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Forest Service

Pacific Northwest Region

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Draft Environmental Assessment

Southside Allotments

Paulina Ranger District, Ochoco National Forest

Grant, Crook, Wheeler Counties, Oregon

T.14S., R.23E., Section 36
T.14S., R.24E., Sections 14-16, 21-24, 25-30, 31-36
T.14S., R.25E., Sections 19, 25-30, 31-36
T.14S., R.26E., Sections 29-32
T.15S., R.23E., Sections 1, 12, 13, 24
T.15S., R.24E., Sections 1-28, 35
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T.15S., R.26E., Sections 4-10, 15-22, 27-32,
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CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

Introduction

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

- *Introduction*: This section includes information on the history of the project proposal, the Purpose of and Need for Action; a brief description of the agency's proposal for achieving that purpose and need, the Proposed Action; and provides details as to how the Forest Service informed the public of the Proposed Action and the public's response.
- *Comparison of Alternatives, including the Proposed Action*: This section provides a more detailed description of the agency's Proposed Action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on key issues raised by the public and other agencies. This discussion also includes possible design criteria. Finally, this section provides a summary table of environmental consequences associated with each alternative.
- *Environmental Consequences*: This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized first by issues and then by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental analysis.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed information to support the analyses of the project area resources, may be found in the project planning record located at the Paulina Ranger District Office in Paulina, Oregon.

Background

Congress approved legislation commonly known as the Rescission Act of 1995 (Public Law 105-19, Section 504), which required the Forest Service to identify all allotments needing analysis under the NEPA. Congress further required the Forest Service to prepare and adhere to a schedule for completing analysis on the identified allotments. The Forest Service established a schedule to complete this work within 15 years (by the year 2010). The Paulina Ranger District, is proposing to continue authorization of livestock grazing for the Wind Creek, Heisler, and Wolf Creek allotments to implement Congressional direction and the schedule established by the Ochoco National Forest.

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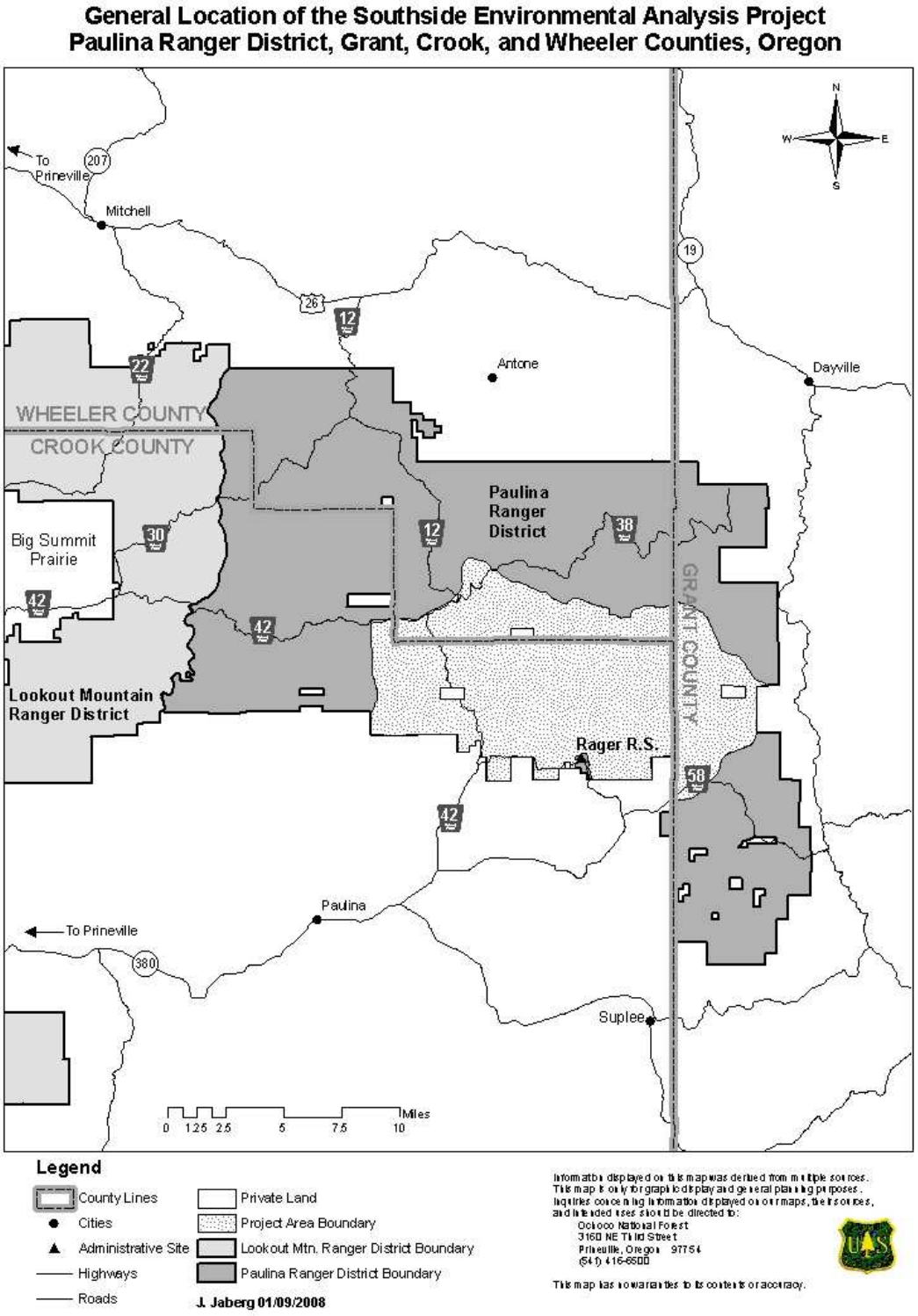
Map 1-1. General Location of the Southside Allotments Project Area



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Purpose of and Need for Action

The purpose of this initiative is to continue authorization of livestock grazing consistent with the goals and objectives of the Ochoco National Forest Land and Resource Management Plan, as amended (hereafter called Forest Plan) to maintain or improve resource conditions. This action is needed on Heisler, Wind Creek, and Wolf Creek allotments because existing laws, regulations, and policies direct the Forest Service to allow livestock grazing on National Forests, as noted in the following:

> Where consistent with other multiple use goals and objectives there is Congressional intent to allow grazing on suitable lands. *(Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976)*
>
> Federal regulation provides that lands producing forage would be managed for livestock grazing where consistent with land management plans (Title 36 of the Code of Federal Regulations (CFR) 222.2 I).
>
> The allotments contain lands identified as suitable for domestic livestock grazing in the Forest Plan. Continued domestic livestock grazing is consistent with the goals and objectives (p. 4-11), standards and guidelines (p. 4-139 to 4-147), and desired future condition (p. 4-12) in the Forest Plan.
>
> It is Forest Service Policy to make forage available to qualified livestock operators on lands suitable for grazing consistent with land management plans (Forest Service Manual (FSM) 2203.1).

There is a need to authorize grazing with new use standards because not all resource conditions within these allotments meet Forest Plan desired conditions. Rangeland monitoring studies, stream surveys, weed monitoring, aspen and cottonwood inventories, and the Upper Beaver Watershed Assessment conducted prior to initiating this project found riparian and upland vegetation, riparian and upland soils, water quality, and noxious weed occurrence or risk of occurrence needs to be improved. See the Affected Environment sections in Chapter 3 and specialist reports in the project record for more detailed information. The project record is available for review at the Paulina Ranger District office.

Upland vegetation is in Satisfactory condition in 12 pastures and in an At-Risk condition in one pasture. Riparian vegetation is in Satisfactory condition in three pastures and in an At-Risk condition in seven pastures. Two pastures are in an Unsatisfactory condition. One pasture (Bronco) does not have sufficient riparian vegetation to be assessed.

Riparian soils are in Satisfactory condition in three pastures and in an At-Risk condition in nine pastures. Soils are in an Unsatisfactory condition in one pasture.

Stream channels are in Satisfactory condition in four pastures and in an At-Risk condition in seven pastures. This feature was not rated in two pastures.

The risk of expansion of existing and/or introduction of new populations of weeds was determined to be Satisfactory in five pastures, At-Risk in six pastures, and Unsatisfactory in two pastures.

These three allotments coincide with portions of the following management areas: Black Canyon Wilderness, Old Growth, Summit National Historic Trail, Eagle Roosting Areas, Developed Recreation sites, Riparian Areas and Riparian Habitat Conservation Areas, Big Game Winter Range, General Forest Winter Range, General Forest, and Visual Management Corridors. Livestock grazing is allowed in each of these management areas with the exception of core developed recreation sites, which are fenced. These allotments are scheduled for analysis under the Forest's Rescission Act schedule provided to Congress. They are the last actively grazed allotments on the Paulina Ranger District to be analyzed through the NEPA process.

Proposed Action

The Forest Service proposes to continue to authorize livestock grazing in the Heisler, Wind Creek, and Wolf Creek allotments using new grazing management standards and an adaptive management strategy. Standards would be implemented pasture by pasture based on a compilation of the resource conditions within individual pastures listed in the Purpose and Need (p. 9) and Affected Environment (pp. 39-140) sections. These standards would not be resource objectives, but would be used as triggers to guide livestock management to achieve the desired resource conditions described in the Forest Plan. Allowable use standards would be most restrictive and management practices most intensive in a pasture rated as Unsatisfactory. Standards and practices for pastures rated as At-Risk would be more restrictive and intense than for a pasture rated as Satisfactory.

Allowable use standards would be implemented based on a weighted compilation of five different resource conditions (features) and one multiple resource assessment. The five resource features include riparian vegetation, upland vegetation, soils, stream channel characteristics, and noxious weed risk while the Proper Functioning Condition protocol is the multiple resource assessment that was used. These six resource factors represent resources and habitat components in the environment that may be affected by livestock grazing. The Forest Service interdisciplinary team (ID Team) developed this process for this analysis and called it the Composite Pasture Resource Rating (CPRR). Each pasture was given a rating of Satisfactory, At-Risk, or Unsatisfactory using this system. Overall five pastures were rated Satisfactory and eight pastures were rated At-Risk. This process is described in more detail in Appendix B.

Monitoring is a key component of the adaptive management approach. A detailed monitoring plan for the proposed action is contained in Chapter 2 on pages 15-17. Monitoring of compliance with allowable use standards would occur during each grazing season. Monitoring to determine if the use standards are effective would be conducted every 5-15 years, depending on the resource. Pasture ratings and the associated allowable use standards would be set based on the result of effectiveness monitoring.

Decision Framework

Given the purpose and need and comments submitted by the public, the District Ranger will decide whether livestock grazing will continue to be authorized on each of the allotments in the Southside Project Area. Should the decision be made to allow grazing, the District Ranger will decide on the use standards to be implemented to achieve desired conditions. In making the decision, the District Ranger will consider how well the alternatives lead to improving resource conditions affected by livestock grazing.

Public Involvement

The Forest Service contacted 102 members of the public, tribes, and agencies in December of 2005. Thirteen responses were received and are filed in the project record at the District office. The project Interdisciplinary Team (IDT) met with the grazing permittees authorized to use the three allotments within the Southside Analysis Area in November of 2005. The proposal was listed in the Deschutes and Ochoco National Forests and Prineville District, Bureau of Land Management (BLM) Schedule of Proposed Actions beginning in the winter of 2005 continuing to the spring of 2008. The IDT used the comments received during the scoping process to develop a list of issues to address in the analysis.

Issues

The Forest Service separated the issues into two groups: substantial and non-substantial. Substantial issues were defined as those directly or indirectly caused by implementing the proposed

action. Non-substantial issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. A list of non-substantial issues and reasons for categorizing them as non-substantial is included in the project analysis file.

The Forest Service identified three primary issues and five additional issues raised during scoping. These issues include:

1. Impacts to Riparian and Upland Vegetation

Livestock grazing can affect the quality and quantity of vegetation resources. The composition of desirable native and introduced species within plant communities can indicate the overall quality of vegetation on the landscape. The amount of plant material, living and dead, can influence the health and functionality of rangelands, particularly soil development and stability. The presence of young desirable woody species is an indicator of a healthy plant community. Vegetation attributes can be described in the following terms:

- Composition (variety and amount of different plant species),
- Cover (amount of soil covered or protected by desirable vegetation),
- Structure (height, width, and density of plants within the plant community).

Measures

Percent composition of desirable species in the plant community

Ground cover provided by vegetation including recruitment of young woody plants (percent of plants that indicate the plant community is functioning as desired)

Percent composition of woody plants in various age classes

2. Impacts to Riparian and Upland Soils

Livestock have the potential to directly impact soil quality by compacting soils and shearing off stream banks. Compaction reduces water infiltration and storage that may lead to increased overland flows and flashy runoff patterns in streams. Compaction can physically restrict root growth and reduce nutrient availability. Livestock can indirectly harm soil by consuming or trampling vegetation that protects and helps form soils. A loss of vegetation along stream courses results in bare ground that is more susceptible to water erosion, which can lead to increased runoff potential. Soil conditions in upland sites are in satisfactory condition across the project area and the proposed action would not create significant effects, therefore effects on upland soils will be addressed briefly in Chapter 3.

Measures

Ground cover (percent of soil protected by litter, rock or desirable vegetation)

Streambank alteration (percent of streambank altered by livestock)

3. Impacts to Water Quality and Aquatic Resources

Livestock grazing has the potential to affect water quality, threatened mid-Columbia River steelhead and its designated critical habitat, and sensitive species redband trout and Columbia spotted frog. Reduction of riparian hardwood species can reduce stream shade allowing greater solar infiltration, which can raise water temperatures. The presence of hardwood and other species to shade streams can contribute to satisfactory water quality. Shade can reduce stream temperatures, which is an indicator of satisfactory water quality. Grazing activities can directly affect bank stability and indirectly affect width to depth ratios. The stability of stream banks and

presence of desirable habitat features in stream channels such as low width-to-depth ratios and water temperatures can indicate habitat conditions for sensitive fish and amphibian species.

Measures

Shade (percent of stream that is shaded by vegetation)

Water temperature (streams meeting minimum standard)

Streambank stability (percent of stable streambank)

Stream channel (length of stream channel meeting or moving toward desired width-to-depth ratio)

Other Concerns Identified by the Public and IDT

The following issues were evaluated and determined to be relevant to the project but did not contribute to alternative development. They did contribute to mitigation measures that apply to the action alternatives and are tracked through the analysis process.

4. Forest Service Pacific Northwest Sensitive Plant and Animal Species

Livestock grazing can affect sensitive species including the greater sage-grouse, gray flycatcher, and several plant species by directly removing herbaceous plants and trampling plants. Grazing at excessive levels can also affect the composition of plant communities over time by reducing the presence of desirable plants.

