and cover for potential prey species within these rested pastures. The utilization of upland vegetation is expected to show an increase from current utilization levels, although upland use is expected to be low to moderate and varied across any particular pasture. Personal observations and information from range examination records indicate that, in general, upland vegetation is currently under utilized and riparian vegetation is over utilized across all allotments. Providing a more equal distribution of use is expected to result in an overall improvement in vegetation conditions which would also improve habitat for potential prey species of the bald eagle. Vegetation that would provide cover or forage for potential prey species would be decreased under this alternative, although high use levels that could potentially affect populations of prey species are not expected. There is the potential for a small amount of disturbance to occur with nesting bald eagles as a result of activities associated with moving or locating livestock during the grazing season. These activities are typically short in duration and are not predictable from season to season and would result in a small amount of disturbance. Alternative 2 is consistent with the project design criteria (PDCs) contained in the Programmatic BA for bald eagle nesting and roosting areas because livestock grazing does not affect forest structure within the BEMAs. For these reasons, the determination for Alternative 2 is may affect but not likely to adversely affect.

Alternative 3

Direct and Indirect Effects

Required fence maintenance activities would occur within 1/4 mile of two bald eagle nests at Antelope Reservoir. Maintenance activities associated with these fences would typically occur during the nesting season. To reduce the potential to disturb nesting bald eagles, fence maintenance within 1/2 mile line of sight or 1/4 mile non-line of sight will be restricted to the dates September 1 through December 31. This seasonal restriction may be waived if monitoring determines a particular nest is not active or no young are present.

The existing vegetation conditions would be maintained under Alternative 3. All permits would be reissued with the same terms and conditions that currently exist. In general, vegetation in riparian areas is expected to be over utilized and vegetation in the uplands would be under utilized. Utilization standards have not been met in riparian areas in many of the pastures throughout the project area. As a result, high use levels often occurred in many riparian areas. Higher use levels have a higher potential for affecting populations of bald eagle prey species within the project area. The distribution of water would not change, with many water developments being located in or adjacent to riparian areas. Water distribution has a large effect

on the distribution of livestock. The season of use would occur later in the season on three of the five allotments and stocking rates would be higher on most allotments. Grazing later in the season when upland vegetation is cured would continue to put increased pressure on riparian vegetation. Small mammal populations (a prey species for bald eagles) and deer and elk (a potential carrion source) would benefit less from this alternative when compared to Alternatives 2 and 4. A small amount of potential disturbance to nesting bald eagles is expected from activities associated with the movement of cattle. However, there is no indication that this type of activity has influenced nesting success in the past. Alternative 3 is consistent with the project design criteria in the Programmatic BA for bald eagle nesting and roosting areas because cattle grazing does not affect forest structure within the BEMAs. For these reasons, the determination for Alternative 3 is may affect but not likely to adversely affect (NLAA).

Alternative 4

Direct and Indirect Effects

Required fence maintenance activities would occur within 1/4 mile of two bald eagle nests at Antelope Reservoir. Maintenance activities associated with these fences would typically occur during the nesting season. To reduce the potential to disturb nesting bald eagles, fence maintenance within 1/2 mile line of sight or 1/4 mile non-line of sight will be restricted to the dates September 1 through December 31. This seasonal restriction may be waived if monitoring determines a particular nest is not active or no young are present.

Alternative 4 is similar to Alternative 2 with a few exceptions. Under Alternative 4, the Drake Pasture of the Shotgun Allotment will be split into three pastures and will be operated under a rest-rotation grazing system. Two new fences would be constructed in the Drake Pasture. One fence would be located on the south side of Miller Lake within 1/4 of the existing bald eagle nest. Activities associated with the construction and maintenance would potentially disturb nesting eagles. Construction of the northern 1/2 mile of this fence in sections 23 and 26 would occur outside the nesting period (January 1 to August 31). Fence maintenance would also be restricted to the dates (September 1 to December 31). There is a small risk that bald eagles could become entangled in the new fence. Alternative 4 would potentially result in increased activities associated with moving cattle in close proximity to the nest site. The increased activities would result because of the new fence and the increased potential for cattle to concentrate at the lower end of the two new pastures. Under Alternative 4, the Klootchman Allotment would have a higher stocking rate following the completion of all improvements when compared to Alternative 2. Under Alternative 4, there is the potential for less vegetation being available for potential prey species of the bald eagle when compared to Alternative 2. Alternative 4 is consistent with the PDC for bald eagle nesting and roosting areas because cattle grazing does not affect forest structure within the BEMAs. For these reasons, the determination for Alternative 4 is may affect but not likely to adversely affect.

Cumulative Effects

Management activities and uses that have occurred in the past have influenced the availability and quality of habitat for the bald eagle. The construction of ponds and reservoirs have created

habitat for bald eagles. Removal of large trees, snags, and down wood through timber harvest has altered the availability of potential nest and roost sites. The West Maurys project includes thinning and prescribed burning within 1/2 mile of nest trees. These activities are expected to increase the longevity of the nest trees by reducing competition with smaller trees in the understory. The East Maurys project is expected to have similar activities with similar effects to bald eagle nest and roost trees. Livestock grazing would not add to the cumulative effects with regards to the availability and quality of nesting or roosting habitat.

Road construction and the development of recreation sites have increased the level of human activity throughout the project area, increasing the potential for disturbance to nest sites. In recent years, recreation use has increased in the Maury Mountains and dispersed recreation has increased at one location in close proximity to the Miller Lake nest site.

Maintenance activities associated with boundary fences are not controlled by the Forest Service and the effects of fence maintenance would not be mitigated. Forest boundary fences are within 1/4 mile of the Miller Lake bald eagle nest and within 1/4 mile of the bald eagle nest site on the south side of the Antelope Reservoir. Maintenance of these fences would likely occur during the nesting period. There have been no previous restrictions on these fences and there does not appear to be any effects related to nesting success.

Bufflehead

In Oregon, the bufflehead nests at high elevation forested lakes in the Central Cascades. Nests are found in both hardwood and conifer tree species (Marshall et al. 2003). No studies have been done in Oregon on water body characteristics (Marshall et al. 2003). Low breeding population in Oregon may be because of limited nesting habitat and high disturbance levels from recreation use at Cascades Lakes (Marshall et al. 2003). Bufflehead feed on animal matter, midge larvae, water boatmen, bulrush, and pondweed (Marshall et al. 2003). This species has been documented on the Ochoco National Forest with one sighting on the Lookout Mountain Ranger District in 2003 during the fall migration. There has also been one unconfirmed sighting of a pair at Peterson Creek Reservoir in May 2001. An additional sighting occurred on a reservoir adjacent to the forest in the fall of 2005. There are three reservoirs that could provide potential habitat within the project area. Suitability for nesting is marginal. Two reservoirs, Miller Lake and Double Cabin Pond are small and shallow and lack suitable snags for nesting. Antelope Reservoir has large fluctuations in water levels and is also deficient in suitable snags for nesting. Both Double Cabin Pond and Antelope Reservoir have high levels of recreation use. Miller Lake is primarily on private land. No grazing occurs on Antelope Reservoir except for the east end of the reservoir which is located on private land. The existing habitat is primarily used as stop-over sites during migration, or in the winter when they are free of ice. No nest sites have been located in the project area.

Direct and Indirect Effects of All Alternatives

There are no direct or indirect effects anticipated by implementing any of the alternatives. There would be no affect to any potential nesting habitat. Livestock grazing would not have an effect on the growth of trees that may become potential nesting habitat. There are no known nest sites

in the project area. The existing reservoirs may be used as stop-over sites during migration, or in the winter when they are free of ice. Cattle grazing would not occur during spring or fall migration. For these reasons, a determination of No Impact was reached for all alternatives.

Cumulative Effects

The development of reservoirs have created habitat for the bufflehead within the project area. Past harvest activities have reduced the availability of suitable nest trees. Developed and dispersed recreation has increased activity levels in the vicinity of the existing reservoirs. Livestock grazing would not alter any reservoir habitat and would not contribute to cumulative effects.

Western Sage Grouse

The western sage grouse inhabits areas dominated by big sagebrush. Seasonal habitats can be described as breeding (March-May), late brood rearing (June-October), and wintering (November-February). Breeding habitats are composed of leks, nesting habitat, and early brood rearing habitat. Leks or breeding display sites occur in open areas surrounded by sagebrush (Gill 1965). Preferred nesting habitat consists of 15-30 percent sagebrush canopy cover, with an understory of 15 percent grass, and 10 percent forb. Nesting cover provides concealment of the hen and the nest. Brood rearing habitat can have less of a sagebrush component with the preferred habitat composed of 15-25 percent sagebrush canopy cover, with an understory of 15 percent grasses, and 10 percent forb. Early brood rearing habitat is usually in close proximity to nest sites, although the distance from nest sites can vary according to moisture and the availability of forbs and insects. In June and July as sagebrush habitats dry up, sage grouse move to sites with more succulent vegetation (Connely and Markham 1983). Seasonal movements may exceed 75 kilometers (Connely et al. 1998). Sage grouse are dependent on large expanses of sagebrush for winter survival.

There have been no sightings of sage grouse in the project area, although several leks occur both south and east of the project area. The closest known lek occurs within 5 miles of the project area on private land. Information is currently unavailable on nesting locations and seasonal habitat use associated with leks in close proximity to the project area. Preliminary mapping of potential sage grouse habitat within the project area has occurred. Habitat was characterized by sagebrush plant associations as defined by Johnson and Clausnitzer (1991) within 6 miles of known lek sites. All mapped habitat was field checked for consistency. Potential habitat was identified within the Shotgun and East Maury Allotments. Following field verification, it was determined that all identified potential habitat would require some level of restoration, primarily juniper removal, in order to become suitable habitat. Juniper encroachment was ranked as the third largest disturbance of sagebrush habitats in Oregon within the greater sage-grouse conservation assessment and strategy for Oregon. The density of juniper, at which use by sage grouse decreases or ceases, has not been determined. In Central Oregon, sage grouse avoided western juniper communities for nesting and winter use (Hanf et al. 1994). Commons and others (1999) indicate that sage grouse avoid areas with juniper invasions and suffer higher predation rates if they occupy habitats near them.

The potential for nesting habitat is low because mountain big sagebrush is scattered and does not cover large areas. The Ned Pasture (East Maury Allotment) has the highest potential for providing nesting habitat within the project area. CVS plot data that was available indicated a range of cover values from 12-17 percent for mountain big sagebrush at one location within the Ned Pasture. Range trend data from another location within the Ned Pasture indicated a decline in the big sagebrush component from 10.5 percent in 1959 to 6 percent in 2003. This site also showed an increase in sandberg bluegrass and intermediate wheatgrass and a decrease in Idaho fescue and blue bunch wheatgrass. Records indicate that sagebrush was sprayed in this area after 1959 which likely is the reason for the decline in sagebrush. Additional sagebrush cover values obtained from CVS plot data at one location in the Cottonwood Pasture (East Maury Allotment) ranged from 7-25 percent. This location is fairly representative of the majority of potential habitat with a mixture of stiff sagebrush and low sagebrush. The majority of the habitat within the Pine and Cottonwood Pastures is dominated by low sagebrush and stiff sagebrush and has the potential for providing early brood rearing habitat. Most of the habitat is dried out by mid to late July and would likely provide limited late brood rearing habitat. Riparian areas that would also provide late brood rearing habitat are small and dominated by juniper and other conifer species and would likely not be used by sage grouse. Continued juniper expansion within potential habitat has the highest likelihood of reducing potential use by sage grouse. Management actions that maintain or improve sagebrush cover, and maintain or improve the native grass and forb component would increase the likelihood that sage grouse will use the area in the future. No sage grouse, tracks, or droppings have been located during a variety of field reviews that have occurred within the potential habitat over the last 15 years.

Direct and Indirect Effects of All Alternatives

The potential habitat within the project area is currently not suitable for sage grouse because of the distribution and densities of juniper. Field reconnaissance of potential habitat has determined that sage grouse currently do not use this area. For these reasons, the determination is No Impact for all alternatives.

Cumulative Effects

Historical livestock grazing, fire suppression, and the resulting expansion of juniper, and sagebrush spraying are the primary factors that have affected the quality of sage grouse habitat that currently exists. To a lesser degree fence construction, road building, and the introduction of invasive plant species, has the potential to affect the quality of the existing habitat. The East Maurys Fuels and Vegetation Management project is a reasonably foreseeable project that will occur in the project area. Juniper reduction is proposed as part of that project and would likely improve the suitability of identified potential sage grouse habitat. The amount of juniper reduction that will occur and the potential for benefiting sage grouse is currently not known. The West Maurys project area does not contain any potentially suitable habitat for sage grouse. There would be no contribution to the cumulative effects to sage-grouse habitat from past, present, and reasonably foreseeable future actions from any of the alternatives.

Gray Flycatcher

The gray flycatcher prefers relatively open juniper and pine woodlands with understories of sagebrush, bitterbrush, and mountain mahogany communities (Marshall et al. 2003). The gray flycatcher feeds exclusively on insects in flight, from the ground, or from plants (Sterling 1999). Such habitats are scattered throughout the project area and are in relatively good condition. There has been a steady increase in juniper across the project area and throughout the west. No sightings of this species have been recorded in the project area, but they are expected to occur there. The species appears relatively common in the west. The North American Breeding Bird Survey shows a survey wide upward trend for the years (1966-2004).

This species prefers small trees and shrubs for nesting within 6 feet of the ground. Cattle grazing could have a small but insignificant effect on nesting individuals because nesting occurs in shrubs and small trees relatively close to the ground.

Direct and Indirect Effects

Alternative 1 (No Grazing)

There would be no risk of nest disturbance. Bitterbrush may show some increase in growth and distribution in the short term with less browse pressure either directly from cattle or indirectly from the effects of cattle grazing on shrub utilization by deer and elk. Sagebrush species may show some increase in growth and distribution when compared to the action alternatives. In Nevada, Robertson (1971) noted increases in all vegetation in areas rested from livestock grazing. Anderson and Holt (1981) found after 25 years of no livestock grazing in southwest Idaho, sagebrush canopy increased by 154 percent. Alternative 1 would have no impact on gray flycatcher.

Alternatives 2, 3, and 4

Cattle typically do not utilize sagebrush species which is the most common understory shrub within the project area. Bitterbrush is also scattered throughout the project area but rarely occurs as a well developed shrub layer. Mountain mahogany is scattered throughout the project area and primarily occurs as tall shrubs that would be unaffected by cattle grazing. Juniper occurs throughout the project area with the highest concentrations at the lower elevations. There are locations within the project area where sagebrush appears to be declining, although this is likely a function of increased juniper densities rather than a function of over-grazing. The continued expansion of juniper and the increase in densities of Douglas-fir and ponderosa pine may pose the biggest threat to sagebrush and other shrub-dominated understories within the project area. The expansion of juniper into sagebrush habitats may have benefited the gray flycatcher in the short term, although in the long term a decrease in understory shrub species may have a negative effect on this species. Because this species often nests below 6 feet in shrubs or small trees there is a small potential for nest disturbance to occur when cattle are grazing in suitable habitat. This effect is expected to be minimal and is not expected to have a significant effect on nesting

success in the project area. The determination for all action alternatives is may impact individuals or habitat, but not likely to contribute to a trend toward federal listing.

Cumulative Effects

Fire suppression activities in the past have contributed to the expansion of juniper and the current distribution of sagebrush within the project area. Prescribed burning may have also altered the availability of nesting habitat for gray flycatchers in some communities, both through short-term loss of nesting structure and the long-term recruitment of shrubby understories. Past sagebrush spraying projects have been documented and have decreased sagebrush in some areas, although sagebrush has recovered on the majority of these sites. Juniper continues to expand which may actually be improving habitat for the gray flycatcher in the short term, although in the long term reductions in understory shrub species may limit available habitat. Juniper thinning has occurred on many acres, although these areas are small in size. Where juniper thinning has occurred not all juniper has been removed. Juniper thinning will occur as part of the West Maurys Project. The foreseeable East Maurys Project also includes proposal to thin junipers.

California Wolverine

In Oregon, the wolverine is typically found in open forests at higher elevations (Csuti et al. 1997). Critical components to wolverine habitat seem to be an absence of human activity, ample big game, and low road densities (Butts 1992). Wolverines are opportunistic foragers feeding on small to medium-sized rodents, hares, and carrion. Wolverines cover large areas in their scavenging lifestyle, with home ranges exceeding 100 square miles. In the last century, the distribution of this species has contracted considerably and they no longer occur throughout much of their historic range in the western United States. Habitat loss through timber harvest, increased roads in forests, and general sensitivity to human disturbance have been implicated in their decline (Banci 1994). Hornocker and Hash (1981) found that wolverine seasonal movements effectively separated them from human activity, and believed that wilderness or remote country with limited human activity was necessary for the maintenance of viable wolverine populations.

The Maury Mountains is within the historic range for wolverines. Unconfirmed wolverine sightings have been reported for the Maury Mountains. Sightings have also been documented on the Deschutes and Malheur National Forests and elsewhere on the Ochoco National Forest. Winter bait stations with video surveillance cameras and hair traps were installed in the project area and monitored for two seasons. No wolverine sightings or evidence were recorded at any of the bait stations (Prineville Wolverine Survey files 2000). Only a small amount of reproductive habitat exists in the Maury Mountains and is confined to isolated areas at high elevations on north slopes. Reproductive habitat is defined as large structure moist grand fir plant associations or boulder fields at high elevations. The project area does not have sufficient habitat to be used as a reproductive home range. Although unconfirmed past sightings indicate that wolverine may utilize the project area, it is believed individuals used the area for foraging within a portion of their home range or were dispersing individuals.

Direct and Indirect Effects

Alternative 1

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

Alternatives 2, 3, and 4

There would be no effect to potential denning habitat within the project area by implementing any of the action alternatives. Cattle grazing would not affect boulder fields or large wood accumulations within the project area. There is the potential to affect vegetation within the project area which could affect prey habitat and the abundance of prey for foraging wolverines. All action alternatives would result in a slight increase in human disturbance associated with fence maintenance and the movement of cattle. There is a low potential for wolverines occupying habitat within the project area because of the relatively high road densities that exist and the levels of recreation use that occurs in the project area. The increase in activity associated with the action alternatives would not have a significant effect on the presence or absence of wolverines within the project area because wolverines would be able to easily avoid these types of activities. For these reasons, the determination is may impact individuals or habitat, but not likely to contribute to a trend toward federal listing for all action alternatives.

Cumulative Effects

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

Neotropical Migratory Birds

Affected Environment

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

The PIF Bird Conservation Plan was used to address the requirements contained in Executive Order 13186, January 10, 2001, Responsibilities of Federal Agencies to Protect Migratory Birds. Under Section 3(E)(6), through NEPA, the Executive Order requires that agencies evaluate the effects of proposed actions on migratory birds. The PIF plan includes guidelines for priority habitats of neotropical migratory birds by subprovince. The conservation plan does not address all landbird species, but instead uses numerous “focal species” as indicators to describe the conservation objectives. Priority habitats and focal species from this conservation plan were used to analyze the effects of this project on different priority habitats and the bird species that use them. The Ochoco National Forest is within the Blue Mountains Subprovince. Table 9 identifies the priority habitats and focal species listed for the Blue Mountains Subprovince.

The conservation plan identifies four priority habitat types: (1) Dry Forest (primarily ponderosa pine), (2) Mesic Mixed Conifer (primarily late-successional), (3) Riparian Woodland and Shrub, and (4) Unique habitats including subalpine forest, montane meadows (wet and dry), steppe shrublands, aspen, and alpine habitats. There are no alpine or subalpine habitats within the project area.

Table 9. Priority Habitats and Focal Species in the Blue Mountains Subprovince.

Priority Habitats	Focal Species	Habitat Attribute
Dry Forest	Lewis' woodpecker	Patches of burned forest
Dry Forest	White-headed woodpecker	Large patches of old forest, large trees, and snags
Dry Forest	Flammulated owl	Old forest, low canopy closure, grassy openings, and dense thickets
Dry Forest	Chipping sparrow	Open forest with small patches of seedling/saplings or shrubs
Mesic Mixed Conifer	Varied thrush	Structurally diverse; multilayered
Mesic Mixed Conifer	Olive-sided flycatcher	Edges and openings created by wildfire

Priority Habitats	Focal Species	Habitat Attribute
Mesic Mixed Conifer	MacGillivray's warbler	Dense shrub layer, openings, understory, or regenerating forests.
Mesic Mixed Conifer	Vaux's swift	Large snags and late-successional forest
Riparian Woodland	Veery	Dense shrub understory
Riparian Woodland	Red-eyed vireo	Deciduous forest high canopy closure
Riparian Woodland	Lewis' woodpecker	Large snags in riparian woodland
Riparian Shrub	Willow flycatcher	Dense shrub patches
Unique Habitats - Subalpine Forest	Hermit thrush	Dense coniferous forests
Unique Habitats - Montane Meadows	Upland sandpiper	Grasslands, prairie, meadows
Unique Habitats - Steppe Shrublands	Vesper sparrow	Bunchgrass/sagebrush few trees
Unique Habitats - Aspen	Red-naped sapsucker	Aspen
Unique Habitats - Alpine	Gray-crowned rosy finch	Alpine habitats

Dry Forest

The Lewis' and white-headed woodpeckers were previously addressed in the management indicator species section for primary cavity excavators and will not be addressed further here. The flammulated owl nests in cavities in older ponderosa pine with an open understory. Patches of saplings or open areas of shrubs are important for roosting. Cattle grazing would not affect nesting habitat for the flammulated owl. Cattle grazing may affect shrub development which could affect potential roost sites. The chipping sparrow prefers open coniferous forests or stands of trees interspersed with grassy openings and patches of shrubs and or seedling/sapling trees, especially pines (Marshall et al. 2003). The chipping sparrow is also associated with juniper woodlands and mountain-mahogany stands. Chipping sparrows forage on the ground and in trees. Nesting occurs between April 15 and July 15 on the ground or in shrub species such as currant but not sagebrush. The chipping sparrow has been observed on the east end of the project area associated with mountain mahogany stands. The dry forest ponderosa pine plant association represents approximately 9,000 acres of habitat scattered throughout the majority of the allotments. Most of the habitat would be considered fairly high density stands although open stand conditions are present. The juniper woodland plant association is represented by approximately 10,000 acres and mountain mahogany is scattered throughout the project area. Habitat is well represented for the chipping sparrow. The conservation plan identifies potential effects of grazing in the dry forest habitat types.

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

Mesic Mixed Conifer

The desirable habitat condition in mesic mixed conifer (late-successional) forest is a multi-layered old forest with a diversity of structural elements (e.g., snags, dense shrub patches, high canopy closure in patches across the landscape). Landbird conservation emphasizes maintaining healthy ecosystems through representative focal species for five habitat conditions.

The varied thrush is most common in dense older coniferous forests (Csuti et al. 1997). This species is locally common in wet sites throughout the Blue Mountains above 4,265 feet (Marshall et al. 2003). This species is believed to be uncommon within the project area because of the lack of suitable old growth Douglas-fir forest habitat. The conservation plan focus is on maintaining structurally diverse multilayered conditions. Cattle grazing would not effect structural development. The varied thrush does rely on a well developed organic layer for foraging on a variety of invertebrates. Reduction in understory vegetation can effect the development of the organic layer.

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

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

Vaux's swift is associated with late seral coniferous forests (Marshall et al. 2003). It uses hollow trees for nesting. Large diameter grand fir that is susceptible to heart rot is likely important to this species. Foraging occurs over the canopy and in openings on insects and can also skim aquatic insects over water. Habitat is limited in the project area because of the lack of late seral grand fir stands. The conservation plan identifies the loss of large snags as the conservation issue for this habitat type. Cattle grazing does not have an effect on snags but heavy grazing may have an effect on insect productivity.

In summary, the conservation plan for mesic mixed conifer habitat focuses on maintaining a variety of seral and structural conditions within the mixed conifer forest types. Generally, cattle grazing does not affect the development of various structural conditions within conifer species. However, the conservation plan indicates that grazing can effect the recruitment of conifer seedlings. Within the project area conifer seedling recruitment is not a problem. In fact, high

stem densities has been identified as limiting the production of understory vegetation such as shrubs, forbs, and grasses throughout the project area. The conservation plan identifies three other issues in relation to cattle grazing. They are (1) the loss of riparian habitat that is important to species like MacGillivray's warbler that depends on dense riparian vegetation, (2) the loss of understory vegetation resulting from intensive grazing, and (3) the potential for a reduction in insect productivity. The effects analysis focused on the potential for reducing insect productivity and the potential for nest disturbance for those species that nest on the ground or in low shrubs.

Riparian Woodlands

The Lewis' woodpecker was previously addressed in the management indicator species section for primary cavity excavators and will not be addressed further here. Riparian woodland habitat represented by deciduous forests with high canopy closure is not well represented within the project area. Habitat that would be considered suitable for the red-eyed vireo and veery is very scattered and does not occupy large areas. Riparian woodland habitat including aspen is represented by scattered aspen clones that are declining in health and distribution. Cottonwoods likely never occurred as a significant habitat component and are currently only represented by three remaining trees. Alder is scattered as isolated individuals and a few clumps and would not be considered a significant habitat component. The project area does not contain dense shrub patches, a key habitat component for species represented by the willow flycatcher. Willow occurs primarily as scattered individuals and rarely occurs in large patches. Deciduous riparian forest with a dense shrub understory characteristic of habitat for species like the veery is also scattered. Riparian woodland and riparian shrub habitat and effects were described under the management indicator section for primary cavity excavators.

Unique habitats

Landbird conservation emphasizes maintaining healthy ecosystems through representative focal species for five habitat conditions. There are no alpine or subalpine forests within the project area. Aspen habitats are described under the management indicator section under primary cavity excavators. Effects to the red-naped sapsucker were described in the management indicator species sections and will not be discussed further here.

The focal species for montane meadows is the upland sandpiper. This species prefers large prairie-grassland habitats. The project area does not contain large prairie or grasslands habitat. Small upland wet and dry meadows occur throughout the project area. These relatively small meadows are important to a variety of bird species including the savannah sparrow and common snipe that are ground nesters in this habitat type. Meadow systems and riparian habitats within the project area receive the highest use by cattle of any habitat type. Early season grazing during the nesting season may result in nest trampling or the reduction of cover surrounding the nest making them more vulnerable to predation.

The focal species for steppe shrublands is the vesper sparrow. The vesper sparrow occurs in a wide variety of open habitat types including grassland, sagebrush, montane meadows, and juniper steppe. The vesper sparrow is most abundant in habitats characterized by bunchgrasses and short, stiff sage. The vesper sparrow constructs nest on the ground and forages on the

ground. Habitat for the vesper sparrow is scattered throughout the project area and generally is in good condition. The vesper sparrow utilize big sagebrush habitats that are marginally suited for the Brewer's sparrow as well as low sagebrush and stiff sagebrush communities that are present throughout the project area. The majority of the open shrub land communities within the project area are composed of low sage/bunchgrass and to a lesser amount stiff sage/bunchgrass communities. Fire suppression activities and the resulting expansion of juniper and other conifer species have resulted in a decline of open shrublands in the project area.

Landbird conservation issues with respect to vesper sparrow and cattle grazing indicate that overgrazing could reduce habitat by altering species composition, reducing residual vegetation, inhibiting vegetation recruitment, and increasing encroachment of noxious weeds. Livestock grazing may not adversely impact vegetation if it is relatively light pressure, rotated between pastures, and deferred on an annual basis.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

This alternative would not result in direct or indirect effects to land birds and neotropical migrants when grazing is halted after 2 years. Habitat would not be altered by livestock grazing. There would be no potential for nest trampling from cattle. Riparian woodland habitats including aspen and alder would be expected to increase. The distribution and densities of riparian shrubs including willow, dogwood, cherry, and birch would also be expected to increase. Recovery of hardwood communities is expected to be slow because many of the remnant populations are scattered and re-colonization over long segments of streams would be slow. There is also expected to be continued browsing by both deer and elk in the short term; although as recovery continues use by deer and elk will be spread over much larger areas and is expected to be less evident. Complete recovery to historical levels is not expected because of the amount of channel degradation that has occurred throughout the project area. Hardwood habitats are expected to expand although large continuous hardwood stands are not expected because of channel conditions as well as other factors like conifer overstory that may limit the potential for expansion. Recovery of hardwood communities expected in the next 50 years is not expected to result in significant population changes for species that depend on them.

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

Cumulative Effects

A variety of activities have affected the habitats described above over time. Livestock grazing, fire suppression, timber harvest and thinning, beaver removal, and road construction have all

affected these habitats. These activities have altered riparian and upland habitat that has affected the species identified.

Livestock grazing has modified vegetation communities in the riparian and upland areas. In riparian areas, historical livestock grazing has contributed to the decline of hardwood communities, changes in meadow habitat through the downcutting of stream channels, lowering of water tables, and changes in species composition. This has resulted in a decrease in distribution and density of riparian hardwood and riparian shrub communities as well as species that are associated with them. Livestock grazing has also affected upland areas as well. Species composition, particularly in regards to bunchgrass and some forb communities, were altered in part by livestock grazing. Records indicate that sagebrush has been sprayed at certain locations. The extent of this activity is not known. Historical grazing contributed to the expansion of juniper that has occurred in sagebrush habitats. This may have benefited some species like the gray flycatcher and vesper sparrow, although species like sage grouse have been negatively affected. Records also indicate that seeding was also associated with the spraying projects which in some areas have changed the native plant communities.

Past vegetation management activities have resulted in major changes to forest structure and associated habitats. Much of the timber harvest prior to the 1990's focused on the removal of large diameter fir and pine. The result was a reduction of multistoried large structure mixed conifer habitats as well as a reduction of open large diameter ponderosa pine habitats. Species that prefer large structure were affected by this activity and species that prefer fragmented habitats and dense forest structure likely benefited. The ground disturbance associated with harvest activities also reduced understory vegetation which was further reduced by grazing activities. Since the early 1990's, the Ochoco National Forest's emphasis has shifted from removal of large pine to re-establishment of large pine and larch, and other single-strata LOS stands. Historically, large, single-storied, ponderosa pine dominated stands are believed to be the predominant conditions within the majority of the project area. Species that prefer open, large single storied stands of large trees will see an increase in habitat in the future. Species that prefer dense forest canopy will experience a decrease in habitat in the future, although this type of habitat will continue to exist across the landscape.

Grazing practices have changed over the years and stocking rates have decreased to adhere to the Forest Plan standards and guidelines. Grazing management in the Maury Mountains has gone from season-long grazing to deferred grazing, reducing the impacts to both riparian vegetation and upland vegetation.

Fire suppression and the resulting changes in forest structure and species composition have affected landbird habitat as well. Combined with timber harvest, and interactions with historical livestock grazing, fire suppression has, in general, allowed the development of denser stands with compositions leaning towards shade-tolerant, fire-intolerant tree species. For landbird species that select for those habitats, habitat quality and quantity increased. The habitat quality and distribution has declined for species that select more open, early-seral mature habitats. Fire can stimulate growth of many species including aspen, willow, alder, and many upland shrubs. The lack of fire and the resulting increases in conifer densities have contributed to the current lack of aspen and other hardwood species. The lack of fire has also contributed to the expansion

of juniper into sagebrush habitats and increased conifer densities in many upland and riparian areas. The amount of conifer canopy that is present in many riparian areas and the lack of fire may have affected the ability of riparian areas to support hardwood and riparian shrub communities.

A variety of riparian restoration projects have been implemented in the past to improve riparian conditions. Riparian planting has occurred along many of the perennial streams in the project area. Headcuts have been stabilized on many streams including Double Cabin, Klootchman, Little Deer, Newsome, and Gibson Creeks. Headcut projects have stopped the further degradation of stream channels and riparian areas, helping to maintain the limited habitat that exists. Check dams have been installed on Maury, Klootchman, Florida, Cow, and Newsome Creeks. Aspen fencing and thinning has occurred within about 30 aspen stands in the project area. The aspen fences have ensured successful regeneration of aspen and the future aspen habitats in those areas. All of these projects have improved or reduced the previous degradation of riparian habitats. The West Maurys Fuels and Vegetation Management Project includes commercial harvest on 6,996 acres, noncommercial thinning on 11,203 acres, and burning on 17,295 acres. These activities would reduce the canopy cover and improve understory vegetation where the potential exists. Reducing conifer densities would speed the rate of the development of large trees which are currently deficient. Habitat would improve for species that prefer open conditions.

A similar vegetation management project is reasonably foreseeable. The East Maurys Fuels and Vegetation Management Project proposal includes 6,850 acres of commercial harvest, 11,130 acres of noncommercial thinning, and 11,140 acres of fuel reductions. Both the East and West Maurys projects include juniper thinning which will improve sagebrush habitats in the project area. Currently open sagebrush habitats are not well represented in the project area because of the expansion of juniper that has occurred. Both projects also include removing conifers within aspen stands. Conifer encroachment is one of the factors that has contributed to the decline of aspen. These restoration and vegetation projects will help to reduce some of the adverse cumulative effects from past activities.

Alternatives 2, 3, and 4

Direct and Indirect Effects

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

Dry Forest - The action alternatives would result in indirect effects to habitats utilized by the chipping sparrow. Early season grazing could decrease available forage both by decreasing insect productivity during the nesting season as well as reducing seed availability. Alternative 2 provides rested pastures from livestock grazing in the Double Cabin, Sherwood, and Klootchman

Allotments each grazing season. The East Maury Allotment would be rested for 10 years in Alternatives 2 and 4. There would be no effects to herbaceous vegetation and insect productivity in the rested pastures and there would be a benefit to the chipping sparrow and other species utilizing dry forest habitats that forage on seeds or insects. The potential for nest trampling to occur would decrease under Alternative 2 within the rested pastures. Alternative 2 is expected to increase use in the uplands when compared to Alternative 3 with the improved distribution of water and requiring daily management within the Shotgun, Double Cabin, and Sherwood Allotments. The increased upland use expected in Alternative 2 would result in a slightly higher level of effect to the forage base and cover for the chipping sparrow when compared to Alternative 3. Alternative 4 is similar to Alternative 2 although increased stocking rates are proposed for the Klootchman Allotment; increased stocking rates are assumed to result in slightly higher utilization levels. Therefore, Alternative 4 would result in a slightly lower forage base and cover for the chipping sparrow when compared to Alternative 2. Fences that are proposed in Alternatives 2 and 4 for the Klootchman Allotment and Alternative 4 for the Shotgun Allotment are also expected to increase use in the uplands which is expected to reduce insect productivity. Early season grazing in Alternatives 2 and 4 would also affect the distribution of cattle with higher levels of utilization expected in the dry forest types. Overall, Alternative 2 is expected to result in a lower level of effect when compared to Alternatives 3 and 4. Foraging habitat and cover is expected to improve in both Alternatives 2 and 4.

Mesic Mixed Conifer and Riparian Woodland/Shrub - The effects to habitat in the mesic mixed conifer habitat types is focused on riparian shrub communities within this habitat type. Livestock grazing under all three alternatives would result in small, indirect effects because of continued browsing of riparian shrubs from both livestock and deer and elk. Even though browsing of hardwood and shrubs would continue, habitats for species like MacGillivray's warbler, willow flycatcher, red-eyed vireo, and veery are expected to slowly improve under Alternatives 2 and 4 with a few exceptions. An earlier season of use, improved distribution of water, daily management for specific allotments, and the rest-rotation grazing schedule is expected to decrease use within riparian areas and distribute use more evenly in the uplands. Under Alternative 4, increases would be slower or static within the Klootchman Allotment because of the stocking rates. Habitat is not expected to improve over a large enough area to affect populations that utilize these habitats because the potential no longer exists for extensive riparian hardwood or riparian shrub communities to exist. Aspen, alder, dogwood, willow, and birch are expected to increase in distribution and density and species that utilize these habitats will benefit. Alternative 3 would continue current management. Riparian hardwood and shrub communities are expected to slowly improve in isolated locations. Although under Alternative 3 increases would be much slower and would not occur in many areas when compared to Alternatives 2 and 4.

Unique Habitats - The vesper sparrow is associated with a variety of sagebrush types characteristic within the project area. All action alternatives have the potential for nest disturbance or trampling to occur. Although, sagebrush habitats typically receive the lowest utilization of all habitat types because of the poor distribution of water. Alternatives 2 and 4 include off-site water developments as well as an earlier season of use. The new water developments within sagebrush habitats would increase utilization within the sagebrush communities when compared to Alternative 3. The water developments increase the potential

for trampling nests and forage consumption near shrublands because they are expected to attract cattle. Trampling and forage consumption would affect only a small amount of available habitat and would not be expected to affect populations of species that utilize these habitats. A small increase in the indirect effects to foraging habitat and cover is expected with Alternatives 2 and 4 because of the increased utilization that is expected in sagebrush habitats, although this effect is expected to be insignificant. A large portion of the sagebrush habitats occur in the East Maury Allotment. Under Alternatives 2 and 4 this allotment would be rested for 10 years which would benefit sagebrush associated species. There would be no direct or indirect effects during this time period. Sagebrush habitats are also scattered within other allotments and the effects are different. Alternative 3 would result in the least amount of effects to sagebrush habitats because there would be no new water developments in these habitats and low utilization levels would be expected. Alternative 3 generally has a later season of use. A later season of use would result in little livestock use within sagebrush habitats because vegetation typically dries out and is less palatable when dry.

Cumulative Effects

Past, present, and reasonably foreseeable future actions affecting dry forest, mesic mixed conifer, riparian, and unique habitats within the project area are described under the cumulative effects section for Alternative 1. All of those actions are pertinent here as well.

Dry Forest - Livestock grazing would not contribute to changes in species composition or structural changes in conifer species. Livestock grazing would continue to affect understory development and composition in the herbaceous plant component through trampling and browsing. This, in combination with past activities, would continue to reduce the quality of foraging habitat for some land birds, and the quality of nesting habitat for others. Alternative 2 would contribute the least to reductions in understory vegetation because it has the lowest stocking rates, followed by Alternative 4, then Alternative 3.

Mesic Mixed Conifer and Riparian Woodland/Shrub - Livestock grazing would continue to suppress hardwood habitat development, and contribute to the cumulative effects under all alternatives. There would be no additional contributions to the cumulative effects related to the various structural stages present in conifer forests. Alternative 2 with the lowest stocking rates, rest-rotation grazing systems on specific allotments, earlier season of use, and improved distribution and location of water sources is expected to result in the least amount of use in riparian habitats which would reduce the level of the cumulative effects to hardwood associated habitats. Alternative 4 is expected to improve riparian habitats although the rate of improvement in the Klootchman Allotments is expected to be slower when compared to Alternative 2. Alternative 3 would continue the current trend with isolated locations of riparian habitats showing improvement. Under Alternative 3, the trend in riparian conditions is expected to remain static or downward. Restoration projects and the activities authorized in the West Maurys Project would help to improve these habitats, as would activities proposed in the East Maurys Project.

Unique Habitats - Alternatives 2 and 4 would not contribute to the cumulative effects within the East Maury Allotment for the next 10 years because this allotment would be rested. The East

Maury Allotment has the largest most contiguous sagebrush habitats within the project area. In the other four allotments, Alternatives 2 and 4 would result in more livestock use of the uplands and steppe shrub land habitats because of improved livestock distribution.

Rocky Mountain Elk and Mule Deer

Affected Environment

The oldest, written record of elk populations indicate that elk were absent from the Ochoco National Forest in 1936 (Bailey 1936). Anecdotal information indicates elk did inhabit the Ochoco National Forest in the mid to late 1800's but were probably extirpated by over-hunting and habitat losses due to heavy livestock grazing. Elk are now found throughout the Ochoco National Forest.

The project area lies within the Oregon Department of Fish and Wildlife (ODFW) Maury Game Management Unit (GMU). The Maury GMU contains 60 percent public lands and 40 percent private lands. Of the public land, 14 percent is located on National Forest System lands within the project area. The state population management objective for the Maury GMU is 1,100 elk. The population estimates for 2001 for this unit was 1,300 elk, an increase from the 1994 estimated population of 1,000. However, the estimate for 2004 was 900. The ODFW population estimate for mule deer in 2004 was 4,000 deer. The estimated population in 1997 was 4,200 deer. The population management objective for the Maury GMU is 5,200 deer.

Elk and mule deer use the project area throughout most of the year. Deer are more abundant than elk, although both species have shown population declines in recent years. Seasonal movements are primarily influenced by snow depth. During winters with below average snow fall amounts, both species can remain in the project area utilizing available forage at the lower elevations. During winters with normal to above normal snow accumulations, the majority of the animals move to lower elevation private or BLM managed lands. Calving and fawning occur throughout the project area although they primarily occur in proximity to riparian areas that provide high quality forage.

Within the project area, 40,022 acres is allocated to General Forest (MA-F22) in the Forest Plan. There are also 8,058 acres allocated to General Forest Winter Range, 3,731 acres allocated to Winter Range, and 3,058 acres allocated to the Hammer Creek Wildlife/Recreation Area. There is no difference in the way forage is allocated between cattle or deer and elk within the General Forest Winter Range, Winter Range, and the Hammer Creek Wildlife/Recreation Area. As a result of the similarities in the three allocations, acreages were combined for analysis purposes and are displayed in Table 10.

Table 10. Acres Allocated to General Forest Winter Range, Winter Range, and the Hammer Creek Wildlife/Recreation Area by Allotment and Pasture.

Allotment	Pasture	GFWR, WR, HC (acres)	Allotment	Pasture	GFWR, WR, HC (acres)
Double Cabin	Center	350	Klootchman	Friday	698
	East	820		Florida	78
	Faught	896		Hamer	458
	Parrish	462		Klootchman	9
	Rickman	591		Lower Klootchman	0
	West	141		Pre-emption	170
Total allocated acres		3,260	Total allocated acres		1,413
East Maury	Arrowwood	3	Sherwood	Gibson	757
	Cottonwood	1,723		Hammer	3,034
	East Pine	1,053		Sherwood	1,870
	Maury	256	Total allocated acres		5,661
	Ned	206	Shotgun	Drake	110
Total allocated acres		3,241		Pine	1,162
			Total allocated acres		1,272

Upland vegetation is currently under-utilized within the project area and riparian vegetation is over-utilized. Both elk and deer utilize the succulent vegetation associated with riparian areas during calving and fawning and throughout the year. The nutritious vegetation provided in riparian areas is important for calves and fawns, and lactating cows. Various studies from the Starkey Project area have demonstrated a variety of interactions between cattle, elk, and deer. Skovlin and others (1968) found that both elk and mule deer used pastures not grazed by cattle more than any of the pastures that were grazed by cattle. As stocking rates of cattle increased, deer and elk use declined. This appears to be more social avoidance rather than competition for resources, although competition for forage may occur in late summer (Coe et al. 2001). Additional studies at Starkey indicate that both deer and elk readily shift their dietary preference in response to previous grazing. When forage was abundant, cattle and deer diets were similar, as forage utilization increased deer preferred shrubs while cattle preferred grass (Coe et al. 2001).

Riparian shrub use was monitored on Klootchman Creek within the Klootchman Allotment during 1992 and 1994. The monitoring indicated that the majority of shrub browsing occurred in the fall after cattle were removed from the allotment. Personal observations on Klootchman Creek have indicated much lower levels of browsing on shrubs from both cattle and deer and elk in recent years. Klootchman Creek is one stream in the project area where riparian shrubs have increased.

The effects to elk and deer focused on the timing, season of use, and distribution of use. There are currently 70 miles of pasture fences the project area. This does not include boundary fences. Fences can affect the movements of both deer and elk. Animals can also become entangled in fences resulting in injury or death.

The Forest Plan contains standards and guidelines for managing habitats for both elk and deer. These standards and guidelines prescribe acceptable road densities, and cover quantity and quality. None of the alternatives would affect road densities or cover, and as a result these habitat components will not be discussed further. The Forest Plan also allocates forage for livestock. The specific use levels (utilization) allocated for livestock were designed to be consistent with the state population management objectives for big game in place at the time the Forest Plan was developed. Utilization measurements have been focused on riparian plant communities because riparian areas have typically received disproportionate use when compared to upland sites. Range inspection records and personal knowledge of the area indicate upland sites are under-utilized and riparian areas are over-utilized. Currently, elk and mule deer populations are below ODFW management objectives, although it is unlikely that forage availability within the project area is limiting population size. Harvesting of animals and predation are likely the primary factors limiting population size.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Alternative 1 would result in the removal of livestock from all the allotments. There would be no displacement of deer and elk by cattle through competition for forage or social avoidance. Alternative 1 would result in the highest potential for riparian improvements when compared to all other alternatives. There would be no competition for higher quality forage in riparian areas for lactating cows or young calves and fawns. All interior fences would be removed which would decrease the potential for injury or death resulting from entanglement. Metal troughs would be removed which may result in a slight decrease in available surface water. There would be areas within the project area that would be water limited which may have a small effect on the distribution of deer and elk although this is not expected to have a significant effect on water availability.