Measure

Percent composition of desirable species in the plant community

5. Management Indicator Species (MIS)

Livestock grazing can affect the recruitment of hardwood species that provide nesting and foraging habitat for avian species. Management Indicator Species that historically occupied, are currently known to occupy, or that could be present in the planning area include the pileated woodpecker and primary cavity excavators. Brook trout do not occur in the Project Area.

Measure

Change in acres of suitable aspen and cottonwood habitat

6. Land Birds including Migratory Species

Livestock grazing can alter the composition of species within plant communities and associated habitat for land birds. Studies conducted on the three allotments within the Project Area indicate some plant communities, particularly riparian vegetation, is not in satisfactory condition. Undesirable shifts in species composition could reduce the available habitat for land bird species.

Measure

Change in acres of suitable habitat by species/habitat type

Other Wildlife Species

Other wildlife species with standards and guidelines established in the Forest Plan include deer and elk, old growth-associated wildlife species, and raptors with specific guidelines to provide security for nesting and around nest and roost sites. Measures for these species are very specific and include road density and cover for deer and elk, establishment and management of structural conditions in old growth reserves for old growth-associated wildlife species, and seasonal restrictions against human activity for raptors. The proposed action to continue grazing would not

affect habitat for any of these species; therefore effects on other wildlife species will not be addressed in Chapter 3.

7. Heritage Resources

Livestock grazing can affect heritage resources through trampling damage. Surveys of the project area and existing heritage sites revealed some damage attributed to historic livestock use. Ground disturbance due to the occurrence of livestock concentrations in and around existing heritage sites can indicate the impact of livestock on these resources.

Measure

Number of heritage sites impacted by livestock concentration

8. Invasive Plants

Livestock grazing can influence invasive plant presence and spread. Cattle grazing may result in the transport, establishment, and spread of invasive plant species, including noxious weeds. Surveys of the project area have found several species of noxious weeds that can impact the health of native rangeland ecosystems. The effect of livestock grazing on invasive plant distribution and abundance is a concern and would be described in the analysis.

Measure

Potential for noxious weed spread as influenced by percent bare ground caused by livestock and presence of noxious weeds within or adjacent to allotments

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CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

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

Alternatives Considered In Detail

Alternative 1 – No Action (No Grazing)

Under the No Action alternative term grazing permits would be cancelled within two years of implementation of the decision. The requirement to delay permit cancellation for two years following the project decision is pursuant to the Code of Federal Regulations (36CFR 222.4 (4) (1)) and the Forest Service Handbook (FSH) 2209.13 part 16.24. Livestock grazing would not be permitted to resume without a subsequent NEPA decision to re-stock any or all of the allotments.

Maintenance of range developments on the allotments would no longer be the responsibility of the permittees. Subsequent decisions would determine whether to retain or remove any improvements (such as water developments and fences). All developments not needed for resource management would be removed.

Past actions with relevance to the current resource conditions

Past activities in the analysis area include vegetation management, livestock use, fire suppression, and road construction (USDA Forest Service 2001, USDA Forest Service 1999). Vegetation management activities within the project area that have contributed to current resource conditions include: Aqua, Brer Rabbit, Bottoms, Butte, Dippy Beaver, Dusty Well, Hat Springs, Hog Wallow, Morgan, Ringsmeyer, Robin, Sugar, TNT, Tower, Wind Creek, Windy John, Yuma, and Runway Timber Sales. Primary activities under these actions are summarized in Table 2-1. These timber sales occurred between 1985 and 2007. Precommercial thinning occurred from 1976 to the present. Various other small projects with beneficial effects or effects too small to measure include spring developments, riparian exclosures, campground improvements, culvert replacement, and fence construction.

Road construction may occur in conjunction with timber harvest. Roads that cross or run parallel to streams have effects on the channel and vegetation. Roads alter stream drainage patterns by confining the stream, reducing the area within the floodplain, so floodplain interaction is disturbed. This in turn affects riparian habitat and its function.

Table 2-1.Past vegetation activities that have occurred in the Southside Allotments Project Area

Allotment	Heisler	Wolf	Wind
Timber Harvest			
Regeneration	184 acres	1,565 acres	566 acres
Thinning	757 acres	2,506 acres	1,639 acres
Overstory removal	1,077 acres	4,804 acres	1,639 acres
Natural Fuels Burning	4,694 acres	19,012 acres	4,155 acres
Precommercial Thin	710 acres	3,540 acres	1,780 acres

Present actions of relevance to resource conditions

Present activities on National Forest land within the project area include natural fuels burning and precommercial thinning, noxious weed control, and livestock grazing. The Hardcorner Fuels Project is being implemented within the Wind Creek allotment. When completed, burning would have occurred on 4,428 acres and understory thinning on 840 acres. The Sugar Creek Campground Vegetation Management project was recently approved and scheduled for implementation in 2008. The Rager Wildland Urban Interface project proposes natural fuels burning and precommercial thinning on 4,000 acres adjacent to the Rager Ranger Station. The Ochoco National Forest is implementing a forest wide integrated weed management program tiered to the programmatic Region 6 Preventing and Managing Invasive Plants EIS. No specific projects are currently planned within the Southside Allotment Analysis area.

Reasonably foreseeable actions of relevance to resource conditions

The Paulina Ranger District is in the process of developing the Upper Beaver Vegetation Management project which is located within the east side of the Wolf Creek allotment and the Heisler allotment. The proposed action for this project includes thinning of commercial and non-commercial trees on 2,923 acres and 8,337 acres, respectively. The project also includes treatment of approximately 16,500 acres of fuels through prescribed fire, creation of a 440 acre fuel break along the Summit Trail, and construction of approximately two miles of temporary roads. Limited thinning in aspen stands and planting of riparian hardwood species along select stream reaches is also included.

Alternative 2 – Proposed Action (Adaptive Management)

The Proposed Action would continue to authorize livestock grazing in all three allotments under new grazing management standards using an adaptive approach. Grazing management standards would be implemented based on a compilation of condition assessments of resources within pastures. Standards would be adapted to changes in resource conditions based on long term monitoring. The pasture would be the basic unit for the compilation of resource conditions and the application of management standards. The allowable use standards that would be applied to each pasture (based on its rating of compiled conditions) are contained in Table 2-2.

Management standards would not be used as resource objectives, but would be used as triggers in livestock management to achieve the resource objectives contained in the Forest Plan. Individual standards or practices would be more restrictive in a pasture that is rated as At-risk or Unsatisfactory than one that is rated Satisfactory.

Table 2-2. Management Standards under the Proposed Action within the Southside Allotments Project Area.

Resource Indicators		Management Standards by Composite Pasture Resource Rating		
		Satisfactory	**At Risk**	**Unsatisfactory**
UTILIZATION	**Riparian and Upland Herbaceous Species Utilization (%)**	≤ 40%	20-35%	<20%
	Riparian Woody Species Utilization	Cattle are moved when there is a change from herbaceous vegetation to woody vegetation consumption		
	Upland Woody Species Utilization (% of annual growth)	≤ 20%	10-15%	<10%
STREAMBANK ALTERATION	**PACFISH/INFISH Streambank Alteration Standard (%)**	≤ 10%	≤ 10%	0-5%
STUBBLE HEIGHT	**Stubble Height (inches):Grass-like End of growing season**	4”	5”	6”
	Stubble Height (inches):Grass-like End of grazing season	6”	6”	6”
TIMING	**Restrictions for South Pasture of the Wind Creek Allotment**	No cattle grazing would occur between February 15th and July 15th.		

The composite pasture resource ratings of Satisfactory, At-Risk, or Unsatisfactory were based on a weighted compilation of riparian vegetative, upland vegetative, soil, stream channel conditions, and risk of noxious weeds establishment and spread. Proper Functioning Condition assessments were completed on select streams and where available were also considered in pasture ratings. The composite pasture resource ratings were based on existing survey data and data collected specifically for this project analysis. Where data was lacking for any of the resources listed above, ratings were based on available information and additional weight was given to those resource parameters with adequate data. Ratings for each pasture are contained in Table 2-3. See Appendix B for further explanation and illustration of each pasture’s rating. The data upon which these ratings are based is available for review and contained in the project file located at the Paulina Ranger District.

Adaptive Management Approach

The Proposed Action would implement an adaptive management approach for livestock grazing. Management standards set for each pasture would be adjusted based on information provided by established monitoring protocols. The ratings (CPRR) in Table 2-3 are the basis upon which management standards contained in Table 2-2 would be applied.

Table 2-3. Composite Pasture Resource Ratings (CPRR) for grazing allotments in the Southside Project Area.

Allotment	Pasture	Composite Pasture Resource Rating
Heisler	Bear	Satisfactory
	East	At-Risk
	North	Satisfactory
	South	At-Risk
Wind Creek	Bronco	Satisfactory
	North	At-Risk
	South	Satisfactory
Wolf Creek	Bull	At-Risk
	Miles	Satisfactory
	Widow	At-Risk
	Nichol	At-Risk
	Riparian	At-Risk
	Sugar	At-Risk

The process for applying the adaptive approach to management is described below and figuratively in Appendix B. Management standards would be set for each pasture based upon the composite pasture resource rating for each pasture. Implementation monitoring would be completed and reviewed at the end of each grazing season. The results of this review would determine whether or not the standards in Table 2-2 and the annual instructions (AOP) to the permittee were met for each pasture. Results from this review would be used to adjust grazing management for the next grazing season in the following ways:

- If the standards prescribed for a pasture through the AOP are not met, then the implementation monitoring would be reviewed to determine whether it was a failure of the AOP or a failure of the permittee to implement the AOP.
    1. If the AOP is at fault, the instructions would be reviewed and modified for the following grazing season so that the allotment meets those standards.
    2. If implementation of the AOP by the permittee is at fault, appropriate administrative action would be taken for the following grazing season and performance would again be monitored. Unless other information indicated a need to change the management standards, they would remain unchanged. Modifications to those standards however, could occur if monitoring indicates declining resource conditions. Modifications to those standards could occur if monitoring indicates declining resource conditions.
- If the standards prescribed for a pasture through the AOP are met, no change to the standards and implementation of that AOP would be proposed. Continued implementation of the existing AOP would be recommended unless otherwise proposed by the Responsible Official, Range Specialist or permittee based upon experience, observations, or other considerations.

Effectiveness monitoring would occur on a 3-15 year basis to assess the condition and trend of individual resources within pastures over time. Effectiveness monitoring would not occur annually because changes in resource condition would likely take longer than one year to detect with established monitoring methods. The Monitoring Section for Alternative 2 (page 15-17) describes implementation and effectiveness monitoring in more detail.

As effectiveness monitoring is completed, the condition of the individual pastures and resource features would be re-evaluated based upon the monitoring results. This would be compared to the baseline pasture ratings established for this analysis. Changes in resource conditions and pasture ratings would be summarized. In all cases changes to livestock management strategies may be

considered to further improve grazing management in pursuit of improving resource conditions. Changes in resource ratings would result in one of the following actions:

- If the CPRR for the pasture is Satisfactory, and the effectiveness monitoring indicates **no change or an upward trend** in the condition of a pasture's resources, the management standards would not be changed. Additional improvements to grazing management may be considered when indicated during monitoring.

- If the CPRR for the pasture is rated as At-Risk or Unsatisfactory and effectiveness monitoring indicates **an upward trend** in resource conditions such that the change in the CPRR is from a poorer condition to a better condition (Unsatisfactory to At-Risk or Satisfactory, or At-Risk to Satisfactory) the management standards would correspond with the latest condition rating.

- If the CPRR for the pasture is rated as At-Risk or Unsatisfactory, and the effectiveness monitoring indicates **an upward trend** in resource conditions, but the level of change in condition does not result in a change in rating for the pasture, then no change to the management standards for that pasture would occur; the existing standards would remain in place. The positive trend maybe considered by the Responsible Official, Range Specialist, and permittee in developing the next year's AOP and may influence the standards set within the ranges prescribed for that pasture rating.

- If the CPRR for the pasture is rated as At-Risk or Unsatisfactory, and effectiveness monitoring indicates **no trend** in resource conditions (no change in the pasture resource rating) changes in management standards would be recommended. The changes would be based upon the monitoring and observations of the Responsible Official, Range Specialist, and permittee to improve the condition of resources within the pasture as a whole.

- If the CPRR for the pasture is rated as Satisfactory or At-Risk, and the effectiveness monitoring indicates a **downward trend** in resource conditions, but does not result in a change in the condition rating for the pasture, changes in management standards for utilization, streambank alteration, and/or stubble height would be implemented. More restrictive utilization, streambank alteration, and/or stubble height standards would be recommended to reverse the downward trend in resource condition, or in the case of a Satisfactory CPRR, maintaining that condition.

- Regardless of CPRR for the pasture, if effectiveness monitoring indicates a **downward trend** in resource conditions that results in a change in rating for the pasture (Satisfactory to At-Risk or Unsatisfactory, or At-Risk to Unsatisfactory), a change in CPRR for that pasture would be implemented. Management standards would be implemented to correspond with the latest pasture rating. More restrictive standards would be implemented through subsequent grazing seasons. For a pasture with a resource rating of Unsatisfactory, that rating would remain in place and more restrictive standards would be implemented.

Adjustments in management standards would be implemented through the AOP based on prior year's monitoring results. Because effectiveness monitoring would not occur every year, review of the CPRR for each pasture would not occur on an annual basis, nor be reviewed during the same time frame as other resource features. Management standards may be modified if other information becomes available (noxious weed establishment, T&E species occurrence, etc.) that would merit changes independent of scheduled intervals.

Monitoring Requirements for Alternatives 2 and 4

IMPLEMENTATION MONITORING would be conducted to ensure that the management standards are implemented as planned and are consistent with the selected alternative. It would occur on an annual or more frequent basis on at least six of the thirteen pastures.

The Forest Service would monitor allotments annually for compliance with all terms and conditions of grazing permits such as salt and feed block placement, spot-checking pasture move dates, evaluating actual utilization levels, verifying permittee maintenance of range improvements, confirming that livestock present are authorized, and livestock are moved on schedule, etc.

EFFECTIVENESS MONITORING would be conducted by the Forest Service or its agents to ensure that the management standards as applied effectively maintain or move vegetation, soil, and water resource conditions toward desired conditions. It would occur on specific and permanently located sites (key areas and designated monitoring areas) including some existing and some additional sites selected by an interdisciplinary team of resource specialists. Effectiveness monitoring would be conducted every 3-15 years depending on each site's estimated ability to respond to management standards. Results from this monitoring would direct changes in management standards to maintain or achieve desired resource conditions.

Forest Service approved protocols would be used for implementation and effectiveness monitoring and would be reviewed as needed to stay current with emerging science. There is considerable scientific support for using long-term monitoring to validate and modify existing standards in this fashion (e.g.,Clary and Leininger 2000, University of Idaho, 2004). The Pacific Northwest Region of the Forest Service *Rangeland Ecosystem Analysis and Monitoring Handbook* (R-6 FSH 2209.21) describes and provides additional information for most of the monitoring protocols for the implementation and effectiveness monitoring planned in the section below. A copy of this document and additional information on rangeland ecosystem monitoring can be found at the Paulina Ranger District office.

Riparian and Upland Vegetation

Implementation monitoring of riparian and upland vegetation would include measuring utilization of herbaceous or woody species and stubble height of residual vegetation during and after grazing. It would occur on key areas, permanent effectiveness monitoring sites, and random locations across allotments. Stubble height monitoring would occur at the end of the pasture use period and growing season each year on select pastures. In the South Pasture of the Wind Creek Allotment, monitoring would be done at least twice a year to gather information on livestock use and effects. Utilization monitoring would occur while livestock are in the pasture and at the end of the use period for the pasture. If stubble height requirements are not met at the end of the use period, stubble height measurement would also occur at the end of the growing season.

Permittees would have the primary responsibility for implementation monitoring and moving livestock as management standards are achieved. The Forest Service would retain final responsibility for ensuring that standards are met in each allotment and therefore, would conduct implementation monitoring in addition to permittee monitoring.

The Forest Service would use existing and establish new permanent studies on riparian monitoring sites to determine condition and trend of riparian vegetation. These plots would be re-evaluated approximately every three to eight years. Plant cover and species composition are important indicators of overall riparian vegetative condition and function. Changes to these indicators over time would indicate changes in the overall condition of riparian vegetation and whether or not riparian sites are meeting or moving towards resource objectives.

The Forest Service would conduct effectiveness monitoring to assess changes in plant cover, species composition, and species abundance over time. Existing sites would be monitored and new sites would be established for monitoring condition and apparent trend of upland vegetation. These

plots would be reevaluated every five to seven years and would be used to guide future management direction. Changes to these indicators would determine whether or not upland areas are meeting or moving towards resource objectives.

Riparian Soils

The Forest Service would monitor soil disturbance on key riparian areas and designated monitoring areas annually. Stream bank alteration would be measured along streams on random sites, designated monitoring areas, key areas, and on streams across the allotments.

Effectiveness monitoring would be conducted approximately every three to eight years depending upon the estimated conditions of resources within pastures or allotments. Ground cover would be measured on long term effectiveness monitoring sites (key areas and designated monitoring areas) to determine if resource conditions are being maintained or improved.

Water Quality, Threatened and Sensitive Aquatic Species

The Forest Service would monitor stream bank alteration annually on key sites to determine the level of physical alteration along stream banks using one of the Forest Service approved monitoring protocols such as the Multiple Indicators Monitoring System.

The Forest Service would monitor water temperature on streams on the Oregon Department of Environmental Quality 303 (d) list of impaired water bodies within the project area. Changes in streamside vegetation due to livestock management would be expected after a period of 3 to 15 years for properly functioning and functioning-at-risk streams, and over 15 years for non-functioning sites.

The Forest Service would establish permanent monitoring sites (channel cross–sections and longitudinal profiles) on selected streams throughout the project area to determine the condition and trend of channel morphology. Trends attributable to changes in livestock grazing would be evident after a period of three to fifteen years on properly functioning and functioning-at-risk streams and more than fifteen years on non-functioning streams. Forest Service Regional stream surveys (Level II, Bottom Line Surveys) would be conducted in selected streams throughout the project area.

Heritage

The Forest Service would monitor ground disturbance from livestock in areas of high probability for occurrence of cultural materials and in the vicinity of known cultural sites. All archaeological sites not updated during 2007 would be visited in the spring of 2008. Based on current condition of these sites, they will be put on a schedule of monitoring from one to every five years. Areas of high probability would be monitored on a schedule depending on current condition and whether cultural materials are found.

Noxious Weeds

The Forest Service would monitor existing noxious weed infestations for spread and density trends by established protocols including gross area, net area and population size estimates. This monitoring strategy would be conducted annually on high priority sites.

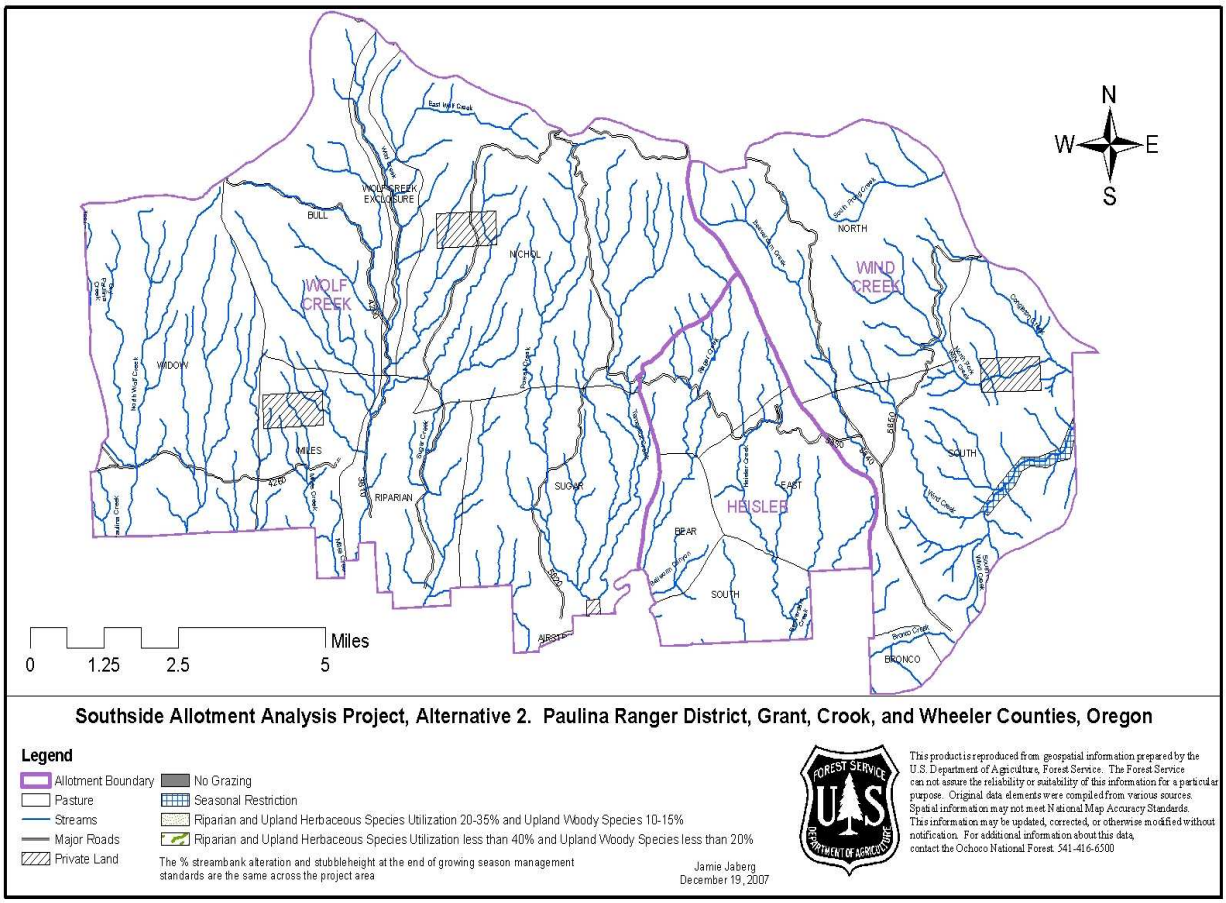
The Forest Service, in cooperation with County Weed Control agencies (Crook, Grant, and Wheeler Counties) would identify new noxious weed infestations through a shared inventory process. Portions of allotments would be inventoried on a rotational basis every one to five years. Noxious weeds would be monitored in two ways, 1) Checking existing sites for spread, and 2) checking high probability sites for establishment. Sites monitored would be based upon the most current information on existing populations or areas of risk for spread and establishment.

Wildlife

The Forest Service, in cooperation with other federal and State agencies, would monitor for nesting sage-grouse annually from April through June (Hanf et al. 1994) over a period of five years following implementation of the decision for this project. Monitoring would determine if sage grouse nesting is occurring in the project area and if so, the distribution of nesting activity. Several techniques are available to monitor nesting activity, including the use of radio collars and trained hunting dogs. Interagency coordination is required to implement this monitoring and may also include cooperation with adjacent private landowners to gain access to sage-grouse hens if radio collaring is used for monitoring.

The Forest Service would monitor for brooding sage-grouse during the months of July through September (Connelly et al. 2004) following implementation of this project. Monitoring would determine if brood rearing is occurring in the project area and if so, the location of brooding sage-grouse and associated habitat. Several techniques are available to monitor brooding habitat use by sage-grouse, including radio collars, trained hunting dogs, and repeated observations of suspected suitable habitat. Interagency coordination is required to implement this monitoring and may also include cooperation with adjacent private landowners to gain access to sage-grouse hens if radio collaring is used for monitoring.

Map 2-1. Select Features of Alternative 2 under
the Southside Allotments Environmental Analysis Project



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Mitigation Measures Common to All Action Alternatives

The following mitigation measures were developed to reduce negative impacts from the action alternatives and respond to public comments:

Soils

1. Permittees would use appropriate management practices such as temporary fences, where practical, to protect soils sensitive to impacts from livestock grazing.
2. Permittees would provide riders to control livestock movement and limit use of sensitive riparian and upland areas to protect and reduce impacts to soil resources.

Fisheries

1. Project design criteria for mid-Columbia steelhead and Chinook salmon, as listed in the current version of the Programmatic Biological Assessment, would continue to apply. Criteria for livestock grazing activities in riparian areas would adhere to standards in the programmatic or the action alternative, whichever is most restrictive.

Heritage Resources

1. Permittees would not place salt or feed blocks or concentrate livestock within 500 feet of known eligible cultural sites. The Forest Service would provide guidance to permittees in the placement of salt.

Sensitive Plant Populations and Habitat

1. Permittees would not place salt or feed blocks within ¼ mile of known Sensitive plant species populations or suitable habitat. The Forest Service would provide guidance to permittees in the placement of salt.
2. Ground disturbing equipment would not operate within a 50 foot buffer of sensitive plant populations and habitat without the approval of the District Ranger. The Forest Service would specify exceptions, which may include the re-use of existing roads and areas reviewed and approved by the District Ranger.
3. Permittees would avoid ground disturbing activities on scablands to protect sensitive plant habitat. The Forest Service would provide for on-site review of unanticipated disturbances, which would be approved by the District Ranger.

Wildlife

1. Project design criteria for sage-grouse, listed in the 2003-2006 edition of the Programmatic Biological Assessment, would be applied immediately if monitoring discovers the nesting or brooding of this species within the project area.
2. Project design criteria specific to threatened or endangered species, listed in the current version of the Programmatic Biological Assessment, would be applied immediately if monitoring discovers new species populations within the project area.

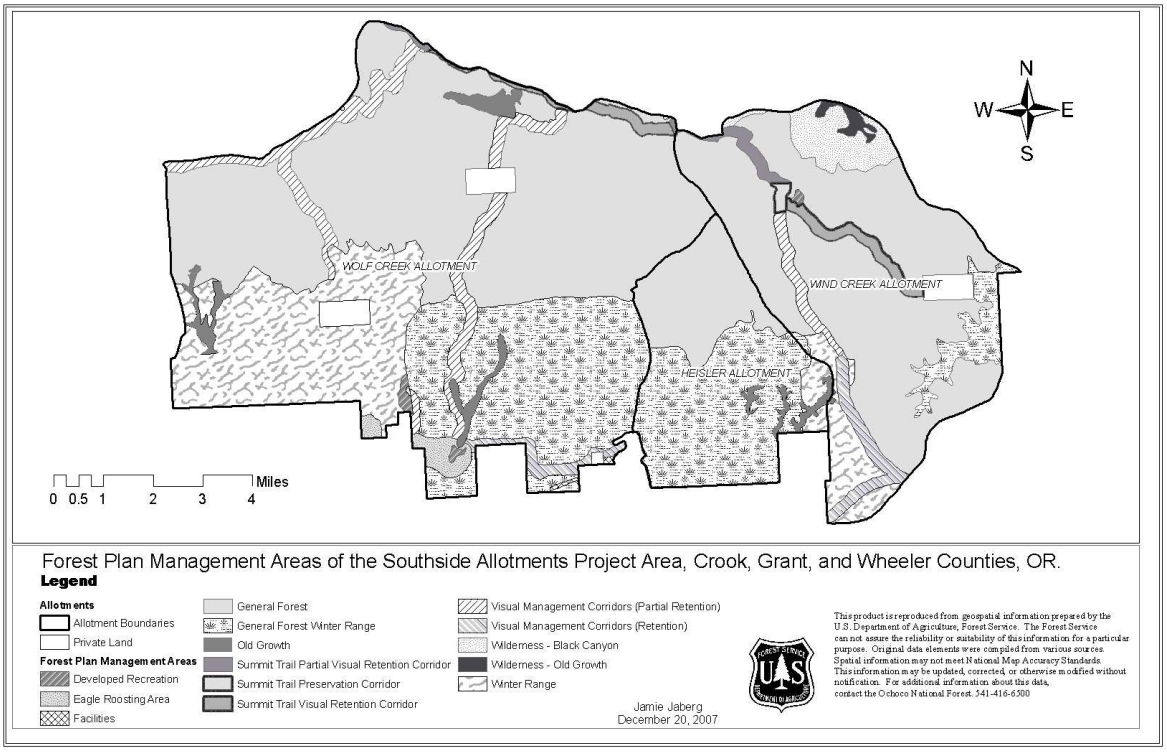
Range

1. Permittees would use riders to control livestock movement and meet management standards.
2. Permittees would place salt and feed blocks at least ¼ mile from riparian areas, water, or trails used by the public.
3. The Forest Service would implement pasture use and rotation according to allotment specific management plans or annual instructions.

Noxious Weeds

1. All agency and permittee owned off-road equipment, including all terrain vehicles (ATV's), would be cleaned prior to coming onto National Forest lands as to be free of soil, seeds, vegetative matter, or other debris that could contain or hold noxious weed seeds (Executive Order 13112, February 3, 1999).
2. The Forest Service would inspect equipment prior to its off-loading from the transportation vehicle. Vehicles requiring cleaning would be moved to a site designated by the Forest Service if cleaning is needed prior to start of operations.
3. Livestock entering the Forest from a known pasture infested with noxious weeds may require holding and feeding for a period of several days in a small holding area in order to allow any seed to pass through the digestive tract. The District Ranger would designate an appropriate holding area in consultation with the affected permittee.
4. Any seeding completed as part of grazing management would use seed in accordance with the Forest Plan, certified as weed free. The Forest Service would designate the appropriate seed mix.
5. The Forest Service would provide grazing permittees a map showing noxious weed infestations within each allotment during Annual Operating Provisions meetings.
6. The Forest Service would provide permittees with weed identification material and training each year or as requested to help them recognize noxious weed species.
7. Permittees would not use weed-infested areas for camps, holding areas, salting areas, or parking areas.
8. All materials used in grazing management activities by the Forest Service and permittees, including logs, rock, boulders, fill-dirt, and gravel, would come from noxious weed-free sources.