Alternative 2

Direct and Indirect Effects

Alternative 2 was designed to achieve a better distribution of livestock throughout all allotments and reduce livestock use in riparian areas.

Double Cabin Allotment - An earlier season of use would provide more palatable forage outside riparian areas for a longer period of time which would help distribute cattle use away from riparian areas. Earlier season of use would also allow for more re-growth to occur on riparian vegetation prior to the fall of the year. More regrowth increases the amount of available forage for both deer and elk in the fall and winter seasons. It may also reduce wildlife use on shrubs that has occurred in the past. Daily management in the Center and West Pastures would be implemented. Daily management as well as additional water developments would redistribute

cattle away from riparian areas. One pasture will be rested each year in the Double Cabin Allotment. Personal observations have indicated that resting pastures has resulted in improved growth of aspen and riparian shrubs on selected sites within the Double Cabin Allotment, as well as in the Sherwood and East Maury Allotments.

Poor distribution of cattle has been documented in the range inspection reports for the Double Cabin Allotment during multiple seasons. Daily management as well as additional water developments would redistribute cattle away from riparian areas. Less consumption is expected on riparian grass, sedge, and shrubs species. More succulent vegetation would be available for calves, fawns, and lactating females throughout the year.

The East Pasture of the Double Cabin Allotment would be eliminated. The East Pasture contains dense mountain mahogany patches which provides excellent escapement cover for both deer and elk.

East Maury Allotment - Resting this allotment would provide an area where there is no potential for competition or displacement to occur between livestock and deer and elk. The East Maury Allotment has currently been rested for 6 years and upland shrub production has increased. The Arrowwood Pasture has shown large increases in upland shrub production in the last 6 years. Observations indicate that big game appear to have proportionally increased use within the East Maury Allotment when compared to other allotments within the project area. No specific monitoring of shrub use has occurred although there is no indication that deer and elk use is excessive.

Klootchman Allotment - An early season of use would provide more palatable forage outside riparian areas which would help distribute cattle use away from riparian areas. Early season of use would allow for more re-growth to occur on riparian vegetation prior to the fall of the year. More re-growth would increase available forage for both deer and elk in the fall and winter seasons. It may reduce wildlife use on shrubs that has occurred in the past. One pasture will be rested each year in the Klootchman Allotment. Personal observations have indicated that resting pastures has resulted in improved growth of aspen and riparian shrubs on selected sites within the Double Cabin, Sherwood, and East Maury Allotments.

An estimated 9.9 miles of new fence would be constructed in the Klootchman Allotment. The new fences would better distribute cattle by creating smaller pastures. The new fences would alter big game movements within the Klootchman Allotment and would increased potential for entanglement to occur. To reduce this potential, all new fences would be constructed to wildlife friendly standards as described in Chapter 2.

Sherwood Allotment - An early season of use would provide more palatable forage outside riparian areas which would help distribute cattle use away from riparian areas. Resting a pasture each year would result in improved growth of aspen and riparian shrubs on selected sites within the Sherwood Allotment. Daily management as well as additional water developments would redistribute cattle away from riparian areas. Less use is expected on riparian grass, sedge, and shrubs species. More succulent vegetation would be available for calves, fawns, and lactating females throughout the year.

Shotgun Allotment - The Shotgun Allotment would be grazed as a single pasture with an earlier season of use than what currently exists. An earlier season of use would allow for more regrowth to occur on riparian vegetation prior to the fall of the year. More regrowth would result in increased forage for both deer and elk in the fall and winter seasons. More regrowth may also help to reduce wildlife consumption of shrubs that has occurred in the past.

Daily management and the development of additional water sources would also be implemented. Poor cattle distribution has been documented within the Shotgun Allotment. There have been locations within the Shotgun Allotment where aspen have successfully regenerated outside enclosures in recent years. Similar observations have not been made with riparian shrub species, although with an improved distribution of cattle and an earlier season of use that would be implemented, improved conditions are expected within riparian communities.

Alternative 2 is expected to result in the most improvement of the action alternatives in the density and distribution of riparian shrubs across the project area resulting in potential benefits to big game following fawning and calving. Alternative 2 would also result in more regrowth occurring following the grazing season when compared to the other action alternatives which would benefit big game during the fall and winter seasons. Additional regrowth may also reduce browsing on shrubs by wildlife that has occurred in the past. Alternative 2 is expected to decrease overall browsing by cattle and big game by decreasing the potential for competition or displacement to occur.

Alternative 3

Direct and Indirect Effects

Riparian conditions are expected to remain in a static or downward trend. Utilization standards currently have not been met within riparian areas at a variety of locations within various pastures and allotments (refer to Table 5). This would potentially have a negative effect on deer and elk by reducing available forage in riparian areas. Less succulent and nutritional forage would continue to be available during and following fawning and calving seasons.

The length of the grazing season would extend later in the season under Alternative 3 in the Double Cabin, East Maury, and Shotgun Allotments. There would be less regrowth available for deer and elk in the fall and winter seasons. Less regrowth and higher use levels within riparian areas may cause a change in vegetation preference for deer and elk later in the season resulting in higher use of riparian hardwood and shrub species.

Problems that currently exist with cattle distribution are expected to continue within the Double Cabin and Shotgun Allotments. The East Maury Allotment would continue to have limited water availability on Arrowwood Point. The Arrowwood Pasture would not function as a separate pasture due to the lack of water. Continued high use in riparian areas is expected on Maury, Rimrock, and Stewart Creeks.

No additional fences would be constructed in the Klootchman Allotment under Alternative 3 which would decrease the potential for additional fences affecting the movement patterns or causing injury or death to deer or elk.

The Sherwood Allotment would be managed under a 3-pasture deferred rotation grazing system. High use could be expected on Newsome, Hammer, and Gibson Creeks. The Sherwood Allotment has been rested for the last three years. Prior to this rest, utilization standards were not met on Hammer, Newsome, and Gibson Creeks. There are indications on Hammer Creek that riparian shrubs (wild cherry) have increased during this 3-year rest period.

Alternative 4

Direct and Indirect Effects

Double Cabin Allotment - An early on/off rest-rotation grazing system would be implemented. The East Pasture would be eliminated. Daily management would be required in the Center and West Pastures. Daily management, new water developments, and relocation of existing water developments would all improve cattle distribution. An earlier season of use would provide more palatable forage outside riparian areas for a longer period of time which would help distribute cattle use away from riparian areas. Earlier season of use would also allow for more re-growth to occur on riparian vegetation prior to the fall of the year. More regrowth increases available forage for both deer and elk in the fall and winter seasons. Less consumption is expected on riparian grass, sedge, and shrubs species. More succulent vegetation would be available for calves, fawns, and lactating females throughout the year. The amount of shrubs that are consumed by wildlife is likely to be reduced.

Daily management as well as additional water developments would redistribute cattle away from riparian areas. One pasture will be rested each year in the Double Cabin Allotment. Personal observations have indicated that resting pastures has resulted in improved growth of aspen and riparian shrubs on selected sites within the Double Cabin Allotment.

Under Alternative 4, the herd would not be split. As a result, the Parrish Creek, Rickman, and Faight Pastures would be used later in the season 2 out of every 4 years. Because water availability is limited in these pastures later in the season, livestock would seek the cooler temperatures and more succulent vegetation in riparian areas. Riparian areas in these three pastures may continue to show higher use 2 out of every 4 years. It is likely that triggers for pasture moves would be met with the result that the grazing season would be reduced. Riparian vegetation is expected to improve at a slower rate than Alternative 2.

East Maury Allotment - The direct and indirect effects for Alternative 4 would be the same as those described for Alternative 2.

Klootchman Allotment - This alternative also include construction of an estimated 9.8 miles of new fence. Fences increase the risk of injury or entanglement to deer and elk. Stocking rates are higher in Alternative 4 when compared to Alternative 2; however, stocking rates would increase only when new structural improvements are constructed. The increased stocking rates would

likely result in higher riparian use when compared to Alternative 2. The Klootchman Allotment would have a longer season of use. As a result there would be the potential for less regrowth and riparian vegetation being available in the fall and winter for deer and elk which may lead to a change in preference and higher use occurring on riparian hardwood and shrub species.

Sherwood Allotment - The direct and indirect effects for Alternative 4 would be the same as those described for Alternative 2.

Shotgun Allotment - The Shotgun Allotment would be split into three pastures with a rest-rotation grazing system. The available acres would be decreased by approximately 1/3 with the stocking rate remaining the same as Alternative 2. Cattle distribution is expected to increase with additional water developments and pasture fences. An additional 7 miles of fence would be constructed. These fences would alter movement patterns of deer and elk as well as increasing the potential for injury or entanglement. Riparian use would only decrease slightly because of concentrating cattle on fewer acres, while resting one pasture each year. The higher the level of cattle use in riparian areas, the lower the amount of riparian vegetation available to deer and elk. Cattle are expected to consume more riparian vegetation under this alternative when compared to Alternative 2, but less when compared to Alternative 3.

Cumulative Effects for All Alternatives

A variety of factors can effect deer and elk populations including the harvesting of animals, climatic changes, quality of winter range, and predation. Predators have increased in recent years, which has likely reduced deer and elk populations. The likely biggest effect on elk and deer populations is the legal and illegal harvesting of animals and deaths from vehicles. The addition of new fences associated with Alternatives 2 and 4 have the potential for an increased risk of injury or death to animals. Incidental deaths from entanglement are unlikely to have a measurable effect on the current population. Current populations within the Maury GMU are slightly below management objectives for deer and elk. The ODFW are currently reviewing management objectives for deer and elk and are proposing to raise the management objective for elk to 1,400 animals. It is unlikely that forage availability within the project area is limiting population size. Although, an increased elk population combined with cattle grazing may affect the rate of improvement that could be expected in hardwoods and shrubs within the project area in the future. Habitat use within the project has been affected by road densities, increased disturbance from recreation, including increased OHV use, hunting pressure throughout the year, and the presence of cattle. The West and East Maurys Fuels and Vegetation Management Projects will have an effect on vegetation within the project area in the short term. Activities associated with commercial harvest would decrease vegetation in the short term as a result of ground disturbance, although various thinning projects would open up the over story and result in and increased grass, forb, and shrub component in the mid term (10-50 years) until the tree canopy again closes over. Prescribed fire activities associated with the East and West Maurys Projects would improve forage conditions for both deer and elk by increasing the palatability of grass species and increasing the forb component.

Management guidelines specific to General Forest Winter Range, Winter Range, and the Hammer Creek Wildlife and Recreation area is to retain fall green-up after the regularly

scheduled grazing season for big game. Grazing extensions would not be permitted in these areas. This would affect all pastures within the project area except for Klootchman, Lower Klootchman, and Arrowwood Pastures.

Threatened, Endangered, and Sensitive Plant Species

Affected Environment

The most common upland plant associations in the project area include ponderosa pine (*Pinus ponderosa*)/Idaho fescue (*Festuca idahoensis*), Douglas-fir (*Pseudotsuga menziesii*)/pinegrass (*Calamagrostis rubescens*), and grand fir (*Abies grandis*)/pinegrass, with upland non-forest communities including western juniper (*Juniperus occidentalis*)/rigid sage (*Artemisia rigida*). Mountain mahogany (*Cercocarpus ledifolius*) occurs primarily on dry ridges. Riparian vegetation includes a variety of sedges (*Carex* spp.), rushes (*Juncus* spp.), along with native and introduced grasses such as hairgrass (*Deschampsia* spp.) and redtop (*Agrostis alba* var. *stolonifera*). Riparian shrubs most commonly include willow (*Salix* spp.), red-osier dogwood (*Cornus stolonifera*), chokecherry (*Prunus virginiana*), and alder (*Alnus incana*) (Franklin and Dyrness 1988, Johnson and Clausnitzer 1991, and USDA Forest Service 2000).

The current condition of vegetation is the result of natural processes and influences from human activities and associated changes within the last 150 years. Human influences have altered the hydrology as a result of road construction, logging, livestock grazing, loss of beaver, fire exclusion, and other activities that eroded stream channels, reduced extent of meadows, reduced the extent of riparian habitats, and lowered water tables on sites formerly dominated by willow, alder, and other deciduous vegetation (USDA Forest Service 2000). Human influences have also increased the density of fire-intolerant conifers (such as fir) and reduced the density of understory vegetation (grasses and shrubs) by excluding fire and grazing livestock (Miller and Rose 1999, USDA Forest Service 1999, USDA Forest Service 2000, Arno 2000, and Agee 1993). On many sites, range monitoring indicates forage is decreasing due to increased shading by conifers (Hall 2004). Species composition has also been altered by the introduction of non-native plants, including both introduced perennial grasses and noxious weeds (USDA Forest Service 2000).

The project area does not contain any plant species federally listed as threatened or endangered. Critical habitat is not present (50 CFR 17 Subpart B). Therefore, there would no effects to proposed, endangered, or threatened plant species or critical habitat.

There are 28 sensitive plant species documented or suspected to occur on the Ochoco National Forest and the Crooked River National Grassland (USDA Forest Service 2004). Of these, 14 have been documented in or near the project area, or the project area contains potential habitat that has not been surveyed. Table 11 includes a listing of the 14 sensitive plants species with potential habitat in the project area. Potential habitat for sensitive plant species was identified using aerial photographs, vegetation maps, as well as the District Botanist's personal knowledge of the project area. (Additional information is contained in the May 10, 2006, Resource Report for Botany, which includes a Biological Evaluation for sensitive plants.)

Table 11. Sensitive Plants with Potential Habitat in the Project Area.

Species	Habitat	Probability of Occurrence
<i>Achnatherum hendersonii</i> Henderson's needlegrass	Sagebrush scablands	moderate
<i>Achnatherum wallowaensis</i> Wallowa needlegrass	Sagebrush scablands	moderate
<i>Botrychium ascendens</i> ascending moonwort	Wet meadows, springs, and seeps	moderate
<i>Botrychium crenulatum</i> crenulate moonwort	Wet meadows, springs, and seeps	moderate
<i>Botrychium minganense</i> Mingan's moonwort	Wet meadows, springs, and seeps	moderate
<i>Botrychium montanum</i> mountain moonwort	Wet meadows, springs, and seeps	moderate
<i>Botrychium paradoxum</i> twin-spike moonwort	Wet meadows, springs, and seeps	moderate
<i>Botrychium pinnatum</i> pinnate moonwort	Wet meadows, springs, and seeps	moderate
<i>Calochortus longebarbatus</i> var. <i>peckii</i> Peck's mariposa lily	Vernally moist meadows, and streambanks	documented
<i>Carex backii</i> Back's sedge	Wet meadows, riparian, and moist conifer forest	low
<i>Carex hystericina</i> porcupine sedge	Riparian	low
<i>Carex interior</i> interior sedge	Wet meadows, springs, seeps, and streams	documented
<i>Dermatocarpon luridum</i> silverskin lichen	Rocks inundated at least most of the year	low
<i>Scouleria marginata</i> marginated streamside moss	Emergent/seasonally submerged rocks	low

Of the 28 sensitive plant species that are documented or suspected to occur on the Ochoco National Forest, there are 14 sensitive plant species that do not have potential habitat in the project area. (These 14 species are listed in the March 1, 2006 Resource Report for Botany.)

The first sensitive plant surveys in the Maury Mountains were conducted in the early 1990's. Most of these surveys were completed using an intuitive control survey method and in areas with highest potential for Peck's mariposa lily and *Oryzopsis hendersonii*. *O. hendersonii* has since been split taxonomically into the two sensitive needlegrass species (Maze and Robson 1996). In 2003, additional intuitive control surveys were completed on a variety of habitats in the project area, with additional emphasis on potential habitat for interior sedge and Peck's mariposa lily. These surveys documented previously unreported populations of Peck's mariposa lily and interior sedge. Limited-focus surveys for Peck's mariposa lily were completed in 2005. Survey records are on file at the Lookout Mountain Ranger District Office in Prineville, Oregon. Plant surveys did not target all sensitive plant habitats, because these habitats are normally avoided

during ground-disturbing activities, or do not appear to be adversely affected from ongoing activities, such as livestock grazing.

The 14 sensitive plant species known to occur or that have potential habitat within the project area are grouped where they occupy similar habitats. Effects are determined for each of the three habitat groups. The groups and species within them are:

Riparian Species

ascending moonwort
crenulate moonwort
Mingan's moonwort
mountain moonwort
twin-spike moonwort
pinnate moonwort
Peck's mariposa lily
porcupine sedge
interior sedge
silverskin lichen
margined streamside moss

Moist Forest Species

Back's sedge

Scabland Species

Henderson's needlegrass
Wallowa needlegrass

Riparian habitat conditions vary throughout the project area. While some areas are stable, others are in an improving trend, and some are at risk of further decline (see January 2006 Hydrology Resource Report).

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Riparian Species - There would be no direct or indirect effects to riparian habitat associated with Peck's mariposa lily, the six moonwort species, porcupine sedge, interior sedge, silverskin lichen, or margined streamside moss once livestock grazing is eliminated. Habitat and populations of sensitive species associated with riparian habitats would be maintained, and may increase as riparian habitats gradually improve in the long term (>10 years). Some riparian systems are not expected to recover and would still be at risk to major changes, due to stream downcutting that results in reductions of riparian habitat. Though livestock would be absent, other influences, such as roads, would still be present and contribute to continued risk. However, risk would gradually decline over time as riparian vegetation increases and streambank stability increases.

Although monitoring by the BLM indicates Peck's mariposa lily appears to be declining where livestock have been excluded, riparian habitat associated with this species is expected to gradually expand, which would allow this species to increase. Therefore, expanding habitat and populations of Peck's mariposa lily, at least in the short term (<10 years), is expected to be offset by any decline due to elimination of grazing.

Non-native invasive plants (noxious weeds) would continue to threaten riparian habitats by displacing native vegetation, including sensitive plant species. Weeds can also indirectly affect sensitive plants by increasing the risk of erosion because these non-native plants commonly provide little root-binding strength to soils (Sheley et al. 1999a). There currently are more than 160 weed infestations documented in the project area; these infestations collectively occupy less than 1 percent of the project area. At this time, displacement due to noxious weeds is not apparent, and is considered low. Assuming noxious weed control continues, anticipated effects resulting from infestation and spread of noxious weeds is expected to remain relatively low.

This alternative would result in no exposed soils from livestock trampling. Therefore, the risk for introduction and spread of noxious weeds that could displace sensitive plants and indirectly alter habitat, would be reduced. Absence of livestock as a vector of weeds would also result in decreased weed risk. Other vectors, such as vehicles and wildlife would still be present, so new introductions are still likely. Existing untreated infestations are expected to spread. Noxious weeds do not appear to be an immediate threat to the viability of any sensitive plant species. They may pose a long-term threat (>10 years), but due to variables that are hard to predict, long-term assessment of weed effects on sensitive plants would be speculative.

With cessation of livestock grazing, accumulations of grasses and other plants would increase, potentially increasing wildfire risk that could affect sensitive plants. Because these sites are moist, wildfire is not expected to threaten viability of these plants or damage habitat. Wildfire could indirectly affect sensitive plants associated with riparian habitats by removing vegetation, and reducing the buffering capacity during runoff events. This could result in erosion and downcutting that may reduce riparian habitat. Though fuels would increase, there would be no measurable change to wildfire risk. Forest conditions in the project area are such that fuels typically carrying wildfire are natural accumulations of trees and natural forest ground litter rather than ground vegetation that would be reduced through grazing (Scholz 2004).

Habitats associated with these species are expected to be stable or gradually improve as riparian vegetation increases.

This alternative would have no impact to the viability or habitat of sensitive plant species associated with riparian habitats.

Moist Forest Species - Though Back's sedge is not expected to occur in the Maury Mountains, habitat is present. This habitat would be maintained and may improve as vegetation, especially in riparian areas, increases over time. Some riparian areas would continue to be at risk of major changes (i.e. loss of riparian habitat) due to stream downcutting that results in reductions of riparian habitat. Upland habitats are generally stable meaning the vegetation is not changing measurably and noxious weeds are few or not present. These sites are not expected to change when livestock grazing ceases.

With cessation of livestock grazing, accumulations of grasses and other plants may increase, potentially affecting wildfire risk, and indirectly, increased risk to habitat associated with Back's sedge. Wildfire could directly affect this sensitive plant because it may not be tolerant of

wildfire. Though fuels would increase with no grazing, there would be no measurable change to wildfire risk. Forest conditions in the project area are such that fuels typically carrying wildfire are natural accumulations of forest biomass (trees and natural forest ground litter) rather than ground vegetation that would be reduced through grazing (Scholz 2004). Therefore, there would be no measurable difference between this and other alternatives in risk to sensitive plant habitat from wildfire.

Compared with other alternatives, the amount of exposed soils would be less due to absence of livestock trampling. The risk for introduction and spread of noxious weeds that could displace sensitive plants and indirectly alter habitat, would be reduced. Risk would decline over time as vegetation increases. Absence of livestock as a vector of weeds would also result in decreased weed risk.

Because no grazing or other activities would occur, and noxious weeds and other factors are not expected to affect habitat, habitat associated with this species is expected to be stable or improve. Therefore, for Back's sedge, no impact to the viability or habitat of this species is expected.

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

Scablands are relatively low productivity sites. Scabland habitats associated with the two sensitive needlegrass species is not expected to change.

Accumulations of grasses and other plants could increase. In addition, these species are likely to be adapted to, and remain viable with periodic wildfire. There would be little change to fuel accumulations or wildfire effects.

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

Because livestock grazing would not occur, scabland habitat is not expected to change and there would be no effects to the viability or habitat of these species.

Alternative 2

Direct and Indirect Effects

Riparian Species - Grazing would occur in areas occupied by or containing habitat for these eleven species. When grazing resumes in the East Maury Allotment, livestock grazing earlier in the year before plants are fully developed and soils sufficiently dry, could damage plants or habitat. A range of conclusions among authorities exists as to whether livestock grazing on Peck's mariposa lily is detrimental or beneficial. Monitoring on lands managed by the BLM indicates Peck's mariposa lily maintains viable populations in areas with moderate grazing, and excluding livestock from its habitat appears to result in decreased densities (Halvorson 2005, pers. comm.). However, risk to Peck's mariposa lily can be compounded by initiating grazing

earlier in the year, when soils are moist and susceptible to damage, and immature plants are more vulnerable to grazing and trampling (Kagan 1996 and Halvorson 2005, pers. comm.). Fencing and water developments, along with other activities such as salting that concentrate livestock, could also affect sensitive plants or habitat. Range improvements would improve the distribution of livestock.

Riparian habitats would improve in the Double Cabin, Klootchman, Sherwood, and Shotgun Allotments as a result of rest-rotation and reduced livestock use (measured as AUMs). Improved distribution in all allotments due to range improvements and daily management in the Sherwood, Shotgun, and Center and West Pastures of the Double Cabin Allotment would also promote improvement of riparian habitats. There would continue to be a risk of habitat loss, but that risk would be less than at present and continued viability of Peck's mariposa lily and other sensitive riparian species is expected. Rest rotation may be one of the more influential factors to improving habitat for riparian species. By resting one pasture each year, it is expected to result in recovery of riparian vegetation and allow for increased streambank stability (Elmore and Kauffman 1994).

Fencing of eight areas (in the Double Cabin, Klootchman, Sherwood, and Shotgun Allotments) occupied by Peck's mariposa lily would reduce livestock trampling during the plant's growing season when it is most vulnerable. Once every 4 years, these areas would be available for grazing. This is expected to reduce risk of livestock damage to plants or habitat, and reduce buildup of vegetation that could otherwise reduce habitat suitability for this plant.

Non-native invasive plants (noxious weeds) would also continue to influence riparian habitat by directly displacing native vegetation, including sensitive plant species. Weeds would also continue to indirectly threaten riparian habitats and water quality, and therefore, indirectly threaten sensitive plants associated with these habitats, by increasing risk of erosion, as these non-native plants commonly provide little root-binding strength to soils (Sheley et al. 1999a). However, non-native invasive plants presently occupy a relatively small portion of riparian habitats, and are not expected to pose a short-term threat (<10 years) to the viability of sensitive plants associated with this habitat. Long-term effects on sensitive plants would be speculative.

Some livestock trampling and grazing, plus range improvements, would occur in proximity to sensitive plant populations and habitat. Project design elements for range improvements and salting are expected to not result in direct impacts to sensitive plants or habitat from construction of improvements or increased use of riparian habitats. Because livestock use would be earlier than has historically occurred, risk of damage to riparian habitats would be higher than in Alternative 3. Because this alternative also implements daily management, range improvements, and rest-rotation as compared with current management (Alternative 3), riparian habitat is expected to improve.

This alternative may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability of sensitive plant species associated with riparian habitats.

Moist Forest Species - This alternative would result in grazing of areas containing habitat for Back's sedge. Initiating grazing earlier in the year in the Double Cabin, Shotgun, and East Maury (once grazing resumes) Allotments could damage plants or habitat. Fencing, water developments, and salting locations could also potentially affect habitat by concentrating livestock use in potential habitat. However, habitat associated with moist forest sites appears to be stable and is not expected to measurably change.

With reduced livestock use, moist forest habitats are expected to remain stable or improve. Although Back's sedge is not known to occur in the project area, some habitat would be affected by livestock trampling and grazing.

Non-native invasive plants would also continue to influence habitat by directly displacing native vegetation. Weeds would continue to indirectly threaten riparian habitats by increasing risk of erosion (Sheley et al. 1999a) that could result in losses of habitat. Though some non-native invasive plants, such as Canada thistle, are relatively common, they presently occupy a relatively small portion of the project area, and do not pose an immediate threat to the viability of sensitive plants associated with this habitat.

With reduced livestock grazing, accumulations of grasses and other plants may increase, potentially affecting wildfire risk, and indirectly, increased risk to habitat associated with Back's sedge. Though wildfire risk would be present, this habitat is generally moist, and wildfire is not expected to threaten this habitat. In addition, forest conditions in the project area are such that fuels typically carrying wildfire are natural accumulations of forest biomass (trees and natural forest ground litter) rather than ground vegetation that would be reduced through grazing (Scholz 2004). There would be no measurable difference between this and other alternatives in risk to sensitive plant habitat from wildfire.

For Back's sedge, Alternative 2 may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Scabland Species - Some livestock grazing would occur on scablands that provide the primary habitat for the two sensitive needlegrass species. Range improvements and other activities could also affect sensitive plants associated with scabland.

Scabland habitats are considered stable (David 2001, pers. comm.). These species have maintained populations with moderate grazing (Halvorson 2005, pers. comm.). However, livestock use before soils are sufficiently dry could result in post holing, pedestalling, trampling, pulling of plants, and livestock trailing that could damage scabland habitat. Grazing before plants are sufficiently developed could also cause damage.

Alternative 2 would result in an earlier season of use in the Double Cabin, Shotgun, and East Maury (once grazing resumes) Allotments. In these allotments, sensitive plants associated with scablands could be at greater risk of damage from livestock grazing and trampling. Based on range readiness guidelines, this alternative is not expected to result in measurable increase in livestock post holing and other impacts to soils that could damage scabland habitat. Moderate

grazing, and associated livestock trampling, would affect some scabland habitat, though not measurably more than occurs under current management.

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

Because scabland habitat typically receives relatively light use by livestock, there would be no measurable difference in fuel accumulations, and associated wildfire risk, between alternatives. In addition, these species are likely to be adapted to, and remain viable with periodic wildfire. Therefore, wildfire is not likely to affect these species.

For the two sensitive needlegrass species, Alternative 2 may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability.

Alternative 3

Direct and Indirect Effects

Riparian Species - Livestock grazing would continue at present levels and season, in areas occupied by or containing habitat for the 11 species associated with riparian habitats. The pattern of livestock use would not change.

Anticipated hydrological effects would be a continuation, and in some cases, increased risk to riparian habitats as a result of downcutting. Some streams are presently downcutting, and others are at risk, including those associated with Peck's mariposa lily populations. Populations in the Double Cabin and Klootchman Allotments associated with Rickman and Pre-emption Creeks, and in the Shotgun Allotment associated with Drake Creek appear to be at highest risk. By continuing existing grazing management, further loss of habitat, and populations of Peck's mariposa lily is likely.

Some livestock trampling and grazing would occur in proximity to sensitive plant populations and habitat. Because this alternative results in the most use by livestock, with no new range improvements that would help disperse livestock, riparian habitats are not expected to recover as they would with Alternatives 2 or 4.

Non-native invasive plants (noxious weeds) would continue to threaten riparian systems by directly displacing native vegetation, including sensitive plant species. Weeds can also indirectly threaten riparian systems, and sensitive plants associated with these habitats, by increasing risk of erosion, as these non-native plants commonly provide little root-binding strength to soils (Sheley et al. 1999a). This could alter habitat for sensitive plants, including those associated with riparian areas. There currently are more than 160 infestations documented within the project area; collectively they occupy less than 1 percent of the project area. At least 95 percent of the infestations of common weed species have been documented along the road system. At present, displacement due to noxious weeds is not apparent, and the risk of displacement is

considered low. Assuming noxious weed control continues, anticipated effects resulting from infestation and spread of noxious weeds is expected to remain low.

Because this alternative would receive the highest amount of livestock use, amounts of exposed soils due to livestock trampling would be highest among the alternatives. Therefore, risk for introduction and spread of noxious weeds that could displace sensitive plants and indirectly alter habitat, would continue at the same level. Non-native invasive plants presently occupy a relatively small portion of riparian habitats, and are not expected to pose a short-term threat (<10 years) to the viability of sensitive plants associated with this habitat. Long-term effects on sensitive plants would be speculative.

The critical factor in maintaining viability of sensitive plant species appears to be in maintaining habitat. Among the sensitive plant species, habitat for Peck's mariposa lily has had the most noticeable losses, and particular stream systems are at a higher risk for downcutting and further loss of riparian habitat. Livestock management and other factors that maintain or improve riparian habitat is expected to maintain viability of Peck's mariposa lily. Management that is expected to result in declines or increases in risk to riparian habitat would threaten viability. With this alternative, the estimated effects on riparian habitat are expected to remain the same, indicating further loss or high risk of loss of some riparian habitat. Therefore, continued loss or high risk of habitat loss for sensitive plants associated with riparian areas is expected. Considering the riparian habitat that has already been lost and the riparian habitats that are currently threatened, additional losses of riparian habitat associated with Peck's mariposa lily could lead to a trend towards listing. Therefore, for Peck's mariposa lily, Alternative 3 will impact individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or loss of viability to the population or species.

Other sensitive plants associated with riparian habitats occupy a wider array of habitats, including springs, seeps, and higher gradient systems that are less likely to be affected by livestock. Populations of these species are also more widespread (ORNHIC 2004), and so losses of species viability are less likely. Therefore, for the six moonworts, porcupine sedge, interior sedge, silverskin lichen, and margined streamside moss, Alternative 3 may impact some individuals or habitat but will not likely contribute to a trend towards federal listing or loss of viability.

Moist Forest Species - This alternative would result in continued grazing, at present levels and season, of areas containing habitat for Back's sedge. No new range improvements would occur, though other existing activities, such as salting, would continue.

Moist forest habitat is generally stable and is expected to remain stable. Because this species occupies a wide array of habitats, Alternative 3 may impact some individuals or habitat but will not likely contribute to a trend towards federal listing or loss of viability.

Compared with other alternatives, there would be no measurable increase or decrease in direct or indirect risk to moist forest habitats from wildfire. Though wildfire risk would still be present, habitat is generally moist, and wildfire is not expected to threaten habitat. In addition, forest conditions are such that fuels typically carrying wildfire are natural accumulations of forest

biomass (trees and natural forest ground litter) rather than ground vegetation that would be reduced through grazing (Scholz 2004). There would be no measurable difference between this and other alternatives in risk to sensitive plant habitat from wildfire.

Noxious weeds would continue to threaten habitat, including sensitive plant habitat. New introductions are also likely. Noxious weeds presently occupy a relatively small portion of the Maury Mountains, and are not expected to pose an immediate threat to the viability of sensitive plants associated moist forest habitat.

Scabland Species - Some livestock grazing would occur on scablands that provide the primary habitat for the two sensitive needlegrass species. Scabland habitats are considered stable (David 2001, pers. comm.). These species have maintained populations with moderate grazing (Halvorson 2005, pers. comm.). However, livestock use before soils are sufficiently dry could result in post holing, pedestalling, trampling, pulling of plants, and livestock trailing that could damage scabland habitat. Grazing before plants are sufficiently developed could also cause damage.

Range readiness guidelines for Alternative 3 would not change. Based on range readiness guidelines, this alternative is not expected to result in measurable increase in livestock post holing and other impacts to soils that could damage scabland habitat. Moderate grazing, and associated livestock trampling, would affect some scabland habitat, though not measurably more than occurs under current management. For the two sensitive needlegrass species, Alternative 3 may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability.

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

Because scabland habitat typically receives relatively light use by livestock, there would be no measurable difference in fuel accumulations, and associated wildfire risk, between alternatives. In addition, these species are likely to be adapted to, and remain viable with periodic wildfire. Therefore, wildfire is not likely to affect these species.

Alternative 4

Direct and Indirect Effects

Riparian Species - This alternative would result in grazing areas occupied by or containing habitat for the 11 sensitive species associated with riparian habitats. Livestock grazing earlier in the year could damage plants or habitat. Range improvements including fencing and water developments, along with other activities such as salting that concentrate livestock, could also impact sensitive plants or habitat.

The critical factor in maintaining viability appears to be in maintaining habitat. Livestock management and other factors that maintain or improve riparian habitat is expected to maintain

viability of Peck's mariposa lily, as well as the other sensitive plant species associated with riparian areas.

Because livestock use would be greater in the Klootchman Allotment compared to Alternative 2, and grazing would be earlier than has historically occurred in the Double Cabin, East Maury, and Shotgun Allotments, risk of further damage to riparian habitats would be higher than Alternative 2. This alternative includes daily management, range improvements, and rest-rotation, so riparian habitat is expected to improve. Continued viability of these species is expected.

Fencing of eight areas occupied by Peck's mariposa lily would reduce grazing and trampling by livestock during the plant's growing season when it is most vulnerable. Once every 4 years, these areas would be available for grazing. This is expected to reduce risk of livestock damage to Peck's mariposa lily plants or habitat, and reduce buildup of vegetation that could otherwise reduce habitat suitability for this plant.

Non-native invasive plants would continue to influence riparian habitat by directly displacing native vegetation, including sensitive plant species. Weeds would also continue to indirectly threaten riparian habitats, and sensitive plants associated with these habitats, by increasing risk of erosion (Sheley et al. 1999a). Non-native invasive plants presently occupy a relatively small portion of riparian habitats, and are not expected to pose a short-term threat (<10 years) to the viability of sensitive plants associated with this habitat. Long-term effects on sensitive plants would be speculative.

Some livestock trampling and grazing, plus range improvements, would occur in proximity to sensitive plant populations and habitat. Project design elements for range improvements and salting are expected to not result in direct impacts to sensitive plants or habitat from construction of improvements or increased use of riparian habitats. Because livestock use would be earlier than has historically occurred, risk of further damage to riparian habitat would be higher. However, with daily management, range improvements, and rest-rotation as compared with Alternative 3, riparian habitats would also be expected to improve, though it would occur more slowly than in Alternative 2.

Alternative 4 may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability of the 11 species associated with riparian habitats.

Moist Forest Species - This alternative would result in grazing of areas containing habitat for Back's sedge. Initiating grazing earlier in the year could damage plants or habitat. Proposed range improvements and other activities, including fencing, water developments, and salting could also potentially affect populations or habitat.

Habitat associated with moist forest species is not expected to be affected. Continued viability of this species is expected.

Noxious weeds would continue to affect habitat. Noxious weeds presently occupy a relatively small portion of the Maury Mountains, and are not expected to pose an immediate threat to the viability of sensitive plants.

Compared with other alternatives, there would be no measurable increase or decrease in direct or indirect risk to moist forest habitats from wildfire. Though wildfire risk would still be present, habitat is generally moist, and wildfire is not expected to threaten habitat. In addition, forest conditions are such that fuels typically carrying wildfire are natural accumulations of forest biomass (trees and natural forest ground litter) rather than ground vegetation that would be reduced through grazing (Scholz 2004). There would be no measurable difference between this and other alternatives in risk to sensitive plant habitat from wildfire.

Some livestock trampling and grazing, plus range improvements, would occur in proximity to sensitive plant populations and habitat. However, moist forest habitats are not expected to change measurably. For Back's sedge, Alternative 4 may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability.

Scabland Species - Some livestock grazing would occur on scablands that provide the primary habitat for the two sensitive needlegrass species. Range improvements and other activities could also affect sensitive plants and habitats associated with scabland.

Scabland habitats are considered stable (David 2001, pers. comm.). These species have maintained populations with moderate grazing (Halvorson 2005, pers. comm.). However, livestock use before soils are sufficiently dry could result in post holing, pedestalling, trampling, pulling of plants, and livestock trailing that could damage scabland habitat. Grazing before plants are sufficiently developed could also cause damage.

Because Alternative 4 results in livestock use earlier in the season, sensitive plants and habitat associated with scablands could be at greater risk of damage from livestock grazing and trampling. Based on range readiness guidelines, this alternative is not expected to result in measurable increase in livestock post holing and other impacts to soils that could damage scabland habitat. Moderate grazing, and associated livestock trampling, would affect some scabland habitat, though not measurably more than occurs under current management. For the two sensitive needlegrass species, Alternative 4 may impact some individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability.

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

Because scabland habitat typically receives relatively light use by livestock, there would be no measurable difference in fuel accumulations, and associated wildfire risk, between alternatives. In addition, these species are likely to be adapted to, and remain viable with periodic wildfire. Therefore, wildfire is not likely to affect these species.

Cumulative Effects

Road construction, livestock grazing, fire exclusion, introduction of non-native plants, and other factors have resulted in changes to forest, scabland, riparian, and aquatic habitats (USDA/USDI

1996 and USDA Forest Service 2000). Because these influences have altered habitat quality and plant species diversity in both upland and riparian areas, these sensitive plant species are likely to have been more abundant prior to settlement.

While overall habitat quality has declined since pre-settlement, upland habitats appear relatively stable. Forest habitats are generally stable and are expected to remain stable for the foreseeable future. Habitats for sensitive species associated with scabland (lithosol soils) have changed little in the last few decades, and are expected to remain in their current condition (David 2001, pers. comm.).

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

Expansion of conifers into meadow systems is also occurring, resulting in reductions of meadow habitat, but currently does not appear to be affecting viability of sensitive plants. Fuels and vegetation management activities associated with the West Maurys project are expected to reverse the trend of conifer expansion into meadows in the western portion of the project area. This is expected to maintain or improve habitat conditions, and the potential for continued viability, of species associated with meadows, especially Peck's mariposa lily.

Timber harvest and prescribed burning occurring with the West Maurys project, East Maurys project, and Sherwood (Creek) prescribed burning project (1300 acres) are expected. Prescribed burning is not expected to affect sensitive plants or habitat associated with riparian areas. These areas are moist, and fire would not generally affect habitat, with the exception of burning in the transitional riparian habitat along the forest/meadow interface that can provide habitat for Peck's mariposa lily. Periodic prescribed burning in this habitat is expected to maintain or improve habitat for this species.

Because scablands have inherent low productivity, fuel levels are relatively low, and are not expected to be affected by prescribed burning. Sensitive plant habitat associated with scabland areas is generally in plant communities that have historically been maintained by periodic fire. Therefore, burning is not expected to have any direct, indirect, or cumulative impact on viability of sensitive plant species.

Burning is likely to result in increased exposed soils, which can increase susceptibility to noxious weed infestation and spread that can affect sensitive plant habitat. This risk increases when prescribed fire exceeds normal intensities. Fuels management projects, such as grapple piling, can concentrate fuels and result in scorching of soils that can leave these sites more susceptible to noxious weeds. Though risk for introduction and spread of noxious weeds would increase with burning, this activity is not expected to result in substantial changes to habitat that would increase risk for introduction and spread of noxious weeds. Therefore, effects resulting

from potential weed introduction and spread due to prescribed fire and wildfire are not expected to affect viability of sensitive plant species for at least the next decade.

Burning is likely to improve forage production and palatability, and can result in increased livestock use on burned areas. If these areas burn too hot, or if livestock grazing occurs before sufficient recovery of vegetation and the soil organic layer, grazing can impact these areas by compacting and displacing soil, and increase risk of riparian degradation and for introduction and spread of noxious weeds. This could affect sensitive plants and habitat. However, large-scale burning can also help distribute livestock over a wider area.

The 11 sensitive plant species associated with riparian habitats are not expected to be affected by wildfire. These species occur in areas that are generally moist year-round, or in the case of Peck's mariposa lily, are dormant during wildfire season. These are also areas with generally light fuel loads, and therefore are not expected to burn with high intensity. Mariposa lily species are generally recognized as dependent on disturbances such as wildfire (Kagan 1996 and Kaye and Rittenhouse 1990).

Species associated with scabland habitats (Henderson's and Wallowa needlegrass) occur on areas with relatively low fuel density. These habitats are known to burn during wildfire events (Johnson 1998). Wildfire would historically occur during summer, when plants are dormant and less vulnerable. Therefore, these species are likely to be adapted to, and remain viable with periodic wildfire.

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

Thinning and fuels reduction projects (such as West Maurys and East Maurys) that move conditions towards the historical range would reduce potential adverse effects due to wildfire. With several thousand acres of thinning and fuels treatments anticipated over the next decade, potential effects due to wildfire, and wildfire suppression, are expected to decrease.

In the Maury Mountains, non-native invasive plants (noxious weeds) currently occupy relatively small areas of sensitive plant habitat. Although noxious weeds appear to be spreading into sensitive plant habitat, especially Canada thistle in Peck's mariposa lily habitat, they do not appear to be threatening viability at this time.

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

Weeds are expected to continue to be introduced by vehicles and livestock. However, control measures for most non-native invasive plants are occurring under the 1998 Integrated Weed Management Plan, and are expected to continue. Though Canada thistle continues to expand, it does not currently appear to be affecting viability of sensitive plants. Biological controls are relatively common for this species throughout Central Oregon. Assuming control measures continue, noxious weeds are expected to have a relatively minor effect on sensitive plants for at least the next decade. Therefore, no cumulative effects are expected that would change the findings described in direct and indirect effects on sensitive plant species.

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

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

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

Non-Native Invasive Plant Species (Noxious Weeds)

Affected Environment

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

During the past half-century, many non-native invasive species have expanded their range in the western United States. The introduction and spread of noxious weeds can reduce the diversity and abundance of native vegetation, forage, diversity, continuity, and quality of wildlife habitat, increase erosion, and decrease water quality (Sheley and Larson 1994 and Sheley et al. 1997). Non-native weeds have developed many characteristics, such as rapid growth rates, high seed production, and extended growing periods that give them advantages over native plants. Their spread is often unchecked because their native pathogens and invertebrate feeders are not present (Roché et al. 1994, Sheley et al. 1999b, and DiTomaso 2000).

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

Non-native plants are often difficult to replace with native species. Damage to soils, notably losing the soil A-horizon, such as from road construction or burning slash piles, can result in sites not capable of returning to their original native plant communities for several decades or longer. Noxious weeds (and some non-native grasses) often out-compete native species on these altered sites (Hall 1996, pers. comm.).

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

A variety of non-native noxious weeds occur in the Maury Mountains, generally on disturbed sites such as road shoulders and old log landings. Broadleaf noxious weeds are the most common, including Canada thistle. Of the noxious weeds present in the Maury Mountains, it occupies the most area, and continues to spread in both upland and riparian areas. It can be found on a variety of sites, including rock pits, roadsides, dispersed camping areas, meadows, and old harvest units. Canada thistle has a deep root system, making hand pulling infeasible. Canada thistle currently occupies less than 1 percent of the project area. Though observations indicate it is more common on disturbed sites, it also occupies areas that have had relatively little disturbance, especially in riparian areas. Where it occurs in disturbed forested sites, such as clearcuts, it appears to decline over time as succession progresses and the amount of shade increases. Because it is common and widely spread the current management strategy focuses on the establishment of biological controls (insects). These biological controls are present over portions of the Ochoco National Forest, and are relatively common on private and public lands adjacent to the Maury Mountains. However, no biological controls appear to have established in the Maury Mountains. An overall assessment of long-term (over the next few decades) effectiveness of biological controls on the Ochoco National Forest cannot be described at this time.