Map 2-2. Forest Plan Management Areas of the Southside Allotments Project Area.



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Alternative 3: Current Management

Management Requirements

Alternative 3 would continue to authorize grazing under the current management standards for the allotments. The allotments would be managed according to the standards established in the Forest Plan and term grazing permits.

Table 2-4. Current Management Standards for allotments in the Southside Allotments Project Area.

CURRENT MANAGEMENT STANDARDS							
						SATISFACTORY	**UNSATISFACTORY**
INTENSITY: Utilization – Stubble Height (Riparian), % of Annual Growth (Non-riparian)	Riparian Herbaceous Species Stubble Height (Inches) for Kentucky Bluegrass dominated sites: End of grazing use (PACFISH/INFISH)					Before 6/30 – 2" Between 7/1 & 8/15 – 3" After 8/15 – 4"	Before 6/30 – 2" Between 7/1 & 8/15 – 3" After 8/15 – 4"
	Riparian Herbaceous Species Stubble Height (Inches) for sites other than Kentucky Bluegrass dominated are: End of grazing use (PACFISH/INFISH)					Before 6/30 – 3" After 7/1 – 4"	Before 6/30 – 3" After 7/1 – 4"
	Riparian Herbaceous Species Stubble Height (Inches): End of growing season (PACFISH/INFISH)					4" Grasses 6" Grass-like	4" Grasses 6" Grass-like
	Riparian Woody Species Utilization (PACFISH/INFISH)					Livestock are moved when there is a change from herbaceous vegetation to woody vegetation consumption	
	Range Resource Management Level	Forested Communities		Grassland Communities		Shrubland Communities	
		SAT	**UNSAT**	**SAT**	**UNSAT**	**SAT**	**UNSAT**
	C – Livestock managed to achieve full utilization of allocated forage. Management systems designed to obtain distribution and maintain plant vigor include fencing and water development.	45	0-35	55	0-35	45	0-30
INTENSITY: Streambank Alteration (PACFISH/INFISH)	Stream Bank Alteration (%)	≤10% on PACFISH streams This <10% is per the programmatic BA not a PacFish requirement. PacFish/Infish requirements are for only <20% Bank Instability.					
TIMING (PACFISH)	Restrictions for Wind Creek, Wind Creek Allotment	No livestock grazing between February 15th and July 15th.					

Table 2-5. Current permitted use within allotments in the Southside Allotment Project Area.

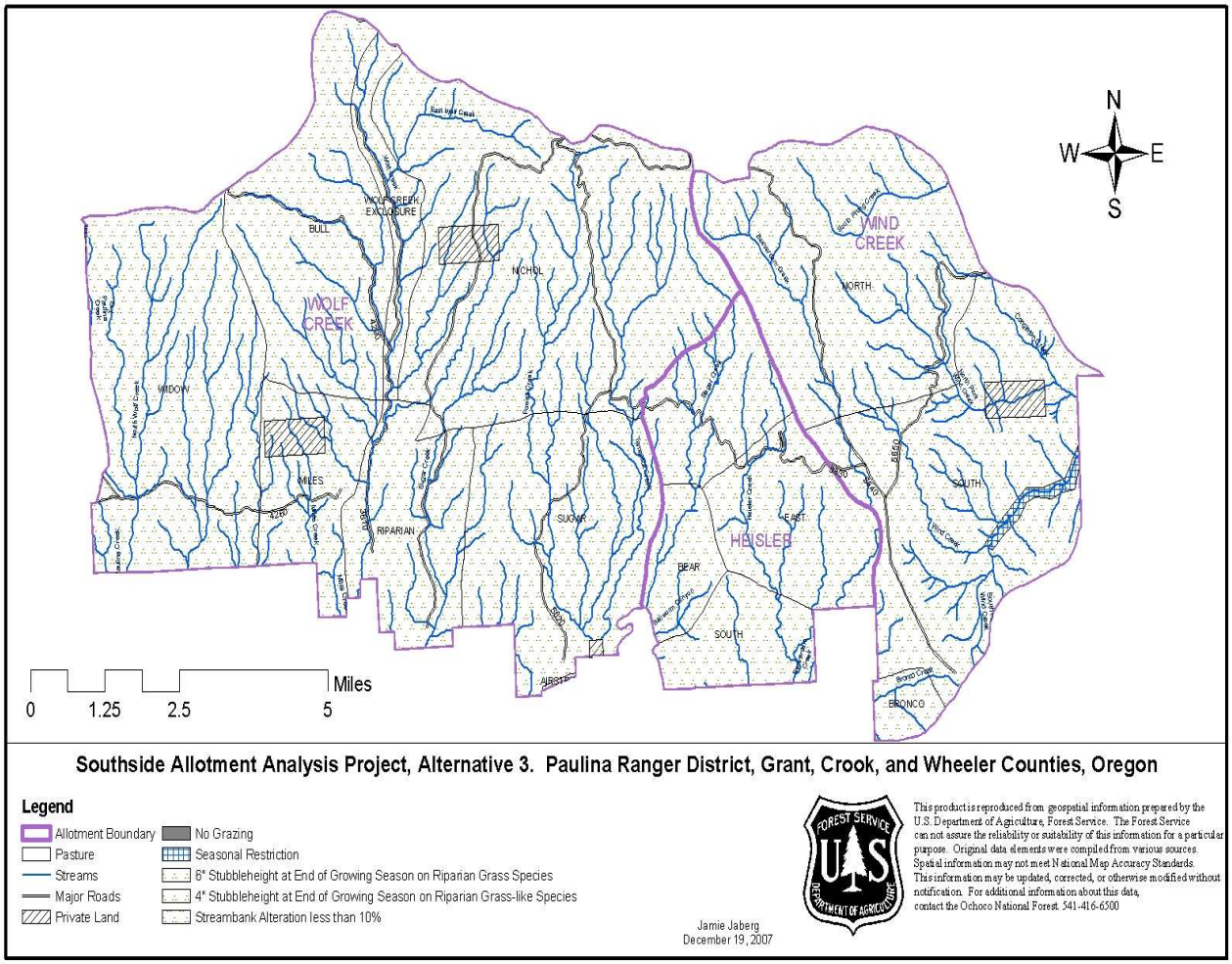
Allotment	Acres	Permit Type	Permitted Number	Kind/Class	Season of Use	Head Months
Heisler Creek	9,142	Term	117 71	Cattle cow/calf	6/1-9/15	412 250
Wind Creek	18,956	Term	200 175	Cattle cow/calf	6/15-9/25 6/1-9/11	677 593
Wolf Creek	42,286	Term	240 541	Cattle cow/calf	6/16-10/15	963 2170

All of these allotments are actively grazed by livestock under current term grazing permits. Table 2-4 displays current management standards. Table 2-5 displays the current permitted use by allotment within the project area.

The allotments would be monitored throughout the grazing season for stubble height, streambank alteration, upland vegetation utilization, and riparian woody species utilization. Annual Operating Provisions (AOP) would be adjusted in response to the prior year monitoring results and expected climatic conditions for the upcoming grazing season. Management on allotments failing to meet standards would be adjusted to meet standards. These adjustments would include such actions as changes in livestock numbers, season of use, and or possibly nonuse on pastures where management standards were not met.

Monitoring would include implementation and effectiveness monitoring. In 1999, the Ochoco National Forest first developed a Programmatic Biological Assessment that when implemented, would result in meeting the management standards outlined in the Pacific and Inland Native Fish Strategy Biological Opinions for riparian vegetation and soils. Since 1999, the project design criteria (management standards) have been adjusted based on monitoring data and end of year reporting. Project design criteria are based on the Forage Utilization/Stubble Height threshold within the greenline and upper terraces at stream channels and other springs (these are identified key areas). Seasonal pasture moves are based on 2, 3, and 4-inch stubble height requirements. All pasture stubble height requirements must be 4 inches at the end of the growing season. Adjustments in grazing management would occur if permittees fail to meet end of growing season stubble height requirements or other project design criteria.

Map 2-3. Select Features of Alternative 3 under
the Southside Allotment Analysis Project



Southside Allotment Analysis Project, Alternative 3. Paulina Ranger District, Grant, Crook, and Wheeler Counties, Oregon

Legend

- Allotment Boundary
- Pasture
- Streams
- Major Roads
- Private Land
- No Grazing
- Seasonal Restriction
- 6" Stubbleheight at End of Growing Season on Riparian Grass Species
- 4" Stubbleheight at End of Growing Season on Riparian Grass-like Species
- Streambank Alteration less than 10%

Jamie Jaberg
December 19, 2007

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Monitoring Requirements for Alternative 3

Range

Some indicators that would be used to evaluate range resources are the presence or absence of noxious weeds or soil disturbance, the seral status of vegetation and utilization of herbaceous and woody vegetation. Trend towards objectives described in the allotment management plans would be assessed in these evaluations.

1. Compliance with Annual Operating Provisions would be monitored including: spot-checking pasture move dates; evaluating allowable and actual use; verifying permittee maintenance of range improvements; and confirming that authorized livestock are grazing on the allotment.
2. Riparian plots are permanently established monitoring sites used to monitor riparian vegetative status and soil stability. These plots would be reevaluated approximately every three to eight years.
3. Stubble Height Monitoring is required under PACFISH/INFISH and the 2004 Programmatic Biological Assessment. Streambank alteration, woody vegetation utilization, and residual herbaceous stubble height would be measured at designated sites within a pasture. Stubble height monitoring would occur at least twice during the grazing season on an annual basis, per the 2004 Programmatic Biological Assessment.
4. Condition and Trend plots are permanent monitoring sites used to monitor the existing condition and apparent trend of upland vegetation and soils. These plots would be reevaluated every 5 to 7 years and would be used to help guide future management.

Noxious Weeds

1. Existing noxious weed infestations would be monitored for spread and density trends by established protocols including gross area, net area and population size estimates. Established photo point monitoring of houndstongue would continue in the Roba Allotment. This monitoring strategy would take place annually.
2. New noxious weed infestations would be identified through an inventory process shared by Forest Service personnel and County Weed Control agencies (Crook, Grant, and Wheeler Counties). Portions of allotments would be inventoried on a rotational basis every one to five years.

Fisheries/Hydrology

1. Stream temperature would be monitored giving priority to streams currently on the Oregon DEQ 303(d) list.
2. Forest Service Regional Level II and Ochoco National Forest (Bottom Line Surveys) stream surveys would be conducted in selected streams throughout the project area. This information would help to describe the quantity and quality of fisheries habitat.

Alternative 4

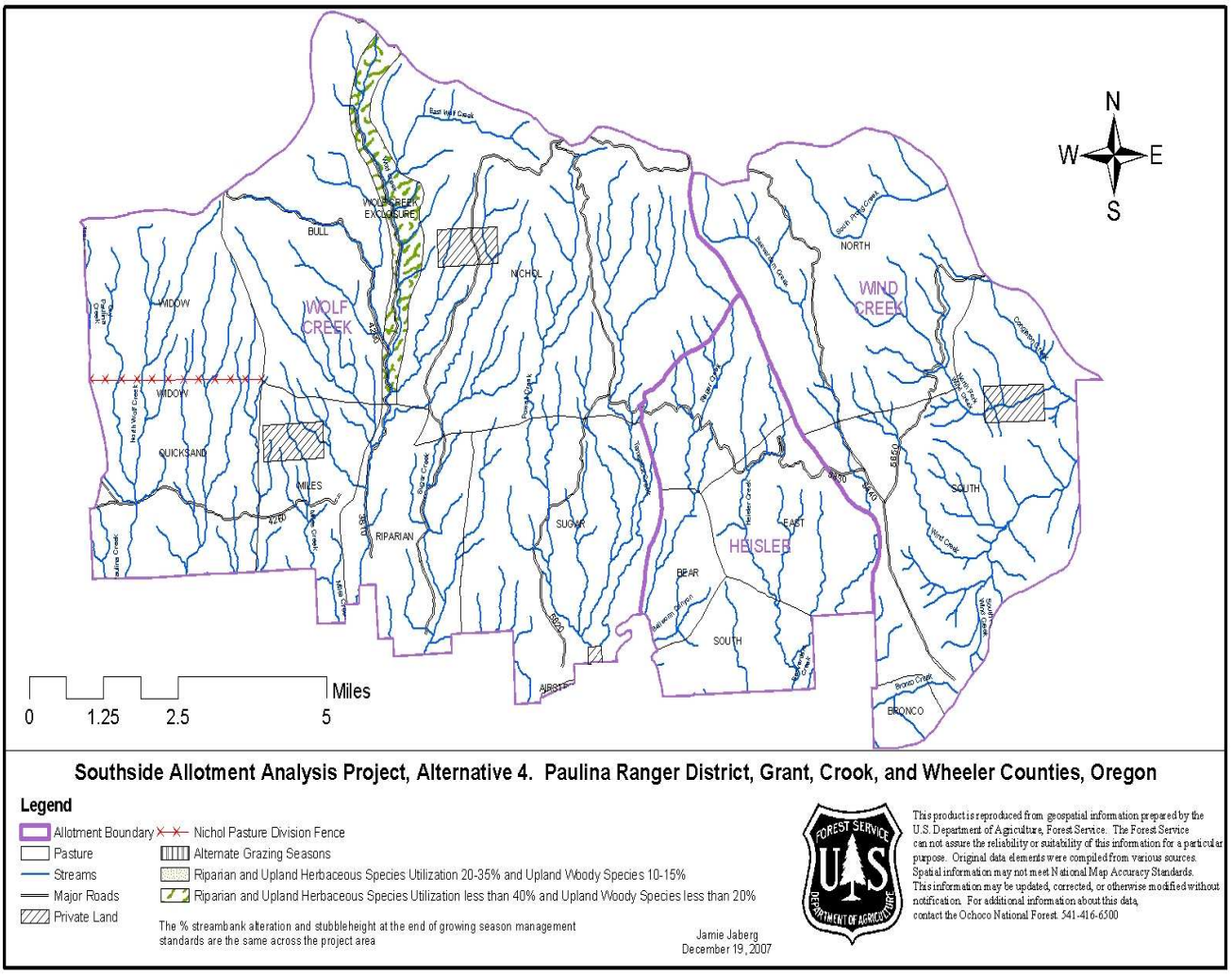
Alternative 4 was proposed by the public and would add specific actions to the Proposed Action alternative. These actions include construction of a three strand barb wire fence in the Widow Pasture of the Wolf allotment; re-instituting grazing use of the Wolf Creek riparian enclosure on the Wolf Creek allotment; and allowing grazing use of Wind Creek on the Wind Creek allotment prior to July 15. There would be no timing restriction for Wind Creek in the South Pasture of the Wind Creek allotment. The same mitigation measures and monitoring requirements would apply to this alternative as apply to the Proposed Action alternative. Additional monitoring would occur in the Wolf Riparian enclosure to monitor resource conditions under grazing use annually and long term.