Other common non-native noxious weeds include the knapweed (*Centaurea*) species, as well as a variety of others such as whitetop (*Cardaria draba*) and Mediterranean sage (*Salvia aethiopsis*).

(A complete list of noxious weeds found in or near the project area are contained in Table 7 of the March 1, 2006 Botany Report.) These species are commonly found along roadsides, and are currently being controlled through the use of herbicides and hand pulling.

Noxious weeds are currently being managed under the Ochoco National Forest 1998 and 1995 Integrated Weed Management Plan decisions. Weed management includes a variety of strategies, depending on the species, size of infestation, and location. Included are chemical, cultural, mechanical, and biological controls. In November 2005, the Forest Service Pacific Northwest Regional Office completed a Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) that provides programmatic direction for treatment of non-native invasive plants through herbicides and other means. The Deschutes and Ochoco National Forests are currently completing site-specific analysis for treatment for non-native invasive plant infestations. This effort is expected to result in additional treatment areas and different methods for integrated noxious weed management beginning in 2007.

Most weed infestations have been present in the project area for at least 2 decades. Existing conditions favor establishment and spread of noxious weeds, and weeds are likely to continue to be introduced and spread to new areas. A history of grazing, road construction, and logging has increased the potential for introduction and spread by removing vegetation and exposing soils, increasing susceptibility to invasion by noxious weeds. Vehicle traffic and other ongoing uses are expected to continue to introduce weeds to the area.

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

Pre-project surveys were completed in 2003-2005 along both open and closed roads within the project area, where weeds most commonly occur. Infestations of the common weed species Canada thistle and bull thistle (*Cirsium vulgare*) were not all documented where scattered individual plants occur along road shoulders. An estimated 95 percent of the infestations of common weed species have been documented along the road system.

Currently, there are approximately 160 documented weed sites encompassing approximately 100 acres in the project area. Locations of documented weed sites are on file at the Lookout Mountain Ranger District office. These weed infestations range from a handful of plants, to several acres of infestations. Several species of noxious weeds are present in or near the project area. Some species, such as yellow star thistle, are not documented on the National Forest. New infestations are documented as they are encountered.

Noxious weeds comprise less than 1 percent of the vegetative cover in the project area and impacts are not measurable at this time. However, given the existing infestations, current, and anticipated human activities, and potential for introduction and spread, weeds could become more of a long-term (>10 years) influence.

As with other portions of the Ochoco National Forest, weed infestations in the Maury Mountains are generally widespread and limited to road corridors. However, due to ongoing efforts to control weed infestations, these infestations are typically small (less than 1/10 acre in size).

Because current effects due to noxious weeds are relatively low, and are not expected to increase measurably, the remainder of the effects analysis for noxious weeds will be on evaluating the risk for introduction and spread of noxious weeds.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Alternative 1 includes no grazing, range improvements, or other activities that remove vegetation, expose soil, and permit the introduction of livestock as a weed vector that increases the potential for introduction and spread of invasive plants. Compared with other alternatives, Alternative 1 offers the lowest risk for introduction and spread of noxious weeds. Removing fences and water development would disturb a small amount of soil and increase the risk of introduction and spread of noxious weeds at these localized areas. The risk would be small and any heavy equipment that would be used to remove these developments would be cleaned of all plant and soil material before entering National Forest System lands.

Alternative 2

Direct and Indirect Effects

Alternative 2 includes grazing and range improvements that increase risk for introduction and spread of invasive plants. Compared with all action alternatives, Alternative 2 has the lowest amount of livestock use (based on AUMs) and is likely to result in less exposed soils and other factors that otherwise increases weed risk. Rotation of pastures in Alternative 2 is also expected to reduce weed risk by allowing vegetation to recover more fully following grazing (Sheley et al. 1999a). Most of the risk of weed introduction is mitigated through design elements that require equipment be cleaned before entering lands managed by the Forest Service. Heavy equipment such as backhoes would be free of soil, weed seed, and plant parts. This substantially reduces the risk of introducing new infestations. However, vehicles, including stock trucks used for hauling are exempt from this requirement and pose a risk.

Alternative 3

Direct and Indirect Effects

Alternative 3 continues the existing level of risk associated with livestock grazing. No new range developments would result in less area of exposed soils, which would otherwise increase susceptibility to noxious weed infestation and spread. However, this alternative has the highest level of livestock use. It also includes no rest-rotation that can provide for more effective recovery of vegetation. Alternative 3 has the highest risk for introduction and spread of noxious weeds. Most of the risk of weed introduction is mitigated through design elements that require equipment be cleaned before entering lands managed by the Forest Service. Heavy equipment such as backhoes would be free of soil, weed seed, and plant parts. This substantially reduces the risk of introducing new infestations. However, vehicles, including stock trucks used for hauling are exempt from this requirement and pose a risk.

Alternative 4

Direct and Indirect Effects

Alternative 4 includes grazing and range improvements that increase risk for introduction and spread of invasive plants. Rotation of pastures in Alternative 4 is also expected to reduce weed risk by allowing vegetation to recover more fully following grazing (Sheley et al. 1999a). Most of the risk of weed introduction is mitigated through design elements that require equipment be cleaned before entering lands managed by the Forest Service. Heavy equipment such as backhoes would be free of soil, weed seed, and plant parts. This substantially reduces the risk of introducing new infestations. However, vehicles, including stock trucks used for hauling are exempt from this requirement and pose a risk.

Cumulative Effects for all Alternatives

Existing conditions favor establishment and spread of noxious weeds. Many areas have had road construction and timber harvest. This has increased the potential for introduction and spread by removing vegetation and exposing soils, creating an ideal seedbed for noxious weeds. In addition, road systems have created a pathway for entry of noxious weeds into the National Forest. The primary vector for noxious weeds appears to be vehicles.

The West and East Maurys Fuels and Vegetation Management Projects are expected to increase the risk of introducing and spreading noxious weeds by reducing shade, removing vegetation, and displacing the soil organic layer. Other present and reasonably foreseeable activities, including recreation and wildfire suppression, pose a high risk for introduction and spread of noxious weeds. This risk can be exacerbated by livestock grazing. These projects include design measures to prevent or reduce the potential effects of noxious weeds introduction and spread.

Though weed densities have generally decreased where controls have been implemented, on the majority of sites, some seed production still occurs from plants that germinate after treatment, re-sprout after incomplete pulling, or otherwise escape the control method. As long as seed production continues, eradication is difficult. This situation is complicated by the persistence of viable seed in the soil for many years (Eddleman 1996, pers. comm.).

Not all noxious weeds can be effectively controlled by herbicides or other measures. The 1998 Noxious Weed Environmental Assessment and Decision Notice limits herbicide use to knapweed and a few other species. The most effective chemicals for use on whitetop are presently not available for use on the Ochoco National Forest. Untreated infestations would continue to spread, displacing native and desirable non-native vegetation, reducing biodiversity.

Biological controls (insects) have been introduced for some species, such as Canada thistle, but establishment has not been observed in the project area, and infestations continue to spread. It is known that biological controls generally do not eradicate weed infestations; however, they generally reduce spread when they reach equilibrium with noxious weed infestations. Ongoing research and monitoring has shown some success in reducing weed densities in other areas in Central Oregon.

Predicting the effects related to decline or rate and extent of spread is largely speculative due to many unknown variables, including weather patterns, funding, and upcoming decisions on the current Deschutes NF/Ochoco NF process for managing non-native invasive plants. For example, if future noxious weed management is limited to measures other than herbicide treatments, and funding for control declines, spread and establishment of new infestations is more likely than a continuation of current management.

One of the primary factors for continued risk is that seed can be introduced from weed-infested areas through soils attached to vehicles and road maintenance or other equipment. Roads will continue to provide dispersal and susceptible sites for noxious weeds. Expanding weed infestations outside the Maury Mountains will likely increase potential for new infestations. Weed densities adjacent to the project area are considered moderate to high. Not all of these infestations are being controlled. These infestations, especially those along main access roads into the Maury Mountains, will continue to be a source for new infestations (Alexanian 2003, pers. comm.). Human use on the Maury Mountains is increasing, especially from September through November during hunting seasons, and is expected to increase in the future as populations in nearby towns continue to grow. Late hunting season is a wet time of year, and is particularly conducive to weed spread because mud clings to tires. With growing recreational use, the potential for new infestations and spread is likely to increase.

Fire suppression can result in introduction or spread of weeds by equipment brought in from different areas that may contain weed seed or plant parts. Due to the emergency nature of wildfire, prevention measures including equipment cleaning are not always implemented or feasible. Dozer lines, hand lines, drop points, safety zones, staging areas all create bare ground with heavy travel and disturbance. Vehicle traffic during and after suppression activity can introduce weeds to susceptible soils. Fire rehabilitation efforts mitigate many of the negative effects through seeding, weed control, erosion control, and closing off areas to vehicles.

The cumulative effects of present and reasonably foreseeable activities indicate a high risk for introduction and spread of noxious weeds. Studies have shown that noxious weeds have the potential to invade sites with relatively little grazing or other activity (Sheley et al. 1997 and Wagner et al. 2001). Weeds will continue to be introduced and spread by vehicles, wildlife, windborne seed, and other sources. Therefore, new infestations are likely in the project area, regardless of the alternative chosen, including no action.

The degree of environmental impact due to noxious weeds is relative to the acres infested. Though over 160 infestations have been recorded within the project area, collectively they occupy less than 1 percent of the project area. Therefore, at present, environmental impact due to noxious weeds is not apparent, and is considered low. Assuming noxious weed control continues, anticipated effects resulting from infestation and spread of noxious weeds is expected to remain relatively low.

Soils

Affected Environment

The Maury Mountains contain a wide variety of soils and landtypes. Parent materials are the Clarno Formation which is comprised of andesitic lava flows, domes, breccia, interlayered saprolite, bedded volcanoclastic and epiclastic mudstone, claystone, siltstone, sandstone, conglomerate and mudflow (lahar) deposits. The Clarno Formation comprises approximately 37 percent (22,953 acres) of the area and encompasses most of the western Maury Mountains. Slopes are steeper in this area and consequently there is more of a tendency for cattle to concentrate in the stream bottoms and flatter benches and meadows.

The Tertiary John Day Formation is found in the far eastern Maury Mountains and underlies 30 percent (18,840 acres) of the project area. This includes the weathered tuffaceous sediments. Tertiary volcanics are more rolling and accessible to livestock. They contain some very low productivity areas which are not attractive to livestock because there is little forage.

Columbia River Basalts, which include the Picture Gorge basalts, are found on the east side of the project area and comprise 3 percent (1,642 acres) of the area. This area is generally flatter overall with some steep rimrocks and escarpments. There is more scabland in this area.

Quaternary (recent) volcanic terrain consisting of basalts, rhyolites, and cinder cones occurs around Arrowwood Point and the Cadle Butte area and comprise 12 percent (7,180 acres) of the area.

Landslide debris occurs over 14 percent (8,623 acres) of the area. Alluvial deposits in the drainage bottoms comprise another 2 percent (1,227 acres).

Volcanic ash from Mt. Mazama blanketed the area about 6,700 years ago with approximately 1.5 feet of largely sandy loam and loamy sand ash. Newberry Crater ash has also been deposited over much of the area but with less depth. After subsequent wind and water erosion there are

varying depths of ash soils throughout the area. The Maury Mountains contain approximately 14,000 acres, or 23 percent of ash soils having at least 7 inches of surface depth, commonly on north and east aspects and in swales and meadows. The balance of the area is largely residual soil which is clay-loam or clay texture. The deepest ash soils occur on the north and eastern aspects. The southern and western aspects have the least amount of ash deposits. Cattle hoof action as a contributor to erosion, particularly along streams, is most pronounced along streams with ashy banks. The thickest ash banks are along streams with north and east aspects. The streams with south and west aspects often have more rock and clay exposed which gives them somewhat more resistance to trampling by cattle.

Clay surface soils are soils with little or no ash capping. They commonly have clay loam surface A horizons quickly grading to heavier clay. These are generally on south and west facing aspects which are hotter and drier than north or east aspects. These soils are not generally as susceptible to detrimental compaction depending on the depth to the smectitic clay which shrinks and swells with each wet and dry season. Surface cracks are common in these soils and they are classified as Vertic intergrades of Argixerolls or Haploxererts. These soils are susceptible to detrimental puddling (destruction of soil ped structure) by cattle trampling and are susceptible to post holing, plugging, and trail erosion during wet conditions such as thunder storms or spring thaw conditions. Sheet and rill erosion is naturally higher on southern exposures. This is due in part to slower permeability, infiltration, and the common presence of vesicular crusting. Riparian areas, seeps, springs, and scablands often contain these soils especially in exposed banks or on southern aspects.

Much of the lower elevation area is scabland, sage, juniper, rock outcrop, low site ponderosa, or meadow.

Erosion naturally occurred without logging, roads, or livestock. Identifying background erosion rates is difficult. Background erosion varies tremendously due to geology. For example, the actively eroding surfaces associated with the tuffaceous hills along the Paulina Highway are natural. Background erosion rates are higher in the 9-16 inch precipitation zones because the amount of effective ground cover is lower because there is a lower percentage of plant cover. Areas which are naturally erosive are lower-elevation, south-facing shrub steppe and bunchgrass plant associations; juniper shrub steppe and juniper woodland associations; and dry ponderosa plant associations. Early accounts indicate that erosion rates were much lower over much of the landscape (Buckley 1992).

This information has been summarized from the March 20, 2006, Resource Report for Soils. The resource report contains additional, more detailed information.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

This alternative would result in the lowest levels of detrimental soil conditions because livestock grazing would be eliminated after 2 years. Allotment and pasture fences, cattle enclosure fences, and water troughs would be removed. Approximately 70 miles of fence and 105 water troughs and pipelines would be removed. Salting would no longer occur. Livestock would no longer concentrate along fence lines or at water locations and would no longer cause compaction, displacement, post holing, and plugging. Bank erosion and sloughing as a result of livestock trampling would cease. Cattle trailing would no longer occur on streambanks and along fence lines.

An estimated 231 acres of detrimental soil conditions has resulted from livestock trampling and concentrating along fence lines and water developments. There are 128 existing water developments located in the project area. Each water development is estimated to include 1-acre of land immediately adjacent to the development that has detrimentally impacted soils associated with livestock. Impacts include compaction, displacement, and post holing. These areas are generally denuded of vegetation. The estimated acres of soils in a detrimental condition from existing water developments are 128. There are an estimated 70.3 miles of fence in the project area. Each mile of fence results in approximately 1.2 acres of soil with detrimental soil conditions. Approximately 84.4 acres in the project area have been detrimentally disturbed from fence construction and livestock trailing along fences. It is estimated that there are 90 salting and mineral-protein supplement locations in the project area. Each salting location results in approximately a 100-square foot area of soil in a detrimental condition. The amount of detrimental soils from salting impacts is an estimated 0.2 acres. Livestock also trail along streams in the project area. There is an estimated 18.8 acres of detrimental soil conditions from livestock trailing along streams. When livestock grazing is halted, and fences and water developments are removed, the estimated 231 acres of detrimental soil condition would recover naturally.

Cumulative Effects

Livestock have reduced effective ground cover by removing vegetation, reduced bank stability by trampling, and reduced infiltration as a result of compaction. Combined, this resulted in higher levels of sheet/rill erosion and channel erosion. Historical grazing resulted in compaction, loss of effective ground cover, head cutting, post holing, puddling, and smearing. Some impacts occurred from elk but most were due to the historical concentrated herds of cattle, horses, and sheep. As documented by Buckley (1992), much of the damage from livestock occurred in the 20 to 30 years before 1900. The main stem of most creeks such as Hammer, Maury, Bear, Camp, and Pine Creeks have been altered. Formerly hydric soils have been drained and the drainage has been channelized. Large amounts of sediment have moved from these areas; and sediment is continuing to move from these areas as a result of past activities.

Soil productivity has been decreased because of erosion caused by historical grazing. Large amounts of upland and riparian soils were removed. Detrimental compaction from timber harvest and road building has reduced the productivity of much of the area by 15 to 20 percent. Areas where livestock congregated around water sources (ponds, troughs, and springs), bedding areas, salting areas, trails along fences, and pasture corners are less productive due to detrimental compaction, displacement, post holing, bank sloughing, and trampling.

Sheet and rill erosion have also increased throughout the project area because of the cumulative effects of livestock (cover removal, compaction, post holing, puddling, and bank trampling), logging (cover removal, detrimental compaction, detrimental displacement, puddling, charring, and concentration of runoff), and road construction (cover removal, detrimental compaction, detrimental displacement, puddling, and concentration of runoff). Past logging practices typically resulted in up to 35 percent detrimental soil conditions. Past road construction and livestock grazing resulted in 1-3 percent of an area in a detrimental soil condition.

Channel and bank erosion is evident throughout the area with headcutting along streams. Headcut repair projects have reduced bank erosion in some areas along Double Cabin, Drake, Gibson, Klootchman, Newsome, Pre-emption, and Wildcat Creeks. Bank stabilization projects have also occurred along Pine and Maury Creeks. Channel and bank erosion has increased above historical rates due to the cumulative effects of beaver removal, livestock grazing, logging, and road construction. Beavers used to be more common and were an integral part of most of riparian systems. Through their dams, foraging habits, and channel digging they provided hydraulic roughness and extensive pool habitat, and helped maintain riparian hardwood habitats. They helped trap sediment, slowed stream flow, and created conditions that allowed former riparian areas to be more productive than they are today. Bank trampling by livestock and effective cover removal have also contributed to channel and bank erosion (Kovalchik 1987 and Buckley 1992). Riparian timber harvest has resulted in compaction, channeling, and large woody debris removal. Road construction, which was often adjacent to or crossed streams, has increased peak flows and increased sediment.

Mass erosion has also been influenced by livestock, logging, and road construction. Mass erosion potential is highest in the west half of the Maury Mountains and on the steep, north-facing slopes that drain into the Crooked River. Some slopes in these areas are in the 36 to 70 percent range; the steeper the slope, the more likely erosion will occur.

Past timber harvest on Forest Service managed lands resulted in detrimental soil conditions on an estimated 4,520 acres or approximately 7 percent of the total 61,165 acres. There are approximately 300 miles of road in the Maury Mountains. Road construction has resulted in an estimated 540 acres or 0.9 percent of the total National Forest System lands in the project area in a detrimental soil condition. These past activities, combined with impacts from livestock grazing, have resulted in an estimated 5,291 acres of detrimental soil conditions.

Present and reasonably foreseeable projects include the West Maurys and East Maurys projects which propose a variety of commercial harvest, noncommercial thinning, and fuels reduction activities across the project area. These two projects would result in commercial harvest,

noncommercial thinning, and fuels reduction on approximately 32,300 acres, or slightly more than half the project area. These projects would result in slight increases in detrimental soil conditions from road construction, commercial timber harvest, and grapple piling activities. These increases are expected to be less than one-tenth of one percent. The Sherwood Wildlife Prescribed Burn includes burning on approximately 1,300 acres in the Sherwood Allotment and is not expected to increase the amount of detrimental soil conditions.

Common to Alternatives 2, 3, and 4

Direct and Indirect Effects

Compaction causes reductions in water infiltration, percolation, and air exchange in the soil. There is also an increase in resistance to root growth. Detrimental compaction is defined as a 15 percent increase in soil bulk density for residual soils and a 20 percent increase in bulk density for ash soils. Livestock can cause detrimental compaction where they congregate. Cattle tend to congregate at water developments, along streams, along fence lines, and at salting/mineral supplement sites.

Along streams livestock trampling can increase the risk of streambank erosion. Mixing helps incorporate and conserve organic matter. It also reduces the mulching effect of organic matter which may leave the soil somewhat less protected from wind and water erosion (Potter et al. 2000 and Schuman et al. 1998). Hooves shear the protective sod mats and create holes and mixing throughout which induces a condition which is susceptible to rill and gully formation. Commonly these areas appear hummocky and show signs of erosion in between the hummocks. Trampling can also loosen fragments of soil and remove vegetation that provides protection from erosion and works as a filter to capture sediment.

Cattle can also cause damage to streambanks. The most damage appears to occur with ingress and egress from the stream when force from a hoof can actually shear off slices of bank material up to 10 cm thick, pushing them towards the stream. Low (<0.5m), grass covered, fine textured banks are particularly vulnerable to trampling by cattle, especially when wet (Clary and Webster 1989). Because the cows can enter or exit at almost any point, this type of bank may be uniformly trampled.

Cutbanks can also be exacerbated by livestock. When cattle venture onto these areas, there hooves can shear off small chunks of bank expanding the extent of the cutbanks. As the cutbank retreats from stream flow, floodplain sod is often left draped over part of the bank and might become reestablished on the bank; however, trampling often shears this sod away. Finally, grazing high banks during very wet periods can promote bank slumping. Not only is there the additional mass of cows, but there is occasional deep penetration of hooves along potential shear planes.

Grazing of riparian areas can remove up to 80 percent of riparian vegetation (Platts and Nelson 1985) and lower their resistance to erosive flows (Beschta and Platts 1986). Smith and others (1993) contend that moderate grazing had little effect on the vegetative cover of the streambanks; they contend that vegetation changes with fluctuations in soil moisture rather than grazing.

Grass cover appears to be effective in anchoring riparian zones (Zimmerman et al. 1967). Reduction of this grass cover could be expected to increase erosion. On the other hand, the browsing of woody vegetation has uncertain effects. In the short term cattle can greatly reduce the forest understory, but a 6 year study by Trimble (1994) suggested that removal of understory permitted more light and increased growth of grass.

Wolman (1959) and Hooke (1979) established that wetness of banks was a prime variable in vulnerability to erosion. The effects of cattle trampling on streambanks have been found to be correlated with soil moisture content (Marlow and Pogacnik 1985, Marlow and Pogacnik 1986, and Marlow et al. 1987). The greatest amount of bank alteration occurs when soil moisture exceeds 10 percent, and that reducing the number of cattle in the riparian area only localizes the damage to the streambanks.

Cooke and Reeves (1976) mention that cattle form trails along floodplains. Trails are formed by compression and displacement; trail form and alignment allow them to transport a greater depth and velocity of water during overbank flows such that trails might be eroded.

Grazing promotes nutrient cycling through rapid breakdown of organic matter into smaller particles in the system, so organic matter is available more readily for soil microorganisms such as soil bacteria and fungi. Microorganisms use the organic matter as an energy source and can release nutrients back into the soil for plant uptake. Thus, grazing may increase the rate at which nutrients cycle through an ecosystem.

Alternative 2

Direct and Indirect Effects

Range readiness criteria were developed to avoid permanent damage to soil and vegetation. The grazing proposed here is short duration during the dry period and is less apt to cause detrimental soil conditions. Utilization standards were developed to maintain surface roughness and plant vigor. The specified stubble heights are assumed to be adequate for control of surface sheet and rill erosion (Clary et al. 1996).

Double Cabin Allotment - In this allotment, an estimated 13 miles of stream would be grazed by livestock. Assuming a 20-foot zone of influence with 10 percent of the acres in a detrimental soil condition, livestock grazing would detrimentally affect approximately 3 acres. Assuming a 100-foot riparian area (based on MA-F15 management area), there are 157 acres of riparian areas in this allotment. Livestock would cause compaction and displacement of less than 1/10 percent of the riparian areas in this allotment.

Four new water developments would be constructed bringing the total number of water developments in the Double Cabin Allotment to 27. Each water development is estimated to detrimentally compact and displace 1 acre of land immediately adjacent to the development because of livestock trampling. Soils immediately adjacent to water developments can also show evidence of post holing. These areas are generally denuded of vegetation. The estimated acres of detrimental soils conditions associated with water developments are 27 acres.

There are also approximately 17 miles of fence in the Double Cabin Allotment. A livestock enclosure fence would be constructed to reduce livestock grazing impacts to the Peck's mariposa lily; cattle are unlikely to trail along this fence because it would enclose a small area and is not linear like pasture/boundary fences. Soil compaction and displacement would occur where motorized vehicles ranging from OHVs to pickups transport materials from roads to the site of the construction. Compaction and displacement would be limited to areas where vehicles were driven. Assuming a 10-foot wide travel way, 1 mile of fence would result in approximately 1.2 acres of detrimental soil conditions. An estimated 20.5 acres of detrimental soils conditions exist as a result of fence construction in the past; new fence construction would cause an estimated 2.3 acres of additional compaction and/or displacement.

Salting and mineral-protein supplement locations would also result in detrimental soil conditions. An estimated 24 salting/mineral-protein supplements sites would be located in the Double Cabin Allotment. Approximately 100 square feet of soils would be detrimentally disturbed per site. These sites are specified to be located away from streams and springs. Therefore, salting sites would affect approximately 0.06 acres.

In the Double Cabin Allotment, Alternative 2 would result in an estimated 4 acres of additional detrimental soil conditions resulting from new water developments. In all, there would be an estimated 51 acres of detrimentally impacted soil in the Double Cabin Allotment as a result of livestock grazing.

East Maury Allotment - The East Maury Allotment would be rested for 10 years. During this period there would be no direct or indirect effects to streambanks from livestock grazing, fence building or maintenance, water developments, or salting/mineral supplement locations. Currently, there is an estimated 52 acres of detrimental soil conditions from livestock grazing activities.

There are approximately 17 miles of stream and livestock would detrimentally affect an estimated 4 acres out of 206 acres of riparian areas. Alternative 2 proposes four new water developments bringing the total number of water developments in the East Maury Allotment to 28. The estimated acres of detrimentally impacted soils associated with the existing and proposed developments would be 28 acres. There are 16.1 miles of fence. Detrimentially impacted soils associated with fences are approximately 19 acres. When grazing resumes, an estimated 19 salting/mineral-protein supplements sites would be located in this allotment. Approximately 0.04 acres would be detrimentally affected by salting activities.

Livestock related compaction, displacement, and post holing around water developments or salting/mineral locations would not occur until grazing resumes in 10 years. At that time, Alternative 2 would result in an estimated 4 acres of additional detrimental soil conditions resulting from new water developments. In all, there would be an estimated 51 acres of detrimentally impacted soil in the East Maury Allotment as a result of livestock grazing.

Klootchman Allotment - There are an estimated 21 miles of stream that would be grazed by livestock in this allotment. Livestock grazing would detrimentally impact approximately 5 acres of the 254 acres of riparian areas in this allotment.

Alternative 2 proposes 7 new water developments bringing the total number of water developments in the Klootchman Allotment to 35. The existing and proposed developments would result in an estimated 35 acres of detrimental soil conditions.

An estimated 9.9 additional miles of pasture fence would be constructed, while an estimated 2.5 miles of fence would be removed. Once all fences are constructed, the total miles of fence in the allotment would be 22.9. The additional fence would increase the area of detrimentally impacted soils associated with fences by 12 acres to approximately 31 acres.

Salting and mineral-protein supplement locations would also result in detrimental soil conditions. An estimated 16 salting/mineral-protein supplements sites would be located in the Klootchman Allotment. Approximately 0.04 acres would be detrimentally affected by salting activities.

In the Klootchman Allotment, Alternative 2 would result in an estimated 18.9 acres of additional detrimental soil conditions resulting from new water developments and fences. In all, there would be an estimated 71 acres of detrimentally impacted soil in the Klootchman Allotment as a result of livestock grazing.

Sherwood Allotment - There are an estimated 13 miles of stream that would be grazed by livestock in the Sherwood Allotment. Livestock grazing would detrimentally impact approximately 3 acres out of 157 acres of riparian areas.

Fifteen new water developments would be constructed bringing the total number of water developments in the Sherwood Allotment to 46. The existing and proposed developments would result in an estimated 46 acres of detrimental soil conditions.

There are approximately 13.8 miles of existing pasture fence. Approximately 1 mile of livestock enclosure fence would be constructed to reduce livestock grazing impacts to the Peck's mariposa lily. There would be an estimated 18 acres of detrimental soil impacts resulting from fences in the Sherwood Allotment.

Salting and mineral-protein supplement locations would also result in detrimental soil conditions. An estimated 10 salting/mineral-protein supplements sites would be located in the Sherwood allotment. Approximately 0.04 acres would be detrimentally affected by salting activities.

In the Sherwood Allotment, Alternative 2 would result in an estimated 16.2 acres of additional detrimental soil conditions resulting from new water developments and fences. In all, there would be an estimated 67 acres of detrimentally impacted soil in the Sherwood Allotment as a result of livestock grazing.

Shotgun Allotment - There are an estimated 13.8 miles of stream that would be grazed by livestock in the Shotgun Allotment. Livestock grazing would detrimentally impact approximately 3.3 acres out of the estimated 167 acres of riparian areas.

Ten new water developments would be constructed bringing the total number of water developments to 28. The existing and proposed developments would result in an estimated 28 acres of detrimental soil conditions.

There are approximately 5.9 miles of existing pasture fence. Three livestock enclosure fences would be constructed to reduce livestock grazing impacts to the Peck's mariposa lily; cattle are unlikely to trail along these fences because it would enclose a small area and is not linear like pasture/boundary fences. There would be an estimated 7.1 acres of detrimental soil impacts resulting from fences in this allotment.

An estimated 10 salting/mineral-protein supplements sites would be located in this allotment. Approximately 0.04 acres would be detrimentally affected by salting activities.

In the Shotgun Allotment, Alternative 2 would result in an estimated 10 acres of additional detrimental soil conditions resulting from new water developments. In all, there would be an estimated 38.4 acres of detrimentally impacted soil in the Shotgun Allotment as a result of livestock grazing.

Cumulative Effects

The effects of past, present, and reasonably foreseeable future actions are described in detail under Alternative 1 and are applicable to this alternative as well.

There is an estimated 231 acres of existing detrimental soil conditions from livestock improvements in the project area. Alternative 2 would result in an estimated 53 acres of additional compaction, displacement, and post holing from proposed improvements.

Past harvest activities have resulted in an estimated to be 4,520 acres or approximately 7 percent of the total 61,165 acres. Past road construction activities have resulted in approximately 540 acres of detrimental soil conditions. The total acres of detrimental soil conditions in the project area are estimated at 5,344 acres or approximately 8 percent of the project area.

Present and reasonably foreseeable projects include the West Maurys and East Maury projects which propose a variety of commercial harvest, noncommercial thinning, and fuels reduction activities across the Maury Mountains and in all allotments. In all, these projects would result in activities on approximately 32,300 acres throughout the project area. These projects would result in slight increases in detrimental soil conditions from road construction, commercial timber harvest, and grapple piling activities. These increases are expected to be less than one-tenth of one percent. The Sherwood Wildlife Prescribed Burn includes burning on approximately 1,300 acres in the Sherwood Allotment and is not expected to increase the amount of detrimental soil conditions.

Alternative 3

Direct and Indirect Effects

Double Cabin Allotment - In the Double Cabin allotment an estimated 13 miles of stream would be grazed by livestock. Livestock grazing would detrimentally impact approximately 3 acres in of the 157 acres of riparian areas in the Double Cabin allotment.

There are 27 existing water developments in the Double Cabin Allotment, 4 of these water developments are located in the East Pasture. The estimated acres of detrimentally impacted soils associated with these developments are 27 acres. There are approximately 18.9 miles of fence. Detrimentially impacted soils associated with fences are approximately 23 acres.

Salting and mineral-protein supplement locations also result in detrimental soil conditions. An estimated 30 salting/mineral-protein supplements sites are located in the Double Cabin allotment. An estimated .07 acres is detrimentally affected by salting activities.

In the Double Cabin Allotment, an estimated 53 acres of soil are in a detrimental condition as a result of livestock grazing. Alternative 3 does not include any new fences or water development and would not result in additional acres of soil disturbance.

East Maury Allotment - In the East Maury allotment there are an estimated 17 miles of stream that would be grazed by livestock. Livestock grazing would detrimentally impact approximately 4 acres of the 206 acres of riparian areas in the East Maury allotment. There are 24 water developments in this allotment, resulting in 24 acres of detrimental soils conditions. There are 16.1 miles of fence. Detrimentially impacted soils associated with fences are approximately 19 acres.

Salting and mineral-protein supplement locations also result in detrimental soil conditions. An estimated 19 salting/mineral-protein supplements sites are located in the East Maury allotment. Approximately a 10 foot by 10 foot (100 square feet) area of detrimentally disturbed soil per site is expected. Therefore, salting impacts are approximately .04 acres.

In the East Maury Allotment, an estimated 47 acres of soil are in a detrimental condition as a result of livestock grazing.

Klootchman Allotment - There are an estimated 21 miles of stream that are grazed by livestock in this allotment. Livestock grazing would detrimentally impact approximately 5 acres of the 254 acres of riparian areas. There are 28 water developments. The estimated acres of detrimentally impacted soils associated with the existing developments are 28. There are 15.6 miles of pasture fence. The area of detrimentally impacted soils associated with fences is approximately 19 acres.

Salting and mineral-protein supplement locations also result in detrimental soil conditions. An estimated 16 salting/mineral-protein supplements sites would be located in the Klootchman allotment. Salting would affect approximately 0.04 acres.

In the Klootchman Allotment, an estimated 52 acres of soil are in a detrimental condition as a result of livestock grazing. Alternative 3 does not include any new fences or water development and would not result in additional acres of soil disturbance.

Sherwood Allotment - There are 8.5 miles of stream that would be grazed by livestock in the Sherwood allotment. Livestock grazing would detrimentally impact approximately 2 acres of the 97 acres of riparian areas. There are 16 water developments. The estimated acres of detrimental soil condition associated with the existing developments are 16. There are approximately 8.3 miles of existing pasture fence. There is an estimated 10 acres of detrimental soil conditions resulting from fences. An estimated 10 salting/mineral-protein supplements sites would be located in the Sherwood Allotment, resulting in approximately 0.02 acres of disturbance.

In the Sherwood Allotment, an estimated 28 acres of soil are in a detrimental condition as a result of livestock grazing. Alternative 3 does not include any new fences or water development and would not result in additional acres of soil disturbance.

Shotgun Allotment - There are an estimated 18.2 miles of stream that would be grazed by livestock in the Shotgun Allotment. Livestock grazing would detrimentally impact approximately 4.5 acres of the 220 acres of riparian areas. There are 33 water developments resulting in an estimated 33 acres of detrimental soil conditions. There is an estimated 11.4 miles of existing pasture fence resulting in 14 acres of detrimental soil conditions from fences. An estimated 15 salting/mineral-protein supplements sites are located in the Shotgun Allotment; resulting in an estimated 0.04 acres of detrimental soil conditions.

In the Shotgun Allotment, an estimated 51 acres of soil are in a detrimental condition as a result of livestock grazing. Alternative 3 does not include any new fences or water development and would not result in additional acres of soil disturbance.

Cumulative Effects

The effects of past, present, and reasonably foreseeable future actions are described in detail under Alternative 1 and are applicable to this alternative as well.

There is an estimated 231 acres of existing detrimental soil conditions from livestock improvements in the project area. Alternative 3 would not result in any additional compaction, displacement, and post holing from activities associated with livestock grazing.

Past harvest activities have resulted in an estimated to be 4,520 acres or approximately 7 percent of the total 61,165 acres. Past road construction activities have resulted in approximately 540 acres of detrimental soil conditions. The total acres of detrimental soil conditions in the project area are estimated at 5,347 acres or approximately 8 percent of the project area.

Present and reasonably foreseeable projects include the West Maurys and East Maury projects which propose a variety of commercial harvest, noncommercial thinning, and fuels reduction activities across the Maury Mountains and in all allotments. In all, these projects would result in activities on approximately 32,300 acres throughout the project area. These projects would

result in slight increases in detrimental soil conditions from road construction, commercial timber harvest, and grapple piling activities. These increases are expected to be less than one-tenth of one percent. The Sherwood Wildlife Prescribed Burn includes burning on approximately 1,300 acres in the Sherwood Allotment and is not expected to increase the amount of detrimental soil conditions.

Alternative 4

Direct and Indirect Effects

Double Cabin Allotment - The direct and indirect effects of Alternative 4 would be the same as Alternative 2.

East Maury Allotment - The direct and indirect effects of Alternative 4 would be the same as Alternative 2.

Klootchman Allotment - The direct and indirect effects of Alternative 4 would be the same as Alternative 2.

Sherwood Allotment - The direct and indirect effects of Alternative 4 would be the same as Alternative 2.

Shotgun Allotment - The direct and indirect effects would be the same as Alternative 2 for miles of stream, water developments, and salting/mineral supplement locations. In Alternative 4, the Shotgun Allotment would be divided into three pastures and an additional 7.1 miles of fence would be constructed. This new fence would result in 8.5 acres of additional soil in a detrimental condition.

In the Shotgun Allotment, Alternative 4 would result in an estimated 18.5 acres of additional detrimental soil conditions resulting from new water developments and fences. In all, there would be an estimated 47 acres of detrimentally impacted soil in the Shotgun Allotment as a result of livestock grazing.

Cumulative Effects

There is an estimated 231 acres of existing detrimental soil conditions from livestock improvements in the project area. Alternative 4 would result in an estimated 62 acres of additional compaction, displacement, and post holing from proposed improvements.

Past harvest activities have resulted in an estimated to be 4,520 acres or approximately 7 percent of the total 61,165 acres. Past road construction activities have resulted in approximately 540 acres of detrimental soil conditions. The total acres of detrimental soil conditions in the project area are estimated at 5,353 acres or approximately 8 percent of the project area.

Present and reasonably foreseeable projects include the West Maurys and East Maury projects which propose a variety of commercial harvest, noncommercial thinning, and fuels reduction

activities across the Maury Mountains and in all allotments. In all, these projects would result in activities on approximately 32,300 acres throughout the project area. These projects would result in slight increases in detrimental soil conditions from road construction, commercial timber harvest, and grapple piling activities. These increases are expected to be less than one-tenth of one percent. The Sherwood Wildlife Prescribed Burn includes burning on approximately 1,300 acres in the Sherwood Allotment and is not expected to increase the amount of detrimental soil conditions.

Heritage Resources

Affected Environment

Grazing has been an ongoing use on the Ochoco National Forest and in the Maury Mountains since the early 1900s. The heritage resource management program on the Ochoco National Forest works with the Oregon SHPO (State Historic Preservation Office) to avoid and manage heritage sites for new ground-disturbing projects. The ongoing grazing of livestock and existing improvements (i.e. fences, spring boxes, piping, and watering troughs) are not viewed as a new effect to heritage resources since the effect from more 100 years of grazing practices has already occurred.

In general, a cow walking or grazing across a pasture would not have a detrimental effect on a heritage resource. Detrimental effects to heritage resources occur where use is concentrated, such as at water developments, along fence lines, and around salting areas. From heritage resource standpoint, the timing of the livestock grazing is not important. The effects to heritage sites would be the same whether the season is early May through July or May through September. Moist soil conditions would increase the likelihood of trampling and artifact breakage, such as at wet meadows and spring sites as well as springtime conditions. In a similar way, the difference between a rest-rotation system and a deferred-rotation system would not cause different effects to heritage resources. For these reasons, this analysis focused on areas where livestock concentrate (fence lines, water developments, and salting areas) and not on the timing of grazing or use of pastures.

Detrimental impacts to archaeological sites from the concentration of livestock include surface re-arrangement and damage to artifacts, soil compaction, soil displacement, post holing, trampling, trails, and disturbance to surface and subsurface integrity from 0-6 inches. Bioturbation or soil displacement from freezing and thawing also occurs from 0-6 inches below the surface. The surface to 6 inches below the surface have been disturbed for at least 100 years from natural processes, grazing, timber harvest, road building, and a variety of past uses. The subsurface integrity, to at least 6 inches below surface, has been compromised by past activities.

An estimated 20 percent of the Maury Mountains or some 21,000 acres has been surveyed for heritage sites since 1979. Information from previous surveys and on all known sites was used during this analysis. Selected high value sites overlapping with water developments and existing fences were revisited and updated during the 2005 field season. Heritage surveys were completed for all new fences during the 2004 field season. Heritage surveys were completed for most new or reconstructed water developments during the 2004 and 2005 field season. (Areas

not surveyed include 11 new spring developments and 6 water developments identified for reconstruction).

The majority of heritage site types are lithic scatters representing the Indian settlement period. Other site types include log troughs, structural remains, carved aspen, and salt logs (representative of the Anglo-settlement period 1880-1950). These types of resources have a limited and natural life expectancy. Most of these sites are part of the stock grazing or FS administrative theme.

Lithic scatters are susceptible to surface and subsurface damage related to grazing activities. These types of sites are predicted to occur near springs, along drainages with developed terraces, ridgelines, and saddles (Claeyssens 1992). These areas correspond to water developments and where fence lines have been established along ridgelines and natural breaks. Structural remains include early portable sawmill activities, cabins, guard stations, and fire lookouts.

Known heritage sites and existing survey coverage (20% sample) provided data for this analysis. New cultural resource surveys were completed for proposed activities including spring developments and fence construction. New survey coverage for proposed fence lines and water developments resulted in no new heritage sites being discovered. New fences were designed to avoid heritage sites.

This information has been summarized from the May 15, 2006, Resource Report for Heritage Resources. The resource report contains additional, more detailed information.

Double Cabin

The Double Cabin Allotment has fence lines overlapping with five heritage sites. These are lithic scatter sites which have been determined eligible to the NRHP (National Register of Historic Places) or have not been evaluated and would be managed as potentially eligible. The fences have likely been in place for 50-100 years and there is a cattle trail along one or both sides of the fence. The trail or traffic area is about 15 inches wide along the fence and artifacts in this area are subject to trampling, displacement, and/or breakage. The area and degree of effect has remained somewhat constant for 50-100 years.

Fourteen heritage sites overlap with water developments. Of these, nine are lithic scatters, four are log troughs, one is of structural remains, and one is a carved aspen site. Cattle congregate at water developments for drinking and bedding down. The effect to archaeological sites in these moist areas includes hoof trampling which results in artifact breakage and subsurface disturbance and bedding areas within 100 feet of spring box where bare soil is exposed and artifacts may be displaced or broken. Many log troughs were developed for livestock grazing in the early to mid 1900s and in most cases they have been replaced with metal troughs. The 60-80 year old log troughs are often left without a water supply which allows them to dry out and become more likely to decay. The wooden troughs are subject to cattle trampling and natural decay. Carved aspen are also common near springs and riparian areas where livestock grazing has occurred. In most cases, the carvings decline in clarity over the years due to natural conditions and aging. Livestock grazing does not affect the carved trees because they are mature trees and the carvings

are generally above rubbing height. Cattle grazing may affect structural remains when/if they are subject to trampling which is usually based on location, slope, and vegetative conditions. The Double Cabin Allotment is located on the south-facing slopes of the project area in the Faught, Indian, and Double Cabin drainages. Archaeological site densities are high largely due to the variety and abundance of upland resources.

East Maury

The East Maury Allotment has fence lines crossing three heritage sites (two lithic scatters and one salt log). The lithic scatter sites have been determined eligible for the NRHP. The fence crosses site boundaries and a cattle trail has been established along both sides of the fence. Soil compaction and soil disturbance occurs along the fence (approximately 3 feet in width) and there is a potential for artifact breakage and displacement. The salt log site is not affected by the fence line or associated cattle trail but is subject to natural deterioration and decay. Nine heritage sites overlap with water developments. Of these sites, seven are lithic scatters, two are log troughs, and one is structural remains. The structural remains are the Maury Guard Station and most structural improvements have been removed. Non-native vegetation and foundation remains have not been affected by grazing activities. The log trough at Rimrock Spring has deteriorated and only the original metal pipe remains. Rimrock Spring is proposed spring development 84. The log trough at Doggie Spring is in a deteriorated state and has been replaced by two metal troughs. Existing spring developments 17 and 84 have been designed to minimize effects from cattle. Four lithic scatter sites have water developments which have been in place for more than 50 years, one site has been determined not eligible to the NRHP and the remaining sites would be managed as potentially eligible.