The new fence in the Widow pasture would divide it into two pastures with an east/west fence (Map 2-4, page 30). Division of this pasture would enable the permittee to have more control over the distribution of cattle use in both of the pastures.

The Wolf Creek Riparian Corridor enclosure is located along the upper reaches of Wolf Creek in the Wolf Creek allotment (Map 2-4). Under Alternative 4 this area would be grazed in rotation with the Nichol, Riparian and Sugar pastures of the Wolf Creek allotment. The pasture begins at the crossing of the Miles/Bull pasture division fence on Wolf Creek, and follows Wolf Creek up to its headwaters, connecting with the Wolf Creek/Rock Creek allotment boundary fence to the north. The enclosure would be grazed in year one in the spring for approximately 40 days. In year two the pasture would be used in the fall for approximately 40 days. In year three, the pasture would once again be grazed in the spring, alternating back and forth over successive years. Eighty (80) cow/calf pairs would be grazed in the pasture during the period of use. Management standards would be set based upon the CPRR rating of "At-Risk."

Lower reaches of Wind Creek on the National Forest would be grazed without the current timing restriction precluding use before July 15 each year. Under Alternative 4 the South pasture of the allotment containing Wind Creek would be grazed early in the season from June 16 to July 30 each year. Cattle would then be moved into the North Pasture until the end of the grazing season before moving to the Bronco Pasture and off of the allotment. Cattle would be allowed access to Wind Creek, which may contain spawning habitat for mid-Columbia steelhead. This rotation would not be in compliance with the current Programmatic Agreement for the Ochoco National Forest and would require separate consultation with the National Marine Fisheries Service.

Map 2-4. Select Features of Alternative 4 Under
the Southside Allotment Analysis Project



Southside Allotment Analysis Project, Alternative 4. Paulina Ranger District, Grant, Crook, and Wheeler Counties, Oregon

Legend

- Allotment Boundary
- Pasture
- Streams
- Major Roads
- Private Land
- Nichol Pasture Division Fence
- Alternate Grazing Seasons
- Riparian and Upland Herbaceous Species Utilization 20-35% and Upland Woody Species 10-15%
- Riparian and Upland Herbaceous Species Utilization less than 40% and Upland Woody Species less than 20%

The % streambank alteration and stubbleheight at the end of growing season management standards are the same across the project area

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December 19, 2007

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Alternatives Considered But Eliminated From Detailed Study

A scoping comment was received that requested the Forest Service consider more alternatives which reduce the number of cattle grazed on the allotments, especially the Wind Creek allotment with its steelhead and salmon-bearing streams. Decisions such as grazing systems (pasture rotation, etc.), timing, and stocking rates are administrative in nature and would be made based on specific data collected for the purpose of making such decisions. Another comment requested the Forest Service consider eliminating or reducing the season of use in riparian areas and other sensitive areas. Eliminating grazing use in riparian sites is included in the analysis of Alternative 1, No Action (no grazing). Reducing the season of use in riparian and other sensitive areas is included in the analysis of Alternatives Two (the Proposed Action), and Four (the Permittee Proposal). Both of these alternatives provide for allowable use standards of zero to forty percent, based on the condition of riparian resources. Reducing the allowable use percentage could most easily be achieved by reducing the length of time livestock are allowed in a pasture, but could also be attained by improved livestock distribution.

Comparison of Alternatives

Table 2-6, beginning on the following page, compares the anticipated effects of the Alternatives considered in the Southside Allotment Project Area.

Table 2-6	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Current Management	Alternative 4 Modified Proposed Action
Condition of Riparian/Upland Plant Communities	Conditions should improve more quickly than other alternatives, until vegetation stagnates. Quickest movement towards desired seral vegetation.	Best recovery of all action alternatives, gradually moving towards desired seral vegetation.	Rapid or consistent improvement is not expected. Likely that some areas would continue not to meet desired seral vegetation condition.	Similar recovery to Alternative 2, gradually moving towards desired seral vegetation with exception of Wolf Exclosure.
Soil Productivity	Most rapid recovery of all alternatives.	Best soil recovery of all action alternatives,	Soil erosion and compaction would continue at its current rate.	Best soil recovery of all action alternatives.
Condition of Stream Channels and Aquatic Habitat	Conditions Streams in a degraded state would improve most quickly and may approach "natural rates of recovery." Quickest movement towards Forest Plan Desired Conditions.	Best recovery of the action alternatives, gradually moving towards Forest Plan Standards. Adaptive management promotes maintenance and slow improvement of conditions.	Delayed recovery and possible degradation within the foreseeable future. Likely that some streams would not meet Forest Plan Standards and/or State water quality standards without active restoration activities.	Best recovery of the action alternatives, gradually moving towards Forest Plan Standards. Adaptive management promotes maintenance and slow improvement of conditions.
Noxious Weeds	Livestock would not cause or spread noxious weed infestations. Bare ground would be reduced and native plant community health would improve, reducing the susceptibility of the area to noxious weed invasion.	Adaptive management techniques such as fencing small infestations and pasture rest, would limit spread by livestock.	Current grazing standards would continue, where livestock act as a vector for spreading weeds. Current pasture function would not likely change; native plant communities would remain susceptible to noxious weed invasion.	Adaptive management techniques such as fencing small infestations and pasture rest, would limit spread by livestock

Table 2-6	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Current Management	Alternative 4 Modified Proposed Action
Heritage Resources	Provides most protection to ground surface archaeological sites, both known and those not yet found and recorded.	Lower risk of possible damage to ground surface archaeological sites not yet found and recorded.	Continued rate of risk of possible damage to ground surface archaeological sites not yet found and recorded.	Lower risk of possible damage to ground surface archaeological sites not yet found and recorded
Sensitive Plant Species	Habitat conditions of sensitive plant species would improve under this alternative.	More stringent grazing standards and the use of adaptive management to quickly address pasture function would move habitat conditions of sensitive plants toward desired future conditions.	Current pasture function would not likely change, therefore habitat conditions for sensitive plant species would not move toward desired future condition.	More stringent grazing standards and the use of adaptive management to quickly address pasture function would move habitat conditions of sensitive plants toward desired future conditions
Sensitive Wildlife Terrestrial Species	Would result in the greatest level and fastest rate of habitat improvement and suitability for those species which use ground level vegetation. This would affect greater sage-grouse and gray flycatcher the most.	Would result in a lower level of habitat improvement for those species which use ground level vegetation, and at a slower rate of improvement, than Alternative 1; would result in a higher level of habitat improvement for greater sage-grouse and gray flycatcher, and at a faster rate of improvement, than Alternative 3.	Would result in the lowest level of habitat improvement for those species which use ground level vegetation, and at the lowest rate of improvement, of the three alternatives, and may lead to further declines in habitat quality and condition.	Would result in a lower level of habitat improvement for those species which use ground level vegetation, and, at a slower rate of improvement than Alternative 1; would result in a higher level of habitat improvement for greater sage-grouse and gray flycatcher, and at a faster rate of improvement, than Alternative 3.

Table 2-6	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Current Management	Alternative 4 Modified Proposed Action
Threatened, and Sensitive Aquatic Species	Populations would slowly expand as habitat improves. Some streams would likely still need active restoration activities to improve watershed interconnectivity and genetic health.	Populations would be maintained or slowly expand as habitat improves. Some streams would likely still need active restoration activities to improve watershed interconnectivity and genetic health.	Populations would be maintained yet still vulnerable to local extirpations due to changes in climate and flow. Active restoration would still be needed to improve watershed interconnectivity and genetic health.	Populations would be maintained or slowly expand as habitat improves. Some streams would likely still need active restoration activities to improve watershed interconnectivity and genetic health.
Management Indicator Species (MIS)	Would result in the greatest level and fastest rate of habitat improvement and suitability for MIS.	Would result in a lower level of habitat improvement for MIS, and at a slower rate of improvement, than Alternative 1; would result in a higher level of habitat improvement for MIS, and at a faster rate of improvement, than Alternative 3.	Would result in the lowest level of habitat improvement for MIS, and at the lowest rate of improvement, of the three alternatives, and may lead to further declines in habitat quality and condition	Would result in a lower level of habitat improvement for MIS, and at a slower rate of improvement, than Alternative 1; would result in a higher level of habitat improvement for MIS, and at a faster rate of improvement, than Alternative 3.

Table 2-6	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Current Management	Alternative 4 Modified Proposed Action
Land Birds Including Migratory Species	Would result in the greatest level and fastest rate of habitat improvement and suitability for land birds	Would result in a lower level of habitat improvement for land birds, and at a slower rate of improvement, than Alternative 1; would result in a higher level of habitat improvement for land birds, and at a faster rate of improvement, than Alternative 3	Would result in the lowest level of habitat improvement for land birds, and at the lowest rate of improvement, of the three alternatives, and may lead to further declines in habitat quality and condition	Would result in a lower level of habitat improvement for land birds, and at a slower rate of improvement, than Alternative 1; would result in a higher level of habitat improvement for land birds, and at a faster rate of improvement, than Alternative 3
Economic Viability/Efficiency for Permittees	Greatest negative impact on all permittees. Loss of 100% of permitted AUM's (4,716) could require permanent herd reductions or purchase or lease of alternate pasture by permittees	Possibility of reduction in permitted AUM's after first effectiveness monitoring cycle	Least immediate impact to permittees; no reduction in permitted AUM's in the short term.	Possibility of reduction in permitted AUM's after first effectiveness monitoring cycle
Water Quality and 303(d) Listed Streams	Stream temperature conditions would improve most rapidly as shade conditions improve. Some streams would likely still need active riparian planting and restoration activities to move into compliance with State water quality standards.	Stream temperatures conditions would improve slowly as shade conditions improve. Some streams would likely still need active riparian planting and restoration activities to move into compliance with State water quality standards.	Stream temperatures would likely remain in a degraded state and in some reaches may actually worsen. Many streams would likely need active riparian planting and restoration activities to move into compliance with State water quality standards.	Stream temperatures conditions would improve slowly as shade conditions improve. Some streams would likely still need active riparian planting and restoration activities to move into compliance with State water quality standards.

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CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, and economic environments that would be affected by the alternatives within the project area and the potential changes due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in Chapter 2, Table 2-6. The following discussion of existing conditions and effects analysis are taken from each of the specialists' reports. The full text of each report is located in the project record file available upon request at the Paulina Ranger District Office. Table 2-3 on page 14 contains the composite resource condition rating for each pasture within the project area.

Riparian and Upland Vegetation

Affected Environment

The current condition of upland vegetation was assessed using Parker 3-Step Condition and Trend transects (Parker, 1951) established in the 1950's and 1960's, and paced transects (USFS-R-6). Riparian vegetative status was assessed using the protocol in Monitoring the Vegetation Resources in Riparian Areas, commonly known as the Winward method (Winward, 2000), Nested Frequency (Area 4 Riparian Monitoring or "Riegel") plots (USDA/USDI 1996), and Proper Functioning Condition assessments (Riparian Area Management TR 1737-15, 1998).

Heavy livestock use prior to the establishment of the National Forest through the 1940's resulted in long term, legacy impacts to vegetative resources affecting conditions on the landscape today. Riparian resource conditions vary by pasture, stream, and even stream reach. Pasture ratings and individual reach conditions will be discussed in the following narrative and are summarized in Table 3-2 below. The data collection forms for monitoring sites provide additional detail on the reasons for individual condition determinations. This data is maintained within the analysis file for this project at the Paulina Ranger District Office.

Upland vegetative conditions and pasture ratings were Satisfactory throughout all of the pastures with one exception: the Miles pasture in the Wolf Creek allotment. The factors which resulted in this pasture being rated at-risk did not appear to be related to livestock grazing. The status of upland vegetation condition will not be discussed in further detail since monitoring has revealed conditions are satisfactory throughout the project area. Riparian conditions are described in further detail below by allotment.

Wind Creek Allotment

The status of the riparian vegetation in the North pasture is rated as "at risk", based upon an assessment of reach A (1.9 miles) of Beaverdam Creek. Although no long-term ecological studies have been established within the riparian areas of this pasture, a proper functioning condition assessment indicated that riparian vegetative condition within this reach was "functioning-at risk" due to a lack of diversity of riparian plant composition, age class, cover and root holding capacity.

The status of the riparian vegetation in the South Pasture is rated as "at risk." Seven of the stream reaches within this pasture were assessed using PFC protocol. Riparian Area Greenline study 16 on reach B (1.3 miles) of Beaverdam Creek indicated a lower than desirable percentage of woody

seedlings and sprouts. A PFC assessment on the same stream also indicated an absence of plants capable of withstanding high stream flow events. The overall PFC rating on this site was "non-functional" although the Greenline study indicated an "at risk" rating.

Riparian Area Greenline study 23, on reach A (0.9 miles) of South Fork Wind Creek found a lack of seedlings and sprouts for woody plant species; most were in the mature age class. The PFC assessment on this reach was consistent with this conclusion and was rated as "functional-at-risk." Assessments using PFC protocol on reaches B (0.6 miles) and C (0.5 miles) of South Fork Wind Creek yielded "unsatisfactory" and "at risk" ratings for riparian vegetation.

The PFC assessment conducted on reach A (3.7 miles) of Wind Creek proper indicated riparian vegetative condition was "at risk," while the PFC assessments on reaches B (0.3 miles) and C (2.3 miles) of the main stem of Wind Creek rated riparian vegetation as "properly functioning." The Area 4 Riparian Plot O07226 located on Congleton Creek (2.2 miles) revealed that the site has moderate similarity to the site's potential.

The status of the riparian vegetation in the Bronco pasture was not determined. There are no permanent riparian or PFC assessment studies within the riparian areas of the Bronco pasture. There is approximately one mile of riparian vegetation within the pasture. In addition, observations by individual specialists were inadequate to make a determination of riparian vegetative conditions based upon professional judgment. The lack of this data is not expected to have a substantial impact on the management of the pasture or allotment as information is available for the other factors, which would be used to generate a composite resource rating for the pasture.