This allotment is dry and the density for archaeological sites is considerably lower compared to other allotments in the Maury Mountains. This allotment has been rested in the recent past and several existing water developments have been designed to avoid or minimize impacts to archaeological sites. Sensitive areas (where known archaeological sites occur) for the most part in this allotment correspond to spring sites where water is available. Cattle trailing has disturbed the surface integrity of portions of two lithic scatter sites along existing fence lines (6 feet in width) due to compaction and potential breakage of artifacts.

Klootchman

The Klootchman Allotment has fence lines overlapping with six lithic scatter sites. Water developments overlap with six heritage sites (five lithic scatters and one log trough). One lithic scatter site has been determined eligible to the NRHP and the other sites would be managed as potentially eligible. Proposed spring development 8 overlaps with a lithic scatter site. Six lithic scatter sites are located at spring developments which have been in use for more than 50 years. Five have been determined eligible to the NRHP and one would be managed as potentially eligible. Disturbance at these sites likely includes artifact breakage, surface rearrangement, and potential subsurface disturbance from trampling. Shearing Spring log trough is in a state of decay and a portion of the trough is located in the stream channel. The Klootchman Allotment is a predominantly south facing allotment with some high archaeological site densities.

Sherwood

The Sherwood Allotment fence lines overlap with two lithic scatter sites (one is eligible to the NRHP and one is potentially eligible). Three heritage sites overlap with existing spring developments (two lithic scatters and one log trough). One of these lithic sites is eligible to the NRHP and one is potentially eligible. The log trough has been determined not eligible to the NRHP. The log trough site is scheduled for improvement. The log trough is deteriorating and no longer holds water. Types of impacts to the two lithic scatter sites would include surface re-arrangement or breakage of artifacts and trampling. The Sherwood Allotment is mostly on north-facing slopes with a variety of aspects and vegetative conditions. High archaeological site densities occur in this allotment.

Shotgun

The Shotgun Allotment fence lines overlap with three heritage sites, all lithic scatters. Eight heritage sites overlap with water developments. Of these, three are lithic scatters, three are log troughs, one is structure remains, and one is a carved aspen site. Proposed spring improvements 12 and 38 overlap with the log trough site and a lithic scatter site. Two sites along the fences are eligible to the NRHP, one site has been determined not eligible to the NRHP, and the remaining sites would be managed as potentially eligible to the NRHP. The structural remains are collapsed and adjacent to a proposed fence and no impacts from cattle have been identified. The mill site is located on private property within the National Forest boundary. Impacts associated with three lithic scatter sites along fence lines include trailing, soil compaction, and potential for artifact breakage. The three lithic scatter sites at springs have impacts associated with trampling, surface re-arrangement, and potential artifact breakage. The log troughs were built to provide livestock water and most have been replaced with metal troughs. The log troughs deteriorate rapidly when water is no longer piped to the trough or the trough no longer holds water. This allotment has areas with traditional root crops of value to the Confederated Tribes of the Warm Springs Reservation. The Shotgun Allotment is located on mostly north-facing slopes. Archaeological sites are concentrated in a few areas.

West Maury

The West Maury Allotment has fence lines that overlap with two lithic scatter sites (one is eligible to the NRHP and one is managed as potentially eligible). Water developments overlap with six heritage sites: two lithic scatters, two log troughs, one rail fence, and one structure remains. Spring developments 5 and 95 overlap with a potentially eligible lithic scatter site with a log trough. Sites along fence lines (10 feet either side) would be affected by trailing, surface re-arrangement, and potential artifact breakage. Lithic scatter sites at the spring developments have been affected by trampling, surface re-arrangement, and potential artifact breakage. Water developments would be coordinated with the archaeologist prior to installation to protect the values which make these sites eligible to the NRHP. The West Maury Allotment is located on the western end of the Maury Mountains.

Environmental Consequences

The evaluation criteria to analyze the effects of grazing on heritage resources are based on disturbance to the resource and the qualities which make it eligible to the NRHP. The effect from grazing to heritage sites was considered and disturbance was determined to occur where livestock concentrate and cause a change in the surface and subsurface conditions.

Alternative 1

Direct and Indirect Effects

Alternative 1 proposes to eliminate grazing in the Maury Mountains. Current grazing operations would continue for 2 years and then cease. Fence lines and metal troughs would be removed and livestock would no longer be permitted on the six allotments in the project area. For 2 years while grazing continues, direct effects from cattle trampling, such as artifact breakage and displacement would continue. After 2 years, there would be no further direct effects to archaeological sites from trailing, hoof action, or soil disturbance and displacement. High value heritage areas where effects from livestock grazing have been documented would not continue, but past affects would not change. High value areas are located in Double Cabin, Shotgun, and Klootchman Allotments. Removal of metal troughs and fences where heritage sites occur would be coordinated and implemented to avoid creating new disturbance at known sites. Log trough water developments or water piped to such troughs would not be removed.

Cumulative Effects

All other activities would continue. Forest users would continue to drive and recreate in the project area. Management activities like prescribed burning, fire suppression, stream improvement projects, wildlife projects, timber harvest, thinning of young trees, and juniper thinning would continue as authorized by other decisions. Projects including West Maurys Fuels and Vegetation Management Project, East Maurys Fuels and Vegetation Management Project, Maury Aspen, and Maury Headcuts, Pre-Emption and Rickman Creek Restoration Projects and ongoing invasive weeds treatment have been designed to avoid or protect the qualities which make these sites eligible to the NRHP. These projects would not affect heritage sites and would not add to the cumulative effect to heritage resources. There would be cumulative effects to heritage sites from dispersed camping, artifact collecting, and off-road vehicle use. The effects from these activities include artifact breakage, surface rearrangement, potential subsurface disturbance, and artifact displacement and removal.

Alternatives 2, 3, and 4

Direct and Indirect Effects

Alternatives 2 and 4 would include the construction of new water development and fences and the removal of some fences. Field surveys conducted during 2005 revealed that the new fences in Alternatives 2 and 4 would avoid all known heritage sites.

No new water developments would be constructed on archaeological sites. There are some existing water developments that occur on or near known sites. Maintenance or relocation of these water developments would be coordinated with the district Archaeologist to avoid or protect known sites. Alternatives 2, 3, and 4 would not change the effects to heritage resources as a result of livestock grazing over the last 100 years. There would be no new direct effects to heritage resources from activities in Alternatives 2, 3, and 4.

Under Alternative 3, livestock would continue to graze and no new water developments or changes to pasture or allotment fences would occur. Livestock would continue to water at the same spring developments they are familiar with. Livestock distribution is not expected to change. A snapshot today shows livestock have caused disturbance to the surface at about 10 percent of the water developments. The condition of these water developments would be expected to remain constant.

A rest-rotation system in Alternatives 2 and 4 (with the exception of the East Maury Allotment) would retain the same number of livestock with more time in selected pastures while resting or not using one pasture each year. This would result in a slightly higher density of livestock per acre. The effect of livestock trailing along a fence line for 10 days compared to 15 days would be comparable. The livestock would be causing the same effect to heritage resources along the trail or fence line. The East Maury Allotment is located on the notably drier east end of the project area. The 9,444-acre allotment is divided into 5 pastures. The East Maury Allotment would be rested for 10 years while installing new water developments. There would no effect to heritage resources during the period of non-use. The proposed water developments would avoid or protect the value of heritage sites.

Cumulative Effects

The Maury Mountains have been grazed for more than 100 years. Most range improvements (such as fences and troughs) were constructed by the 1940s and damage to archaeological sites occurred by 1940. Current grazing continues to effect portions of the sites that have been altered since the early 1900s. The effect to heritage sites has previously occurred and continued grazing is not increasing the amount of damage or leading to the loss of heritage resources. Since 1980, projects have been designed to avoid or protect heritage sites. For the past 25 years, all new range improvements have been coordinated to manage for heritage resources. In this same way, road construction and timber sale activity prior to 1980 contributed to greater damage and loss of heritage sites and information than grazing and associated activities.

Ongoing forest uses and activities and all scheduled activities would continue. Forest users would continue to drive and recreate in the forest. There would be effects to heritage sites by dispersed camping, artifact collecting, and off-road vehicle use. Projects like prescribed burning, wildfires, fire suppression, headcut repair activities, aspen thinning and fencing, timber harvest, thinning of young trees and juniper would continue. Projects including West Maurys Fuels and Vegetation Management Project, East Maurys Fuels and Vegetation Management Project, Maury Aspen, Maury Headcuts, Pre-Emption and Rickman Creek Restoration Projects, and ongoing invasive (noxious) weeds treatment have been designed to avoid or protect the qualities which

make heritage sites eligible to the National Register of Historic Places. Consultation with the Oregon SHPO has been completed. These projects would not add any effects to heritage resources.

Socio-Economics

Affected Environment

For the purposes of describing socio-economics effects, the counties of Crook, Deschutes, and Jefferson were considered because they are the area most likely affected.

The major population centers and their population figures based on the 2000 census are Prineville (7,356), Bend (52,029), Redmond (13,481), and Madras (5,078) (U.S Department of Commerce, Bureau of Census 2001). The total population for the three-county area during the 2000 Census totaled 234,235. Populations and change for the region and by each individual county are displayed in Table 12.

Table 12. Central Oregon Population Growth

County	Population		Change	Percent
	1990 Census Data	2000 Census Data		
Jefferson	13,676	19,009	5,333	39
Deschutes	74,958	115,367	40,409	53.9
Crook	14,111	19,182	5,071	35.9
Totals	102,745	153,558	50,813	50

Source: U.S. Bureau of the Census, Vital Records, Oregon Health Division

Future population projections mimic that of the past decade. Deschutes, Crook, and Jefferson Counties are expected to continue with aggressive growth.

Madras and Jefferson County have Central Oregon's most culturally diverse population. Native Americans comprise 16 percent and Hispanics 18 percent of the area's overall residents. Crook and Deschutes Counties' minority populations are 7 percent and 5 percent, respectively. Oregon as a whole consists of a 15 percent minority population (U.S. Department of Commerce 2001).

According to the 2000 Census, estimated civilian labor force was 7,525 in Crook County (up 12 percent since the 1990 census), 57,614 in Deschutes County (up 40 percent since the 1990 census), and 8,570 in Jefferson County (up 31 percent since the 1990 census). The labor force in Oregon as a whole increased 18 percent.

In Crook County, the three largest employment sectors were trade (1,640), lumber and wood products (1,510), and government (1,180). Since then, with the closure of the remaining sawmills, employment in the lumber and wood products has decreased. In February 2006, there were 1,110 people employed in the lumber and wood products sector. In Deschutes County, the three largest sectors were Finance/Insurance/Real-estate (14,170), trade (13,080), and government (6,900). In Jefferson County, the three largest sectors were government (2,460),

trade (1250), and lumber and wood products (1,150) (U.S. Department of Commerce, Bureau of Economic Analysis 2001 and Labor Trends 2006).

Unemployment rates in the individual counties were 9.1 percent in Crook County, 6.4 percent in Deschutes County, and 6.5 percent in Jefferson County. The unemployment rate in Oregon as a whole was 5.7 percent (U.S. Department of Commerce, Bureau of Census 2001).

Since then the economies have had both better and worse years. As of February 2006, unemployment rates in the individual counties were 7.7 percent in Crook, 6.1 percent in Deschutes, and 8.5 percent in Jefferson. The unemployment rate in Oregon as a whole was 6.5 percent (Labor Trends 2006)

The economies of Deschutes and Jefferson Counties, followed by Crook, are the most robust in all of central and southeastern Oregon. In Deschutes County, although there has been an increase in the number of jobs created, the huge increase in the labor force (up 40%) has negated much of this success, at least in terms of the unemployment rate. Crook County's overall economic diversity which is dominated by one manufacturing sector industry (lumber and wood products) and one wholesale trade sector company (Les Schwab) is lower than the other two economies; however, because of their diversity all three economies are expected to remain strong. Future projections call for continued growth and diversification of these economies (U.S. Department of Commerce, Bureau of Census 2001 and Oregon Employment Department).

Crook County's agricultural sector is heavily oriented toward livestock (cattle). However, much of the marketing and agricultural services for the tri-county area, are located in Jefferson County. Although farm employment is only about one third of what it was in 1970, it remains an important contributor to the local and surrounding communities' economies.

Statewide in 2005 there were 1,686,000 cattle. Livestock (cattle) sales statewide in 2005 were \$619,491,000, which comprised 21 percent of all agricultural sales. In Oregon, livestock sales lead all state agricultural production.

Agricultural crop sales in Crook County for 2005 totaled \$42,624,000. Livestock sales were 65 percent or \$27,487,000 of that total. Agricultural crop sales in Jefferson County for 2005 totaled \$42,958,000. Livestock sales were 29 percent or \$12,588,000 of that total. Agricultural crop sales in Deschutes County for 2005 totaled \$23,257,000. Livestock sales were 38 percent or \$8,929,000 of that total (Oregon State University 2005). Of the three counties' agricultural economic sectors, Crook County is the most dominated by cattle.

Most of the animals that currently graze on the Ochoco National Forest (including on these allotments) are mother or breeding beef cattle. They are part the ranching and farming economic base of the area. They produce the calves, which are sold to be "fed out" to produce consumer beef and provide a foundation for the beef industry. They are part of the basis of stability for the local industry. Livestock sales in Crook County were 65 percent (\$27,487,000) of the total agricultural crop sales, by far the single largest agricultural commodity in the county.

Changing the authorized level of use could affect the economic viability of the permittees' operations, depending on the minimum number of Animal Unit Months (AUMs) necessary for the permittees to remain in business. The magnitude of effects would depend upon several factors including: (1) options available to each permittee; (2) the size of their total operations; (3) debt structure; (4) access to and availability of private land for grazing; (5) availability and costs of replacement forage; (6) business goals and objectives; and, (7) the market for cattle.

Changing the number of permitted AUMs could affect the associated ranches' capacity because grazing on these allotments provide up to 50 percent of the ranches' forage needs.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under Alternative 1, grazing would be eliminated on all six allotments. Whether the permittees would continue to maintain their business in a reduced form or supplement the forage loss through other means could depend on several factors. The permittees may choose a number of different options to provide forage previously provided by these allotments. They may choose to: (1) graze on their own properties if they have sufficient grazing land; (2) find and graze on other private lands at a fee; (3) use alternative sources of feed such as purchasing hay; or (4) reduce the size of their herds (i.e. sell cattle) to reduce their demand for forage.

Eliminating cattle from these allotments could affect the economic viability of the livestock operations because of the additional costs associated with securing additional range or buying supplemental feed, to accommodate herd sizes consistent with current permitted numbers. Additional costs could include the possibility of additional fencing and establishment of water on newly acquired range, along with increased trucking costs, and labor costs associated with moving and otherwise handling cattle.

In Crook County, buying additional pasture use can cost up to \$15 per AUM (Fessler 2003). The amount charged per AUM on public lands is \$1.56 (2006). Along with additional forage costs, there may be added costs related to transporting cattle to various locations, hiring additional employees, or other administrative costs that may occur because of changing established grazing routines.

Alternatives 2, 3, and 4

Direct and Indirect Effects

Alternatives 2 and 4 reduce permitted AUMs approximately 17.5 and 13 percent, respectively. The Double Cabin Allotment is reduced 20 percent and the Shotgun Allotment is reduced 45 percent. In Alternative 2, the Klootchman Allotment is reduced 20 percent, in Alternative 4 AUMs would remain the same. Alternative 3 is the current management alternative and AUMs would remain the same.

Alternatives 2 and 4 include a daily management requirement in the Sherwood Allotment and two pastures in the Double Cabin Allotment. In Alternative 2, daily management is required in the Shotgun Allotment. All allotments would require additional maintenance with the addition of new water developments and/or fences. These requirements would increase the administrative cost to manage these allotments.

Although the changes in AUMs and increased administrative costs would have some economic impact on the permittees, the magnitude of effects depends upon a number of factors, including options available to each permittee, the size of their total operations, debt structure, and business goals and objectives. These factors are specific to each individual operation and only the permittees can choose which options fit their business needs.

Table 13 shows annual permitted AUMs by alternative. Assuming a direct relationship between herd size and total sales, the percentage decreases in AUMs noted for each alternative when compared to Alternative 3 provides estimates of changes in potential gross sales.

Table 13. Reductions in AUMs by Alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Reductions in AUMs	5,081	884	0	656
Percent Change	-100	-17.5	0	-13

Grazing reductions would affect employment and income in three ways: (1) direct effects attributable to employment associated with the ranches; (2) indirect effects attributable to industries that supply materials, equipment, and services to the ranches; and (3) induced effects attributable to personal spending by the ranch owners, employees, families, and related industries.

Employment and personal income impacts were derived from estimates predicted for the Ochoco National Forest and Crooked River National Grassland (USDA Forest Service 1989). Personal income effects have been adjusted to 2006 dollars.

Table 14 shows the estimated income by alternative. Job totals shown in the table should be interpreted as regional impacts to the general area of influence and not necessarily the expected impact on any one county. This small change is because the ranching industry does not require substantial labor inputs to produce a product unit (one cow).

Table 14. Ten-year Employment and Income, Impacts by Alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Jobs* (0.25/1000 AUMs)	0	7.3	9.5	7.8
Income* (\$3,575/1000 AUMs)	0.00	\$103,800	\$135,400	\$111,900

*No jobs or income was calculated for the East Maury Allotment because it would be rested for 10 years.

Changes in jobs and personal income would result in changes in the economic activity of the communities where the permittees base their operations, hire employees, and buy equipment,

supplies, and services. Under all alternatives, corresponding job and income effects would be attributable primarily to Crook and Jefferson Counties.

Cumulative Effects

The economic influence from implementation of any of the alternatives, including Alternative 1, is likely to be minimal within the economic context of the three county area as a whole. Although the area has a substantial number of people whose work activities fall within the ranching life-style category, the ranching industry does not require substantial labor inputs to produce a unit of output (a single cow). In addition, the ranching industry is not tied as directly to Federal lands as the wood products industry. As a result, the elimination of livestock grazing under Alternative 1 would not have a major impact on the number of people making a living from ranching. Under Alternatives 2, 3, and 4, although there are differences in permitted numbers, actual use is expected to be relatively similar to the recent past, as a result all three action alternatives will help maintain the existing ranching industry and the people who make a living from it.

Employment trends within Crook County and throughout the Central Oregon area indicate the increased job supply is primarily in construction, services, and trade. Even considering other management activities in the project areas (timber harvest, road construction, burning, and precommercial thinning from the West Maurys Fuels Vegetation Management Project, Sherwood Wildlife Burn, Maury Aspen, and other projects) the economic influence would be small.

Cumulative Effects

Cumulative effects have been discussed throughout this chapter. As discussed in the June 24, 2005, Council on Environmental Quality Memorandum on Guidance of the Consideration of Past Actions in Cumulative Effects Analysis, past actions that warrant consideration because they are continuing to cause identifiable effects in the project area have been considered and are described in Table 15. Past activities that have changed the environmental baseline have been included in the description of the affected environment. Table 15 also includes a description of present and reasonably foreseeable actions that were considered in the cumulative effects sections. The type and amount of activity have been described on an allotment-by-allotment basis to provide both the decision-maker and the public a better estimate of the expected effects.

Past activities include activities that have already been completed. Present activities include activities that have been authorized under a separate NEPA decision and are partially implemented or will be implemented in the near future (1-10 years). Reasonably foreseeable actions are those actions that have been proposed, but have not been authorized through a NEPA decision.

Table 15. Past, Present, and Reasonably Foreseeable Future Actions

	Past	Present	Reasonably Foreseeable
Allotment	Project/Activity		
Double Cabin	<u>Riparian Planting:</u> Double Cabin Creek - 1.0 miles; Wiley Creek - 0.5 miles; Indian Creek - 1.5 miles	<u>West Maurys Project:</u> 2,602 acres of commercial harvest, noncommercial thinning, and fuels reduction activities. <u>Maury Aspen Restoration:</u> thinning conifers and fencing 2 sites, approx. 5 acres.	<u>East Maurys Project:</u> 3,981 acres of for commercial harvest, non-commercial thinning, and fuels reduction activities.
East Maury	<u>Riparian Planting:</u> Maury Creek - 1.5 miles <u>Log Placement:</u> Maury Creek - 1.5 miles	None identified.	<u>East Maurys Project:</u> 4,436 acres of commercial harvest, noncommercial thinning, and fuels reduction activities.
Kloutchman	<u>Riparian Planting:</u> Cow Creek - 1.75 miles; Ferguson Creek - 0.4 miles; Florida Creek - 0.5 miles; Kloutchman Creek - 3 miles; Hammer Creek - 0.25 miles; Pre-emption Creek - 1 mile <u>Headcut Repair:</u> Pre-emption Creek - 13 structures; Kloutchman Creek - 4 structures <u>Checkdams:</u> Kloutchman Creek Tributaries - 0.4 miles Kloutchman Creek - 0.75 miles <u>Log Placement:</u> Ferguson Creek - 0.4 miles; Kloutchman Creek - 2 miles.	<u>West Maurys Project:</u> 7,642 acres of commercial harvest, noncommercial harvest, and fuels reduction activities.* <u>Riparian Planting:</u> around headcut repairs on Kloutchman Creek. <u>Maury Aspen Restoration:</u> thinning conifers and fencing 7 sites, approximately 20 acres.	None identified.

Table 15. Past, Present, and Reasonably Foreseeable Future Actions

	Past	Present	Reasonably Foreseeable
Allotment	Project/Activity		
Sherwood	<p><u>Riparian Planting:</u> Sherwood Creek - 0.5 miles</p> <p><u>Headcut Repair:</u> Newsome Creek - 0.1 miles; Gibson Creek - 3 structures.</p> <p><u>Checkdams:</u> Newsome Creek - 1.5 miles</p> <p><u>Log Placement:</u> Newsome Creek - 1.5 miles; Sherwood Creek - 1 mile</p>	<p><u>West Maurys Project:</u> 3,586 acres of commercial harvest, noncommercial thinning, and fuels reduction activities.</p> <p><u>Riparian Planting:</u> around headcut repairs on Gibson Creek.</p> <p><u>Sherwood Wildlife Prescribed Burn:</u> 1,300-acre burn.</p>	None identified.
Shotgun	<p><u>Riparian Planting:</u> Pine Creek Tributaries - 0.75 miles; Shotgun Creek - 0.25 miles; East Shotgun Creek; Drake Creek - 1 mile</p> <p><u>Headcut Repair:</u> Drake Creek - 0.5 miles</p> <p><u>Log Placement:</u> Pine Creek - 2 miles; Drake Creek - 1 mile</p>	<p><u>West Maurys Project:</u> 4,403 acres of commercial harvest, noncommercial thinning, and fuels reduction activities.</p> <p><u>Headcut Repair:</u> West Fork Shotgun Creek - 2 structures; Drake Creek - 4 structures</p> <p><u>Maury Aspen Restoration:</u> thinning conifers and fencing 6 sites, approx. 21 acres</p>	<u>East Maurys Project:</u> 5,669 acres of commercial harvest, noncommercial thinning, and fuels reduction activities.
	Projects/Activities Common to all Allotments		
	Historical livestock grazing, timber harvest, prescribed fire, fire suppression, firewood cutting, seeding non-native species, beaver trapping, road construction, and recreational activities, such as driving, camping, hunting, riding OHV's, and artifact collecting.	Firewood cutting, fire suppression, weed treatment, road maintenance (grading and blading of Forest Roads 16, 1640, 17 and 1700-600), fence maintenance, and recreational activities such as driving, camping, hunting, and riding OHV's.	Fire suppression, firewood cutting, weed treatment, road maintenance (grading and blading of Forest Roads 16, 1640, 17 and 1700-600), and recreational activities such as driving, camping, hunting, and riding OHV's.

Other Required Disclosures

The CEQ regulations at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ... other environmental review laws and executive orders.” Several laws and executive orders were consulted during the preparation of this draft environmental impact statement.

National Forest Management Act

To ensure consistency with the National Forest Management Act, the Ochoco National Forest Land and Resource Management Plan, as amended, was consulted. The Forest Plan contains several standards and guidelines that apply forest-wide or to specific management areas. Both forest-wide and management area specific standards and guidelines were reviewed. Table 16 briefly identifies the applicable standards and guidelines and how the alternatives are consistent. If the alternatives are not consistent, a brief description of the needed Forest Plan amendment is included. In addition, the requirements at USC (United States Code) 1604(g)(3) were reviewed and the proposed activities are consistent.

Alternative 1 is the no action alternative and is not included in Table 16 because livestock grazing would no longer be authorized.

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
MA-F12 Eagle Roosting Areas. Use of motorized equipment prohibited from December 1 to May 1 (Forest Plan, p. 4-147).	Design element prohibits use of motorized equipment from December 1 to May 1.	Design element prohibits use of motorized equipment from December 1 to May 1.	Design element prohibits use of motorized equipment from December 1 to May 1.	Design element prohibits use of motorized equipment from December 1 to May 1.
MA-F13 Developed Recreation Areas. No livestock grazing is allowed in core areas. There are 5 developed recreation sites in the project area (Forest Plan, p. 4-142).	Core areas are fenced to exclude livestock.	Core areas are fenced to exclude livestock.	Core areas are fenced to exclude livestock.	Core areas are fenced to exclude livestock.
MA-F15 Riparian. Encourage improvements to disperse livestock away from riparian areas (Forest Plan, p. 4-144).	New fences and water developments would encourage livestock to disperse away from riparian areas. Earlier grazing season would encourage livestock dispersal. Several existing water developments would be relocated away from riparian areas. Salt and protein blocks would be used to disperse livestock away from riparian areas.	Salt and protein blocks would be used to disperse livestock away from riparian areas.	New fences and water developments would encourage livestock to disperse away from riparian areas. Earlier grazing season would encourage livestock dispersal. Several existing water developments would be relocated away from riparian areas. Salt and protein blocks would be used to disperse livestock away from riparian areas.	New fences and water developments would encourage livestock to disperse away from riparian areas. Earlier grazing season would encourage livestock dispersal. Several existing water developments would be relocated away from riparian areas. Salt and protein blocks would be used to disperse livestock away from riparian areas.

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
MA-F15. Riparian Forage Utilization Table 4-30. Allowable use of available forage for livestock ranges from 0-50 percent based on whether plants communities are in satisfactory or unsatisfactory condition (Forest Plan, p. 4-141 and 4-142). In this project area, allowable use is 0-40 percent.	Double Cabin - 40 percent.	Double Cabin - 75 percent. Forest Plan amendment needed to alter utilization standards.	Double Cabin - 40 percent.	Double Cabin - 40 percent.
	East Maury - 40 percent.	East Maury - 55 percent. Forest Plan amendment needed to alter utilization standards.	East Maury - 40 percent.	East Maury - 40 percent.
	Kloutchman - 40 percent.	Kloutchman - 60 percent. Forest Plan amendment needed to alter utilization standards.	Kloutchman - 40 percent.	Kloutchman - 40 percent.
	Sherwood - 40 percent.	Sherwood - 60 percent. Forest Plan amendment needed to alter utilization standards.	Sherwood - 40 percent.	Sherwood - 40 percent.
	Shotgun - 40 percent.	Shotgun - 65 percent. Forest Plan amendment needed to alter utilization standards.	Shotgun - 50 percent. Forest Plan amendment needed to alter utilization standards.	Shotgun - 40 percent.
MA-F15. No more than 10 percent of an activity area can be compacted or displaced to a degree which degrades vegetative productivity (Forest Plan, p. 4-199).	Livestock grazing would result in less than 1/10 percent of detrimental soil conditions in MA-F15 riparian areas.	Livestock grazing would result in less than 1/10 percent of detrimental soil conditions in MA-F15 riparian areas.	Livestock grazing would result in less than 1/10 percent of detrimental soil conditions in MA-F15 riparian areas.	Livestock grazing would result in less than 1/10 percent of detrimental soil conditions in MA-F15 riparian areas.

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
<p>MA-F15. The requirement for shade along streams will generally correspond to provisions for more than 80 percent of the surface shaded. Where this can not be attained, 100 percent of the potential for shade is the standard. Shade requirements may be reduced in cases where management is necessary to sustain a thrifty community of shade providing species over time, e.g., in the case of local infestation or disease or for managing for future shade in a decadent stand, but activities may not result in an increase in temperatures above the limits specified (Forest Plan, p. 4-240).</p>	<p>Map 13 displays existing levels of shade. The amount of shade would increase over time because of increased growth, vigor, and expansion of willow, alder, sedges, rushes, and other riparian vegetation in wetlands and floodplains. Where riparian vegetation is present, vegetative cover is expected to show measurable increases in approximately 10 years. Overall, vegetative cover along streams, including those on the 303(d) list, is expected to improve. It is expected to take approximately 10-20 years before stream temperatures are expected to decrease as a result of increased amounts of shade.</p>	<p>Overall, riparian vegetative cover (i.e. shade) would remain at existing levels (see Map 13). Some areas are expected to show slight increases and some areas are expected to decline. Livestock within all allotments, except for East Maury, would continue to browse and trample riparian vegetation, resulting in no increases in riparian vegetation and no decreases in stream temperature. Livestock would continue utilizing riparian areas at present levels. Livestock would continue to decrease riparian vegetative cover.</p>	<p>Map 13 displays existing levels of shade. The amount of shade would increase over time because of increased growth, vigor, and expansion of willow, alder, sedges, rushes, and other riparian vegetation in wetlands and floodplains. Where riparian vegetation is present, vegetative cover is expected to show a measurable increase in 10-15 years. Overall, vegetative cover along streams, including those on the 303(d) list, is expected to improve. It is expected to take approximately 10-20 years before stream temperatures are expected to decrease as a result of increased amounts of shade.</p>	<p>Map 13 displays existing levels of shade. The amount of shade would increase over time because of increased growth, vigor, and expansion of willow, alder, sedges, rushes, and other riparian vegetation in wetlands and floodplains. Where riparian vegetation is present, vegetative cover is expected to show a measurable increase in 10 years. Overall, vegetative cover along streams, including those on the 303(d) list, is expected to improve. It is expected to take approximately 10-20 years before stream temperatures are expected to decrease as a result of increased amounts of shade.</p>

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
MA-F18 Hammer Creek Wildlife Area, MA-F20 Winter Range, and MA-F21 General Forest Winter Range. Fall green-up after the regularly scheduled grazing season will be reserved for big game. Grazing extensions will generally not be permitted (Forest Plan, p. 4-143).	Design element indicates grazing will not be extended in these management areas.	Design element indicates grazing will not be extended in these management areas.	Design element indicates grazing will not be extended in these management areas.	Design element indicates grazing will not be extended in these management areas.
MA-F18 Hammer Creek Wildlife Area, MA-F20 Winter Range, and MA-F21 General Forest Winter Range. Use of motorized equipment restricted to open roads from December 1 to May 1 (Forest Plan, p. 4-147).	Design element restricts use of motorized equipment to open roads from December 1 to May 1.	Design element restricts use of motorized equipment to open roads from December 1 to May 1.	Design element restricts use of motorized equipment to open roads from December 1 to May 1.	Design element restricts use of motorized equipment to open roads from December 1 to May 1.
Forest-wide. Primary Range Utilization Table 4-31. Allowable use of available forage for livestock ranges from 0-50 percent based on whether plants communities are in satisfactory or unsatisfactory condition (Forest Plan, pp. 4-141 and 4-142). In this project area, allowable use is 0-40	Double Cabin - 40 percent.	Double Cabin - 35 percent.	Double Cabin - 40 percent.	Double Cabin - 40 percent.
	East Maury - 40 percent.	East Maury - 25 percent.	East Maury - 40 percent.	East Maury - 40 percent.
	Klootchman - 40 percent.	Klootchman - 30 percent.	Klootchman - 40 percent.	Klootchman - 40 percent.
	Sherwood - 40 percent	Sherwood - 60 percent. Forest Plan amendment needed to alter utilization standards.	Sherwood - 40 percent.	Sherwood - 40 percent.

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
percent.	Shotgun - 40 percent.	Shotgun - 50 percent. Forest Plan amendment needed to alter utilization standards.	Shotgun - 50 percent. Forest Plan amendment needed to alter utilization standards.	Shotgun - 40 percent.
Forest-wide, except Wilderness and Research Natural Areas. Allow new developments unless they conflict with the management emphasis for the specific management areas (Forest Plan, p. 4-146).	New range developments would not conflict with specific management area emphases.	No new range developments would be constructed.	New range developments would not conflict with specific management area emphases.	New range developments would not conflict with specific management area emphases.
Forest-wide, in the Crooked River and associated tributaries. Where stream temperatures exceed 58 F., management activities will include objectives for reducing stream temperatures to levels that will improve fish habitat capability (Forest Plan, p. 4-236).	Modifications to grazing practices, including season of use and new water developments would reduce livestock use in riparian areas and result in increased amounts and extent of riparian vegetation which would provide shade to streams and help to reduce stream temperatures.	This alternative does not propose any activities that would reduce stream temperatures.	Modifications to grazing practices, including season of use and new water developments would reduce livestock use in riparian areas and result in increased amounts and extent of riparian vegetation which would provide shade to streams and help to reduce stream temperatures.	Modifications to grazing practices, including season of use and new water developments would reduce livestock use in riparian areas and result in increased amounts and extent of riparian vegetation which would provide shade to streams and help to reduce stream temperatures.

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
<p>Forest-wide, Water Quality. Comply with State requirements in accordance with the Clean Water Act for protection of waters of the State of Oregon (Forest Plan, p. 236). INFISH (p. A-4) identifies an objective of “No measurable increase in maximum water temperature (7-day moving average of daily temperature of the warmest consecutive 7-day period). This means maintaining or decreasing the average of the 7-day maximum stream temperature so that it is less than 18° Celsius. The project area contains six streams that are currently on the 2002 303(d) list for exceeding state stream temperature standards.</p>	<p>Streams currently on the 303(d) list are expected to improve and have more shade (i.e. higher vegetative cover) and lower stream temperatures over time. Temperatures in 303(d) listed streams are expected to decrease. Bear Creek is expected to see slight decreases in stream temperatures because Antelope Reservoir will continue to be a heat source and influence temperatures in Bear Creek.</p>	<p>Streams listed on the state 303(d) list would not be expected to improve. Other streams that have relatively high temperatures would not be expected to improve and could be added to the 303(d) list in the future.</p>	<p>Streams currently on the 303(d) list are expected to improve. Vegetative cover along streams is expected to increase but over a longer period of time than Alternative 2. Temperatures in 303(d) listed streams are expected to decrease. Bear Creek is expected to see slight decreases in stream temperatures because Antelope Reservoir will continue to be a heat source and influence temperatures in Bear Creek.</p>	<p>Streams currently on the 303(d) list are expected to improve. Vegetative cover along streams is expected to increase but over a longer period of time than Alternative 2. Temperatures in 303(d) listed streams are expected to decrease. Bear Creek is expected to see slight decreases in stream temperatures because Antelope Reservoir will continue to be a heat source and influence temperatures in Bear Creek.</p>

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
<p>Forest-wide, Soil Compaction and Displacement. In order to maintain site productivity, all project activities will be planned to reduce soil compaction and displacement to the lowest reasonable level. Strive to reduce compaction and displacement to get as close to 90 percent of the total activity area remaining in a non-compacted/non-displaced condition (Forest Plan, p. 4-196).</p>	<p>Livestock grazing combined with other activities would result in approximately 8 percent of the activity area in a compacted/displaced condition.</p>	<p>Livestock grazing combined with other activities would result in approximately 8 percent of the activity area in a compacted/displaced condition.</p>	<p>Livestock grazing combined with other activities would result in approximately 8 percent of the activity area in a compacted/displaced condition.</p>	<p>Livestock grazing combined with other activities would result in approximately 8 percent of the activity area in a compacted/displaced condition.</p>
<p>Forest-wide. Modify grazing practices (e.g., accessibility of riparian areas to livestock, length of grazing season, stocking levels, timing of grazing) that retard or prevent attainment of RMOs or are likely to adversely affect inland native fish (INFISH GM-1, p. A-9).</p>	<p>Grazing practices would be modified by changing season of use, relocating some water developments, constructing new water developments, and constructing fences.</p>	<p>Grazing practices would not be modified. A Forest Plan amendment is needed to alter this standard and allow livestock grazing to continue at present levels.</p>	<p>Grazing practices would be modified by changing season of use, relocating some water developments, constructing new water developments, and constructing fences.</p>	<p>Grazing practices would be modified by changing season of use, relocating some water developments, constructing new water developments, and constructing fences.</p>

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Forest-wide. Locate new livestock handling and/or management facilities outside of riparian areas (INFISH GM-2, p. A-9).	No new livestock handling or management facilities will be constructed in riparian areas. Several existing water development in riparian areas would be relocated outside riparian areas.	No new livestock handling or management facilities will be constructed.	No new livestock handling or management facilities will be constructed in riparian areas. Several existing water development in riparian areas would be relocated outside riparian areas.	No new livestock handling or management facilities will be constructed in riparian areas. Several existing water development in riparian areas would be relocated outside riparian areas.
Forest-wide. Limit livestock trailing, bedding, watering, salting, loading, and other handling efforts to those areas and times that would not retard or prevent attainment of RMOs (INFISH GM-3, p. A-9).	Livestock use of riparian areas would be reduced. Salting locations would be located outside RHCAs. Several water developments would be relocated away from riparian areas.	Livestock use of riparian areas would not be changed.	Livestock use of riparian areas would be reduced. Salting locations would be located outside RHCAs. Several water developments would be relocated away from riparian areas.	Livestock use of riparian areas would be reduced. Salting locations would be located outside RHCAs. Several water developments would be relocated away from riparian areas.
Forest-wide. Maintain viable populations of all threatened, endangered, and sensitive plant and animal species (Forest Plan, p. 4-120).	Biological Evaluations were completed. This alternative would not adversely affect any threatened or endangered species. This alternative would not cause a trend toward federal listing for any sensitive species.	Biological Evaluations were completed. This alternative would not adversely affect any threatened or endangered species. This alternative would not cause a trend toward federal listing for any sensitive species with the exception of Peck's mariposa lily.	Biological Evaluations were completed. This alternative would not adversely affect any threatened or endangered species. This alternative would not cause a trend toward federal listing for any sensitive species.	Biological Evaluations were completed. This alternative would not adversely affect any threatened or endangered species. This alternative would not cause a trend toward federal listing for any sensitive species.

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Forest-wide. Protect fragile sites such as shallow soil areas (scablands) and natural meadows (Forest Plan, p. 4-121).	Range readiness guidelines would protect fragile sites because livestock would not be present until soils are sufficiently dry.	Range readiness guidelines would protect fragile sites because livestock would not be present until soils are sufficiently dry.	Range readiness guidelines would protect fragile sites because livestock would not be present until soils are sufficiently dry.	Range readiness guidelines would protect fragile sites because livestock would not be present until soils are sufficiently dry.
Forest-wide. The installation of structural improvements or various types of livestock management will be designed specifically not to concentrate livestock use on scablands (Forest Plan, p. 4-140).	No new structural range improvements will be constructed on scablands.	No new structural range improvements will be constructed.	No new structural range improvements will be constructed on scablands.	No new structural range improvements will be constructed on scablands.
Forest-wide. Use permit clauses to prevent the introduction or spread of noxious weeds by contractors and permittees. For example, where determined to be appropriate, use clauses requiring contractors or permittees to clean their equipment prior to entering National Forest System lands.	Design element indicates that heavy equipment must be cleaned of all soil and plant parts prior to entering National Forest System lands.	Design element indicates that heavy equipment must be cleaned of all soil and plant parts prior to entering National Forest System lands.	Design element indicates that heavy equipment must be cleaned of all soil and plant parts prior to entering National Forest System lands.	Design element indicates that heavy equipment must be cleaned of all soil and plant parts prior to entering National Forest System lands.

Table 16. Applicable Forest Plan Direction

Standards and Guidelines	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Forest-wide. Actions conducted or authorized by written permit by the Forest Service require the cleaning of heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands. (November 2005 ROD for Preventing and Management Invasive Plants, Standard 2).	Design element indicates that heavy equipment must be cleaned of all soil and plant parts prior to entering National Forest System lands.	Design element indicates that heavy equipment must be cleaned of all soil and plant parts prior to entering National Forest System lands.	Design element indicates that heavy equipment must be cleaned of all soil and plant parts prior to entering National Forest System lands.	Design element indicates that heavy equipment must be cleaned of all soil and plant parts prior to entering National Forest System lands.
Forest-wide. Use only gravel, fill, sand, and rock that is judged to be weed free by District or Forest weed specialists. (November 2005 ROD for Preventing and Management Invasive Plants, Standard 7).	Design element indicates only material from weed-free sources would be used.	Design element indicates only material from weed-free sources would be used.	Design element indicates only material from weed-free sources would be used.	Design element indicates only material from weed-free sources would be used.

Clean Water Act

The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. To carry out this law, the State of Oregon has established state water quality standards for factors such as water temperature, sedimentation, habitat modification and pH, and an anti-degradation policy to protect water quality conditions. Under the anti-degradation policy in Section 303(d), water bodies that do not meet water quality standards are designated as "water quality limited."

The project area contains six streams that are currently on the 2002 303(d) list for exceeding the average of the 7-day maximum stream temperature standard (18°C) for rearing. The streams within the project area on the 303(d) list are: Bear, Cow, Deer, Klootchman, Shotgun, and Wildcat Creeks.

Alternative 1 would eliminate livestock grazing and eliminate the reduction in riparian vegetation and stream shade caused by livestock. Alternatives 2 and 4 include modifying grazing practices to reduce the amount of use in riparian areas and increase the amount of riparian vegetation and stream shade. Alternatives 1, 2, and 4 would result in more riparian vegetation that in time would provide shade and reduce stream temperatures, which would lead to restoring water quality. These alternatives comply with the Clean Water Act and state water quality standards.

Alternative 3 does not alter the current timing or distribution of livestock grazing; livestock would continue to consume and trample riparian vegetation. Riparian vegetation and stream shade are not expected to increase; therefore, this alternative does not help restore water quality and does not comply with the Clean Water Act.

Endangered Species Act

Biological Evaluations (BEs) have been prepared to document possible effects of proposed activities on threatened and endangered species in the project area. There are no endangered species known or suspected to occur on the Ochoco National Forest. Threatened species that are known or suspected to occur on the Ochoco National Forest include bull trout, mid-Columbia River steelhead, northern bald eagle, and Canada lynx. Potential effects to these species were analyzed and the analysis is summarized in the BEs (January 2006 Resource Report for Wildlife and January 2006 Resource Report and Biological Evaluation for Aquatic Species). There would be no effect to bull trout or mid-Columbia River steelhead. The project may affect, but is not likely to adversely affect northern bald eagle and Canada lynx. Consultation with the U.S. Fish and Wildlife Service has been completed.

National Historic Preservation Act

Compliance with State Historic Preservation Office (SHPO) for livestock grazing contained in this environmental impact statement has been completed. Heritage surveys did not result in the discovery of any new site. If sites are discovered during construction of fences or water

development, efforts would be made to avoid any further disturbance. Site-specific mitigation would be developed if it is determined that sites could not be avoided and consultation with the SHPO would occur before resuming construction activities. Under all alternatives, known sites would be avoided or the qualities which make these sites eligible to the NRHP would be protected. All alternatives considered in this draft environmental impact statement would comply with the National Historic Preservation Act.

Executive Orders 11988 and 11990 Floodplains and Wetlands

Executive Order 11988 requires agencies to avoid adverse impacts associated with the occupancy and modification of floodplains. Executive Order 11990 requires agencies to avoid adverse impacts associated with the destruction or modification of wetlands. Alternatives 1, 2, and 4 are consistent with these executive orders. These alternatives either eliminate or reduce livestock grazing in floodplains or wetlands. The level of livestock use in riparian areas under Alternatives 2 and 4 would reduce the amount of streambank alteration when compared to current uses (Alternative 3). Alternatives 2 and 4 would not result in adverse modifications of floodplains or wetlands. Alternative 3 does not alter the current timing or distribution of livestock grazing; livestock tend to congregate in riparian areas and are causing streambank alteration that may lead to entrenched stream channels and cause adverse modification to floodplains.

Environmental Justice and Civil Rights

Civil Rights legislations, including the Civil Rights Act (CR) of 1964, Title VI, prohibit discrimination in Forest Service program delivery. The underlying principal behind the Civil Rights Act is that no activity shall negatively affect minorities, woman, or persons with disabilities by virtue of their race, color, sex, national origin, religion, age, disability, or material or familial status. Executive Order 12898 directs each Federal agency to make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

There is no known potential for disparate or disproportionately high effects from any of the alternatives considered in this environmental impact statement to low-income or minority populations. None of the alternatives considered would discriminate or negatively impact any individual or subset of the population described above.

Adverse Environmental Effects which Cannot be Avoided

Alternatives 2, 3, or 4 may result in potential adverse environmental effects that cannot be mitigated or avoided. Alternatives 2 and 4 were specifically developed to reduce the amount of livestock grazing in riparian areas where livestock grazing can cause adverse effects to streams, fish and frog habitat, and water quality. Alternative 3 is a continuation of current grazing management and would also cause adverse effects to streams, fish and frog habitat, sensitive plant habitat, and water quality. Livestock grazing will reduce some riparian vegetation, cause some sediment to enter streams, and cause some detrimental soil conditions. These are adverse

effects that cannot be avoided. Applying certain Forest Plan Standards and Guidelines and mitigation measures (see design elements contained in Chapter 2) will lessen potential effects. The specific effects associated with project activities are discussed throughout this chapter. The potential still exists for adverse impacts. Livestock grazing under Alternatives 2 and 4 are consistent with all applicable standards and guidelines.

Short-term Uses vs. Long-term Productivity

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). The use of forage on suitable range is considered to be a short-term use of a renewable resource. When this resource is properly utilized and meets the Forest Plan Standard and Guidelines for all affected resources, long-term productivity can be sustained. Alternative 1 would not provide short-term use of forage for livestock. As discussed in this chapter, Alternatives 2 and 4 would provide forage use for livestock while meeting all applicable Forest Plan Standards and Guidelines.

Irreversible or Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the removal of minerals or extinction of a species. Irretrievable commitments are those that are lost for a period of time. Alternative 1, which includes eliminating livestock grazing, would result in an irretrievable loss of the economic value of forage for livestock. Under all three action alternatives, there would be a level of detrimental soil conditions that would cause an irretrievable loss of soil productivity. As described above, the action alternatives would result in 231 to 293 acres of detrimental soil conditions; these areas would be detrimentally compacted and/or detrimentally displaced and soil productivity on these sites would be lost until livestock grazing is eliminated in these areas.

CHAPTER 4. CONSULTATION AND COORDINATION

Preparers and Contributors

The following Forest Service employees contributed to the development of this environmental impact statement:

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Mark Lesko - Botanist
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BARBARA FRANANO has B.S. and M.S. degrees in Biology (fish and wildlife emphasis) from West Texas State University in Canyon, Texas. Her experience includes 25 years of government service working for the Wasatch-Cache, Uinta, and Ochoco National Forests,

U.S. Bureau of Reclamation, and the Division of Wildlife Resources in Utah. She has worked as a fisheries and wildlife biologist and as a program manager for special uses. For the last 7 years, she has been the Fisheries Biologist for the Lookout Mountain Ranger District and Crooked River National Grassland, Ochoco National Forest.

THERESA (TERRY) HOLTZAPPLE earned a B.A. in Anthropology from the University of Texas at Austin in 1975. Her experience includes more than 25 years of archaeological excavation and survey work in Texas, Alaska, and Oregon with University Research Centers, Texas State Parks and Wildlife Department Historic Sites and Restoration, National Park Service, and the Forest Service. She has worked on the Ochoco National Forest in cultural resource management since 1979. In 1985, she made a career shift and worked on a local ranch, the Paulina School, and the Post Store. She returned to the Ochoco National Forest in 1990. Terry is currently the District Archaeologist on the Lookout Mountain Ranger District and Crooked River National Grassland and an active member of the Archaeological Society of Central Oregon and the Crook County Historical Society.

KEVIN KEOWN has a B.S. in Wildlife Science from Oregon State University. Kevin has 15 years of experience working for the Forest Service. He began his career as a biological technician on the Malheur National Forest, then moved to the Deschutes National Forest as a Wildlife Biologist. In 2002, he moved to the Ochoco National Forest as the Natural Resources Team Leader on the Lookout Mountain Ranger District. Kevin's experience includes project planning, habitat improvement and restoration, wildlife habitat inventory, wildlife survey and monitoring. Kevin has also worked as a Research Assistant at Humboldt State University and as a Wildlife Biologist for a private consulting firm.

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ROB TANNER has B.S. in Environmental Studies and General Science from the University of Oregon and a Masters degree in Forest Hydrology from Oregon State University. He has 2 years experience with the Eugene BLM as a hydrology technician, 6 years experience as a hydrologist on the Deschutes and Ochoco National Forests, and 2 years experience working as a hydrologist for the Crooked River Watershed Council.

Distribution of the Environmental Impact Statement

This environmental impact statement has been distributed to the following agencies, federally recognized tribes, state and local governments, organizations, and persons who were consulted during the scoping phase of this analysis or who specifically requested a copy of the document. In addition, copies have been sent to several Federal agencies and State and local governments that receive copies of environmental impact statements prepared by the Forest Service.

Federal, State, and Local Agencies

Advisory Council on Historic Preservation
Environmental Protection Agency, Region 10
Environmental Protection Agency, Office of Federal Activities
Federal Aviation Administration, Northwest Mountain Region
Federal Highway Administration
National Marine Fisheries Service, Scott Hoefler
National Marine Fisheries Service, Habitat Conservation Division
Northwest Power Planning Council
Oregon Department of Fish and Wildlife, Brett Hodgson
Oregon Department of Fish and Wildlife, Glen Ardt
Oregon State University, Dept of Rangeland Resources, Michael Borman
U.S. Army Engineers, Northwestern Division
U.S. Coast Guard, Marine Environmental & Protection Division
U.S. Department of Energy, Office of NEPA Policy & Compliance
U.S. Fish and Wildlife Service, Jeff Dillon
U.S. Fish and Wildlife Service, Jerry Cordova
USDA Animal and Plant Health Inspection Service (PPD/EAD)
USDA National Agricultural Library
USDA Natural Resources Conservation Service
USDI Office of Environmental Policy and Compliance

Tribes

Confederated Tribes of the Warm Springs Reservation
The Burns Paiute
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The Klamath Tribes

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The Bulletin

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GLOSSARY

Affected Environment - a description of the environment of the area that would be affected or created by the alternatives under consideration.

Allotment - A designated area of land available for livestock grazing. Permits are issued for allotments or portions of allotments.

Allotment Management Plan (AMP) - A document that specifies the program of actions designated to reach a given set of objectives. It is prepared in consultation with the permittee involved and:

1. Prescribes the manner in, and extent to which livestock operations will be conducted in order to meet the multiple-use, sustained yield, economic, and other needs and objectives as determined for the lands involved.
2. Describes the type, location, ownership, and general specifications for the range improvements in place, or to be installed and maintained, on the land to meet the livestock grazing and other objectives of land management.
3. Contains such other provisions relating to livestock grazing and other objectives as may be prescribed by the authorized officer, consistent with applicable law.

Animal Unit Month (AUM) - The amount of dry forage required by one mature cow of approximately 1,000 pounds or its equivalent, for one month, based on a forage allowance of 26 pounds per day.

Annual Operating Instructions (AOIs) - The AOIs clearly articulate the annual grazing management requirements, standards, and monitoring necessary to document compliance with management direction. The AOIs should set forth:

1. The maximum permissible grazing use authorized on the allotment for the current grazing season and should specify numbers, class, type of livestock, and timing and duration of use.
2. The planned sequence of grazing on the allotment, or the management prescriptions and monitoring that will be used to make changes.
3. Structural and non-structural improvements to be constructed, reconstructed, or maintained and who is responsible for these activities.
4. Allowable use or other standards to be applied and followed by the permittee to properly manage livestock.
5. Monitoring for the current season that may include, among other things, documentation demonstrating compliance with the terms and conditions in the grazing permit and/or AMP.

Authorized Use - Use specified on the annual bill(s) for collection and verified by payment of fees.

Capability - The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at given levels of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease. (36 CFR 219.3, 1982).

Cancellation - Action taken to invalidate a term grazing permit, in whole or in part.

Channel (stream) - The deepest part of a stream or riverbed through which the main current of water flows.

Compaction - Soil compaction is an increase in bulk density and soil strength, and decrease in porosity and infiltration rate. Soil compaction is caused by forces such as weight and vibration.

Condition and Trend Studies (C&T) - Monitoring sites with permanent transect lines which can be analyzed and compared to previous years to detect changes in range condition over time. C&T plot data is collected over time and “scored” (to provide comparable current data to past data), and used to provide a current condition/status of range vegetation, as well as a comparative condition to past range vegetation.

Cumulative Effects - The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7).

Deferred Rotation - Any grazing system which provides for a systematic rotation of deferment among pastures. Grazing is deferred (delayed or postponed) in various parts of an allotment in succeeding years or seasons to provide for seed production, plant vigor, and/or seedling growth.

Designated Monitoring Area or Zone (DMA or Z) - A portion of a pasture or management unit selected as a monitoring point for grazing use. Individual DMAs are selected based on location, use, or grazing value. It is assumed that DMAs, if properly selected, will reflect the overall riparian condition and the current grazing management in riparian areas.

Detrimental Soil Conditions - Soil erosion, displacement, compaction, puddling, or burning that exceeds certain thresholds. For instance, displacement is a detrimental soil impact only if more than 50 percent of the topsoil or humus-enriched A-horizon is removed from an area of 100 square feet or more, which is at least 5 feet in width. The Regional Soil Quality Standards indicate that a minimum of 80 percent of an activity area should be in an acceptable soil quality condition.

Early on/Early off - Early on/early off means that cattle will be placed on an allotment early in the grazing season (e.g. May instead of July) and will also be removed from the allotment early (e.g., removed by August 15, instead of September 30).

Exclosure - An area of land enclosed by a barrier, such as a fence, to prevent livestock grazing or big game browsing. Exclosures can be constructed to protect small areas, such as areas with aspen or Mariposa lily.

Forage - All non-woody plants (grass, grass-like plants, and forbs) and portions of woody plants (browse) which is available to and may provide food for domestic livestock and wildlife.

Forage Production - The weight of forage produced within a designated period of time on a given area. The term may also be modified as to time of production such as annual, current year, or seasonal forage production.

Forage Utilization - The degree to which animals have consumed or trampled the total current production of plants, expressed in percent. It may refer to the use of a pasture or use of an individual plant.

Grazing Permit - Any document authorizing livestock to use NFS lands or other lands under Forest Service control for the purposes of livestock production.

Grazing System - A description of the type of system used for livestock management.

1. **Deferred rotation** - a system where one or more pastures will be grazed at a delayed or postponed time to allow for plant growth or for plants to set seeds.

2. **Rest-rotation** - a system where one or more pastures will be rested from livestock grazing (i.e. ungrazed) each year and livestock will be moved from one pasture to another pasture in the allotment as forage is utilized.

Greenline - The first perennial vegetation from the water's edge. Riparian areas that are in high seral status with stable streambanks will exhibit a continuous line of vegetation at the bankfull discharge level. Rocky stream types may have a significant amount of rock causing breaks in the vegetation. This rock is considered part of the green line. Other breaks may occur in the first perennial bank of vegetation (watercourses or bare ground). The amounts of these (perennial vegetation, rock, and bare ground) should be recorded.

Heritage Resource - Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. This term includes artifacts, records, and remains that are related to and located within such properties. It also includes properties of traditional religious or cultural importance to an Indian tribe that meet the National Register criteria. Also Cultural Resource.

Inland Native Fish Strategy (INFISH) - A decision signed in 1995 that adopted an interim strategy for protecting the habitat and populations of resident native fish outside of anadromous fish habitat in eastern Oregon, eastern Washington, Idaho, western Montana, and portions of Nevada. INFISH amended the Ochoco National Forest Land and Resource Management Plan.

Interdisciplinary Team (ID) - A group of individuals with skills from different disciplines. An interdisciplinary team is assembled to adequately identify, analyze, and resolve issues or problems.

Livestock - Foraging animals of any kind kept or raised for use or pleasure, such as cattle, sheep, or horses.

Management Indicator Species - Any species, group of species, or species habitat element selected to focus management attention for the purpose of resource production, population recovery, maintenance of population viability, or ecosystem diversity (FSM 2605).

Managed Daily - Permittees would be present on the allotment on a daily basis and, when needed, would actively move livestock to achieve adequate distribution. This does not mean that permittees must move cattle on a daily basis.

Mitigation Measures - Actions that are taken to lessen the severity of effects of other actions. Mitigation includes (a) Avoiding the impact altogether by not taking a certain action or parts of an action. (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation. (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. (e) Compensating for the impact by replacing or providing substitute resources or environments.

Monitoring and evaluation - The periodic evaluation of forest management activities to determine how well objectives were met and whether management practices should be adjusted.

Non-use - (1) Absence of grazing use on current year's forage production. (2) Temporary lack of exercising a grazing privilege on grazing lands. (3) An authorization to temporarily refrain from placing livestock on public ranges without loss of preference for future consideration.

Pasture - A grazing area enclosed and separated from other areas by fencing or other barriers; a management unit for grazing land.

Permitted Livestock - Livestock authorized by a written Forest Service permit. This may include:

1. Livestock currently being grazed under a permit, or
2. Livestock grazed under a permit which occupied NFS lands during the preceding permitted season of use, including their offspring retained for herd replacement.

Permittee - any person who has been issued a grazing permit or other special use permit for occupancy and use of National Forest System lands.

Permitted Use - The number of animals, class of livestock, period of use, and place of use specified in part 1 of the grazing permit. See also *Authorized Use*.

Pond - A water impoundment made by constructing a dam or by excavating a dugout or both, to provide water for livestock and wildlife.

Post holing - a hole sunk in the ground by livestock hooves.

Project Area - A delineated area of land where management activities are proposed.

Proposal - A proposal exists when an agency a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated. Preparation of an environmental impact statement on a proposal should be timed (Sec. 1502.5) so that the final statement may be completed in time for the statement to be included in any recommendation or report on the proposal. A proposal may exist in fact as well as by agency declaration that one exists. (40 CFR 1508.23)

Proposed Action - A proposal made by the Forest Service to authorize, recommend, or implement an action to meet a specific purpose and need. See definition for “proposal.”

Rangeland - Land on which the native vegetation is predominately grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing use. Forested sites and non-forested sites providing forage and habitat for domestic and wild herbivores are included. (FSM 1905, 3/15/91)

Rangeland Improvement - Any activity or program on or relating to rangelands that is designed to improve production of forage, change vegetative composition, control patterns of ungulate use, provide water, stabilize soil and watershed conditions, and provide habitat for livestock and wildlife. The term includes, but is not limited to, structures, treatment projects, and use of mechanical means to accomplish the desired results or conditions. Rangeland improvements may include the following:

1. **Nonstructural** - Practices and treatments undertaken to treat rangeland not involving construction of improvements. Examples include but are not limited to such practices and treatments as prescribed burns, fertilizing, mowing, furrowing, seeding, or similar practices relating to the vegetation or soil.

2. **Structural** - Improvements requiring construction or installation to improve the rangeland, facilitate management, control distribution and movement of livestock or wildlife, or all of the above. These improvements fall into the following two categories:

a. **Permanent** - Rangeland improvements installed or constructed which are a longer lasting part of the landscape like dams, ponds, pipelines, wells, certain tanks, fences, and trails.

b. **Temporary** - Short-lived or portable improvements that can be easily removed, like troughs or tanks, pumps, electric fences, and other structures.

Rangeland Vegetation - Vegetation on all land with rangeland resource objectives or rangeland resource values, including riparian areas. Generally, the focus is on land supporting grass or grasslike plants, forbs, or shrubs during one or more ecological stages. Forested and non-forested sites providing forage and habitat for wild and domestic animal species are included. (FSM 1905, 3/15/91)

Range Readiness - The defined stage of plant growth at which grazing may begin under a specific management plan without permanent damage to vegetation or soil. Because of the different grazing management schemes in the alternatives, the definition used for Alternatives 2 and 4 is different from the definition in Alternative 3.

1. **Alternatives 2 and 4** - range readiness will be more a factor of soil conditions and enough forage for livestock. For an early season of use, livestock will be allowed to turn on when there is enough forage to sustain them. Soils will still be moist, but not wet enough that livestock will cause aeration, displacement, or infiltration effects to soils that are not relieved by the overwintering (freeze/thaw) process. The two key points to manage turn-on and benefit from early grazing seasons are:

a. livestock will be removed while soils still have moisture and a good portion of the growing season remains to get plant regrowth.

b. Reduce livestock concentration, particularly in riparian areas, by having stock on the allotment while the weather remains relatively cool.

2. **Alternative 3** - The criteria that will be used to determine when cattle will be turned on to the allotments are:

a. Sandberg bluegrass seed heads are conspicuous or headed out.

b. Idaho fescue leaves will be 3-5 inches in height or seed heads will be showing.

c. Bluebunch wheatgrass will have 5-8 inches of leaves or seed stalks will be showing.

d. Soil firm enough to support livestock without creating compaction or breaking sod.

Rest - Leaving an area ungrazed and foregoing grazing of one forage crop. Rest is absence of grazing for a full growing season or during a critical portion of plant development; i.e., seed production.

Rest-Rotation - An intensive system of range management where grazing is deferred on various parts of the range during succeeding years, allowing the deferred part complete rest for a specified period of time, usually 1 year. Livestock are moved from one pasture to another on a scheduled basis.

Riparian Habitat Conservation Areas (RHCAs) - Portions of watersheds where riparian-dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems by (1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams, (2) providing root strength for channel stability, (3) shading for stream, and (4) protecting water quality. RHCAs are separated into four categories:

1. Category 1 areas (fish-bearing streams) incorporate the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site potential trees, or 300 feet slope distance (600 feet, including both sides of the stream channel), whichever is greatest. Category 1 areas are defined on the Ochoco as Class I or II streams.

2. Category 2 areas (perennial non-fish-bearing streams) incorporates the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year flood plain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet, including both sides of the stream channel), whichever is greatest. Category 2 areas are defined on the Ochoco as Class III streams.

3. Category 3 areas (ponds, lakes, reservoirs, and wetlands greater than 1 acre) consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonally saturated soil, or to the extent of moderately and highly unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest.

Category 4 areas include the extent of landslides and landslide-prone areas, or the intermittent stream channel and the area to the top of the inner gorge, or wetlands less than 1 acre and the area to the outer edges of the riparian vegetation, or the area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one-half site potential tree, or 50 feet slope distance, whichever is greatest. Category 4 areas are defined on the Ochoco as Class IV streams.

Salting - Placing salt or mineral blocks in specific areas for use by livestock or game. Blocks are periodically relocated to distribute animals throughout a pasture or an allotment.

Scope - The range of actions, alternatives, and impacts to be considered in an environmental impact statement. To determine the scope of environmental impact statements, agencies shall consider types of actions (connected and cumulative), alternatives (no action, other reasonable courses of actions, and mitigation not in the proposed action), and impacts (direct, indirect, and cumulative). (40 CFR 1508.25)

Season of Use - The time during which livestock grazing is permitted on a given allotment, as specified in the grazing permit.

Standards and guidelines - Requirements found in a Forest Plan which impose limits on natural resource management activities, generally for environmental protection.

Stream Class - see stream category under Riparian Habitat Conservation Area.

Stubble Height/Residual Vegetation - The height of residual vegetation that is remaining at the end of the growing season just prior to winter dormancy.

Suitability - the appropriateness of applying certain resource management practices, such as grazing to an area of land.

Suitable Range - Land that is accessible or that can become accessible to livestock, that produces forage or has inherent forage-producing capabilities, and that can be grazed on a sustained-yield basis under reasonable management goals.

Unsuitable Range - Land that should not be grazed by livestock because of unstable soils, steep topography, or inherent low potential for forage production.

Trampling - Treading heavily underfoot so as to bruise, crush, or damage plants or soils.

Transitory Range - Lands which temporarily produce forage as a result of fire, logging, or other events.

Trend - The direction of change in ecological status or resource value rating observed over a period of time. Trend in a value rating can be described as increasing, up, decreasing, down, static, or not apparent.

Unauthorized Livestock - Any cattle, sheep, goat, hog, bison, or horse not defined as a wild free-roaming horse or burro, which is not authorized by permit. Noncommercial pack and saddle stock used by recreationists, travelers, other forest and grassland visitors for occasional trips, and livestock trailed over an established driveway when there is no overnight stop on NFS land do not fall under this definition.

Unauthorized Use - The grazing of livestock without proper authority.

Upland - Ground elevated above the lowlands along rivers or between hills. The portion of the project area outside Riparian Habitat Conservation Areas.

Water Quality Limited - A water body that does not maintain surface water quality standards for its designated uses.

APPENDIX A. RESPONSE TO COMMENTS

Introduction

The Notice of Availability for the Draft EIS for the Maury Mountains Allotment Management Plan Project was published in the Federal Register on July 7, 2006 (Vol. 71, No. 130). A legal notice inviting comments on Draft EIS was published in *The Bulletin* newspaper, Bend, Oregon, on July 14, 2006. The 45-day comment period closed on August 21, 2006. Twelve comment letters were received during the comment period, including two letters from governmental agencies. Letters from governmental agencies are included in Appendix B.

This appendix restates a variety of the comments and provides a response. Every comment was read and considered, even though not every comment is restated here.

The interdisciplinary team identified both substantive and non-substantive comments during the review, evaluation, and analysis of comments. The appeal regulations (36 CFR 215.2) define substantive comments as “Comments that are within the scope of the proposed action, are specific to the proposed action, have a direct relationship to the proposed action, and include supporting reasons for the Responsible Official to consider.” This definition was used to determine whether comments were substantive. All substantive comments have been restated.

The comments and responses have been grouped by subject. The order of the subjects follows the order topics are presented in the Final EIS.

Chapter 1. Purpose of and Need for Action

Purpose and Need for Action

Comment: The Purpose and Need cannot just capriciously claim that there is a need for continued livestock grazing in the Maury Mountains. Such claims must be substantiated in the document and weighed in assessment with ecological restoration, wildlife, and fisheries needs of the area. (Sierra Club, p. 2)

Response: The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.13) instruct agencies to “briefly specify the underlying purpose and need to which the agency is responding...” In this instance, the Forest Service stated “This action is needed because there continues to be a demand for livestock forage in the six allotments in the Maury Mountains and resource conditions related to stream shade and bank stability need to be improved” (Draft EIS, p. 2). The demand for livestock grazing is substantiated. All five of the current permit holders would like to continue livestock grazing, at the same or even higher levels. In addition to the permittees, another adjacent landowner has indicated an interest in obtaining a grazing permit. The Final EIS has been updated to indicate the demand for livestock forage exists.

Comment: Purpose and Need clauses may not be devised so as to preclude the selection of the no-action alternative by the decision-maker. (Sierra Club, p. 2).

Response: CEQ regulations (40 CFR 1502.14(d)) require that the no action alternative be included so that its environmental consequences can be compared with the effects of taking an action. In this case, the no action alternative displays the environmental effects of not authorizing livestock grazing. Typically, the no action alternative does not meet the purpose and need for action. Courts have indicated that purpose and need for action statements can not be so narrowly defined as to preclude a reasonable range of alternatives. The decision-maker is not precluded from selecting the no action alternative as long as his/her rationale for selecting no action is clearly stated.

Public Involvement

Comment: We recommend the Final EIS discuss the process and outcomes of consultations with the tribes. (EPA, p. 3)

Response: Chapter 1 in the Final EIS has been updated to indicate that potentially affected Tribes were consulted. These consultations did not result in identifying any significant issues related to the proposal.

Comment: At meetings with Forest Service range managers in October 2004, the result was to keep the ranchers viable without decreasing AUMs. The importance of keeping the rancher involved and not decreasing the AUMs was stressed. Continuance of AUMs at the same level is not happening in this plan. (McCormack, pp. 1-2)

Response: Ochoco National Forest staff have and will continue to consult with affected permittees. Forest staff met with permittees during September and October 2003 to discuss the analysis process. At those meetings, the affected permittees were able to recommend changes to livestock grazing. Some of these recommendations included items like constructing new water developments, constructing fences, look at rest rotation rather than deferred rotation. Other recommendations were to leave grazing as is and not change dates, numbers, or rotation systems. The affected permittees were contacted again in December 2003 and were asked to submit any further recommendations. The information and recommendations provided by the affected permittees was considered during the development of the proposed action.

After the proposed action was developed, the scoping process began. During the scoping process, affected permittees along with other potentially interested or affected individuals, groups, organizations, and tribes were contacted. At that time some commenters suggested that AUMs (Animal Unit Months) should not be reduced. The proposed action, Alternative 2, would not reduce AUMs in the Sherwood or East Maury Allotments. Alternative 3 includes reauthorizing livestock grazing with no reduction in AUMs for any allotment. Alternative 4 would temporarily reduce the numbers of AUMs in the Klootchman Allotment but the number of AUMs would increase to current levels as fences and water developments are constructed.

Alternative 4 did not consider retaining the numbers of AUMs in the Double Cabin and Shotgun Allotments because the size of these allotments would be decreased. During the scoping phase, members of the interdisciplinary team participated in a field trip with the affected permittees. During this field trip, affected permittees were able to express concerns and interact with team members.

Overall, the preferred alternative does result in a reduction of AUMs. The reduction in AUMs is a result of two permittees expressing an interest in no longer using some pastures where livestock grazing is currently authorized.

Comment: Any discussions of allotment management plans should also include some understanding of the ranch activities/work on the adjoining private lands. (Wood, p. 2)

Response: Forest Service staff, including some members of the interdisciplinary team, have met with affected permittees in order to gain an understanding of ranching activities. As discussed in the previous response, suggestions and recommendations from the affected permittees were used in the development of the proposed action and in the development of Alternative 4.

Comment: I request that the comment period be kept open further. The Draft EIS was published at a time of year which is extremely busy and time available to generate comments has been limited. The meeting to discuss the Draft EIS left less than 30 days to meet the closing of the comment period. (Wood, p. 1 and OSU, p. 1)

Response: The comment period began on July 7, 2006, when a Notice of Availability was published in the Federal Register. The comment period closed on August 21, 2006. During this 45-day period, Forest Service staff met with affected permittees and provided them copies of the Draft EIS. Some permittees requested an extension of time to file their comments. As a result, affected permittees were informed that they could submit comments until September 5, 2006.

Chapter 2. Alternatives, Including the proposed action

Comment: We recommend that a clear description of the preferred alternative be included in the Final EIS, along with clear distinctions and comparisons to other alternatives. (EPA, p. 2)

Response: The Final EIS has been updated to clarify the preferred alternative. For example Tables 1, 2, and 3 have been updated with a “Preferred Alternative” column that summarizes the activities and effects associated with the preferred alternative.

Comment: We recommend that the Final EIS indicate the timeframe covered under the proposed grazing program. (EPA, p. 3)

Response: Term grazing permits authorize grazing for 10 years. The timeframe covered for these allotments is expected to be at least 10 years. When the permits expire at the end of 10 years, grazing activities will be reviewed to determine if the analysis and documentation contained in the Final EIS remains valid. If there is new information that requires further

analysis and potential modification of grazing activities, a new NEPA-based decision will be issued. If the authorized officer determines that correction, supplementation, or revision is not necessary, implementation of existing decisions shall continue and another term grazing permit will be issued.

Alternative 1 - No Action

Comment: The No Action alternative is actually a no grazing alternative. This alternative must be developed to include proactive restoration actions to correct the extensive harms from decades of livestock abuses. (Sierra Club, p. 2)

Response: No action alternatives mean the proposed activity would not take place. In this instance, the no action alternative appropriately describes not authorizing livestock grazing. There is no requirement that the no action alternative include “proactive restoration actions.”

Alternative 2 - Proposed Action

Comment: With respect to the East Maury Allotment, we are still concerned with how vague the proposal is with regard to the amount of grazing permitted after the 10-year rest period. We would like the alternative description to state:

The East Maury Allotment will be rested from livestock grazing for 10 years. During this 10-year rest structural improvements will be constructed, maintained, or relocated as mentioned in the preceding paragraph. After 10-years, livestock grazing will continue at a level that is equal to or greater than the level of livestock grazing authorized just prior to the 10-year rest period. (Schwab, p. 1)

Response: The preferred alternative for the East Maury Allotment is described in the Draft EIS (p. 20). The suggested language is identical to the alternative description with the exception of “at a level that is equal to or greater than the level of livestock grazing authorized just prior to the 10-year rest period.” After the 10-year rest period, 241 cow/calf pairs will be permitted to graze between May 1 and August 30 for a maximum of 1,294 AUMs. This is equal to the level of livestock grazing currently permitted.

Comment: The AUMs in the Shotgun Allotment should not be reduced by 45 percent. A better alternative would be to set the early-on date at May 15 with removal on August 15 which would allow for better range management. (Thompson, p. 1)

Response: The AUMs for the Shotgun Allotment were determined primarily by the acres available for grazing and estimates of forage production. Under Alternative 3, the Shotgun Allotment includes both the Drake and West Pine Pastures with 16,594 acres available for grazing. Under the preferred alternative, the Shotgun Allotment consists of only the Drake Pasture with 9,582 acres available for grazing. The reduction in AUMs is appropriate considering the reduction in acres available for grazing. The period of May 15 to July 16 for the Shotgun Allotment (DEIS, p. 16) is a target period for livestock grazing and can vary annually.

The actual season of use based on annual conditions will vary between May 1 and August 15 (DEIS, p. 13).

Comment: The new proposal reduces AUMs (Animal Unit Months) on the Double Cabin Allotment by about 20 percent, from 957 to 765. (Luttrell, p. 1)

Response: The AUMs for the Double Cabin Allotment were determined primarily by the acres available for grazing and estimates of forage production. In the Double Cabin Allotment, the AUMs would be reduced from 958 to 765 because of the reduction in the acres available for grazing (elimination of 1,546 acres in the East Pasture) and change to a rest-rotation grazing system (DEIS, p. 14). With a rest-rotation grazing system one pasture is rested each year, decreasing the amount of land grazed by one pasture.

Comment: Decreasing the AUMs on the allotments is unnecessary due to other restrictions. Once AUMs have been decreased they will likely never be increased. With the changes in management, the AUMs should be left the same or increased. The proposal of resting one pasture every year will be producing unutilized forage for the next year. That forage would not have been available in the past. This part of the plan needs to be addressed yearly as conditions change each year. (McCormack, p. 1)

Response: The AUMs were decreased in the Double Cabin, Klootchman, and Shotgun allotments to account for the reduced land area available for grazing each year. In the Double Cabin Allotment the AUMs would be reduced from the current stocking rate of 958 to 765 to account for the reduced land area resulting from the elimination of the East Pasture (-1,546 acres) and implementation of the rest-rotation grazing system (DEIS, p. 14). With a rest-rotation grazing system one pasture will be rested each year, decreasing the amount of land grazed per year. In the Shotgun Allotment, the West Pine Pasture would no longer be grazed as a part of the Shotgun Allotment and the acres available for grazing would be reduced by 7,012. In the Klootchman Allotment, the AUMs are reduced to account for the implementation of a rest-rotation grazing system. However, the preferred alternative for the Klootchman Allotment maintains AUMs at the current permitted levels, once structural improvements are in place (DEIS, p. 21). The reductions in AUMs are appropriate considering the reduction in acres available for grazing.

The rest-rotation grazing strategy is proposed so that vegetation has an entire growing season without grazing. While this leaves unutilized forage, it was proposed to help achieve the purpose and need of increasing stream shade provided by riparian vegetation (grass, sedges, and hardwoods) and increased bank stability provided by deep-rooted vegetation including willows and sedges. A rest-rotation grazing system provides increased seed bank storage and plant vigor from improved root growth and carbohydrate storage. Rested plants do not need to use energy for re-growth or to produce seed after grazing and can send energy to root growth and carbohydrate storage for the following year.

Comment: The Double Cabin and Sherwood Allotments are the only allotments that are going to be implementing daily riding. Nowhere in the management plan does it say how many riders

would be required. Also, the summary Table S-2 says nothing about daily riding to improve livestock distribution. (Luttrell, p. 1).

Response: Daily management would be required in the Double Cabin and Sherwood Allotments under Alternatives 2 and 4. Daily management would also be required in the Shotgun Allotment under Alternative 2. In the Shotgun Allotment, daily management would not be required under Alternative 4 because the Drake Pasture would be divided into three pastures. Daily management is described in the Draft EIS (p. 13) as “the permittee or his/her representative will be present on the allotment daily and actively moving livestock to achieve adequate distribution.” The definition in the glossary (DEIS, p. 215) indicated that livestock would be moved *when needed* to ensure adequate distribution. The statement on page 13 of the Draft EIS has been updated in the Final EIS to clearly indicate that livestock will be moved when needed and that managed daily does not mean actively moving livestock on a daily basis.

The Double Cabin Allotment includes five pastures. Under Alternatives 2 and 4, daily management is required in the Center and West Pastures to ensure livestock are adequately distributed. The Center and West Pastures are the largest pastures in the allotment and are 3,538 and 2,960 acres, respectively. As discussed in the Draft EIS (p. 45), utilization has been uneven and more use has occurred in riparian areas than in upland areas. Daily management is one method that will be used to ensure livestock are adequately distributed in these pastures. In addition to daily management, Alternatives 2 and 4 include four new water developments in the Double Cabin Allotment. Three water developments are in the Center Pasture and one is in the West Pasture. These developments will also help achieve adequate livestock distribution.

Under Alternatives 2 and 4, the Sherwood Allotment would consist of four pastures ranging in size from 2,788 to 7,012. Daily management is required to ensure that livestock are adequately distributed. Fifteen new water developments would be constructed in the Sherwood Allotment; however, it will take time to construct these water developments.

Comment: Daily monitoring is not only ridiculous it is unachievable. I would suggest that you change that whole scenario to no more than weekly. We cannot logistically or financially be checking daily our forest allotments. (McCormack, p. 3)

Response: The requirement to “manage daily” applies to all or some pastures in the Double Cabin, Sherwood, and Shotgun Allotments as mentioned previously. Manage daily is not required for the Klootchman or East Maury Allotments. The purpose of this requirement is to improve livestock distribution. The Draft EIS (p. 29) recognizes that manage daily is only one of several methods that can be employed to improve livestock distribution. The Forest Service staff consulted with the current permit holders to determine how best to achieve livestock distribution in each allotment. As stated above, the Final EIS has been updated to clarify the intent of daily management.

Comment: Why has the requirement to manage daily been imposed on some allotments and not others? Daily management need not be written in the plan. (Wood, pp. 2 and 5)

Response: The requirement for daily management was based on the resource concerns and issues within the individual allotments. Resource considerations include vegetation, topography, water availability, size of the pastures, grazing strategy being proposed, and difficulty in maintaining adequate distribution.

Comment: Why has the East Maury Allotment been put into a 10-year rest? Why couldn't it be grass-banked in a fashion similar to the Lost Horse Allotment or offered to another ranch, thereby keeping the AUMs? (Wood, p. 2)

Response: The permittee in the East Maury Allotment has a continued interest in grazing the allotment. They are agreeable to the 10-year rest period to provide the opportunity for recovery of riparian conditions along several streams in the allotment, including stream shade and bank stability. The allotment has been rested for the past several years for resource concerns. The East Maury Allotment is the driest allotment in the Maury Mountains. During the 10-year rest period, water developments will be constructed, maintained, or relocated to improve water availability.

Comment: Flexibility on both parties is necessary in order to see improvement in the forest health. It will take more than just changing grazing to meet the management goals that need to be addressed in the Maury Mountains. (McCormack, p. 4)

Response: The Maury Mountains Allotment Management Plan EIS addresses those aspects of forest health that are affected by livestock grazing and for which the existing condition is not meeting the desired condition. The purpose of the proposal is to authorize livestock grazing in a manner that is consistent with the Ochoco National Forest Plan, as amended (DEIS, p. 2). It has been identified that resource conditions related to stream shade and bank stability need to be improved and that livestock grazing is a contributing factor (DEIS, p. 2). It is acknowledged in the Draft EIS that there are other factors which are limiting forest health, including stream shade and bank stability. Proposals on many of these factors such as timber harvest, prescribed fire, fire suppression, and road building or decommission are outside the scope of the purpose and need for this analysis. However, there are several other projects such as timber harvest and prescribed fire that have been proposed or will be implemented in the project area. The effects of these other projects have been described in the cumulative effects discussions throughout Chapter 3 of the EIS. A list of past, present, and reasonably foreseeable future projects is included in Table 15 of the EIS.

Alternative 4

Comment: Splitting the herd will cost a huge amount of money and will require extra staff to achieve this correctly. (Luttrell, p. 1)

Response: Alternative 4 is the preferred alternative in the Double Cabin Allotment and does not require splitting the herd.

Comment: The early-on date of May 14 is not workable. In most years, there is still snow in most pastures and the amount of mud will definitely impact soil compaction and do much more soil disruption. (Luttrell, p. 1)

Response: With respect to the Double Cabin Allotment, May 14 is the target date that livestock grazing would begin. The actual date that livestock are turned into the allotment will be dependent on weather and range readiness (DEIS, p. 19). Range readiness is defined in the glossary (DEIS, pp. 216-217). In summary, range readiness criteria ensures that vegetation and soils are at an appropriate stage for grazing so as not to compact soils or negatively impact vegetation. The Annual Operating Instructions, which are prepared in consultation with the permittee, will determine the actual turn-on date each year.

Comment: The proposed turn-on date (May 14/15) makes no concession to climatic conditions. This year there was still a significant snow pack on the north slopes of the Maurys through the latter part of May. There was not any way we could have turned out early in May this season. Turn-on dates need to be flexible dates due to changing conditions each year. (Wood, p. 3; McCormack, p. 3)

Response: The Draft EIS (pp. 13 and 19) acknowledges that there are annual variations in weather and range readiness and that livestock grazing will be adjusted annually. The Draft EIS also acknowledges that there are unpredictable events such as wildfire and drought that may result in adjusting livestock grazing. Turn-on dates are flexible. The dates listed for each allotment are target dates for grazing and actual use may be sooner or late than indicated based on annual conditions (DEIS, pp. 13 and 19)

Comment: The early-on, early-off strategy does not fit in well for us. The season of use needs to be later. (Wood, p. 5)

Response: The purpose of the early-on, early-off strategy is to improve livestock distribution and meet Forest Plan goals for shade and bank stability. Early season use has been demonstrated to minimize effects on riparian vegetation and improve livestock distribution (Platts and Nelson 1985, Kovalchik 1987, Marlow et al. 1989, Clary and Webster 1989).

With respect to the Sherwood Allotment, the preferred alternative (Alternative 4), as well as the Proposed Action, has the same season of use as the current permit. During the development of the Proposed Action the permittee was consulted. At that time, the permittee indicated a preference to maintain the current numbers, dates, and grazing rotation. As noted in the Draft and Final EIS, the actual timing of grazing can be adjusted annually. The earliest date livestock would be permitted in any allotment is May 1. The latest livestock will graze in four of the five allotments, including the Sherwood Allotment, is August 15. The length of grazing depends on utilization, reaching triggers (or thresholds) for pasture moves, and the allocated AUMs.

Comment: The Draft EIS presents the “rest-rotation system” as superior to others, but this is not necessarily so. The Draft EIS will lock us into one system of grazing removing the flexibility of employing another when conditions permit. (Wood, p. 2)

Response: The rest-rotation grazing strategy is preferred because it best meets the purpose and need of increasing stream shade provided by riparian vegetation (grass, sedges, and hardwoods) and increased bank stability provided by deep-rooted vegetation including willows and sedges. Varra et al. (1993) indicated a rest-rotation grazing strategy rated higher than a deferred rotation strategy for restoring riparian and watershed systems. Howery and others (2000) reported that rest provides a chance for vegetation around water to recover. Bohn and Buckhouse (1985) found that deferred rotation “did little to enhance, and sometimes hindered, hydrologic expression.” Rest-rotation has also been reported to favor recovery in increasing water infiltration rates, decreasing compaction, and decreasing sediment production (Bohn and Buckhouse 1985).

A rest-rotation grazing system would also provide for increased seed bank storage and plant vigor from improved root growth and carbohydrate storage. Rested plants are allowed to set seed. They do not need to use energy for re-growth or to produce seed after grazing and can send energy to root growth and carbohydrate storage for the following year. It is also not dependant on needed resources like water being available at the dry season.

Flexibility is inherent in the AOIs and allows annual changes to timing, duration, and intensity based on annual conditions.

Design Elements Common to Alternatives 2, 3, and 4

Comment: Protective measures, such as the installation of wildlife escapement ramps in troughs and designing fencing to minimize bird-wire collisions, should be included in the design or re-design of water developments. (USFWS, p. 3 and 4).

Response: Chapter 2 of the Draft EIS (p. 25) discloses that new fences will be constructed to wildlife friendly standards. The Draft EIS (p. 25) also discloses that all new water developments would be constructed with wildlife escapement ramps. The Final EIS has been updated to indicate that as existing water developments are maintained, wildlife escapement ramps will be installed.

Comment: Fenced exclosures have not been fixed and Forest Service staff says “Don’t fix it it’s our responsibility.” (Luttrell, p. 2)

Response: Part 3 of the grazing permit identifies the responsibilities for construction and maintenance of structural improvements. The permittee is assigned specific responsibility for maintaining improvements on the allotment. Fenced exclosures are not the responsibility of the permittee unless specifically identified in the permit. Exclosures are generally maintained by the Forest Service.

Comment: Exclosure fences must be kept in good repair and cattle must be kept completely out of these areas. (Sierra Club, p. 3)

Response: Enclosure fences can be constructed for a variety of resource objectives that may or may not include exclusion of livestock. For example, the Peck's mariposa lily enclosures included in Alternatives 2 and 4 are designed to reduce, but not eliminate livestock use around these plants. Aspen enclosure fences are generally constructed to eliminate most livestock use and sometimes wildlife use until aspen sprouts grow 6 to 8 feet high and are less susceptible to trampling and browsing. The aspen enclosure referred to in pictures submitted by the Sierra Club was constructed in 1993 and was intended to be removed when aspen regeneration reached a height where browsing would no longer influence growth. This objective has been met and the enclosure will be removed.

Fences are not expected to create an impenetrable barrier to livestock. Fences can be and are regularly damaged by a variety of factors such as livestock and other animals, falling trees, snow loading, and humans that leave gates open, cut fences to gain access, or use fence posts for firewood. While fences are not 100% effective all of the time, they do aid in controlling livestock and in improving resource conditions by reducing livestock use. Maintenance of enclosure fences occurs sporadically and every enclosure is not maintained every year.

Comment: Livestock grazing destroys the recreational desirability throughout extensive areas of the Maury Mountains. Federal multiple use (MUSYA) policy laws require the agency to make clear management provisions for all members of the public. It is illegal for a few commercially-motivated livestock ranchers to control and degrade nearly the entirety of the Maury Mountains. The agency must set aside the majority of this area, prohibiting livestock grazing in all but a small percentage of these public lands. (Sierra Club, p. 3)

Response: The Multiple-Use Sustained-Yield Act states "It is the policy of Congress that the National Forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." The Act also authorizes and directs the Secretary of Agriculture "to develop and administer the renewable surface resources of the National Forests for the multiple use and sustained yield of the several products and services obtained therefrom." Nothing in the Act requires the agency to set aside the majority of the Maury Mountains for recreational uses as suggested. The Forest Plan made decisions for the coordinated multiple-use management of the various resources and uses on the Ochoco National Forest, including recreation, wildlife and fish, range, timber, watershed, minerals, and wilderness. The Draft EIS (pp. 4-7) briefly discusses Forest Plan Direction and notes that livestock grazing is not allowed in "Core Areas" of areas allocated to developed recreation.

Comment: The Final EIS should provide information on proposed corrective actions if unauthorized use occurs or standards are not met in pastures exhibiting riparian plant communities in unacceptable conditions. (USFWS, p. 5)

Response: The Forest Service Manual (FSM) 2230 and Forest Service Handbook (FSH) 2209.13, Chapter 10 discuss suspension and cancellation of term grazing permits when unauthorized use occurs or when permittees are not following the approved allotment management plan. In addition, a grazing permit can be suspended if a temporary change is necessary to accomplish a specific resource purpose. Also, non use of a grazing permit may be approved for resource protection. This information has not been added to the Final EIS because

the FSM requires the line officer to consider circumstances and prevailing conditions in deciding the kind and extent of appropriate action to take.