Wolf Creek Allotment

Two permittees run two separate herds on this allotment; one uses three pastures on the west (Widow, Miles and Bull Pastures) and the other uses four pastures (Riparian, Nichol, and Sugar, and Sugar Holding) on the east side of the allotment. Wolf Creek Riparian Corridor exclosure was fenced in 1988 and has not been used for grazing since that time.

The status of the riparian vegetation in the Bull Pasture was rated as "at risk." There are no permanent riparian monitoring studies, nor were PFC assessments completed in the Bull pasture. The "at risk" rating is based upon observations by Paulina Ranger District resource professionals and their knowledge of riparian areas and springs tributary to Wolf Creek (3.2 miles) within the pasture. Factors such as lack of riparian vegetation, presence of "weedy" vegetation and stream entrenchment were considered in making this summary determination.

The status of the riparian vegetation in Miles Pasture was not rated because data and observations by resource professionals are unavailable for about 4.2 miles of streams within the pasture. The lack of this data is not expected to have a substantial impact on the management of the pasture or allotment as information is available for the other factors which will be used to generate a composite resource rating.

The status of the riparian vegetation in the Widow pasture was rated as "at risk." The assessment of riparian vegetative conditions within this pasture was based upon an assessment of three reaches of North Wolf Creek. Quantitative data was collected from two Riparian Area Greenline surveys on reach C (3.2 miles) of North Wolf Creek. One set of data indicated moderate similarity of existing riparian plant communities to desired plant communities, while the other indicated low similarity. Proper functioning condition assessments conducted on reaches A (1.4 miles) and B (1.3 miles) of North Wolf Creek indicated that riparian vegetation within reach A was in "properly

functioning" condition while within reach B riparian vegetation was in a "functioning-at risk" condition due to a lack of woody riparian species and cover.

The status of the riparian vegetation in the Nichol Pasture was rated as unsatisfactory, based on the assessment of riparian vegetative conditions within two reaches of Sugar Creek and three reaches of Tamarack Creek. Quantitative data collected from a Riparian Area Greenline survey indicated that riparian plant communities within reach A (2.3 miles) of Sugar Creek were quite dissimilar to the desired plant communities for the reach. A proper functioning condition assessment was conducted on reach B (0.3 miles) of Sugar Creek and determined that riparian vegetation within that reach was in a "functioning-at risk" condition primarily associated with the lack of riparian obligate vegetation that would otherwise be present where a high proportion of vertical cutbanks occur. A riparian area greenline survey on reach B (0.8 miles) of Tamarack Creek indicated that riparian plant communities were quite dissimilar to the desired plant communities for the reach. It is interesting that the proper functioning condition assessment for this reach indicated that riparian vegetation was "properly functioning". Proper functioning condition assessments conducted on reaches A (0.6 miles) and C (0.7 miles) of Tamarack Creek, determined that riparian vegetation within reach A was in "nonfunctioning" condition. This rating was due to entrenchment and lack of riparian area. Reach C was in a "functioning-at risk" condition due to a scarcity of riparian species.

The status of the riparian vegetation within the Riparian Pasture was rated as at risk, based on the assessment of riparian vegetative conditions on three reaches of Sugar Creek, one tributary to Sugar Creek and the reaches of Wolf Creek within the pasture. Quantitative data collected from two Area 4 Riparian Plots (O07169 and O07170) indicated that riparian plant communities within reach D (0.9 miles) of Sugar Creek were dissimilar to the desired plant communities for the reach, however, the proper functioning condition assessment indicated that riparian vegetation fell within the "properly functioning" rating. A proper functioning condition assessment was conducted on reaches C (1.3 miles) and E (1.2 miles) of Sugar Creek and determined that riparian vegetation within those reaches were in a "properly functioning" and "functioning-at risk" (presence of canary reedgrass) conditions, respectively.

Two Area 4 Riparian Plots (O07172 and O07173) indicated that riparian plant communities within an unnamed tributary to Sugar Creek (1.5 miles) were dissimilar to the desired plant communities. Quantitative data collected from one Area 4 Riparian Plot (O07105) indicated that riparian plant communities within the portion of Wolf Creek within this pasture (2.5 miles) were dissimilar to the desired plant communities.

The status of the riparian vegetation for Sugar Pasture was rated as unsatisfactory, based on data from three Riparian Area Greenline plots and one Area 4 plot. Quantitative data collected from Winward Greenline survey 25 on reach D (1.5 miles) of Tamarack Creek indicated that riparian plant communities were quite dissimilar to the desired plant communities for the reach. Greenline stability was rated as high and woody riparian species were lacking with an absence of younger age classes (seedlings/sprouts). This was consistent with the PFC assessment conducted on this reach, which rated it as "non-functioning."

Data collected from Winward Greenline survey 19, on reach E (2.0 miles) of Tamarack Creek indicated that riparian plant communities were quite similar to the desired plant communities for the reach. Greenline stability was rated as "good" and most age classes of woody riparian species were represented. This was consistent with the PFC assessment which rated this reach as "properly functioning." Data collected from Riparian Area Greenline survey 24, on Reach F (0.6 miles) of Tamarack Creek revealed that riparian plant communities were quite dissimilar to the desired plant communities for the reach. The greenline stability rating was "moderate" with non-riparian woody

species dominating the site and few seedling/sprouts were present. This was similar to the PFC assessment which rated this reach as "functioning at risk." Quantitative data collected from Area 4 Riparian Plot O07175 on Powell Creek (4.1 mile) indicated that the riparian plant community on this site had a low similarity to the desired plant communities.

The riparian vegetation in the Sugar Holding Pasture (0.9 miles) was rated as satisfactory based on Riparian Area Greenline survey 21. This survey revealed that the riparian plant community on this site had a high similarity to the desired plant community. Greenline stability was good and riparian woody species were present in the young/sapling and mature age classes. However the survey also indicated that the seedling/sprout class was not represented and that the riparian woody species present on the site were planted.

The riparian vegetation in the Wolf Creek Riparian Corridor Pasture (5.5 miles) was rated as "at risk." The assessment of riparian vegetative conditions within this pasture was based upon quantitative data collected from Area 4 Riparian Plot O07234 on Wolf Creek. This data indicated moderate similarity of existing riparian plant communities to desired plant communities.

Heisler Allotment

The status of the riparian vegetation within South Pasture was rated as "unsatisfactory," based upon Riparian Area Greenline survey 15 on reach D (0.4 miles) on Beaverdam Creek. Quantitative data collected from this survey indicated that existing riparian plant communities had a very low similarity to desired plant communities. Greenline stability was rated as poor and woody riparian vegetation was infrequent. The PFC assessment conducted on this stream reach was similar to the Greenline data generating a "functioning-at-risk" rating.

A PFC assessment was also conducted on Heisler Creek in 1997. This assessment rated the stream reach as "functioning-at-risk."

There was neither adequate data nor professional observations and knowledge concerning the riparian vegetation within the North Pasture to assess riparian vegetative condition on Rager (approx. 3.0 miles) and Heisler (approx. 2.0 miles) Creeks. This factor was not considered in the composite resource rating process for this pasture. The lack of this data is not expected to have a substantial impact on the management of the pasture or allotment as information is available for the other factors which will be used to generate a composite resource rating.

The status of the riparian vegetation within East Pasture was rated as "at risk," based upon a PFC assessment of reach C (2.1 miles) of Beaverdam Creek. The riparian vegetative condition within this reach was "functioning-at risk" because of a lack of diverse, bank stabilizing riparian vegetation.

The status of the riparian vegetation in the Bear/Rager pasture was rated as "satisfactory." This rating is based upon reasoned professional judgment and observations of agency personnel concerning the vegetative condition of plant communities on Bellworm (1.6 miles) and Rager (2.0 miles) Creeks. Rager Creek received a "low satisfactory" rating because of the amount of bare soil, hydrologic cutting, and a relative lack of riparian species, due to historic logging.

Upland vegetation within the Bear/Rager Pasture was rated as "satisfactory". The rating was based upon reasoned professional judgment and observations of agency personnel who concluded that the upland communities had satisfactory ground cover and vegetative composition. The presence of *Ventenanta dubia* and Japanese brome represent substantial risk to non-forested upland plant

communities in this pasture due to the aggressive reproduction and competitive advantage of these species.

Table 3-1. Summary of riparian and upland vegetation condition ratings for the Wind Creek, Heisler, and Wolf Creek allotments by pasture in the Southside Allotment Project Area.

Allotment	Pasture	Riparian Vegetation	Upland Vegetation	COMMENTS
Wind Creek	North	At-Risk	Satisfactory	
	South	At-Risk	Satisfactory	
	Bronco	No Rating	Satisfactory	
Heisler	North	No Rating	Satisfactory	
	South	Unsatisfactory	Satisfactory	1997 PFC rating of functioning-at-risk
	East	At-Risk	Satisfactory	
	Bear/Rager	Satisfactory	Satisfactory	
Wolf Creek	Bull	At-Risk	Satisfactory	
	Miles	Not Rated	At-Risk	Upland rating due to fire effects
	Widow	At-Risk	Satisfactory	
	Nichol	Unsatisfactory	Satisfactory	
	Riparian	At-Risk	Satisfactory	
	Sugar	Unsatisfactory	Satisfactory	
	Sugar Holding	Satisfactory	Satisfactory	
	Wolf Riparian Enclosure	At-Risk	Satisfactory	Non-use since 1989

Environmental Consequences

Short-term impacts are defined as those effects lasting less than 5 years. Long-term impacts are defined as those lasting more than 15 years. The analysis area for effects from the alternatives upon riparian and upland vegetation is the suitable and used riparian and upland plant communities that are grazed within the project area.

Alternative 1: No Action

Under the No Action alternative livestock grazing would no longer occur within the project area. Livestock would no longer eat vegetation or physically impact vegetation. Although livestock grazing and associated impacts would no longer occur there would be an evolution of resource conditions as biophysical processes would continue to occur. The difference between this evolving condition and current conditions for any given portion of land would be dependent on the past level or degree of grazing impacts across the landscape. Current conditions indicate that management activities have impacted riparian sites more than upland sites (Table 3-1).

Riparian Vegetation

Implementation of the no action alternative would be expected to provide for the greatest improvement to riparian vegetative conditions within the shortest time frame. There would be no livestock impacts to vegetation on stream banks. Removal of livestock as a disturbance to riparian systems would facilitate a more rapid increase in the amount and diversity of riparian grasses, sedges, and rushes on most riparian areas.

Studies of livestock exclusion from riparian areas have found that recovery of riparian vegetation occurred in four to eight years, depending on site location (Skovlin 1984). Rates of recovery would be expected to vary across this project area with previously altered sites presently lacking a riparian vegetation component taking longer to fully recover, but recovering at a more rapid rate. The return to pre-European conditions on some sites (particularly entrenched streams) would be very slow or non-existent (Laycock 1989; Winward 1991). In the long-term, it would be expected that in the absence of very aggressive exotic species such as canary reedgrass, desirable riparian vegetation would gain competitive advantage in the absence of grazing and would replace less desirable species that had been favored by grazing (shallow rooted annuals and short lived perennials).

Riparian hardwood species would benefit in both the short and long-term from a reduction in browsing pressure and would expand their canopy cover where conifer cover allows. An increase in riparian hardwood cover would result in a corresponding increase in the amount of stream shading. In areas capable of supporting woody species, such as willows and alders, increased amounts and age classes of these deeply rooted plants would help stabilize streambanks, catch large woody debris, filter sediment, and help improve water quality. Increases in woody species numbers, age classes, and distribution would only be expected to occur in areas with suitable soil types. A reduction in browsing pressure on aspen associated with the cessation of domestic livestock grazing might be adequate to increase numbers of small aspen stems. This could result in an increase in aspen stands within the analysis area within fifteen years. This potential increase is questionable at best because the current levels of browsing by wildlife, conifer encroachment, and the exclusion of fire could impact aspen regeneration to the degree that increases may not occur without active restoration activity (prescribed fire, wildlife exclusion fencing, etc.).

Upland Vegetation

The difference between vegetative conditions under current gazing management and the evolving conditions without grazing in uplands would be less evident than in riparian areas. The rate of evolving conditions would be much slower in uplands than in riparian areas.

Upland plant communities which have supported substantial levels of grazing and grazing related impacts under current management would be expected to recover slowly over the long-term

following the removal of livestock. Areas that continue to display the legacy effects of the very heavy grazing that occurred in the late 1800s and early 1900s would not be expected to show measurable improvement even over the very long term (100 years).

Most forested communities would display little to no change following the removal of livestock as present timber management practices are leading to densely stocked stands that are not accessible to livestock use (Hall 2004). Understory shrubs and grasses would continue to decline as canopy cover increases. Fuel loading in these areas would continue to increase thereby increasing the risk of wildfires short through long-term, except in areas where thinning is conducted through cutting or prescribed fire. Belsky and Blumenthal (1997) stated that livestock grazing is a main contributor to increasingly dense western forests. Borman (2003) acknowledged that past grazing practices, predominately by large herds of sheep, contributed to dense western forests. However, Borman believes tree regeneration was promoted by other management activities such as fire suppression and logging activities in combination with favorable climatic conditions, especially during the early 20th century, and that current grazing management practices do not substantially contribute to an increase in tree densities.

Currently prescribed intensities of livestock grazing are expected to result in negligible local reductions in fine fuels and, therefore, not expected to contribute to the forest health issue of tree overcrowding. In addition, many sources indicate that, although reduced competition due to livestock grazing may result in greater individual tree growth rates, tree survival associated with grazing has either not been appreciably affected (Karl 1991; Seidel, Geist, Stickler 1990; Skovlin, Harris, Strickler, Garrison 1976), or has been reduced by grazing (Karl 1991; Kingery and Graham 1991; Krueger 1983; Currie, Edminster, Knot 1978; Allen, Bartolome 1989; McLean, Clark 1980; Eissenstat, Mitchell, Pope 1982). Timber harvest, stand improvement, fuels management and fire suppression activities have continued to the present.

Under the No Action alternative, dead plant matter (litter) would accumulate, helping to protect and stabilize soils. Some grass species that evolved with the periodic removal of vegetative material by fire, insects, or ungulates would probably not benefit over the long term, under this alternative. In the absence of grazing or other disturbance, plant matter accumulates on the soil surface. After years of this accumulation, which surpasses the rate of decay in arid environments, some plants (many grass species in particular) go into a "self-imposed stress" whereby the litter chokes out new shoots competing for light (Knapp, et al. 1986). The vigor of the entire plant is reduced. When this occurs over a broad scale rangelands become less productive and healthy. Healthy and productive grass and shrub lands are important for many invertebrate and wildlife species that depend upon them, particularly for winter range.

The evolving conditions in the absence of livestock grazing on upland rangeland condition could be beneficial on limited areas the first few years following livestock removal and potentially neutral or less probably negative thereafter. In addition to loss of plant vigor and a decrease in rangeland health, the accumulation of litter allows fine fuels to build on the limited local areas where grazing impacts fine fuel loads. This in turn may result in a slight increase in landscape susceptibility to fire.