Comment: The plan should provide a mechanism for identifying that when the Forest Service reintroduces forest management back into the Maury's how livestock grazing will be affected in the short term (during harvest) and how it will be addressed long term (post-harvest). (OSU, p. 4)

Response: The Final EIS has been updated to indicate that implementation of other projects will be coordinated with livestock permittees. Where logging, thinning, and underburning overlap individual allotments, coordination will occur with permittees during the preparation of the AOI. Adjustments will be made annually, as needed. The cumulative effects discussion in the Draft EIS (pp. 48-49) states that forest management proposed in the West and East Maury projects would improve transitory range. The result would be an increase in forage in upland areas. When that occurs, livestock are expected to use more forage in upland areas and less in riparian areas, further meeting the purposes and need to increase stream shade and improve bank stability.

Monitoring

Comment: Does the Ochoco NF monitor these allotments on a periodic basis? Cattle were permitted to be released in areas where aspen enclosure fences were in disrepair. (Sierra Club p. 2)

Response: Implementation monitoring occurs annually and consists of spot checks of permittee maintenance, checks of all pastures to ensure compliance with the annual operating instructions, stubble heights, bank alteration, hardwood utilization, and forage utilization (DEIS, pp. 25-26). Specific maintenance responsibilities of the permittee are identified in Part 3 of the grazing permit. The annual operating instructions identify the structural and non-structural improvements to be constructed, reconstructed, or maintained each year and who is responsible for these activities (FSH 2209.13 Chapter 94.3). Unless specifically identified in the grazing permit, maintenance of aspen enclosures is not the responsibility of the permittee but rather the responsibility of the Forest Service.

Comment: Are not permittees required to move cattle out of an allotment area well before vegetation has been reduced to mere stubble, soils are denuded to dust, and streams are trampled to collapsed muddy banks filled with putrefied cow pies? (Sierra Club, p. 2)

Response: Implementation monitoring occurs during the grazing season and consists of spot checks of permittee maintenance, checks of all pastures to ensure compliance with the AOI, stubble heights (by permittee and checked by the Forest Service), and utilization. Designated monitoring areas (DMA) have been established within each pasture. DMAs are monitored during the mid-season and again at the end of the grazing season. Residual stubble height, bank alteration, and hardwood utilization is measured. Thresholds or triggers are established which are used to indicate pasture moves. Minimum stubble heights are based on location (terrace,

greenline, or meadow) and species (grasses or sedges). The monitoring protocol and criteria are identified in the Monitoring section of the Draft EIS (pp. 25-26). Permittees are aware of these thresholds and are involved in monitoring with the Forest Service.

Comment: I have consistently opposed measuring as a monitoring criterion because it is the MOST subjective manner of monitoring. Where and when to measure, as well as who should do the measuring, and who else can be present when it is done are only a few of the issues. The “trend approach” utilized by the BLM is a far more objective standard and one that has worked well for years. (Thompson, pp. 1-2)

Response: The Ochoco National Forest, as well as many other National Forests and BLM Districts, follow the guidance contained in the Final Range Resource Implementation Monitoring Module (IMM) (July 2002). The IMM applies to field units that are covered by the PACFISH and INFISH management strategies. The application of the IMM meets the grazing implementation monitoring requirements of the salmon, steelhead, and bull trout PACFISH and INFISH Biological Opinions issued by the National Marine Fisheries Service on June 19, 1998, and by the U.S. Fish and Wildlife Service on August 14, 1998.

Under the IMM, designated monitoring areas (DMA) are identified in each pasture. Some of the criteria for selecting DMAs include: (1) selecting areas that are representative of grazing use specific to riparian areas; (2) measuring actual use of riparian areas, not an average use; and (3) avoiding sites that are resistant to disturbance or concentrate livestock use (DEIS, p. 25). The permittees are informed of these locations and are encouraged to participate in monitoring these areas. Measurements taken at these locations include residual stubble height, percent bank alteration, and hardwood utilization. Thresholds or triggers have been established and are used to indicate when livestock should be moved (DEIS, p. 26).

The Draft EIS (pp. 27-28) describes effectiveness monitoring. It consists of periodically completing surveys to determine if planned actions are effective in meeting or moving towards desired conditions. Effectiveness monitoring will occur every 3-5 years at DMAs in each allotment (DEIS, p. 27). Effectiveness monitoring will be utilized to determine trend and answer the following key questions: (1) What is the effect of the selected grazing strategy on riparian vegetation species and growth over time, and (2) what is the effect of the selected grazing strategy on physical stream habitat (e.g., width to depth ratio, entrenchment, and channel type)?

Comment: Monitoring will become a critical component in predicting effects and the success of the proposed mitigations. An adaptive management strategy should integrate flexibility in the development of the AOI and the management standards set for each allotment, based upon active feedback through implementation and effectiveness monitoring and annual review of the allotments. (USFWS, pp. 2-3)

Response: Monitoring, including both implementation and effectiveness monitoring, is discussed in the Draft EIS (pp. 25-28). Implementation monitoring occurs during the grazing season and consists of spot checks of permittee maintenance, checks of all pastures to ensure compliance with AOI rotation schedule, monitoring of stubble heights (by permittee and checked by the Forest Service), and monitoring of utilization. Effectiveness monitoring consists of

periodically (every 3-5 years) completing surveys at DMAs in each allotment to determine if planned actions are effective in meeting or moving towards desired conditions and what management actions, if any, are necessary in order to meet desired conditions (DEIS, pp. 27-28).

The AOI provide the flexibility (adaptability) to make changes, if necessary, to meet desired conditions. The AOI are based in part upon the previous years implementation monitoring. Effectiveness monitoring will also provide management information to the AOI. The AOI specify those annual actions that are needed to implement the management direction set forth in the project-level NEPA-based decision. They set forth (1) the maximum permissible grazing use authorized on the allotment for the current grazing season and the numbers, class, type of livestock, timing, and duration of use; (2) the planned sequence of grazing on the allotment, or the management prescriptions and monitoring that will be used to make changes; (3) structural and non-structural improvements to be constructed, reconstructed, or maintained, and who is responsible for these activities; (4) allowable use or other standards to be applied and followed by the permittee to properly manage livestock; and (5) monitoring. Based on implementation monitoring, timing, intensity, and duration of livestock grazing can be adapted to meet stubble height and utilization goals. Meeting stubble height and utilization standards should improve trend and will be evident in the effectiveness monitoring.

In addition, the Agency Administrator (Forest Supervisor or District Ranger) has the authority to make adaptive changes in order to meet desired conditions. Within this authority is the ability to change grazing permits for proper use of the forage resource by livestock, to comply with forest land management plans, laws, regulations and policy, or to ensure permittee compliance with provisions and requirements of the permit (FSM 2231.6). Grazing permits can be modified at any time during the term period for various reasons such as to respond to permittee request, increase or decrease livestock numbers or period of use, change kind or class of livestock or areas to be grazed, change or include Allotment Management Plan (FSM 2231.61). Grazing permits may also be suspended if a temporary change is necessary to accomplish a specific resource purpose (FSM 2231.62). Many of these actions can occur without the need to re-analyze under the NEPA. However, if changes or modifications implement actions that were not considered during the NEPA analysis, or if the effects of implementation are determined to be greater than the effects originally predicted, a supplemental or new NEPA analysis and NEPA based decision would be needed.

Comment: The Ochoco National Forest should satisfy both stubble height and utilization standards for all allotments within the project area. Stubble height standards for grasses and sedges should be species specific in order to ensure Forest Plan standards are being met. The Department recommends incorporating calculated stubble heights of common riparian plants when grazed to standards of 35 percent and 45 percent utilization in riparian areas. This method was developed on the Wallowa-Whitman National Forest. (USFWS, p. 5).

Response: The Ochoco National Forest currently monitors and will continue to annually monitor grazing within the allotments. Monitoring will include taking photos and measuring stubble height, bank alteration, and hardwood utilization at DMAs. Monitoring will continue to occur twice a year (once mid-season and once end-season). Pasture moves will occur before the alteration condition threshold (trigger) is reached or before the forage stubble height threshold is

reached. This means that the stubble height should be 2, 3, or 4 inches when all cattle have been removed (DEIS, p. 25). With the exception of Kentucky bluegrass (*Poa pratensis*) stubble height standards are not specific to individual species. They are specific to genera (grasses and sedges), timing of grazing, and the location of the DMA (terrace, dry meadow, greenline). The Draft EIS (p. 26) discusses the stubble height trigger.

Monitoring consists of spot checks of permittee maintenance, checks of all pastures to ensure compliance with standards (stubble height, bank alteration, switch in preference to hardwoods, utilization). Most of the riparian areas in the Maury Mountains contain many different species that are all important in capturing sedimentation and protecting riparian areas. Stubble height is an efficient method to measure residual vegetation.

Comment: The monitoring in the Draft EIS is inadequate to ensure compliance with preferred in-channel and forage standards or to determine compliance with RMOs. (CTWA, p. 6)

Response: The Ochoco National Forest, as well as many other National Forests and BLM Districts, follow the guidance in the Final Range Resource Implementation Monitoring Module (July 2002). This monitoring module was specifically developed to ensure compliance with the PACFISH and INFISH management strategies. The Draft EIS (pp. 27-28) describes the effectiveness monitoring that will occur to determine compliance with RMOs. If data gathered as a result of effectiveness monitoring provides new information that indicates the analysis and conclusions contained in the Final EIS need to be reconsidered, then the authorized officer can determine whether to further modify or suspend grazing practices.

Range of Alternatives, including Alternatives Considered but Eliminated from Detailed Study

Comment: A new EIS must be developed that presents alternatives that downsize or eliminate allotments. Most of the Maury's should remain cattle-free in perpetuity. (Sierra Club, p. 3).

Response: The Draft and Final EISs include an alternative that would eliminate livestock grazing in the Maury Mountains.

Comment: It appears that G-channels could be introducing significant sediment bedload to the system, which would slow the rate of water quality recovery. We recommend that active restoration be considered for these areas. (EPA, p. 2)

Response: The purpose and need for this proposal is to authorize livestock grazing in a manner that is consistent with the Ochoco National Forest Plan not water quality recovery. As disclosed in the cumulative effects sections, some past and present activities, such as headcut repair, are designed to improve water quality.

Comment: An alternative should have been evaluated that looked at changing time of use under the current grazing system. (OSU, p. 3)

Response: In the “40 Most Asked Questions” the Council on Environmental Quality provided guidance on what is meant by “range of alternatives.” The range of alternatives includes reasonable alternatives that are considered in detail and alternatives that are eliminated from detailed study. When there is a potential for numerous alternatives, only a reasonable number that cover the full spectrum of possible alternatives need be considered. In this case, the range of alternatives is reasonable. The Forest Service could have created dozens of alternatives that change only one possible activity in each, such as you suggest by changing only the timing and leaving the current grazing system in place. The alternative you suggest was considered but eliminated from detailed study because it was within the range of environmental effects already considered and did not include structural improvements for improving livestock distribution.

Comment: The Final EIS should include an alternative that incorporates an adaptive management strategy that allows for flexibility in the development of the Annual Operating Instructions (AOI) and the management standards set forth for each allotment. An adaptive management strategy should be based on active feedback through implementation and effectiveness monitoring. (USFWS, pp. 1 and 2)

Response: The alternatives already considered in the Draft EIS already include flexibility in the development of the AOI. Chapter 2 includes both implementation monitoring to ensure livestock grazing is implemented as planned and effectiveness monitoring to determine if the project area is moving toward the stated desired future conditions and interim Riparian Management Objectives. As required by Forest Service policy, new information will be reviewed to determine if grazing practices should be modified. Data gathered as a result of effectiveness monitoring might provide new information that would indicate the analysis and conclusions contained in the Final EIS need to be reconsidered. Because the alternatives already include the flexibility to adapt based on changing circumstances and new information, the Final EIS does not include an alternative as you suggest.

Comment: The Final EIS should include alternatives that meet the Forest Plan standards and guidelines for forage utilization through reduction of allowable use for available forage in addition to structural range improvements. (USFWS, p. 3)

Response: The preferred alternative in both the Draft and Final EISs meets the Forest Plan standards and guidelines for forage utilization.

Comment: The Ochoco National Forest must develop an alternative that includes (1) exclusion or rest of riparian areas from livestock grazing sufficient to allow full recovery of ecological systems, (2) compliance with ESA and Forest Plan standards, including INFISH, and (3) the removal of livestock from riparian areas at anytime when such compliance is not taking place. (CTWA, p. 6-7)

Response: The Forest Plan as amended by INFISH outlines the goals and desired future condition for riparian areas. The Forest Plan goals do not include “full recovery of ecological systems.” The goals include items like:

1. Maintain or restore water quality to a degree that provides for stable and productive riparian and aquatic ecosystems.

2. Maintain or restore diversity and productivity of native and desired non-native plant communities in riparian zones.

3. Maintain or restore riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific region.

To achieve these goals, the Forest Plan includes standards and guidelines such as “Maintain upper streambanks in a stable condition along at least 80 percent of the length of a stream” (p. 4-241) and “The requirements for shade along streams will generally correspond to provisions for more than 80 percent of the surface shaded” (p. 2-240). The Forest Plan goals, objectives, and standards and guidelines were considered during the early stages of the analysis process for this project and were key considerations in developing the Purpose and Need for Action. The proposed action and Alternative 4 were developed to achieve compliance with Forest Plan standards for riparian areas. Alternatives 2 and 4 include rest-rotation grazing systems that will provide periodic rest for riparian areas. Alternatives 2 and 4 also include fencing a portion of Sherwood Creek to reduce livestock grazing in an area with active headcuts.

As described in the section of this appendix on Threatened, Endangered, and Sensitive Aquatic Species, the Draft and Final EISs comply with the Endangered Species Act.

Table 16 of the Draft and Final EISs discuss how each alternative complies with applicable Forest Plan direction, or discloses that a Forest Plan amendment would be needed. The preferred alternative complies with all applicable Forest Plan direction.

As part of administering the term grazing permit, the authorized line officer can remove livestock from riparian areas if conditions warrant.

Comment: Aside from the status quo and the requisite no action alternative, the alternatives under the Draft EIS address only removal of livestock from the planning area and no other options that may be more politically acceptable and would have low impacts to certain areas overall. (CTWA, p. 3)

Response: The Draft EIS considered four alternatives in detail and considered but eliminated from detailed study five alternatives. Two additional alternatives were considered but eliminated from detailed study in the Final EIS. The no action alternative considers eliminating livestock grazing. Alternative 3 considers the status quo. Alternatives 2 and 4 considered modifying grazing practices to reduce overall impacts in riparian areas. The Draft EIS considers a range of reasonable alternatives.

Comment: I would recommend that a fifth alternative be evaluated that looks at the current grazing system with modifications in livestock distribution (deferred rotation with proposed water developments included). (OSU, p. 4)

Response: This alternative was considered but eliminated from detailed study because a deferred rotation grazing system is not expected to meet the purpose and need for improving bank stability and stream shade. And, because this alternative would have effects similar to Alternative 3.

Comment: Because considerable uncertainty exists regarding the effectiveness of the management changes described in Alternative 1, 2, and 4, to improve stream shade and bank stability conditions, the Department recommends that the Final EIS include project alternatives that incorporate recommendations to better address the conditions that contribution to habitat for redband trout, Columbia spotted frog, and sage grouse. (USFWS, p. 3)

Response: Considerable uncertainty about the effects of the alternatives does not exist. There are a number of scientific studies that support the expected effects of halting grazing as described in Alternative 1. Removal of livestock grazing would increase the height and percent cover of riparian vegetation, resulting in more bank stability, more shade, and more organic inputs to the channel (Platts et al. 1983, Kauffman et al. 1983, Kauffman and Krueger 1984, and Elmore and Beschta 1987). Several other studies (Gunderson 1968, Platts et al. 1983, Stuber 1985, and Clifton 1989) demonstrate that with increased riparian vegetation, stream channel widths are expected to decrease and depths are expected to increase, resulting in lower width-to-depth ratios.

There is some uncertainty regarding the effectiveness of the management changes in Alternatives 2 and 4. However, there is not *considerable* uncertainty and there are a number of scientific studies that support the effects expected as a result of modifying livestock grazing as described in Alternatives 2 and 4. Changing to rest-rotation and early season grazing would lessen the impact on riparian vegetation and trampling of streambanks. Habitat improvements under this type of grazing system were documented by Platts and Nelson (1985), Marlow and others (1989), and Clary and Webster (1989). The Draft EIS (pp. 90-91) references these studies and explains how they support the expected environmental consequences.

The Draft and Final EISs include requirements for monitoring. When monitoring is completed, it should document improvement in aquatic habitat due to changes in grazing systems. If effectiveness monitoring indicates that expected improvement are not occurring, then that information will be reviewed to determine if further analysis and modification of grazing activities is needed.

Chapter 3. Affected Environment and Environmental Consequences

Vegetation (Forage)

Comment: The plan says that under rest-rotation, plants will have the ability to set seed. The inference here is that under deferred rotation, seed set does not occur. This is incorrect. Under

deferred-rotation grazing systems, pastures grazed before the grass goes into a reproductive stage go through that reproductive stage after grazing is removed. (OSU, p. 3)

Response: Seed set does occur under both deferred rotation and rest-rotation grazing system. The rest-rotation grazing strategy is preferred in this instance because it best meets the purpose and need of increasing stream shade provided by riparian vegetation (grass, sedges, and hardwoods) and increased bank stability provided by deep-rooted vegetation including willows and sedges. A rest-rotation grazing system provides for increased seed bank storage and plant vigor from improved root growth and carbohydrate storage. With rest, plants do not need to use energy for re-growth or to produce seed after grazing and can send energy to root growth and carbohydrate storage for the following year. Seed set and carbohydrate storage under a rest-rotation grazing system is also not dependant on needed resources like water being available after grazing has occurred.

Comment: The Draft EIS does not adequately address the impacts of maintaining the maximum (or greater) allowable use of riparian forage given the current forage and resource conditions. The Department recommends that this issue be addressed and analyzed in the Final EIS. (USFWS, p. 2)

Response: Alternatives 2 and 4 in the Draft EIS analyze modifying grazing practices to promote recovery of vegetation in riparian areas and promote recovery of deep-rooted vegetation. With the exception of the Shotgun Allotment in Alternative 4, these alternatives are consistent with Forest Plan standards and guidelines for maximum allowable forage use in riparian areas. Alternative 3 analyzes the effects of continuing the current grazing practices, which would result in exceeded the maximum allowable forage use in riparian areas. The preferred alternative would result in 40 percent use of forage in riparian areas which is the maximum allowable use in the Forest Plan. This is consistent with Forest Plan standards and guidelines for riparian forage utilization. Because allowable use in riparian areas was already described in the Draft EIS, no additional information was included in the Final EIS.

Comment: The Draft EIS does not address utilization standards for range forage in riparian areas. (CTWA, p. 6)

Response: The Draft EIS did address allowable forage use in riparian on pages 38 and 39. Based on the Forest Plan and the condition of riparian communities, allowable use in riparian areas in the Maury Mountains is 0-40 percent (DEIS, p. 39). Table 16 (p. 183) disclosed the utilization standards. In the Final EIS, Table 16 has been updated to disclose that the preferred alternative is consistent with applicable Forest Plan direction.

Comment: It is the lack of upland management that has had the most negative impact on riparian areas. The canopy cover in the Maury's has gotten so overgrown that other forage cannot grow. The East and West Maurys Fuels and Vegetation Management Projects will have two direct impacts on this EIS and subsequent forage and water quality and available AUMs. Perhaps the fuels and vegetation management projects should be undertaken first to avoid having to do a second EIS. (McCormack, p. 2, Wood, p. 1)

Response: The Maury Mountains Watershed Analysis (p. 71) states that limiting factors for development of potential riparian vegetation is a lowered water table due to stream downcutting and increased density of upland coniferous vegetation. The Draft EIS (p. 37) acknowledges that historical grazing practices, fire suppression, and changing timber harvest practices have all led to the conditions that exist today. As disclosed in the Draft EIS (pp. 48-49), several projects in the area would improve transitory range by increasing the abundance and condition of upland vegetation, which would lead to less livestock use in riparian areas. Improved forage conditions as a result of the West Maurys project are expected to begin showing up within 5 years. The East Maurys project is currently on hold and there is no estimate for when upland forage conditions may improve as a result of that project. The increase in transitory range is not expected to alter authorizations to graze livestock.

Comment: If your goal is to move cattle and elk out of riparian areas, then the uplands need to be improved. There is little forage in most of the uplands due to downed trees, thick pine needles, and dense underbrush. Lack of riparian shrub cover can also be attributed to increasing coniferous tree canopy and tree density in the riparian corridors. Modifying grazing (timing or duration) will not have an effect on this interaction. (Luttrell, p. 2; OSU, p. 2)

Response: The EIS addresses livestock grazing and issues directly related to grazing. There are other projects within the project area that would reduce canopy cover and improve transitory range; these projects include the West and East Maurys Vegetation Management Project and the Maury Aspen Restoration project. The effects of these projects are disclosed in the cumulative effects discussions in Chapter 3 in the Vegetation (Forage) section (DEIS, p. 37). Within 5 years in the western portion of the project area, resources such as water and sunlight will be available to the understory and would temporarily improve the abundance and condition of herbaceous species in the upland until the tree canopy closes again after 20 to 50 years (DEIS, pp. 42, 48, 53, 58).

The preferred alternative changes the grazing season to an earlier season to improve distribution by reducing the time livestock seek water in riparian areas because the upland vegetation will have more water content (DEIS, p. 42). Parsons et al. (2003), Clary and Webster (1989), Platts and Nelson (1985), Elmore and Beschta (1987), and Marlow (1989) all noted benefits of earlier season grazing which included improved palatability of upland vegetation. The purpose of changing livestock grazing is to increase the amount of riparian vegetation, not just riparian shrubs. The Draft EIS recognized that only modifying livestock grazing would not result in increases in riparian shrubs. "Recovery of hardwoods in areas with conifer encroachment would be dependant upon active vegetative management (i.e. burning or thinning to remove conifers)" (DEIS, p. 76).

Forage production was calculated considering the plant associations, tree canopy cover, slope, and range condition as determined by the Condition and Trend plots (Range Specialist Report pg. 64). Forage production is adequate for the proposed stocking rates.

Comment: The Final EIS should conduct a complete evaluation of forage capability of sustaining current utilization levels for all the allotments while ensuring an upward trend of key resource variables (i.e. stream shade and bank stability). (USFWS, p. 3)

Response: The Forest Service Manual (FSM) 1905 indicates that capability refers to the potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at given levels of management intensity. All lands in the project area are capable of growing at least some forage. Approximately 80 acres throughout the Maury Mountains are considered incapable of grazing because the slope is greater than 60 percent (Holechek et al. 2000). Otherwise, the remaining acres in the project area are capable of livestock grazing.

FSM 1905 indicates that suitability is a determination of “[t]he appropriateness of applying certain resource management practices to a particular area of land as determined by an analysis of the economic and environmental consequences and the alternative uses forgone.” This analysis was done during the development of the Forest Plan. Suitability was determined based on Management Area Standards and Guidelines for forage (Forest Plan, pp. 4-142 through 4-147). The Forest Plan determined that livestock grazing was “unsuitable” in two Management Areas: Research Natural Areas (MA-F5) and Developed Recreation Areas (MA-F13). Within the project area, the five campgrounds are deemed “unsuitable” for livestock grazing. These developed recreation areas are: Antelope Flat Reservoir, and Wiley, Elkhorn, Pine Creek, and Double Cabin Campgrounds. These developed recreation areas are fenced to exclude livestock.

Water Quality

Comment: We recommend that the Final EIS include a discussion of bacteria and nutrients, if data are available. (EPA, p. 2)

Response: Data on bacteria and nutrients is not available and was not included in the Final EIS.

Comment: It would be helpful to have a summary table showing stream miles of riparian areas and wetlands adversely impacted by grazing and expected improvements under each alternative. (EPA, p. 2)

Response: Most all streams and riparian areas within the project area have been impacted to some extent by cattle grazing. Expected improvements to stream shade and bank stability for each alternative are discussed in the Draft EIS (pp. 63-84).

Bank Stability (Channel Morphology)

Comment: There have not been enough studies done to say one way or the other that trampling is a bad thing. In some cases, bank trampling is in fact beneficial to stream stabilization. Ten percent or less streambank alteration annually is unreasonable as well as unrealistic. The same should be addressed to the proposal of cut banks as well. Cut banks in some instances are part of the healing process for streams. (McCormack, p. 2)

Response: Several studies have been completed that indicate bank trampling can have adverse effects to streambank stability, fish habitat, and frogs. The Draft EIS (p. 62) discusses

streambank stability/alteration, and references studies that have found adverse impacts to streambanks from hoof action and livestock grazing. The Forest Service recognizes that cutbanks are part of the healing process, but only once a stream is entrenched. This process is referred to in the Draft EIS (p. 61) which states “F-channels generally have high bank erosion rates and a high sediment supply. Once a stream reaches the ‘F’ stage, it is in recovery mode and starts to build a new channel within the ‘F’ channel.” The Forest Plan recognizes that a certain amount of cutbank is expected and states that “Stream channel cutbanks should not exceed an average of 20 percent for any given stream drainage.” Ochoco National Forest would like to prevent the development of cutbanks and F-channels, as indicated by the Forest Plan requirement to “Maintain upper streambanks in a stable condition along at least 80 percent of the length of stream.” Likewise, the INFISH RMO states that bank stability should be 80 percent or greater. The bank alteration measurement is a surrogate to reduce the likelihood that cutbanks will form. In some areas, streams are in the process of down cutting due to the loss of vegetation and livestock trampling can exacerbate the down cutting. The streambank alteration measurement is designed to reduce chronic trampling so that riparian vegetation can recover before stream channels become entrenched.

The Draft EIS cites several studies that indicate bank trampling can result in loss of vegetation and loss of bank stability. In 1985, Bohn and Buckhouse completed a study that indicated livestock can cause compaction and decrease infiltration by grazing protective plant cover, reducing organic matter, or trampling. They also found “Rest rotation also favors recovery in increasing infiltration rates, decreasing compaction, and decreasing sediment production.” In 1984, Skovlin reported that streambank alteration from trampling leads to instability of aquatic habitat. Altered streambanks are more susceptible to the transport of fine soil particles from unvegetated banks to stream channels (i.e. higher sediment yield) than streams with vegetated banks (Skovlin 1984). The Draft EIS (p. 62) discloses “Channel morphology is primarily affected by streambank alteration (from trampling, hoof shear, and/or post holing).”

In other studies, Platts (1979) and Swanson and others (1982) determined riparian vegetation reduces velocity and erosive energy of flows during floods. They also reported that healthy riparian vegetation tends to stabilize streambanks, provide shade and cooler stream temperatures with more vegetative cover, determine bank morphology, and can reduce streambank damage from ice, log debris, and animal trampling.

Comment: Sedimentation of streams has been touched on in the EIS. It was largely attributed to cutbank and headcut formation with the role of grazing on streamside vegetation, yet little or no mention is made of the effect of the now dense forest canopy and lack of a robust grass/shrub plants to absorb raindrop impact when thunderstorms hit. (Wood, p. 3)

Response: Canopy closure/conifer encroachment is acknowledged as an important component in recovery of riparian vegetation. The Draft EIS (p. 76) states “Recovery of hardwoods in areas with conifer encroachment would be dependant upon active vegetative management (i.e. burning or thinning to remove conifers).” Canopy closure is not discussed in detail in the direct/indirect effects sections because cattle do not measurably influence canopy closure, especially large tree canopy closure. Under cumulative effects, the Draft EIS (p. 78) states The West and East Maury Fuels and Vegetation Management Projects include activities to reduce conifer

encroachment in areas with hardwoods; hardwoods would increase where conifer encroachment is reduced.” Currently, cutbanks and headcuts are the major contributors to instream sediment within the project area. Because livestock trampling can increase sediment inputs, the analysis focused on the amount of bank alteration caused by livestock as explained in the Draft EIS (p. 62).

Comment: While it is appropriate that the Draft EIS disclose instances of grazing-caused harms, it is very clear from our surveys in the area (see attached photo exhibits) that almost all of the allotment areas have extensive severe damage from years of livestock over-grazing abuse. It is highly questionable if there are truly any areas that “meet” bank stability standards. (Sierra Club, p. 2)

Response: The Ochoco National Forest has conducted several Bottom Line Stream surveys in the project area. These surveys follow the protocol in the Bottom Line Survey Manual (which was last updated in 2004) and the Forest Service’ R6 Stream Inventory Handbook. The stream surveys in the project area indicate that some, but not all, riparian areas do not meet bank stability standards. Maps 12 and 13 display the results of stream surveys. As disclosed in the Draft EIS (p. 2), 55 miles of the 85 miles of Class II and III streams have been surveyed. Based on the stream surveys that have been completed, it is likely similar conditions would be found on streams that have not been surveyed.

Part of the Purpose and Need for this project is to move toward that 80 percent objective throughout the project area. Page E-3 of INFISH states, “The interim RMOs for stream channel conditions provide the criteria against which attainment or progress toward attainment of the riparian goals is measured. Interim RMOs provide the target toward which managers aim as they conduct resource management activities across the landscape. It is not expected that the objectives would be met instantaneously, but rather would be achieved over time.” The preferred alternative would modify grazing practices to improve conditions along streams and improve bank stability.

Comment: The Forest Plan calls for no more than 80 percent bank disturbance but the proposed action requires no more than 10 percent “alteration” which is: (1) more restrictive, and (2) the use of the word “alteration” defines a condition that is not addressed in the Forest Plan. (OSU, p. 1)

Response: The Forest Plan actually states “Stream channel cutbanks should not exceed an average of 20 percent for any given stream drainage.” It does not address percent disturbance. The Forest Plan (p. 4-241) also states “Maintain upper streambanks in a stable condition along at least 80 percent of the length of stream.” INFISH recommends 80 percent bank stability in non-forested systems. For ease of understanding in this document, cutbanks are considered unstable streambanks and the desired condition is 80 percent stable streambanks. The Draft EIS (p. 62) explains both the Forest Plan standard and the reason for measuring streambank alteration.

Comment: The Draft EIS would have us believe that there is data (research) that directly connects alteration with some future streambank cutting. The Draft EIS provides no citation of

this evidence. What someone (Rhodes 1994) suggests as potential criteria should not be adopted without evidence of cause and effect. (OSU, p. 1)

Response: The Forest Service has not adopted potential criteria without evidence. The Forest Service is using streambank alteration to account for annual hoof shear, trampling, and/or post holing. The July 2002 Implementation Monitoring Module describes the roles of triggers in monitoring livestock grazing. Common triggers in use are forage utilization, stubble height, streambank alteration, and woody browse. Streambank alteration is used because the elimination or reduction of trampling along streambanks is an important step in allowing stream channels to narrow and deepen.

Comment: The Draft EIS completely fails to discuss available information indicating that bank stability is consistently degraded or impeded recovery under grazing. (CTWA, p 5)

Response: Table 7 of the Draft EIS (p. 63) discloses streambank alteration measurements from the project area. Sixty five percent of the streambank alteration measurements from designated monitoring areas exceeded 10 percent, with the majority of those figures also exceeding 20 percent. Part of the Purpose and Need for this project is to move towards 80 percent stable streambanks.

Comment: The Draft EIS fails to adequately disclose that grazing will significantly thwart attainment of the bank angle standards under PACFISH. It also fails to adequately disclose that the no-grazing alternative would result in far more rapid rates of recovery of overhanging banks than the preferred alternative. The Draft EIS fails to disclose that continued grazing will impede progress towards reduced summer water temperature needed by anadromous species in Maury Mountains. (CTWA, p. 2)

Response: Within INFISH, the lower bank angle RMO applies to non-forested systems. There is only a small fraction of the project area that is non-forested (meadows). By managing towards 80 percent bank stability, then lower bank angle (i.e. undercut banks) would be protected. The Draft EIS (pp. 63-64) reveals that Alternative 1 would have the least impacts to streambanks across all allotments and pastures. Pages 82 and 83 disclose that continued grazing under Alternative 3 will result in riparian vegetation disturbance with poor shading conditions. Furthermore, page 82 states for Alternative 3 that, "Streams listed on the state 303(d) list would not be expected to improve. Other streams that have relatively high temperatures would also not be expected to improve and could potentially be added to the 303(d) list in the future." The preferred alternative would result in increases in riparian vegetation and increases in bank stability which indirectly leads to reduced water temperatures. There are no anadromous fish species in the Maury Mountains.

Comment: The Draft EIS fails to disclose that grazing significantly retards the recovery of width/depth ratios. (CTWA, p. 2)

Response: Livestock grazing in the preferred alternative would not retard the recovery of width/depth ratios. The Draft EIS (p. 62) states "Streambank alteration (from trampling, hoof shear, and/or post holing) typically leads to the development of unstable banks, cutbank,

alteration of width/depth ratios, entrenchment, lowering of the water table and sediment input to the stream.” The preferred alternative includes a trigger of 10 percent bank alteration to indicate that pasture moves are needed. This trigger is designed to reduce the amount of streambank alteration to low levels that do not result in unstable streambanks. The preferred alternative is expected to result in decreases in sediment yield and width/depth ratios as riparian vegetation increases.

Comment: The Ochoco National Forest must provide a reasonable analysis of the cumulative effects of conditions on downstream non-federal lands and for federal lands on channel form, substrate conditions, flow levels, and water temperature. (CTWA, p. 3)

Response: Cumulative effects to streambanks, channel morphology, width/depth ratio, entrenchment, stream cover/shade, and stream temperatures for federal and non-federal lands are discussed in the Draft EIS (pp. 64-84). Page 82 discusses effects to the Crooked River, downstream of the project area, and also private lands outside the project area.

Riparian Vegetation and Stream Shade

Comment: Most of the streams in the Maury’s are intermittent and tend to dry up by the end of August. There are significant periods of time throughout the year that the streams are not flowing. Periods in which water temperatures are reported (those in excess of the maximum 7-day average) are periods when stream flow is at its lowest. These intermittent streams are prone to wide temperature fluctuations. Because of this some reconsideration of stream classification data is warranted. Changing the grazing management will not produce stream shade. (OSU, p. 2; Luttrell, p. 2; Wood, p. 4; McCormack, p. 3)

Response: The Draft EIS (pp. 59-60) defines stream class and describes the amount of streams, by class, within the project area. Class IV streams are intermittent streams and there are approximately 100 miles of intermittent streams in the project area. The Draft EIS (p. 59) discloses “Formal surveys are not completed on Class IV streams because they usually dry up in the summer months.” For the same reason, the Ochoco National Forest does not deploy stream temperature recorders in intermittent streams. When stream temperature recorders are retrieved at the end of the summer season, flow conditions are assessed and noted (conditions vary annually depending on climatic conditions). When the data is reviewed at the end of the summer, it is evident if the temperature recorder was in an isolated pool with no incoming flow or if the stream had dried up. This data is deleted.

A portion of the Oregon Department of Environmental Quality’s stream temperature standards applies to the summer season when flows are lowest and temperatures the highest. This is an important period of time for fish rearing. During drought years, data is subject to review. In 1998, data and streams put on the 303(d) list from 1994 were discounted due to drought conditions (defined under the Oregon Administrative Rules).

As disclosed in the Draft EIS, several studies indicate that changing grazing systems can result in more riparian vegetation and more stream shade.

Comment: The plan relies of a bias view that shade (and only shade) controls stream temperature. (OSU, p. 1)

Response: There are many factors that affect stream temperature, including amount of surface shading, solar input, depth of water, volume of flow, stream orientation, and air temperature. The analysis contained in the Draft and Final EISs focused on stream shade because (1) the desired condition for stream shade in the Forest Plan is not currently being met and (2) livestock grazing can and does affect stream shade by reducing riparian vegetation. The Final EIS has been updated to acknowledge that several factors affect stream temperature.

Comment: The Draft EIS emphasizes the influence of shading and stream temperature with little or no emphasis on other factors such as water depth, volume, velocity and stream orientation. These factors are equally, if not more, important than shading.” (Wood, p. 3)

Response: The Draft EIS (p. 62) identifies the two hydrologic features that are directly and indirectly influenced by livestock grazing (bank stability and riparian vegetation). Changes in riparian vegetation directly influence stream shade and stream temperatures. As discussed in the previous response, there are several factors that influence stream temperatures, not just shade. The analysis focused on riparian vegetation and percent shade because the effects of livestock grazing on these factors is measurable.

Comment: The Draft EIS fails to fully disclose that average water temperatures in the Maury Mountains do not meet INFISH standards. (CTWA, p. 2)

Response: The Draft EIS (p. 75) states “The project area contains six streams that are currently on the 2002 303(d) list for exceeding the average of the 7-day maximum stream temperature standard (18° C or 64.4° F) for fish rearing.” Table 8 in the Draft EIS (p. 77) displays stream temperature monitoring data within the project area. The table indicates that several streams do not meet State temperature standards for temperature. The Interim RMO for water temperature in INFISH states “No measurable increase in maximum water temperature (7-day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period). Maximum water temperatures below 59° F within adult holding habitat and below 48° F within spawning and rearing habitats.” This temperature standard was based on bull trout presence or potential. Bull trout do not occur within the project area. Redband trout do occur within the project area. The state water quality standards of 64.4° F is more typical of redband trout habitat and is used for this project area.

Comment: The Draft EIS does not state how many miles of stream have the potential of 80 percent cover and how many miles should be managed for 100 percent of potential. (OSU, p. 1)

Response: The Forest Plan (p. 4-240) states “The requirements for shade along streams will generally correspond to provisions for more than 80 percent of the shaded surface. Where this can not be attained, 100 percent of the potential for shade is the standard.” It also says, “Kovalchik’s Riparian Plant Community guide will be used for determining site potential until more specific data is available.” The Ochoco National Forest has no complete compilation of existing riparian vegetation for the entire project area. Observations of exclosures throughout the

project area reveal a vegetative potential that is variable depending on soil type, aspect, overstory canopy cover, species composition, water availability, etc. In some cases, vegetative potential within exclosures has shown a dramatic difference when compared to conditions outside the exclosures. An exclosure on Shotgun Creek (north aspect) demonstrates that shade/percent cover can be 100 percent from grasses, sedges, and rushes with about 50 percent overstory canopy. This is a big game exclosure that was constructed approximately 10 years ago. In other exclosures, such as on Deer Creek (south aspect), there has been very little response in riparian vegetation over approximately 20 years. This exclosure has a higher percentage of overstory canopy cover and is not a big game exclosure. Other exclosures throughout the project area show variable response in riparian vegetation.

Soil type within the project area is a major factor in determining which species are present and what the potential shade/cover is. Personal communication with Wayne Elmore in 2005 revealed that the percentage of clay in the upper part of the soil profile can dictate whether or not willows should be present. Generally willows need aeration within the soil, and soil types that approach 30 percent clay don't typically support willow establishment. It is important to note however that fluvial systems are dynamic and alluvial deposition may change the composition of the upper portion of the soil profile, such to support willow establishment. It is also important to note that since the amount and distribution of individual fluvial surfaces change with alteration in channel type, and since riparian vegetation is related to the amount and distribution of these fluvial landform types, a change in channel type dramatically affects the ability of a site to produce a specific plant community type. Hence conditions that define what potential may be may change over a relatively short time period.

Threatened, Endangered, and Sensitive Aquatic Species

Comment: The Draft EIS fails to adequately discuss cumulative impacts on aquatic or riparian habitats or fish and any discussion of such impacts is primarily limited to the effects of livestock and big game grazing and the impacts of distribution, stocking rates, and economics to private lands. (CTWA, p. 6)

Response: The CEQ regulations (40 CFR 1508.7) identify cumulative impacts “as the impact on the environment when *added* [emphasis added] to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”

The Draft and Final EISs appropriately identified the direct and indirect effects of the proposed action and other alternatives. The interdisciplinary team then looked at when and where the direct and indirect effects added to the effects of other actions. Where there was an additive effect, the effects were described in the cumulative effects sections. If there was no overlap in the timing or area of effect, then no cumulative effects were identified.

Comment: The Draft EIS fails to reasonably disclose existing cumulative effects on salmonid populations and habitats within the area affected by the proposed allotment management.

Likewise, the Draft EIS completely fails to address the cumulative effects of conditions on federal lands together with effects and actions on non-federal lands, including significant floodplain alteration, grazing, and water withdrawal. The Draft EIS fails to adequately discuss cumulative impacts on aquatic or riparian habitats (f) or fish and any discussion of such impacts is primarily limited to the effects of livestock and big game grazing and the impacts of distribution, stocking rates and economics to private lands. (CTWA, pp. 3 and 6)

Response: Cumulative effects have been discussed throughout Chapter 3 of the Draft EIS. The Draft EIS (pp. 179-181) states “Cumulative effects have been discussed throughout this chapter. As discussed in the June 24, 2005, Council on Environmental Quality Memorandum on Guidance of the Consideration of Past Actions in Cumulative Effects Analysis, past actions that warrant consideration because they are continuing to cause identifiable effects in the project area have been considered and are described in Table 15. Past activities that have changed the environmental baseline have been included in the description of the affected environment. Table 15 also includes a description of present and reasonably foreseeable actions that were considered in the cumulative effects sections. The type and amount of activity have been described on an allotment-by-allotment basis to provide both the decision-maker and the public a better estimate of the expected effects.” The cumulative effects analysis for aquatic species can be found in the Draft EIS (pp. 64-65, 68-70, 72, and 74-75).

Comment: The Final EIS should include a detailed analysis of the action’s impacts on fish. This analysis should include detailed comparison of the impacts on tribal fisheries of the different alternatives. (CTWA, p. 7)

Response: The Draft EIS (p. 84) notes that “anadromous fish are not currently present in the project area because of downstream blockages at dams that do not provide fish passage facilities.” The Draft EIS includes a detailed discussion of impacts to redband trout, the only salmonid species currently present within the project area.

Beginning on page 88, the Draft EIS discloses the expected impacts of each alternative on redband trout. Alternatives 1, 2, and 4 are expected to result in improved habitat for redband trout. The Draft EIS (p. 91) discloses that populations of redband trout are expected to increase when the habitat improves and the food base increases. Under Alternative 3, habitat improvements are not expected and the populations of redband trout would not be expected to increase.

Comment: The Draft EIS fails to adequately prevent the effects of livestock grazing on riparian and stream habitats and fish species listed under the federal Endangered Species Act (ESA). The Draft EIS violate ESA standards. The ESA requires an analysis of watershed conditions via the “Matrix of Pathways and Indicators.” The Draft EIS fails to provide whether such analysis has been performed. (CTWA, pp. 1, 6)

Response: The Draft EIS (p. 83) clearly states that there would be no effect to bull trout or Mid-Columbia River steelhead trout because the species are not present or there is no habitat in the project area. Anadromous fish are not present in the project area because of downstream blockages at dams that do not provide fish passage facilities. The Draft EIS does not violate

ESA requirements. An analysis using the “Matrix of Pathways and Indicators” is not needed and has not been performed for this project because there would be no effect to any aquatic species that is listed under the ESA.

Threatened, Endangered, and Sensitive Wildlife Species

Western Sage Grouse

Comment: The Final EIS should include a thorough analysis of the effects of continued grazing and the proposed grazing management of the allotments on existing and potentially restored sage-grouse habitats. (USFWS, p. 2 and 3)

Response: Both the Draft and Final EISs provide a thorough analysis of effects to potential sage grouse habitat. Only the Shotgun and East Maury Allotments contain potential habitat for sage grouse. Currently, the potential sage grouse habitat within these allotments is not suitable because of the distribution and density of juniper. As noted in the cumulative effects discussion, the East Maury's Fuels and Vegetation Management Project was identified as a reasonably foreseeable project that includes juniper reduction in potential sage grouse habitat. The East Maury's Fuels and Vegetation Management Project is currently on hold and there is no scheduled date for completion. Typically, it takes 1-2 years to complete an EIS. After the EIS is completed and a decision is signed, it could take several years for juniper reduction activities to occur. It is uncertain when any juniper reduction activities in potential sage grouse habitat will occur. In addition, grazing activities will be periodically reviewed to determine if the analysis and documentation contained in the Final EIS remains valid. If the potential sage grouse habitat does become suitable habitat that information will be reviewed to determine if further analysis and potential modification of grazing activities is needed.

Rocky Mountain Elk and Mule Deer

Comment: Little attention seems to have been given to the effects of the deer and elk on stream shade and shrub utilization. Yet cattle AUMs listed on page v are 4197 while deer and elk (p.129) are somewhere between 10,000 and 13,000 AUMs - 2.4 to 3.2 times greater than cows (calculated from 4000 deer and 1100 elk, p. 129). The brief attention given this subject focused in Klootchman Creek and is full of conjecture. “This may have been a response to previous heavy grazing from cattle in riparian areas or simply a response to shrub densities.” This begs the question: was there heavy grazing from cattle? Or was there a snow covering which forced wildlife to switch from grazing to browsing? Perhaps they simply wished to change in taste? (Wood, p. 4)

Response: The 4,000 deer and 1,100 elk population estimates given on page 129 are for the entire Maury Game Management Unit, not just the project area. The Maury Game Management Unit contains 60 percent public lands and 40 percent private lands. Of the 60 percent public land, 14 percent is located on National Forest System lands within the project area. Trying to determine what proportion of the estimated population spends time on National Forest System lands within the project area would be difficult. As a result, trying to determine AUMs for deer

and elk would be speculative. To state that the AUMs for deer and elk are 2.4 to 3.2 times greater than for livestock is also speculative.

The statement “This may have been a response to previous heavy grazing from cattle in riparian areas or simply a response to shrub densities” has been removed from the Final EIS.

The Draft EIS (p. 2) states there is a need to adjust livestock management to promote the recovery of vegetation in riparian areas to increase the amount of stream shade and recognizes livestock grazing is a contributing factor. Other factors that affect riparian vegetation include wildlife, recreationists, and roads that are in close proximity to streams. The analysis focused on the effects from livestock grazing because the Forest Service is proposing to continue to authorize that activity. The Forest Service acknowledges deer and elk do browse on shrubs. However, it is difficult to separate hardwood use between cattle, deer, and elk within the project area. A study conducted during the years 1992, 1994, and 1996 attempted to evaluate the use of shrubs by cattle on Klootchman Creek with an early on/off grazing system. In summary, 2 years of the study determined little use by cattle on willows with the majority of use occurring by deer and elk following the removal of cattle. In 1996, there was increased use of the willows by cattle and also use was documented on snowberry. During this same time period, elk population estimates increased from 400 animals in 1992 to 1,300 animals in 1996. Deer population estimates increased from 2,700 animals in 1992 to 3,700 animals in 1996. Shrubs have continued to increase in height along Klootchman Creek to the present. Observations of Forest Service staff indicate the majority of streams within the Maury Mountains did not show a similar response in growth of shrubs. Riparian shrub recruitment and growth continues to be impacted on the majority of streams by browsing.

The East Maury Allotment has been rested since 2000. Observations by Forest Service staff over the last 6 years note that there is an increase in growth of riparian and upland shrubs within the East Maury Allotment. During this same time, the estimated elk population decreased from 1,400 to 1,000. The estimated deer population decreased by 1,000 animals between 2000 and 2006.

Comment: The Forest Service should review the interdisciplinary and inter-agency study of shrub use on Klootchman Creek. The attempt to address this issue in the Draft EIS (p. 131) is inappropriate and incomplete. To suggest that some unreported heavy grazing in the riparian areas caused significant shrub use by wildlife fails to recognize there was no evidence of heavy livestock use during the years of study. This plan fails to analyze the impact of wildlife populations on shrub and aspen recovery and fails to analyze if shrub and aspen objectives can be met under existing wildlife pressures. (OSU, p. 2 and McCormack, p. 3)

Response: The range files were reviewed and the monitoring data from Klootchman Creek for the years 1992, 1994, and 1996 was reviewed. The monitoring data during 1992 and 1994 indicates there was very little willow use from cattle. The incidence of use by wildlife was estimated at 90 percent in September 1992. In 1994, willow browsing was less than 10 percent when cattle were removed and in November 70 percent of leader growth remained. That would indicate 20 percent of leaders were removed by elk and deer. In 1996, 60 percent of the willows showed use when cattle were removed. Snowberry was also recorded as showing heavier use in 1996. Monitoring in the fall of 1996 indicated wildlife use increased later in the year with no percentages of use. The results also included numerous comments referring to how well the area

looked. The statement “This may have been a response to previous heavy grazing from cattle in riparian areas or simply a response to shrub densities” has been removed from the Final EIS. The intent of the statement was to acknowledge that big game do browse on riparian shrubs. The statement was also intended to acknowledge that deer and elk can and do shift their dietary preference in response to previous grazing as reported in studies completed at the Starkey Experimental Forest. When forage was abundant, cattle and deer diets were similar, but as forage utilization increased deer preferred shrubs while cattle preferred grass (Coe et al. 2001).

Threatened, Endangered, and Sensitive Plant Species

Peck’s Mariposa Lily

Comment: The Draft EIS indicates an enclosure for Peck’s mariposa lily will be constructed in the Rickman Pasture. If this is such a fragile piece of the environment, why are cattle going in there at all? I would guess to keep down the weeds and under brush. That is one of the virtues that cattle provided to the forest ecosystems. (Luttrell, p. 2)

Response: The Draft EIS (p. 141) discloses that there is some uncertainty about livestock grazing effects to Peck’s mariposa lily. Peck’s mariposa lily is an early or mid-succession species and periodic disturbance from fire or livestock grazing can help maintain its habitat. Monitoring by the BLM indicates Peck’s mariposa lily maintains viable populations in areas with moderate grazing while excluding livestock from its habitat appears to result in decreased densities (Halvorson 2005, pers. comm.). However, the preferred alternative would result in grazing earlier in the year when soils are moist, which is when Peck’s mariposa lily plants are more vulnerable to grazing and trampling (Kagan 1996). Fencing the population of Peck’s mariposa lily in the Rickman Pasture would reduce livestock trampling during the plant’s growing season when it is most vulnerable. Seven other enclosures in the Klootchman, Sherwood, and Shotgun Allotments would also reduce livestock trampling near Peck’s mariposa lily populations. Once every 4 years these areas would be available for grazing. Excluding livestock when soils are moist is expected to reduce risk of livestock damage to plants or habitat. Livestock grazing after July 15 and/or once every 4 years is expected to reduce buildup of vegetation that could otherwise reduce habitat suitability for this plant. Alternatives 2 and 4 help maintain habitat when the plants are less vulnerable to trampling.

Socio-Economics

Comment: The socio-economic impacts should be further explored. Oregon State University’s Department of Agricultural and Resource Economics has done some excellent work and publications in this area, e.g. The Oregon Beef Cattle Industry: Impact on the Oregon Economy. The actual dollar value to the local economy is probably much greater than stated in the Draft EIS. In fact, it is probably twice that. (Wood, p. 1)

Response: Table 14 in the Draft EIS depicts the difference in income between current management and Alternative 4 at just over \$14,000 (\$135,000 v. \$111,900). In 2005, the total agricultural sales in Crook County were more than \$42,000,000. Even if the dollar value were 2

or more times greater than depicted in Table 14, the economic impact within the community would still be next to impossible to detect.

Comment: Reducing AUMs is not in the best interest of the local economy. Too great a reduction could lead directly to the demise of ranching operations. The rampant growth in Central Oregon has limited the availability of other grazing. This coupled with rising fuel costs makes the allotments adjoining base property very valuable. Without the allotment or with too drastic a cut in AUMs, we would undoubtedly be forced to sell out to “rampant growth.” (Wood, p. 2)

Response: The Forest Service recognizes the threat of subdivisions and partitioning of private lands surrounding National Forest System lands and the potential for substantial resource impacts. In fact, the Chief of the Forest Service has identified the loss of open space as one of the four threats to the health of the Nation’s Forests and Grasslands. However, the 13 percent reduction in permitted AUMs proposed which is primarily the result of suggested changes by individual permittees, should not be of a magnitude to threaten the viability of the local ranches.

Comment: I am not sure why the Draft EIS (p. 177) is quoting private grazing fee structures that are more than 3 years old. The plan suggests little private grazing land is available in Jefferson County (p. 177). What is the availability of private grazing lands near the area being affected? If we are going to truck livestock 60-100 miles, the economic analysis needs to be expanded and include more than just a comparison of private and public grazing fees. (OSU, p. 3)

Response: The intent of this paragraph was not to suggest that the permittees would have to truck their livestock 60-100 miles for alternative forage; but to suggest that there may in fact be some economic ramifications to individual ranchers if there was a reduction on Forest Service lands. The magnitude of the impact is contingent on many factors, all of which are outside of Forest Service control.

Comment: The economic impacts reviewed by the Draft EIS are incomplete and misleading. The document fails to explore the impacts of the existing livestock operations affected by this plan. The plan states that the impacted ranches rely on a significant amount of public land based AUMs (p. 176) and reports that alternative AUMs are limited (p. 177). The plan’s analysis fails to analyze the important factors and how they influence the economic viability of the ranches affected. The plan does not analyze the increased operating costs associated with the plans implementation (increased fence and water development construction and maintenance, increased costs of livestock management including daily riding). These and other costs associated with this plan should be a part of the economic review. Reduced forage and increased costs associated with plan implementation may reduce the economic viability of these ranches (OSU, p. 3 and Luttrell, p. 1)

Response: The analysis did consider the potential for the alternatives to impact the existing livestock operations. However, the magnitude of effects would depend entirely upon several factors including: options available to each permittee, the size of their total operations, debt structure, access to and availability of private land for grazing, availability and costs of

replacement forage, business goals and objectives, and the market for cattle. Many of these factors are specific to each individual operation and are not available to the Forest Service. For instance, the decrease in AUMs in the Double Cabin Allotment is a direct result of less acres available for grazing, which was suggested by the permittee. The significant investment in new developments in the Klootchman Allotment is tied to suggestions by the permittee to improve livestock distribution. The decrease in AUMs in the Shotgun Allotment is commensurate to the reduction in acres available for grazing, which is based on suggestions from the permittee. As the commenters point out, there will be an increase in administration costs, especially in the two allotments where daily management is required. The changes in AUMs and increased administrative costs would have some economic impact on the permittees, but the exact impact cannot be calculated because the exact economic condition of each operation is unknown, and the continuous fluctuations in market prices for pasture use, supplement feed, and cattle.

Cumulative Effects

Comment: Rather than analyzing the impacts of the preferred alternative alone, the Ochoco National Forest must study the cumulative impacts of all actions affecting instream flows. The Draft EIS completely fails to address the cumulative effects of conditions on federal lands together with effects and actions on non-federal lands, including significant floodplain alteration, grazing, and water withdrawal. (CTWA, p. 3)

Response: The Final EIS does not need to study the cumulative impacts of all actions affecting instream flows. The CEQ regulations require agencies to consider the direct and indirect effects of an action added to the effects of past, present, and reasonably foreseeable future actions. Instream flows in the project area are determined by elevation, precipitation, snowmelt patterns, summer soil moisture conditions, and groundwater sources, not livestock grazing. Because the CEQ regulations suggest NEPA document must concentrate on the issues that are truly significant to the action in question and because any effects from livestock grazing cannot be meaningfully evaluated, no discussion of instream flows is included in the Final EIS.

Other Required Disclosures

National Forest Management Act

Comment: Authorizing grazing in the Maury Mountains Allotments will violate INFISH standards. INFISH grazing standard GM-1 requires the Forest service to: “[m]odify grazing practices ... that retard or prevent attainment of [RMOs] or are likely to adversely affect listed anadromous fish. Suspend grazing if adjusting practices is not effective in meeting [RMOs] or avoiding adverse effects on listed anadromous fish.” (Sierra Club, pp. 3-4)

Response: INFISH standard and guideline GM-1 states

Modify grazing practices (e.g., accessibility of riparian areas to livestock, length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of Riparian Management Objectives or are likely to adversely affect

inland native fish. Suspend grazing if adjusting practices is not effective in meeting Riparian Management Objectives.

As disclosed in the Draft EIS (p. 187), authorizing livestock grazing under Alternatives 2 and 4 would not violate INFISH standards and guidelines. As required by GM-1, the preferred alternative would modify grazing practices by changing timing of grazing, relocating some water developments, constructing new water developments, and constructing some fences. Chapter 2 discloses the effectiveness monitoring that is included in the action alternatives. The effectiveness monitoring was proposed to determine if planned activities are moving toward desired conditions. If effectiveness monitoring determines that the proposed modifications to the livestock grazing practices do not result in moving toward desired conditions, then the authorized officer can determine whether to further modify or suspend grazing practices. INFISH standard GM-1 does not automatically require the suspension of livestock grazing. As required by INFISH GM-2, no new livestock handling or management facilitation will be constructed in riparian areas under any alternative. INFISH GM-3 indicates that livestock trailing, bedding, watering, salting, loading, and other handlings effort should be limited in riparian areas. The Draft EIS (p. 24) indicates that salting locations will be located outside riparian areas. In addition, the preferred alternative includes relocating some existing water developments outside of riparian areas. As disclosed in Table 16, the preferred alternative is consistent with the Forest Plan., including INFISH standards and guidelines.

Comment: The Ochoco National Forest fails to indicate how the proposed action will comply with the INFISH mandate that grazing practices not “retard or prevent attainment” of RMOs. The Draft EIS fails to disclose the degree to which existing conditions fail to meet RMOs. RMOs that are directly and indirectly affected by livestock grazing have not been addressed including: (1) pools, (2) water temperature, (3) lower bank angle in non-forested systems, and (4) width/depth ratio. The Draft EIS indicates that redband-bearing streams are failing to meet RMOs, that grazing is retarding and preventing RMO attainment, and that grazing will continue to retard RMOs under the selected alternative. The Draft EIS must be revised and new alternatives developed to effectively address this serious issue. (Sierra Club, p. 4 and CTWA, pp. 4-5)

Response: The Draft EIS discloses that Alternatives 2 and 4 are consistent with INFISH standards and guidelines. Key sections of the Final EIS have been updated to include information on the preferred alternative, which combines elements of Alternatives 2 and 4. The Final EIS discloses the preferred alternative is consistent with INFISH standards and guidelines. Aquatic habitat would improve under these alternatives. The Draft and Final EISs also disclose that Alternative 3 would not be consistent with INFISH standards and guidelines.

INFISH specifically recognizes “The interim RMOs for stream channel conditions provide the criteria against which attainment or progress toward attainment of the riparian goals is measured. Interim RMOs provide the target toward which managers aim as they conduct resource management activities across the landscape. It is not expected that the objectives would be met instantaneously, but rather would be achieved over time.” INFISH also recognizes that all habitat features may not be present in any specific stream segment, but that all of them should generally occur at the watershed scale. The Draft EIS (p. 86) discusses RMOs and explains how

the fish habitat features described in the interim RMOs are all interconnected and how the analysis will focus on cutbanks and riparian vegetation as a surrogate for all RMOs. The Draft EIS (p. 62) discloses that bank stability and riparian vegetation are directly and indirectly influenced by livestock grazing.

Comment: The Draft EIS fails to adequately disclose the RMOs for bank stability and substrate as required by the NMFS (National Marine Fisheries Service) BO (Biological Opinion) for Forest Plans as amended by PACFISH. The Draft EIS also fails to list requirements that the Ochoco National Forest pursue a bank stability objective of 90% on all streambanks in non-forested systems, <20% surface fine sediment in spawning habitat and <30% cobble embeddedness in rearing habitat for listed salmonids. The Draft EIS also completely fails to provide any analysis of the degree of current compliance with these objectives and how the alternative will differ with respect to meeting these RMOs. The Draft EIS fails to reasonably differentiate among the alternatives with respect to likely effects on habitat attributes, including those set as Forest Plan standards. (CTWA, pp. 4, 5, and 6)

Response: The PACFISH amendment does not apply to this project area. Anadromous fish are not able to access streams above Prineville Reservoir. The management direction for this area includes the INFISH amendment. The RMOs identified in INFISH are different than the RMOs in PACFISH. The RMOs applicable to this project area do not require a bank stability objective of 90% on all streambanks in non-forested systems, <20% surface fine sediment in spawning habitat and <30% cobble embeddedness in rearing habitat for listed salmonids. The INFISH RMOs indicate that streambanks in non-forested systems should be 80 percent stable or greater. There are no objectives for fine sediment or cobble embeddedness. The Draft EIS (pp. 63-75) describes the effects of each alternative on bank stability.

Table 16 in the Draft EIS (p. 187) describes applicable Forest Plan direction and discloses that the alternatives are consistent or states that a Forest Plan amendment would be needed.

Comment: The Draft EIS fails to disclose and analyze existing consistency with, and effects of the alternatives on the 10 PACFISH ecological goals. The Final EIS should explicitly analyze and disclose current and likely future consistency with PACFISH ecological goals by alternative. (CTWA, pp. 6 and 7)

Response: The 10 PACFISH ecological goals do not apply to this project. There are no threatened or endangered aquatic species within the project area (DEIS, p. 84). The INFISH management direction includes riparian goals and RMOs that are applicable to this project. INFISH also includes several standards and guidelines that are used during project planning and implementation. This project is consistent with the applicable INFISH standards and guidelines. Consistency with these standards and guidelines should aid in achieving the goals and objectives included in INFISH. In addition, Chapter 2 describes the monitoring that will be used to ensure that the standards and guidelines are effective in moving toward the goals and objectives.

Comment: The Draft EIS violates the Forest Plan because it merely concludes that “current grazing management activities are presently fully meeting the requirements of the” LRMP. (CTWA Humphrey, p. 4)

Response: The Draft EIS does not violate the Forest Plan and does not conclude that current grazing management is fully meeting Forest Plan requirements. Table 16 summarizes applicable Forest Plan direction and discloses whether the action alternatives are consistent with direction.

Comment: The Draft EIS lacks sufficient information to determine whether the document is consistent with the Ochoco National Forest. (CTWA, p. 1 and 7)

Response: Both the Draft and Final EISs include information on consistency with the Forest Plan. This information is contained in Table 16 near the end of Chapter 3.

Comment: The Ochoco National Forest fails to disclose existing compliance with the substrate standard, analyze likely compliance with this standard within the project area and in affected down stream reaches. (CTWA, p. 4)

Response: The Forest Plan for the Ochoco National Forest does not contain a substrate standard.

Miscellaneous

Comment: The Draft EIS claims that livestock grazing is a “historical” use, but fails to substantiate this claim. Historical has been scientifically defined as referring to pre-European settlement times. Livestock grazing does not constitute an historical use. (Sierra Club, p. 3)

Response: Webster’s Dictionary (1984) states “Historic refers to whatever is important in history (the historic voyage of Columbus); historical refers to anything in the past, whether important or not (a historical character).” Chapter 3 of the Draft EIS (pp. 37-38) briefly describes the historical grazing that occurred in the Maury Mountains, including a table that displays a comparative look at the levels of livestock grazing.

Comment: Moving water tanks and improving ponds will help with distribution. We have asked to fix several water troughs and ponds to no avail. We thought we were not allowed to fix these water developments. (Luttrell, p. 1)

Response: The grazing permit and AOI identify maintenance responsibilities within the allotment. The grazing permit specifies that the permittee will maintain all range improvements, whether private or Government-owned, that are assigned for maintenance to standards of repair, orderliness, and safety acceptable to the Forest Service. The improvements and acceptable level of maintenance are specified in Part 3 of the permit. The AOI identifies the structural and non-structural improvements to be constructed, reconstructed, or maintained and who is responsible for these activities each year (FSH 2209.13 Chapter 94.3). The maintenance responsibilities are reviewed annually with the permittee and documented in the AOI.

Many water troughs need to be relocated to reduce livestock use in riparian areas. Before they could be moved, surveys for heritage resources and sensitive plants needed to be completed. Those surveys were completed as part of this EIS process. Once a decision is made,

implementation of maintaining and relocating water developments can begin. The actual schedule of maintaining and relocating water developments will be determined on an annual basis and will be documented in the AOI.

APPENDIX B. LETTERS FROM GOVERNMENT AGENCIES

Changes Between Draft and Final EIS

This is a new appendix

This appendix contains copies of letters from government agencies. These letters were received during the 45-day comment period.

The letters contained here may not appear exactly as submitted because of conversions between software. They do contain the exact wording from the letters.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

August 21, 2006

Reply To

Attn Of: ETPA-088

Ref: 05-018-AFS

Arthur J. Currier, District Ranger
Ochoco National Forest
Lookout Mountain District
3160 N.E. 3rd Street
Prineville, OR 97754

Dear Mr. Currier:

The U.S. Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (DEIS) for **Maury Mountains Allotment Management Plan** (CEQ no. 20060275) on Ochoco National Forest, Crook County, Oregon. The review was conducted in accordance with EPA responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309, independent of NEPA, specifically directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions. Under our policies and procedures, we evaluate the document's adequacy in meeting NEPA requirements.

The draft EIS assesses the effects of continuing or eliminating livestock grazing on five allotments in the Maury Mountains of Ochoco National Forest where there is demand for livestock forage and stream shade and bank stability improvements are needed. Analysis of effects that would result from continued livestock grazing on the allotments considered four action alternatives, three of which would include authorization of grazing, construction and maintenance of water developments and fences, and modification of the amount of livestock grazing authorized. The 4 action alternatives are:

1. **No Action:** Under this alternative, the Forest Service (FS) would prohibit livestock grazing on the allotment.
2. **Proposed action** (*Preferred alternative for the Shotgun allotment*): Under this alternative, the FS would reauthorize livestock grazing on the five allotments early in the grazing season, use rest- and deferred-rotation grazing systems, and authorize construction of 41 new water developments and maintenance of another 128 existing water developments, and building of about 10 miles of new fences and maintenance of nearly 67 miles of existing fences. Activities under the proposed action would result in reduced amount of grazing authorized compared to current levels, better forage

utilization, and improved riparian vegetation conditions and stream bank stability and shade.

3. Under Alternative 3, the FS would reissue current grazing permits and make no changes in stocking rates and season of use, unless there were annual variations in weather and range readiness to trigger alterations in season of livestock use. All five allotments would be managed under a deferred rotation system, without construction of new fences and water developments. If implemented, Alternative 3 would result in under-utilization of upland forage compared to forage use in riparian areas where livestock would have easy access to water. That would lead to deterioration of riparian vegetation conditions and stream bank stability and shade.

4. Under Alternative 4 (Preferred alternative for the Double Cabin, East Maury, Klootchman, and Sherwood allotments), the FS would reauthorize livestock grazing in five allotments, change the season of use to earlier season grazing, and authorize new construction and maintenance of the same number of water developments and miles of fence as in Alternative 2, with about six additional miles of fencing. Like the Proposed Action (Alternative 2), Alternative 4 would result in overall reduction in the amount of grazing authorized when compared to current levels and two more weeks of grazing on one pasture compared with alternative 2.

The DEIS includes good discussion and analysis of many of the points raised in EPA's scoping comments, including analysis of water quality, habitat and vegetation, consultation with tribes, and monitoring. The DEIS also does an excellent job of disclosing how grazing has affected and would affect soils, vegetation, streams and riparian areas, and other resources. In general, we agree with the proposed grazing strategy to improve conditions in riparian areas. However, we also have a few additional comments that we hope will be useful to you as you complete the NEPA analysis for the proposed allotment management plan.

The DEIS states that the preferred alternative for one pasture is Alternative 2 and the preferred alternative for the other four pastures is Alternative 4. This makes it a bit difficult to compare the overall preferred alternative to the others, especially when some alternatives are similar such as Alternative 2 and 4. We recommend that a clear description of the preferred alternative be included in the final EIS, along with clear distinction and comparisons to other alternatives.

EPA supports the strategy to use a grazing system that combines early season, rest-rotation grazing system with fences and water developments. We believe such a system will improve riparian health and water quality. The DEIS does a good job of explaining how management of vegetative growth in riparian areas will stabilize streambanks, increase shade and lower summer water temperature in streams over time. This strategy is likely to be consistent with watershed plans such as the Total Maximum Daily Loads (TMDLs) for 303(d) listed water bodies in the area.

Such a strategy is also likely to reduce loading of fecal coliform and nutrients to waterways. We recommend that the final EIS include a discussion of bacteria and nutrients, if data are available. Additionally, it appears that G channels could be introducing significant sediment bedload to the

system, which would slow the rate of water quality recovery. We recommend that active restoration be considered for these areas. The maps that show channel type and shade are useful. It would also be helpful to have a summary table showing stream miles of riparian areas and wetlands adversely impacted by grazing and expected improvements under each alternative.

The draft EIS states that the planning team held consultations with the tribes, but information about the outcomes of these consultations was not included in the draft EIS. We recommend the final EIS discuss the process and outcomes of consultations with the tribes. We also recommend that the final EIS indicate the time frame covered under the proposed grazing program and discuss funding for the program as a whole, including the cost for each alternative action.

On many National Forest land systems, recreational and Off-Road Vehicle use has been increasing. If there will be potential effects or conflicts between livestock grazing and recreational use of the analysis area, we recommend that the FEIS include specific information on recreational use, possible conflicts between livestock use and recreationists, and plans to reduce potential conflicts and effects.

Based on our review, we have assigned a rating of LO (Lack of Objections) to the DEIS. An explanation of this rating is enclosed.

We appreciate the opportunity to comment on this project. If you would like to discuss our comments in detail, please contact Theogene Mbabaliye at (206) 553-6322 or me at (206) 553-1601.

Sincerely,

/s/

Christine B. Reichgott, Manager
NEPA Review Unit

cc:

EPA Oregon Operations Office



United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
500 NE Multnomah Street, Suite 356
Portland, Oregon 97232-2036



9043.1
IN REPLY REFER TO:
ER06/0695

Filed Electronically

August 18, 2006

Mr. Kevin Keown, Team Leader
Ochoco National Forest
3160 NE Third Street
Prineville, Oregon 97754

Dear Mr. Keown:

On August 8, 2006, the Department of the Interior (Department) sent you a no comment letter on the Ochoco National Forest (ONF) Draft Environmental Impact Statement (DEIS) for the Maury Mountains Allotment Management Plan. After that letter was sent, we received comments the U.S. Fish and Wildlife Service. Please consider this letter as the Department's comments for use in the development of the final environmental impact statement (FEIS).

General Comments

The Department's primary concern is to assure that the proposed actions do not result in direct and indirect adverse impacts to fish and wildlife within the Maury Mountains. Based on the information provided in the DEIS, the Department believes that in order to address this concern and to meet the purpose and need identified by the ONF, including minimizing environmental impacts of the Proposed Action, the FEIS should include an alternative that incorporates the modifications proposed in this letter as well as an adaptive management strategy that allows for flexibility in the development of the Annual Operating Instructions (AOI) and the management standards set for each allotment. By adopting an adaptive management strategy, the ONF would have the ability to modify AOI based on the data yielded from monitoring.

According to Table 5 of the DEIS, standards for utilization and stubble height have not been consistently met over the last seven years. From 1999 – 2005, both utilization and stubble height standards were met less than eight percent of the time for all non-rested pastures (i.e., five out of 64 non-rested pastures). Based on our review of the DEIS, the Department is concerned that: 1) the action alternatives propose the maximum (40 percent) or, in the case of Alternative 3, exceed the maximum allowable use of available

forage for livestock, regardless of resource conditions related to stream shade and bank stability resulting from grazing; 2) this level of use may result in adverse impacts to several trust resources including: redband trout (*Oncorhynchus mykiss* ssp.), Columbia spotted frog (*Rana luteiventris*), and the Greater sage-grouse (*Centrocercus urophasianus*) (sage-grouse); and 3) there is no adaptive management strategy for the development or adjustment of the AOI nor the management standards set for each allotment.

The FEIS should analyze the development and application of an adaptive management strategy that is based on active feedback through implementation and effectiveness monitoring and annual review of the allotment in an effort to more consistently meet established use and stubble height standards and minimize adverse impacts to fish and wildlife resources.

The 2003 Condition and Trend (C&T) survey indicated an increase in litter, an increase in canopy cover, and a decrease in perennial plants in the Maury Mountains. The project area was determined to be in unsatisfactory condition overall based on the 2004 National Environmental Policy Act Evaluation of Livestock Grazing for the Ochoco National Forest, which rated the condition of the Maury Mountains as poor or very poor, and the C&T surveys in the uplands, which rated most areas in poor to very poor conditions. Although forage conditions have continued to decline throughout the majority of the Maury Mountains, the permitted Animal Unit Months (AUMs) have remained relatively stable since 1978; Since 1978, forage utilization within the project area has declined by only 488 AUMs, from 5,569 to 5,081 AUMs. The DEIS does not adequately address the impacts of maintaining the maximum (or greater) allowable use of riparian forage given the current forage and resource conditions. The Department recommends that this issue be addressed and analyzed in the FEIS.

The majority of the sage-grouse habitat within the project area is in the Pine and Cottonwood Pastures. These pastures are dominated by low (*Artemisia arbuscula*) and stiff sagebrush (*Artemisia rigida*) and currently have the potential for providing early brood rearing habitat. A known lek site occurs within 5 miles of the Pine and Cottonwood Pastures. The distribution and densities of juniper in the eastern portion of the Maury Mountains currently reduces potential use by sage-grouse. Reasonably foreseeable shrub-steppe restoration actions are expected to occur within the project area from the proposed Maurys Fuels and Vegetation Management project. Therefore, viable sage-grouse habitat is expected to increase in the future. Activities described in the Maury Mountain Allotment Management Plan (e.g., grazing or water developments within important nesting and brood rearing habitats) may degrade important sage-grouse habitat or limit the ability to restore and manage habitat conditions in the future. The Department recommends that the FEIS include a thorough analysis of the proposed action's effects to current or potential sage-grouse habitat.

Recognizing the uncertainties regarding administrative effectiveness, predicted environmental consequences, and cumulative effects, the Department believes that monitoring will become a critical component in predicting effects and the success of proposed mitigations. An adaptive management strategy could provide the framework and the management flexibility to sequentially implement mitigation measures to meet the desired environmental conditions. The strategy should integrate flexibility in the development of the AOI and the management standards set for each allotment, based upon active feedback through implementation and effectiveness monitoring, and annual review of the allotment. The purpose is to move various

resources and the allotments themselves to a desirable functional condition in a more active and responsive way. The ONF's Paulina Ranger District established a similar successful strategy for the Westside Allotments Project.

Because considerable uncertainty exists regarding the effectiveness of the management changes described in Alternative 1, 2, and 4, to improve stream shade and bank stability conditions, the Department recommends that the FEIS include project alternatives that incorporate the following recommendations to better address these resource conditions, and their contribution to habitat conditions for redband trout, Columbia spotted frog, and sage-grouse habitat.

- Meet Forest Plan Standard and Guidelines for riparian forage utilization through the reduction of allowable use for available forage in addition to structural range improvements for pastures in unsatisfactory condition.
- Conduct a complete evaluation of forage capability of sustaining current utilization levels for all the allotments while ensuring an upward trend of key resource variables (i.e., stream shade and bank stability).
- Conduct a thorough analysis of the effects of continued grazing and the proposed grazing management of the allotments on existing and potentially restored sage-grouse habitats. Information regarding status of sage-grouse within the project area and monitoring information on the condition of shrub-steppe habitat would be necessary in assessing project impacts to this species. Mitigation measures to avoid or minimize project impacts should also be discussed.
- Monitoring should include grass and forb composition and abundance in sage-grouse habitat. The FEIS should propose to monitor other characteristics of sage-grouse habitat (e.g., condition and trend) to better analyze impacts to sage-grouse habitat. Stubble height less than seven inches does not provide suitable habitat for sustaining sage-grouse nesting. The FEIS should consider a reduction of grazing in sage-grouse nesting areas that cannot sustain residual stubble height of at least seven inches where achievable considering Ecological Site Descriptions. The FEIS should consider sage-grouse habitat and forage needs throughout all seasons, but especially for nesting and brood rearing (April 1 – July 31).
- Vegetation damage can increase as a result of livestock congregating at water sources. Water source locations in relation to sage-grouse habitat should be discussed in the FEIS. Additionally, if water sources are located within sage-grouse habitat, protective measures for sage-grouse, such as the installation of wildlife escapement ramps in troughs, and designing fencing to minimize bird-wire collisions, should be included in the design or re-design of water developments.
- The ONF should satisfy both stubble height and utilization standards for all allotments within the project area. In addition, applied stubble height standards for grasses and sedges should be species specific in order to ensure Forest Plan standards are being met. For example, 45% utilization of Nebraska sedge (*Carex nebrascensis*) would translate to a mean stubble height of 7.5 inches (range: 6.5-8.5). The Department recommends incorporating

calculated stubble heights of common riparian plants when grazed to standards of 35% and 45% utilization in riparian areas. Their methodology was developed by Gene Yates, Forest Botanist (Wallowa-Whitman National Forest).

- The Department recognizes that due to limited resources, the Lookout Mountain Ranger District will need to set priorities to address the most important upland and riparian restoration needs within allotments identified in the project area. Priority setting should also include a formalized process to track, resolve, and/or enforce compliance with established use standards developed within the FEIS over the life of the project. Specifically, the FEIS should provide information on:

- o Proposed corrective actions if unauthorized use occurs or standards are not met in pastures exhibiting riparian plant communities in unacceptable conditions.

- o A monitoring and reporting program that facilitates adaptive management of the Forest's grazing program to minimize the potential for adverse effects to redband trout and their habitat.

- Establish an annual allotment status assessment to evaluate effectiveness of restoration and management efforts, including trend analysis of key natural resources exhibiting cumulative effects, and then apply an adaptive management strategy to provide the management flexibility to effectively address restoration goals within the project area.

- Both short-term and long-term monitoring should be coordinated with rangeland users, general public, landowners, academia, and local, State, and Federal agencies. The goal of the monitoring should be to determine whether progress is occurring, and if progress is not occurring, to identify adjustments. The Department recommends a committee be formed to review and refine the implementation and effectiveness monitoring plan to be included in the FEIS that addresses local resource concerns within each of the proposed allotments within the Maury Mountains.

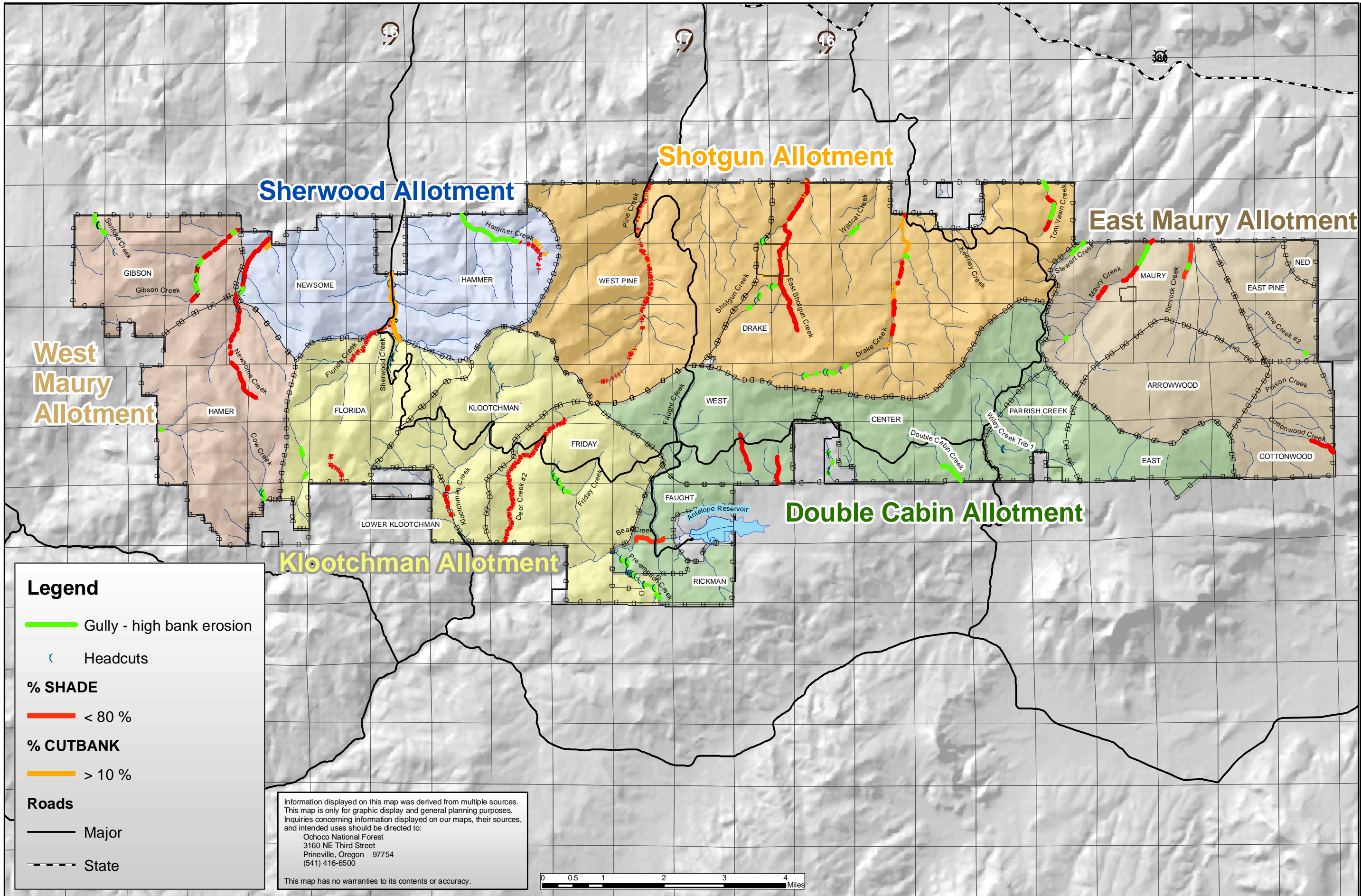
The Department appreciates the opportunity to provide comments on the DEIS. If you have any questions regarding the Department's comments, please contact Mr. Jerry Cordova or Ms. Nancy Gilbert, U.S. Fish and Wildlife Service, Bend Field Office, 20310 Empire Ave., Ste. A-100, Bend, Oregon 97701, telephone (541) 383-7146.