Direct and Indirect Effects – Alternative 2

Direct and Indirect Effects Common to all Allotments

Alternative 2 provides the flexibility to change use levels as resource conditions in a given pasture change. Negative impacts to vegetation caused by the implementation of Alternative 2 would be

reduced by putting into practice the mitigation and monitoring requirements listed in Chapter 2. These requirements refer to management practices such as: herding livestock, designating locations for salt placement, limiting ground disturbance, installation of temporary fencing, etc. Reductions in the number of livestock or changes in the season of use may be necessary in order to meet the desired conditions.

Riparian Vegetation

The primary impacts associated with livestock grazing (eating vegetation and physical/mechanical activities) would occur as a result of implementation of Alternative 2. The removal of vegetation (through ingestion) at the levels proposed in Alternative 2 would not reduce plant vigor and carbohydrate reserves, thereby affecting overall plant health. Individual plants and plant communities as a whole would be able to maintain their health and vigor if vegetative removal were adequately limited. Mosley et al. (1997) states that to protect water quality, herbaceous utilization levels of less than 65% are usually appropriate and the utilization on riparian shrubs should not exceed 50 to 60% during the growing season. Popolizio et al. (1994) suggested that studies have found there were no differences in foliar cover of forbs between treatments involving no grazing and 65% utilization. Clary and Webster (1989) suggest that spring utilization levels of 65% and summer utilization levels of 40-50% are sufficient to maintain plant vigor and afford streambank protection. The proposed standards associated with Alternative 2 would meet or be lower than the utilization levels recommended by Clary and Webster (1989), promoting an improvement in vegetation conditions.

Clary and Leininger (2000), in studying stubble height and appropriate grazing levels for maintenance and improvement of riparian area health, concluded that maintenance of a minimum streamside stubble height of four to six inches may be best in many situations. This conclusion applies especially when allowing for multiple riparian issues such as maintaining plant vigor, trapping and stabilizing sediment, and stream bank trampling. The authors stated that allowable stubble height can change depending on stream type and soil classification. Clary and Webster (1989) cited Elmore (1988) in suggesting that three to four inches of stubble height would maintain riparian components. Elmore (1988) thought that three to four inches of stubble height would maintain plant vigor, provide stream bank protection, and aid deposition of sediments needed to rebuild degraded stream banks.

The presence of vegetative mats and willows are important for reducing water velocities and trapping sediments that are needed to rebuild stream banks (Clary et al 1996, Platts 1991). Hall and Bryant (1995) maintain that undesirable grazing impacts can occur any time stubble height reaches three inches or less. Clary and Webster (1989) conclude that for healthy plant vigor, grazing strategies in riparian areas must provide for re-growth of riparian plants after use, or should leave sufficient vegetation at the time of grazing for maintenance of plant vigor and stream bank protection. Maintaining a minimum stubble height can help preserve forage plant vigor, reduce browsing on willows, stabilize sediments and indirectly limit stream bank trampling (Clary and Leininger 2000).

Recently, there has been considerable agreement that monitoring of these annual variables lacks context if they are not tied to meeting long term condition and trend resource objectives (University of Idaho 2004; Smith 1998; Rasmussen 1998; Krueger 1998; Smith et.al. 2005). Full implementation of utilization, stubble height and streambank alteration standards under Alternative 2 would meet or be more restrictive than those recommended by these grazing studies and would be expected to allow for the improvement of riparian vegetation and streambank stability. Riparian vegetative communities with very low to mid-seral ecological status would improve, although improvement would not occur at a rate as rapidly as predicted under Alternative 1. Riparian

communities would most likely achieve late seral ecological status in the long-term. Increased amounts of residual vegetation and litter would provide additional protection to the soil surface and would correlate to a lower percentage of bare ground.

The change in management outlined under Alternative 2 would provide willows and alders with an opportunity to recover from the impacts of annual livestock grazing. Woody species would benefit in both the short and long-term from less browsing pressure and would likely expand their canopy cover providing increased amounts of stream shading. In areas capable of supporting woody species such as willows and alders, increased amounts and age classes of these deeply rooted plants would help stabilize stream banks, catch large woody debris, and filter sediment, helping to improve water quality. It is expected that increases in woody species numbers, age classes, and distribution would only occur in areas with suitable soil conditions. Aspen stands may benefit from increased numbers of young plants resulting from less browsing pressure by livestock. However, continued browsing of aspen by wildlife and the exclusion of fire as an aspen stand maintenance disturbance would potentially outweigh any gains associated with changes in livestock impacts. Under Alternative 2, as riparian areas improve the cumulative effects of other activities may have less of an impact on the streams and watershed health.

Upland Vegetation

Under Alternative 2 there would be very little change in upland vegetative conditions. The only upland areas that would display notable changes in vegetative conditions would be those very limited areas where current livestock grazing impacts are influencing upland vegetative conditions. Meeting management standards within riparian plant communities is generally the factor which limits livestock use within a pasture. Generally these standards are met within riparian areas far in advance of appreciable impact occurring within the uplands. However, in those limited areas where current levels of livestock grazing have influenced upland vegetation, upland plant communities would be expected to show improvement within fifteen years (mid-term) as plant health and vigor would improve under decreased livestock utilization and physical/mechanical activities.

Holechek et al. (1989) reviewed research studies and found that grazing at moderate levels (40-45%) would maintain healthy rangelands and that a maximum of 30-35% utilization is needed for rangeland improvement. Utilization levels greater than 45% resulted in declining plant production. Currently impacted upland shrubland types, such as those found in scabland areas would start to improve within ten years (mid-term). Most forested types would not be expected to appreciably change even over the very long term (100+ years) in association with changes in livestock management standards because little of this vegetative type is currently impacted by livestock grazing to any measurable degree. In those areas that are currently impacted by livestock grazing, increased amounts of litter would help protect soils from erosion and from direct impacts of livestock. As forest canopy cover increases, the number, health, and vigor of understory shrubs and grasses is expected to decline. As this happens, livestock and wildlife using rangeland forage would move to areas with more forage, such as dry and moist meadows and other riparian areas.

Utilization levels under Alternative 2 are consistent with findings from both Holechek et al. (1989) and Mosley et al. (1997), and would be expected to improve vegetative conditions where they are not satisfactory and reduce the percentage of bare ground where grazing is influencing that factor. Areas currently displaying “legacy” impacts from historic activities may not show substantial vegetative change for decades (Burkhardt 1993).

Direct and Indirect Effects Specific to Individual Allotments

Wind Creek Allotment

Under Alternative 2 riparian vegetative conditions in the North Pasture, reach A of Beaverdam Creek (1.9 miles) would be expected to improve from an "at risk" rating to "satisfactory" over a period of 15 to 20 years (long-term). This duration of recovery is anticipated to be necessary for the natural introduction, establishment, and generation of age diversity of riparian shrubs and herbaceous species to advance in overall rating.

The riparian vegetative status for the South Pasture would be expected to improve to "satisfactory" within five to ten years. Riparian vegetative conditions in reach B (1.3 miles) of Beaverdam Creek would be expected to improve to "satisfactory" condition in 20 – 50 years. This period of time is anticipated to be necessary to re-establish a floodplain and associated vegetation within this deeply incised channel.

Riparian vegetative conditions in reach A (0.9 miles) of South Fork of Wind Creek would remain "satisfactory." Conditions in reach B (0.6 miles) would not be expected to improve to "satisfactory" until a disturbance reduces conifer canopy cover and stream bed load becomes adequate to establish a new flood plain. Reach C (0.5 miles) would be expected to improve to satisfactory condition within five to ten years as riparian vegetation increases in correlation with decreased disturbance.

Riparian vegetation conditions in reaches B (0.3 miles) and C (2.3 miles) of the main stem of Wind Creek would remain in "satisfactory" condition, while reach A (3.7 miles) would be expected to improve to "satisfactory" condition within five to ten years as time allows a diversity of ages of riparian hardwoods to establish. Congleton Creek (2.2 miles) would be expected to improve to satisfactory condition within five to ten years as riparian species dominate available habitat. The status of the riparian vegetation in the Bronco pasture was not determined during this analysis. Under Alternative 2 riparian vegetative conditions would be established through monitoring and would be incorporated into the annual allotment review.

Wolf Creek Allotment

Under Alternative 2 riparian vegetative condition within the riparian areas and springs in Bull Pasture that are tributary to Wolf Creek (3.2 miles) would be expected to improve short through long term. While riparian vegetation would be expected to respond within five to ten years, raising the water table within those portions of the stream that are entrenched would take much longer. Therefore, improving to a "satisfactory" riparian vegetative pasture rating would be expected to take 20 – 50 years.

The status of the riparian vegetation in the Miles pasture was not determined during this analysis. Under Alternative 2 riparian vegetative conditions would be established through monitoring and would be incorporated into the annual allotment review.

Riparian vegetation in the Widow Pasture on reach A (1.4 miles) of North Wolf Creek would continue to be "satisfactory." Riparian vegetation on reaches B (1.3 miles) C (3.2 miles) would be expected to improve to a "satisfactory" status within five to ten years as herbaceous riparian species increase in cover, woody riparian species become established, and a variety of age classes develop.

Riparian vegetation for the Nichol pasture would be expected to take 20-50 years to improve to "satisfactory" condition. Reaches A (2.3 miles) and B (0.3 miles) along Sugar Creek would require 20-50 years to improve to satisfactory condition as entrenched stream channels stabilize and slowly raise water tables. Riparian vegetative conditions in Tamarack creek within reaches A (0.6 miles) and C (0.7 miles) would improve to a "satisfactory" condition within the next five to ten years as riparian species increase in cover, density, and age diversity. However, it is expected that riparian vegetative conditions within entrenched reach B (0.8 miles) of Tamarack Creek would take from 20 to 50 years to raise water tables and re-establish floodplains.

Riparian vegetation for the Riparian Pasture would be expected to take five to ten years to improve to "satisfactory" status. Reach C (1.3 miles) of Sugar Creek would remain in satisfactory condition. It is further expected that riparian vegetation within reach D (0.9 miles) would improve to a "satisfactory" condition within five to ten years. However, it is anticipated that canary reedgrass within reach E (1.2 miles) of Sugar Creek would continue to pose a risk to the riparian vegetation. This would continue until it actually degrades riparian condition to unsatisfactory or until active and aggressive treatment controls or eradicates reedgrass from the plant community. Riparian vegetation within the unnamed tributary to Sugar Creek (1.5 miles) and the portion of Wolf Creek in the Riparian Pasture would improve to a satisfactory condition within five to ten years as it increases in cover, density and age diversity.

Under Alternative 3 the riparian vegetative status rating for Sugar Pasture would be expected to improve to "satisfactory" within five to ten years. Riparian vegetation within reach D (1.5 miles) of Tamarack Creek would be expected to improve to "satisfactory" within five to ten years as woody riparian vegetation increases in cover and density, particularly within younger age classes. In addition, riparian vegetation within reach E (2.0 miles) of Tamarack Creek is anticipated to maintain a "satisfactory" condition. Riparian vegetation within reach F (0.6 miles) of Tamarack Creek, would be expected to improve to a "satisfactory" condition within four to eight years as riparian species increase in cover, density and age diversity. Riparian vegetative condition within Powell Creek (4.1 mile) would improve to a "satisfactory" status within five to ten years.

Under Alternative 2 riparian vegetative condition within the Sugar Holding Pasture (0.9 miles) would be expected to maintain a "satisfactory" status. It is anticipated that the earlier/smaller age/size classes of riparian woody species would increase dramatically over the next one to three years. Riparian vegetative condition would improve to "satisfactory" status within the Wolf Creek Riparian Corridor Pasture (5.5 miles) over the next four to eight years.

Heisler Allotment

Under Alternative 2 riparian vegetative condition within the South Pasture on reach D (0.4 miles) of Beaverdam Creek and on Heisler Creek would be expected to improve to "satisfactory." This improvement would be expected to occur over the next five to ten years as riparian vegetation increased in cover, density and age diversity.

The status of the riparian vegetation in the North pasture was not determined during this analysis. Under Alternative 2 riparian vegetative conditions on Rager (approx. 3.0 miles) and Heisler (approx. 2.0 miles) Creeks would be established through monitoring and would be incorporated into the annual allotment review.

Under Alternative 2 riparian vegetative condition within the North Pasture on reach C (2.1 miles) of Beaverdam Creek would be expected to improve to "satisfactory." This improvement would be expected to occur over the next four to eight years as riparian vegetation increased in cover, density and age diversity.

Under Alternative 2 riparian vegetative conditions on Bellworm (1.6 miles) and Rager (2.0 miles) Creeks would be expected to be maintained in "satisfactory" status. It is anticipated that the earlier/smaller age/size classes of riparian woody species would increase dramatically over the next one to three years.

Direct and Indirect Effects – Alternative 3- Current Management

This alternative continues to implement the current grazing standards as defined by the Ochoco National Forest Land and Resource Management Plan. Although it continues upland and riparian livestock grazing under current standards it is expected to improve vegetative conditions. The allotments would be monitored during the grazing season for stubble height, streambank alteration, and woody species utilization. Every year, monitoring results from the previous year and the expected climatic conditions for the upcoming grazing season would be considered when drafting the Annual Operating Provisions (AOP). Failure to meet standards would result in adjustments in management such as in livestock numbers, season of use, and nonuse on pastures with resource concerns the following year.

Direct and Indirect Effects Common to All Allotments

Current management practices have been inadequate, leading to current resource conditions. Under Alternative 3, existing Forest Plan management standards, as recently implemented, would not improve riparian and upland vegetative condition. Current management standards do provide the ability and flexibility to change allowed forage utilization levels as updated allotment information becomes available.

Standards for forage utilization as listed in the Ochoco National Forest LRMP range from 0-40% for upland vegetation communities in unsatisfactory condition to as high as 45% for communities in satisfactory condition. Riparian forage utilization standards are currently 0-35% for vegetation communities in unsatisfactory condition to as high as 45% for those in satisfactory condition. The Forest Plan allows for utilization levels of up to 55% on uplands and 50% on riparian areas that are in satisfactory condition and are managed under "optimized" or "intensive" grazing systems. However, none of the grazing allotments with the analysis area are managed at this level.

Clary and Webster (1989) suggest that spring utilization levels of 65% and summer utilization levels of 40-50% are sufficient to maintain plant vigor and afford streambank protection. Current management in riparian areas is focused on meeting a residual stubble height of four inches for grasses and six inches for grass-like species at the end of the growing season, as listed in PACFISH/INFISH (1994/95) and the Joint Biological and Terrestrial Programmatic Biological Assessment within the Deschutes and John Day Basins (2006). These management standards are consistent with recommended allowable use levels.