Sincerely,

Preston A. Sleeper
Regional Environmental Officer

cc:
Kemper McMaster, OFWO

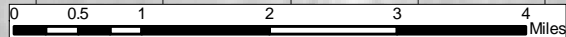
Maps

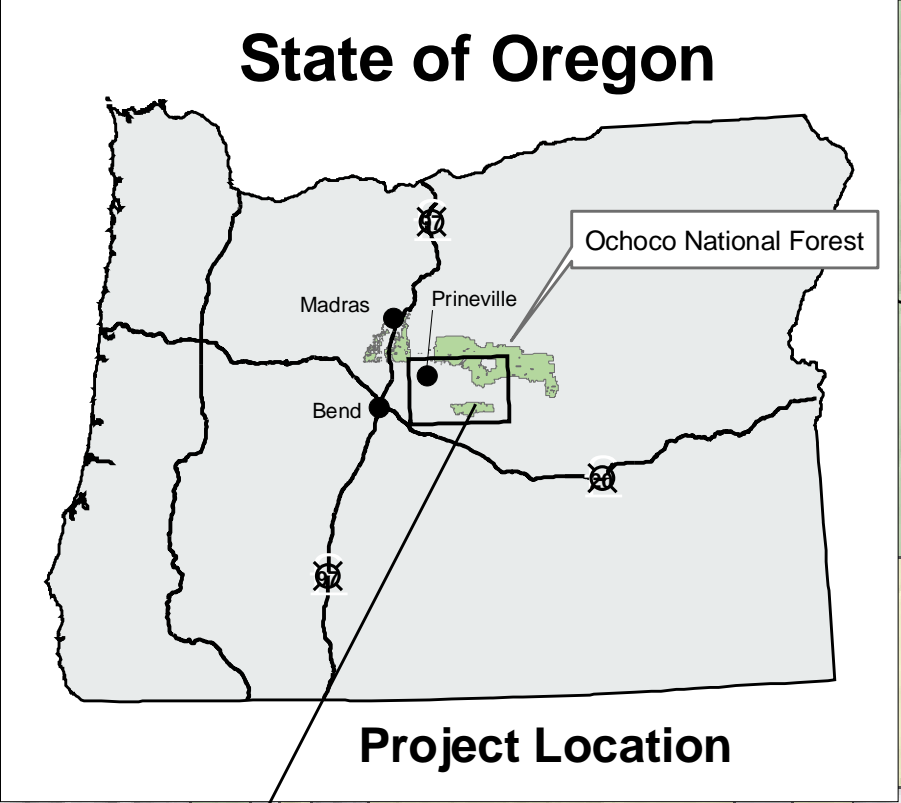
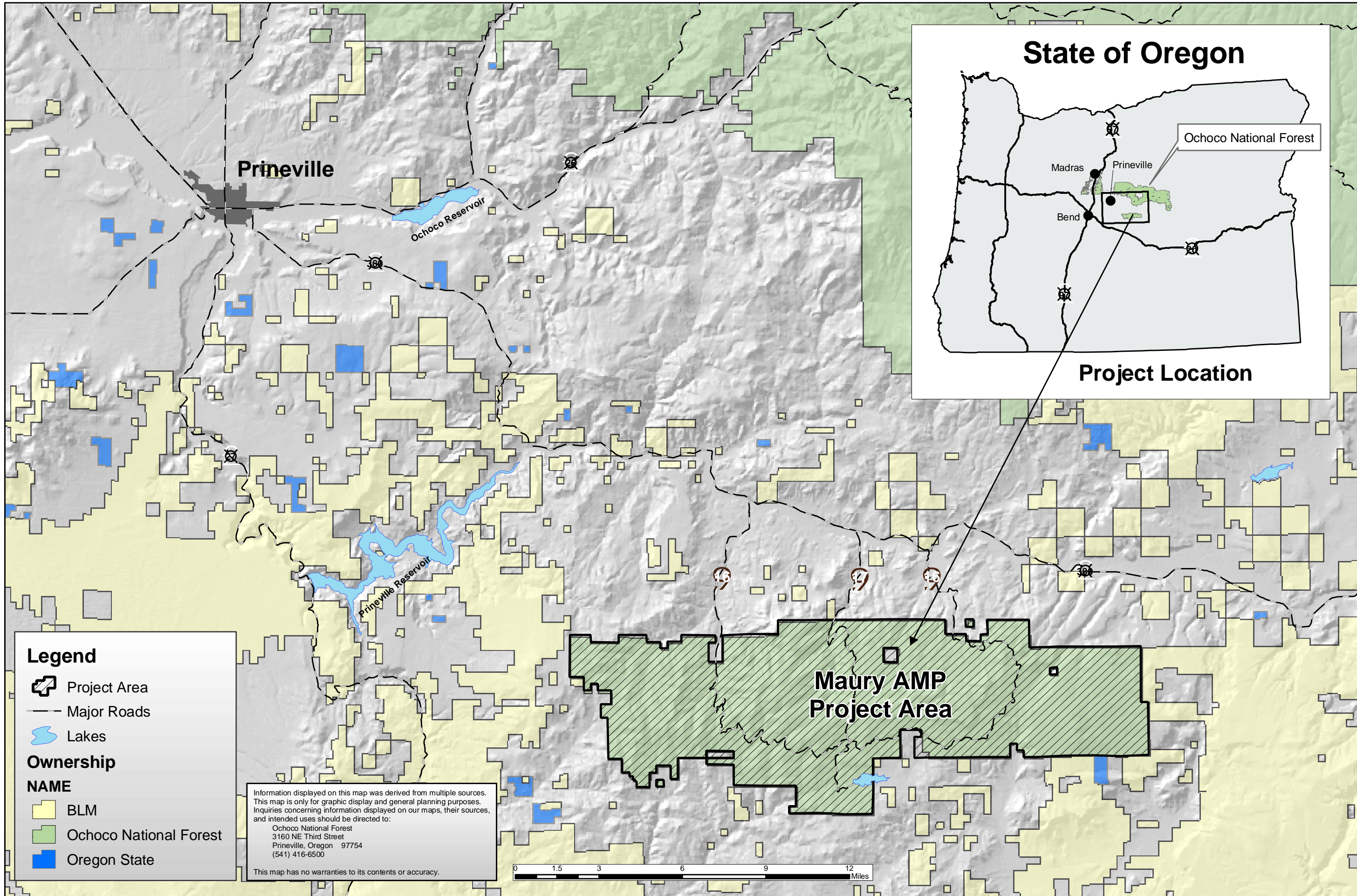


Legend

- Gully - high bank erosion
- (Headcuts
- % SHADE**
- < 80 %
- > 10 %
- Roads**
- Major
- State

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Legend

- Project Area
- Major Roads
- Lakes

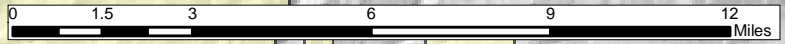
Ownership

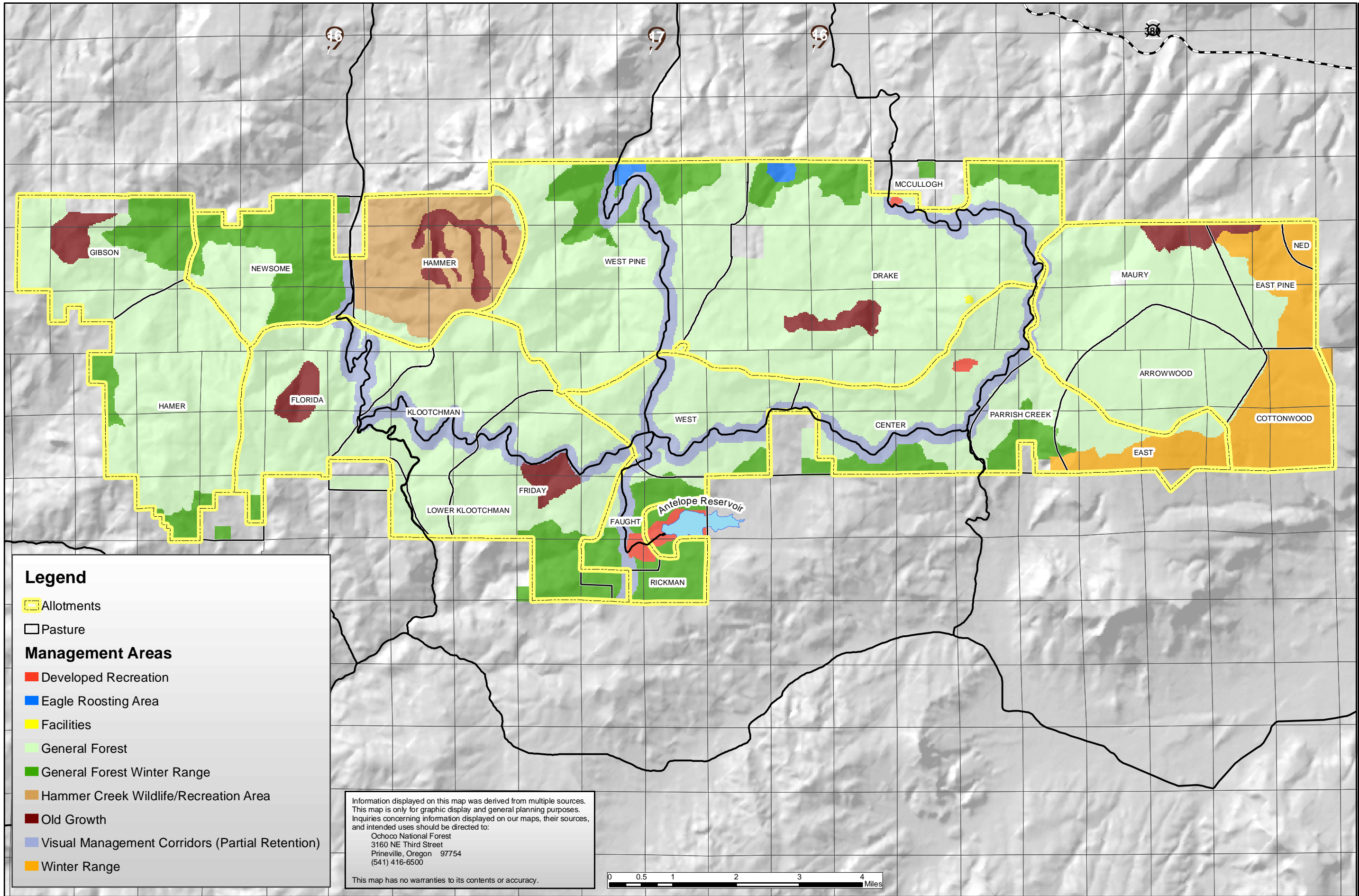
NAME

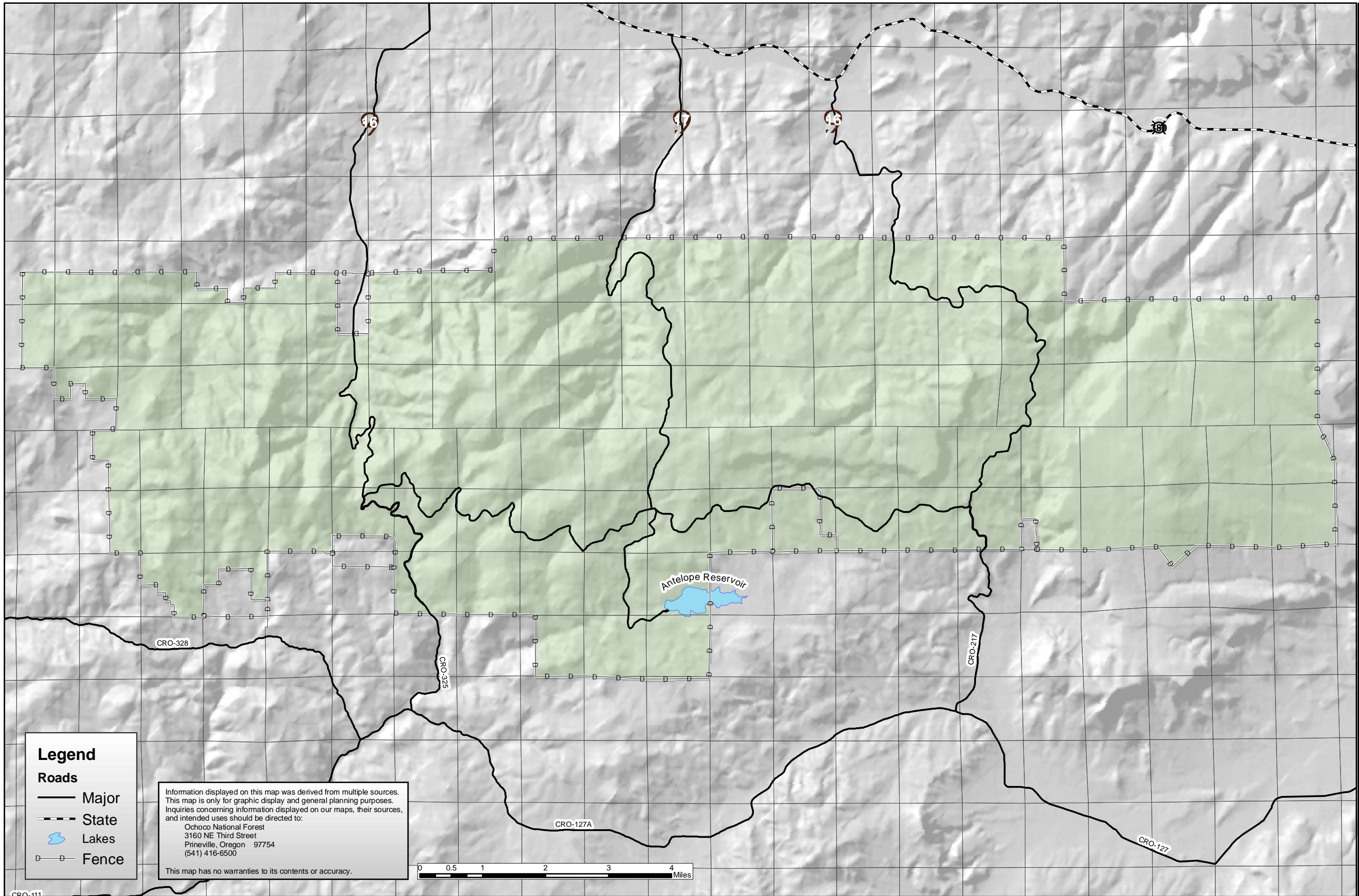
- BLM
- Ochoco National Forest
- Oregon State

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Sherwood Allotment

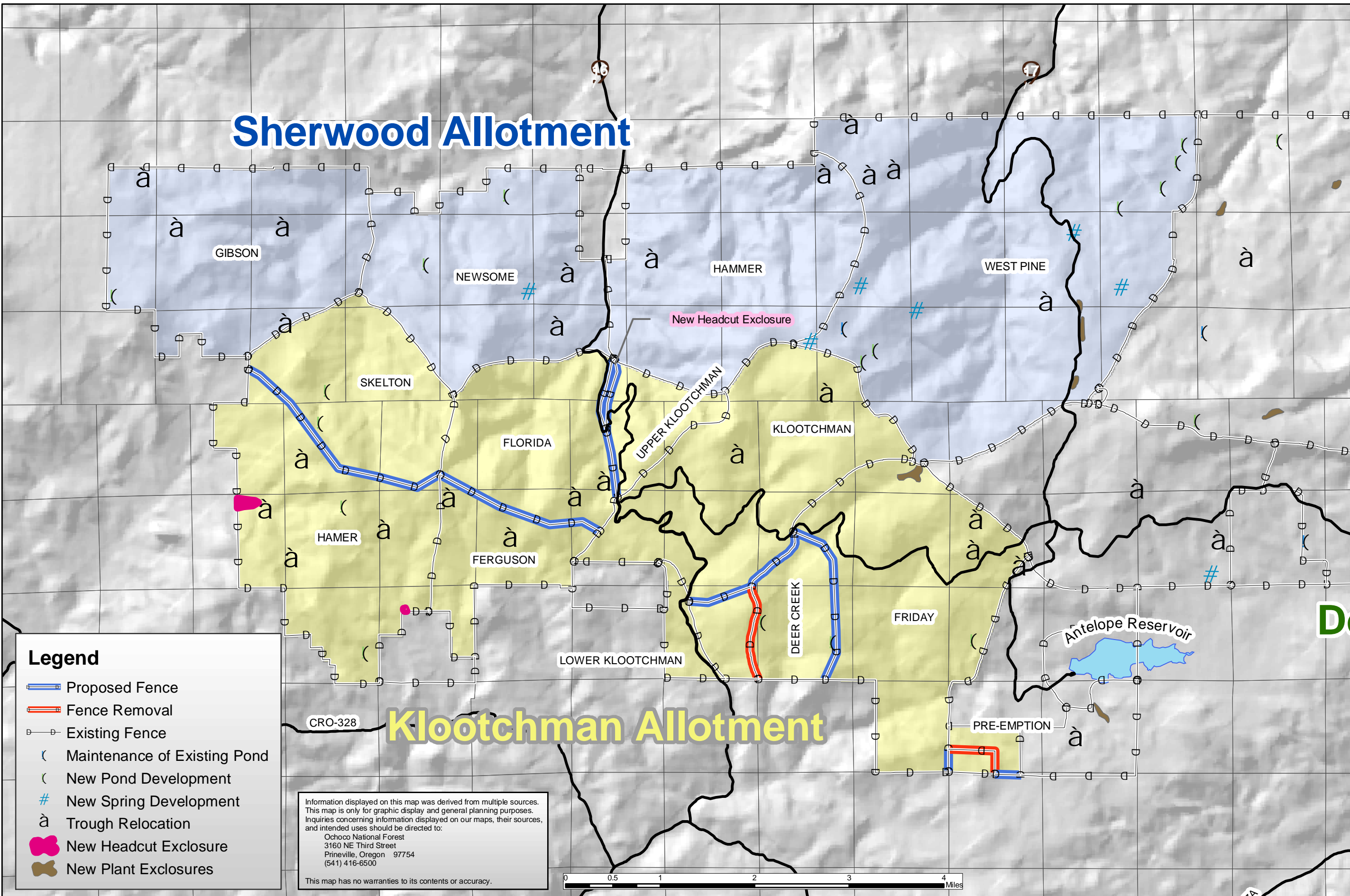
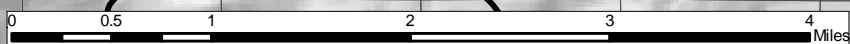
Klootchman Allotment

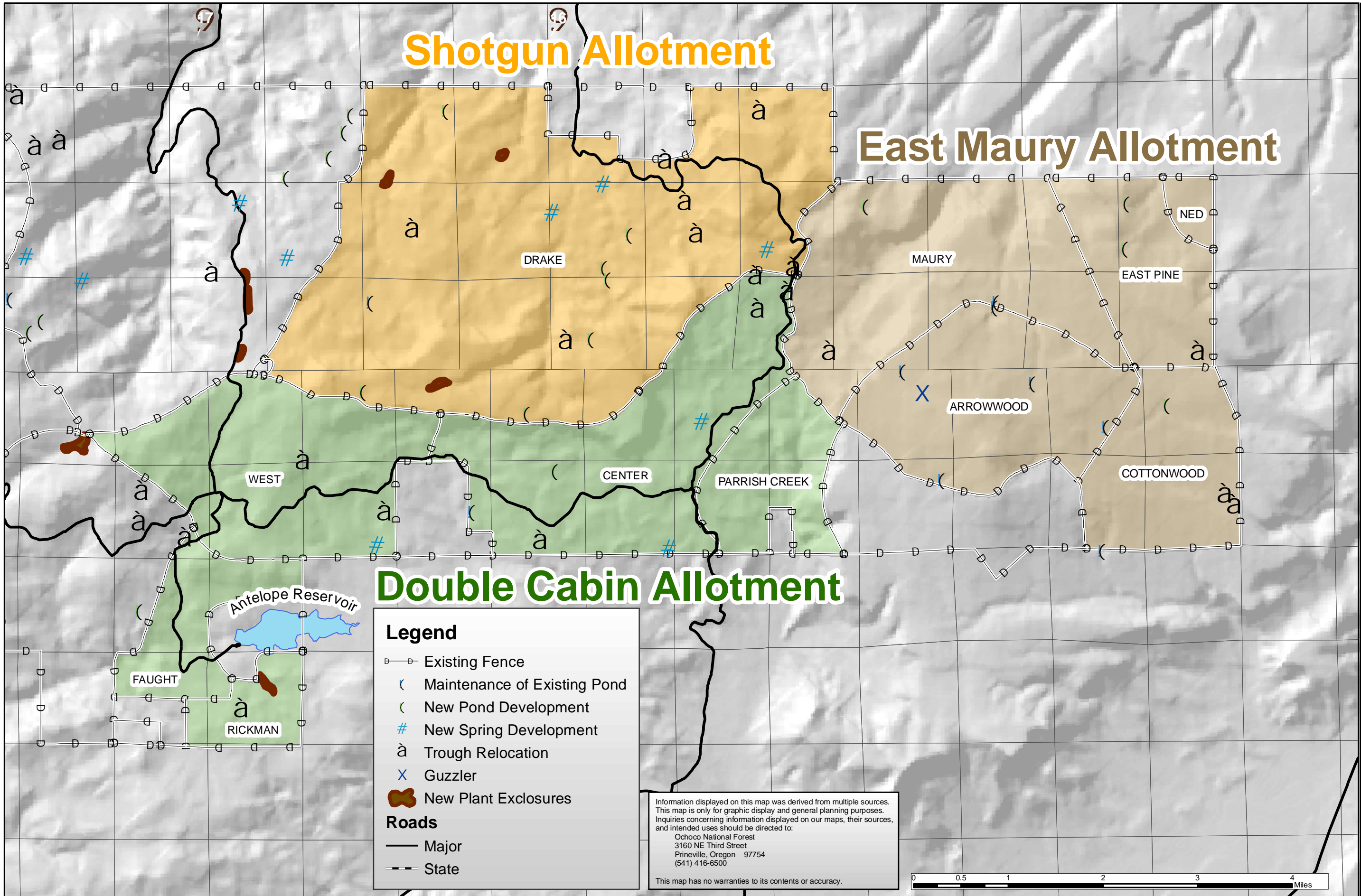
Legend

-  Proposed Fence
-  Fence Removal
-  Existing Fence
-  Maintenance of Existing Pond
-  New Pond Development
-  New Spring Development
-  Trough Relocation
-  New Headcut Exclosure
-  New Plant Exclosures

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Shotgun Allotment

East Maury Allotment

Double Cabin Allotment

Legend

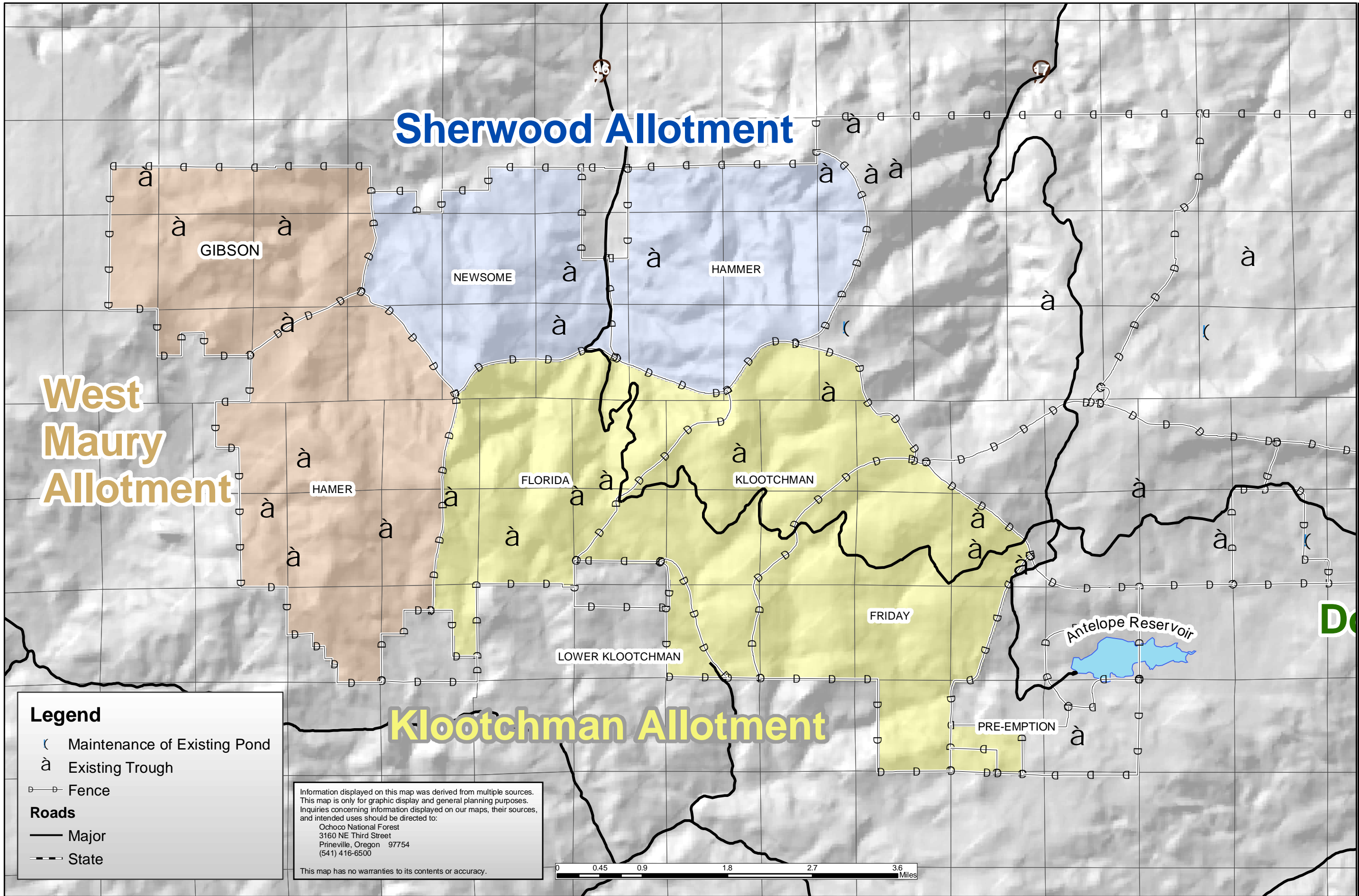
- Existing Fence
- (Maintenance of Existing Pond
- (New Pond Development
- # New Spring Development
- à Trough Relocation
- X Guzzler
- 🍄 New Plant Enclosures

Roads

- Major
- State

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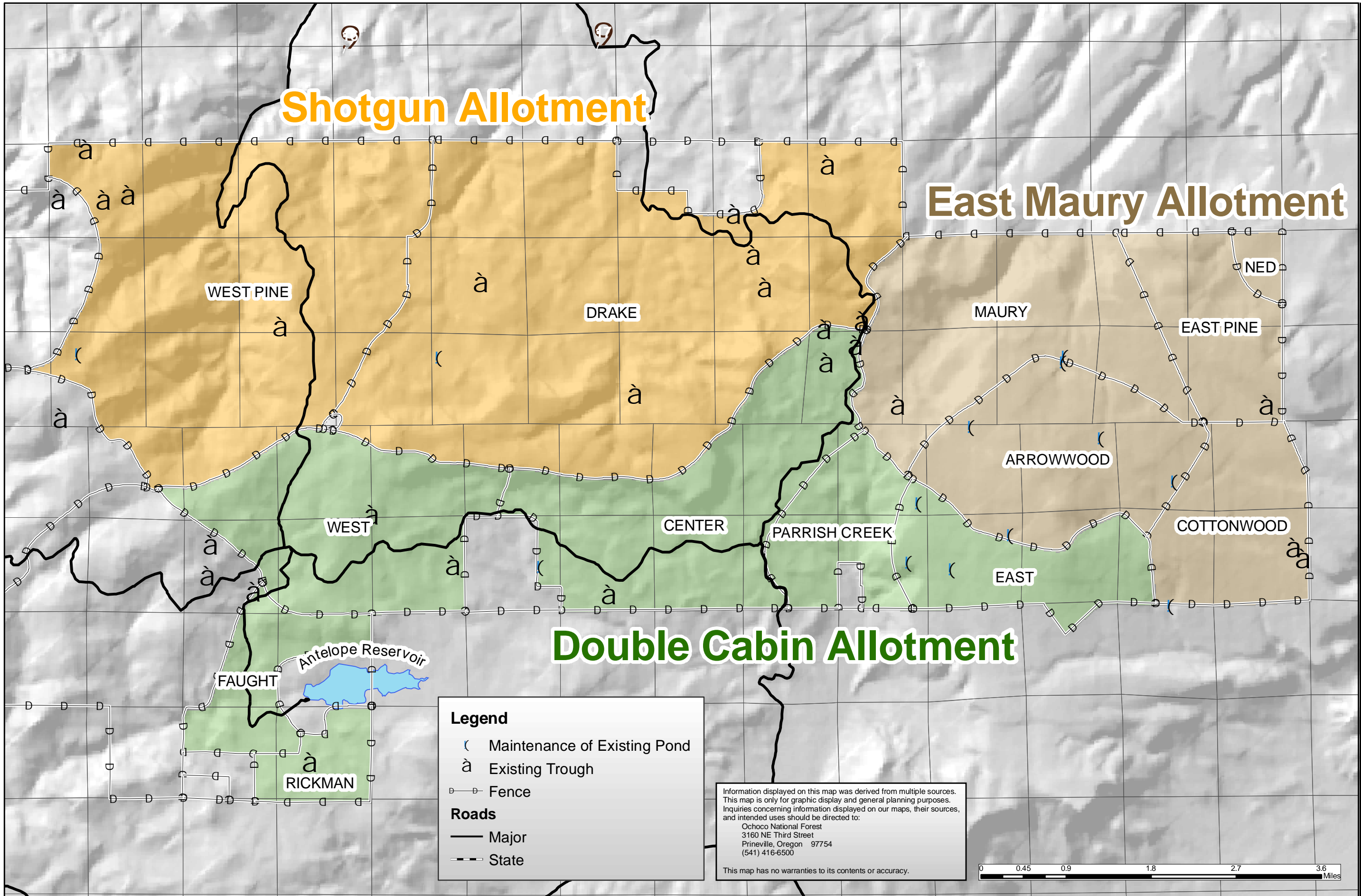
Legend

- (Maintenance of Existing Pond
- à Existing Trough
- Fence

Roads

- Major
- State

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Shotgun Allotment

East Maury Allotment

Double Cabin Allotment

Legend

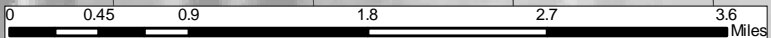
- (Maintenance of Existing Pond
- à Existing Trough
- ▬ Fence

Roads

- ▬ Major
- ▬ State











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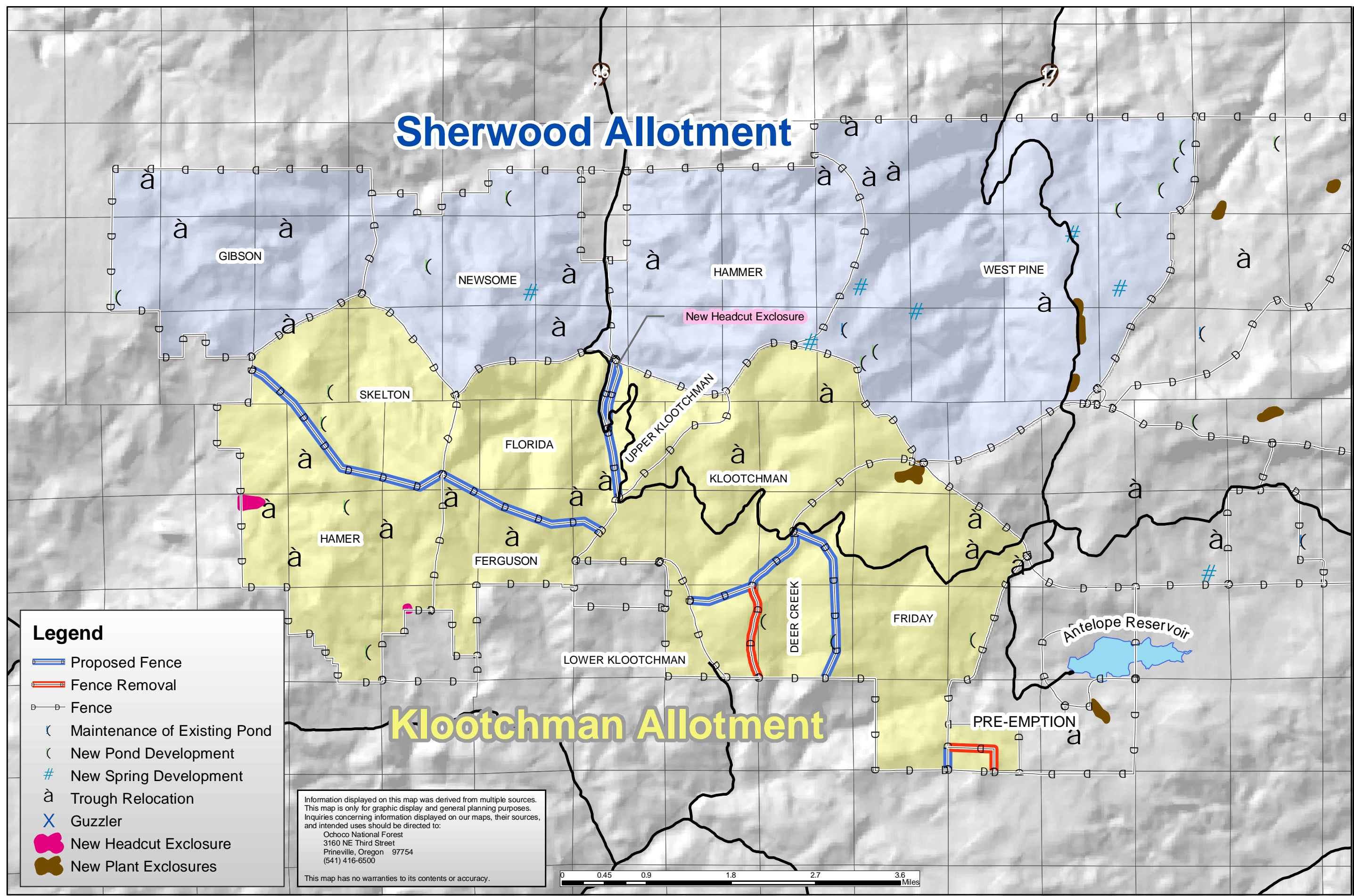
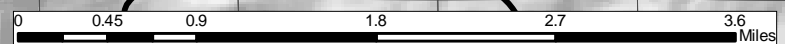


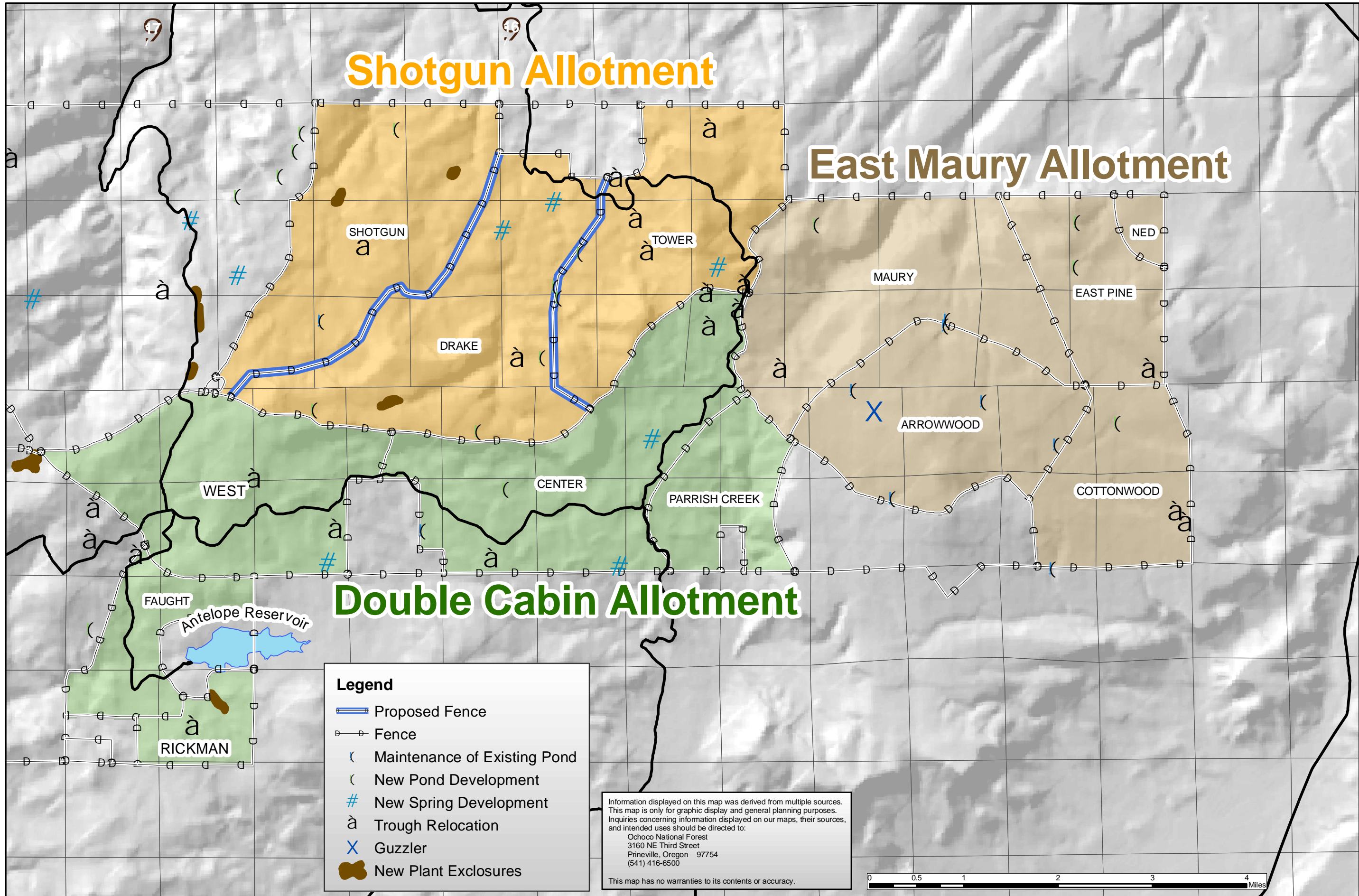
Sherwood Allotment

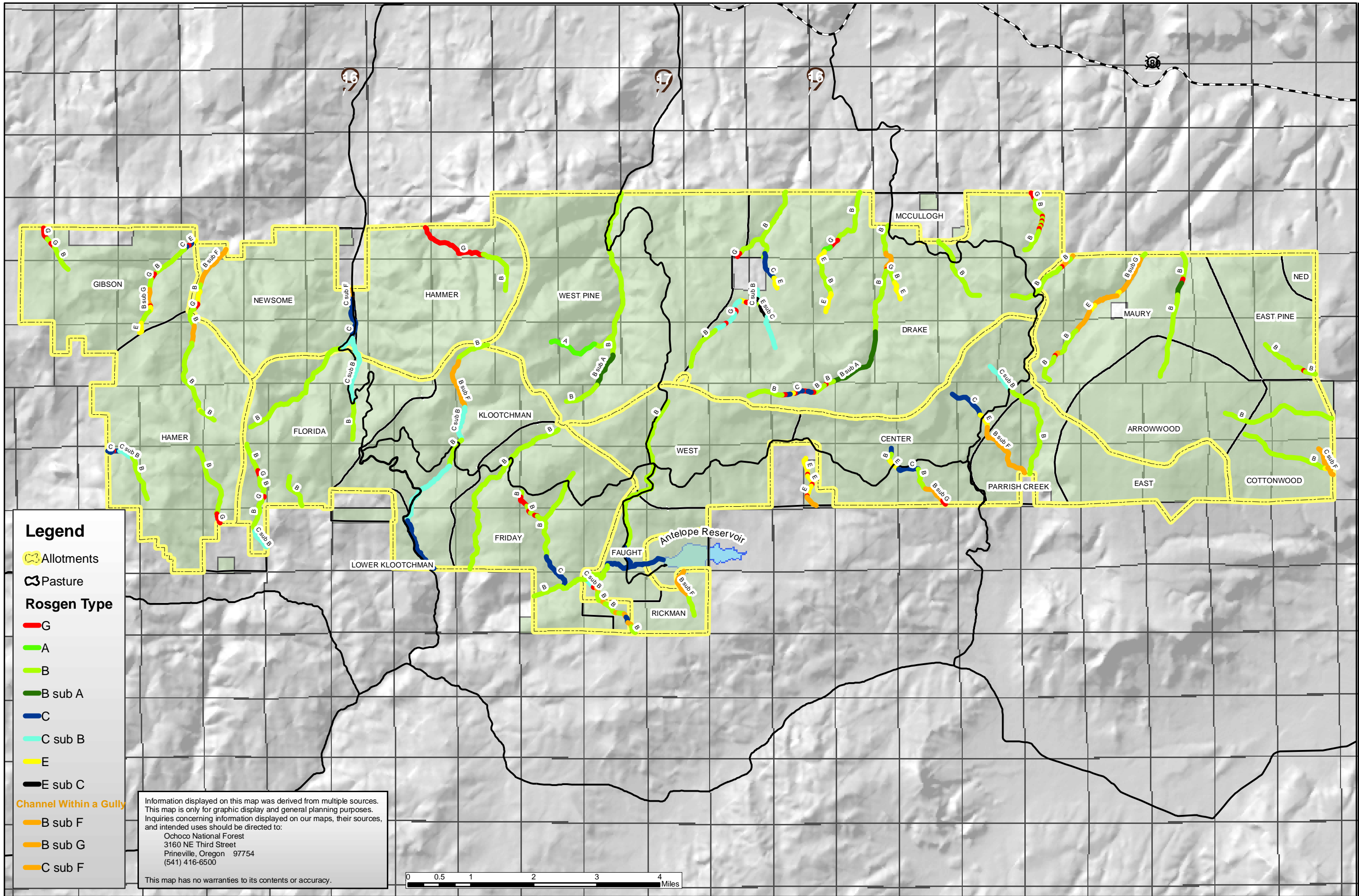
Klootchman Allotment

- Legend**
-  Proposed Fence
 -  Fence Removal
 -  Fence
 -  Maintenance of Existing Pond
 -  New Pond Development
 -  New Spring Development
 -  Trough Relocation
 -  Guzzler
 -  New Headcut Exclosure
 -  New Plant Exclosures

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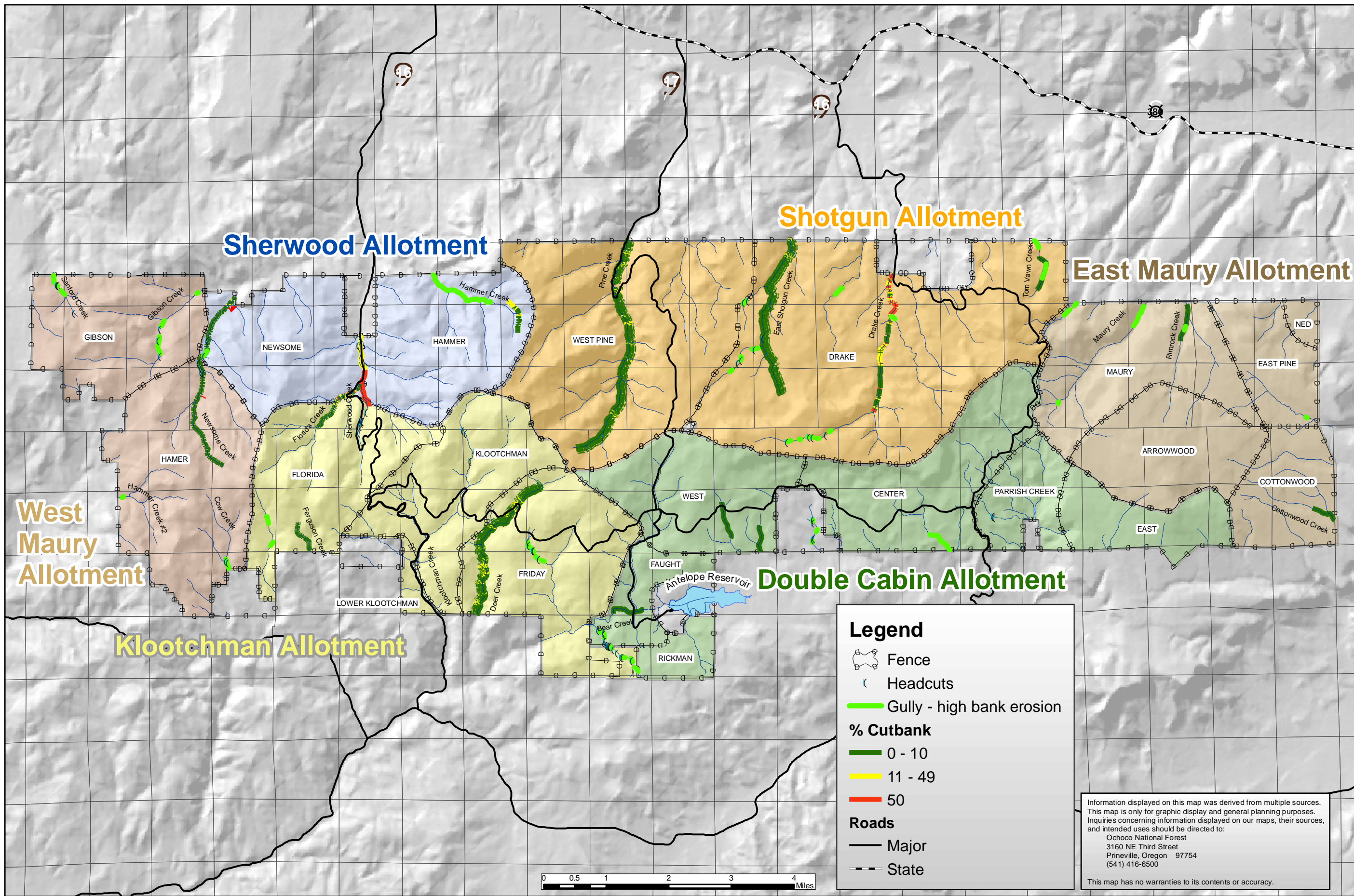






MAURY AMP **ROSGEN CHANNEL TYPES**

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Legend

- Fence
- Headcuts
- Gully - high bank erosion

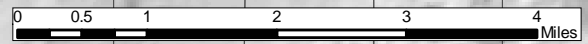
% Cutbank

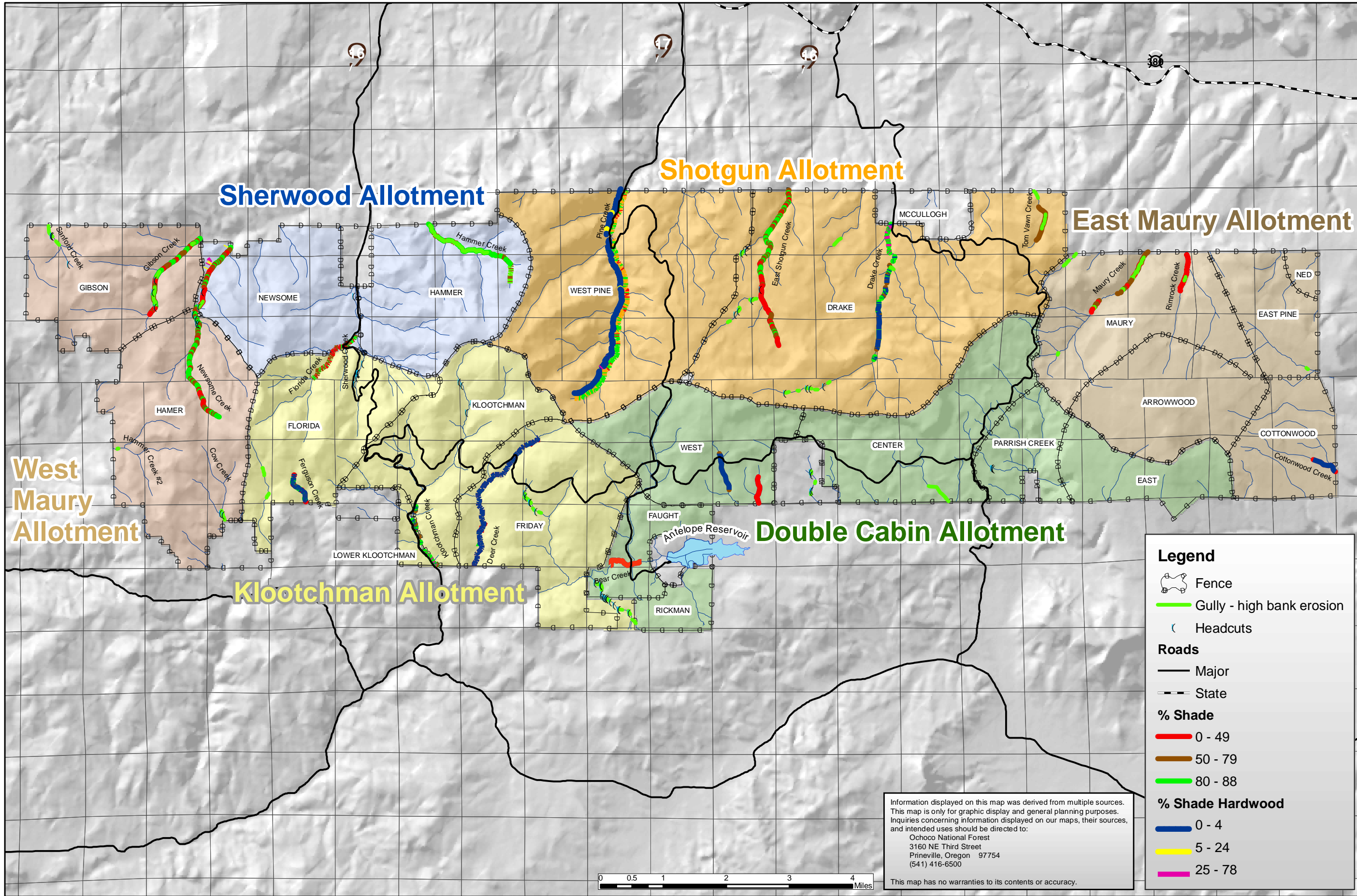
- 0 - 10
- 11 - 49
- 50

Roads

- Major
- State

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Legend

- Fence
- Gully - high bank erosion
- Headcuts

Roads

- Major
- State

% Shade

- 0 - 49
- 50 - 79
- 80 - 88

% Shade Hardwood

- 0 - 4
- 5 - 24
- 25 - 78

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