If current management standards were properly implemented and administered, vegetative conditions would be expected to move toward desired conditions over the short through long-term. With properly funded monitoring efforts, current management standards would be expected to improve riparian and upland vegetative conditions.

Direct and Indirect Effects Specific to Individual Allotments

Wind Creek Allotment

Under Alternative 3 riparian vegetative status in the North Pasture in reach A of Beaverdam Creek (1.9 miles) would be expected to improve from an "at risk" rating to "satisfactory" over a period of 20 to 25 years (long-term). This recovery period is anticipated to be necessary for the natural introduction, establishment, and generation of age diversity of riparian shrubs and herbaceous species to advance in overall condition. This timeframe could be substantially shortened through active reintroduction of riparian species in combination with appropriate protective measures.

Under Alternative 3 the riparian vegetative condition for the South Pasture would be expected to improve to "satisfactory" within seven to fifteen years. Riparian vegetative conditions in reach B (1.3 miles) of Beaverdam Creek would be expected to improve to "satisfactory" condition in 25 – 60 years. This period of time is anticipated to be necessary to re-establish a floodplain and associated vegetation within this deeply incised channel.

Riparian vegetative conditions in reach A (0.9 miles) of South Fork of Wind Creek would remain "satisfactory." Riparian vegetative conditions in reach B (0.6 miles) would not be expected to improve to "satisfactory" condition until a disturbance reduces conifer canopy cover, and stream bed load becomes adequate to establish a new flood plain. Reach C (0.5 miles) would be expected to improve to satisfactory condition within seven to fifteen years as riparian vegetation increases in correlation with decreased disturbance.

Under Alternative 3 reaches B (0.3 miles) and C (2.3 miles) of the main stem of Wind Creek would remain in "satisfactory" condition, while reach A (3.7 miles) would be expected to improve to "satisfactory" condition within seven to fifteen years as time allows a diversity of ages of riparian hardwoods to establish. Congleton Creek (2.2 miles) would be expected to improve to satisfactory condition within seven to fifteen years as riparian species dominate available habitat.

The status of the riparian vegetation in the Bronco pasture was not determined during this analysis. Under Alternative 3 Forest Plan riparian management standards would be monitored, implemented, and administered as appropriate for the Bronco Pasture and Wind Creek Allotment.

Wolf Creek Allotment

Under Alternative 3 riparian vegetative condition in the Bull Pasture within the riparian areas and springs tributary to Wolf Creek (3.2 miles) would be expected to improve short through long term. While riparian vegetation would be expected to respond within seven to fifteen years, raising the water table within those portions of the stream that are entrenched would take much longer. Therefore, improving to a "satisfactory" riparian vegetative pasture rating would be expected to take 25 – 60 years.

The status of the riparian vegetation in the Miles pasture was not determined during this analysis. Under Alternative 3 Forest Plan riparian management standards would be monitored, implemented, and administered as appropriate for the Miles Pasture and Wolf Creek Allotment.

Riparian vegetation within the Widow Pasture on reach A (1.4 miles) of North Wolf Creek would continue to be "satisfactory." Riparian vegetation on reaches B (1.3 miles) and C (3.2 miles) would be expected to improve to a "satisfactory" condition within seven to fifteen years as

herbaceous riparian species increased in cover, woody riparian species become established, and a variety of age classes become apparent.

Under Alternative 3 the status of the riparian vegetation for the Nichol Pasture would be expected to take 25-60 years to improve to "satisfactory." Reaches A (2.3 miles) and B (0.3 miles) of Sugar Creek would require 25-60 years to improve to satisfactory condition as entrenched stream channels stabilize and slowly raise water tables. Riparian vegetative conditions within reaches A (0.6 miles) and C (0.7 miles) of Tamarack Creek would improve to a "satisfactory" rating within the next seven to fifteen years as riparian species increase in cover, density, and age diversity. However, it is expected that riparian vegetative conditions within entrenched reach B (0.8 miles) of Tamarack Creek would take from 25 to 60 years to raise water tables and re-establish floodplains.

Riparian vegetation in the Riparian Pasture would be expected to take seven to fifteen years to improve to "satisfactory" status. Riparian vegetation in reach C (1.3 miles) of Sugar Creek would remain in satisfactory condition and in reach D (0.9 miles) would improve to a "satisfactory" condition within seven to fifteen years. However, it is anticipated that canary reedgrass within reach E (1.2 miles) of Sugar Creek would continue to pose a risk to the riparian vegetation until it actually degrades to an "unsatisfactory" condition, or until active and aggressive treatment of the weed controls or eradicates it from the plant community. Riparian vegetation within the unnamed tributary to Sugar Creek (1.5 miles) and the portion of Wolf Creek within this pasture (2.5 miles) would improve to a satisfactory condition within seven to fifteen years as riparian vegetation increases in cover, density and age diversity.

Under Alternative 3 the riparian vegetative condition rating for the Sugar Pasture is expected to improve to "satisfactory" within seven to fifteen years. Riparian vegetation within reach D (1.5 miles) of Tamarack Creek would be expected to improve to "satisfactory" within seven to fifteen years as woody riparian vegetation increases in cover and density, particularly within younger age classes. In addition, riparian vegetation within reach E (2.0 miles) of Tamarack Creek is anticipated to maintain a "satisfactory" condition. Riparian vegetation within reach F (0.6 miles) of Tamarack Creek, would be expected to improve to a "satisfactory" status within five to ten years as riparian species increase in cover, density and age diversity. Riparian vegetative condition within Powell Creek (4.1 mile) would improve to a "satisfactory" status within seven to fifteen years.

Riparian vegetative condition within the Sugar Holding Pasture (0.9 miles) would be expected to maintain a "satisfactory" status. In addition, it is anticipated that the earlier/smaller age/size classes of riparian woody species would increase dramatically over the next two to five years.

Under Alternative 3 it would be expected that riparian vegetative condition would improve to "satisfactory" status within the Wolf Creek Riparian Corridor Pasture (5.5 miles) over the next five to ten years.

Heisler Allotment

Under Alternative 3 riparian vegetative condition status in the South Pasture on reach D (0.4 miles) of Beaverdam Creek and on Heisler Creek would be expected to improve to "satisfactory" over the next seven to fifteen years as riparian vegetation increased in cover, density and age diversity.

The status of the riparian vegetation in the North pasture was not determined during this analysis. Under Alternative 3 Forest Plan riparian management standards would be monitored, implemented, and administered as appropriate for Rager (approx. 3.0 miles) and Heisler (approx. 2.0 miles) Creeks in the North Pasture.

Under Alternative 3 riparian vegetative condition in the East Pasture on reach C (2.1 miles) of Beaverdam Creek would be expected to improve to "satisfactory" over the next five to ten years as riparian vegetation increased in cover, density and age diversity.

Under Alternative 3 riparian vegetative condition in the Bear/Rager Pasture on Bellworm (1.6 miles) and Rager (2.0 miles) Creeks would be expected to maintain a "satisfactory" status. It is anticipated that the earlier/smaller age/size classes of riparian woody species would increase dramatically over the next two to five years.

Upland vegetative conditions under Alternative 3 in the Bear/Rager Pasture of the Heisler allotment would be expected to remain satisfactory short through mid term. The presence of *Ventenanta dubia* and Japanese brome represents substantial risk to upland plant communities in this pasture and could potentially degrade upland plant communities over the long term. Although grazing can certainly favor these two species, the degree (intensity or magnitude) to which grazing would favor these species under this alternative would be negligible to slight primarily because riparian management standards would be expected to be met far in advance of livestock grazing impacts of any substance occurring on the uplands. Therefore, under Alternative 3, upland vegetative condition would be expected to degrade to "at risk" over the long term, and to "unsatisfactory" over the very long term assuming that no additional general vegetative disturbance such as wild or prescribed fire occurs within that time period (fire would accelerate this degradation). Livestock grazing is expected to have a negligible to slight contribution to this degradation of upland vegetative conditions.

Direct and Indirect Effects – Alternative 4: Modified Proposed Action

The standards discussed under Alternative 2 would also be implemented under Alternative 4, so riparian vegetative conditions would be expected to improve as described under Alternative 2. Additional effects would result from the three additional actions proposed under Alternative 3.

Wolf Creek Riparian Corridor Pasture, currently treated as an exclosure, would be used as a riparian pasture rather than as an exclosure. The proposed use of the Riparian Corridor Pasture would provide an alternate forage source and reduce utilization on other parts of the allotment. Permitted livestock numbers and season would not be increased, but the use of the Riparian Corridor would amount to about 100 animal months of use that would not occur elsewhere on the allotment. Use of the Riparian Corridor Pasture would alternate between spring and fall use each year. The standards discussed under Alternative 2 would also be implemented under this alternative so the riparian vegetative conditions would be expected to improve as described under Alternative 2.

Wind Creek and South Fork Wind Creek lie within the South Pasture. With late use each year the upland vegetation has cured out and becomes unpalatable, influencing distribution of livestock, resulting in greater pressure on riparian areas along the creeks, even with daily dispersal efforts by riders. In general it would be better for the upland vegetation to alternate use of these two pastures, that is, use South Pasture first in year 1 and use North Pasture first in year 2, and so on. Early use of the South Pasture may reduce grazing impacts to Wind and South Fork Wind Creeks.

The Widow Pasture division fence would create two pastures out of the existing Widow pasture. The fence would run in an east-west direction and divide lower elevation forage resources from higher elevation forage resources. This would result in increased flexibility and control of livestock. The pasture division would allow use of the lower elevation forage first and the higher elevation forage later in the season when it is ready. The pasture division would also allow for a

rotation of use of the two “new” pastures with the other pastures in the allotment, ensuring that the area is not used at the same time year after year.

Alternative 4 would be expected to make the greatest provision for grazing while improving riparian vegetative condition. This alternative would provide for the rotation of the timing of use within pastures, and provides more flexibility in the use of the Widow Pasture of the Wolf Creek Allotment. Alternative 4 also allows for the use of the South Wind Creek pasture at a more logical time of year.

Cumulative Effects

The activities proposed in Alternatives 2, 3, and 4 would cumulatively effect riparian and upland vegetation. Under all alternatives these affects to riparian and upland vegetation would be positive, increasing the density, health, and vigor of the plant communities as compared to the existing conditions. The positive cumulative effects would be similar to the evolving conditions described under Alternative 1.

Of the action alternatives, Alternative 4 would be expected to move toward meeting resource objectives the fastest as the sum of the incremental impacts from past, present, and future management activities would be expected to be least. Alternative 2 would be expected to result in cumulative impacts and rates of vegetative recovery very similar to Alternative 4 (only slightly slower within the Widow Pasture of Wolf Creek Allotment and the North and South Pastures of the Wind Creek Allotment).

Soils

Affected Environment

The Southside Allotment Management area is a largely southern aspect area of scab/stringer terrain which is contained within the Upper Crooked River Sub-basin which forms the drainage area (2700 square miles) for Prineville Reservoir. The area includes the watersheds of Wolf Creek, Sugar Creek, Bellworm Creek, Rager Creek, Heisler Creek, Beaverdam Creek, Wind Creek and Squaw Creek.

This area contains a wide variety of soils and landtypes. Parent materials are largely Picture Gorge basalts and andesites. (Paulson, 1977, Soil Resource Inventory). The Picture Gorge basalts and andesites encompass most (96%) of the Southside Allotment Area. This area is generally flatter overall with some steep rimrocks and escarpments. This is largely scab/stringer terrain with a high percentage of scabland throughout.

Volcanic ash from Mt. Mazama blanketed the area about 6700 years ago and has been subsequently reworked by water and air. Ash soils occur over 11 percent of the area or 8030 acres on USFS lands commonly on east and southeast aspects and in swales and meadows. The balance of the watershed is largely residual soil which is clay-loam or clay texture. Much of the planning area is non-commercial ground and is scabland, sage, juniper, rock outcrop, low site ponderosa or meadow.

When Mazama ash was deposited here approximately 6700 years ago the apparent prevailing winds were from the southwest. These winds helped deposit approximately 1.5 feet of largely sandy loam and loamy sand ash over this area. After subsequent wind and water erosion there are varying depths of ash soils throughout the area. The Southside Allotment Area contains

approximately 8030 acres of ash soils having at least 7 inches of surface ash. The deepest ash soils occur on the few 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 E aspects. The streams with S and W aspects often have more rock and clay exposed which gives them somewhat more resistance to hoof action (see below discussion on hoof forces and bank resistance).

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) via hoof action and will be 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 type of soils especially in exposed banks or on southern aspects.

The allotments in this Southside Allotment area (Wolf Creek and Heisler) are largely southern exposure areas with the exception of the Wind Allotment which is southeast.

Environmental Consequences: Alternative 1

Direct and Indirect Effects

This alternative would result in no direct or indirect impacts because cattle grazing would be eliminated on the entire 69,892 acre planning area. Allotment and pasture fences, cattle exclosure fences, interior cattle guards and water troughs and pipelines would remain, unless, under future decisions, it were decided to remove them. Grazing impacts such as compaction, displacement and post holing and plugging would not occur. Bank erosion and sloughing via hoof action would not be a contributing factor to potential erosion. Cattle trailing would no longer occur along, on stream banks, and down fence lines.

An estimated 162 acres of detrimental soil conditions has resulted from livestock trampling and concentrating along fence lines, slat blocks, and water developments. There are 28 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 28. There is an estimated 83.8 miles of fence in the project area. Each mile of fence results in approximately 1.2 acres of soil with detrimental soil conditions. Approximately 100 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 62 acres of detrimental soil conditions from livestock trailing along streams. When livestock grazing is halted, the estimated 224 acres of detrimental soil condition would recover

naturally; however, until the fences and water developments are removed, one would expect recovery to be slower because wildlife would continue to congregate around them.

Cumulative Effects: Alternative 1

There are no cumulative effects with Alternative 1 because there are no actions associated with Alternative 1.

Effects Common to Alternatives Two, Three and Four

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 ashy 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.

The zone most affected by cattle and large ungulate hoof action in terms of erosion and delivered sediment is viewed as the 20 foot zone (10 feet each side) of an average class II and III stream. This is based partly on a Montana study which showed that 94 to 99 percent of sediment was retained in 6 meter (ca. 20 feet) wide buffer regardless of vegetation type or slope. (Hook, Paul B.; 2003, Sediment Retention in Rangeland Riparian Buffers, Journal of Environmental Quality 32:1130-1137.) This is viewed as the zone most likely to be affected by cattle and large ungulate grazing such as elk..

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) have stated 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 over bank flows such that trails might be eroded. Hooves shear the protective sod mats and create holes and mixing throughout which induces a condition which is susceptible to rill and gully formation. Commonly, these areas appear hummocky and show signs of erosion in between the hummocks. This can be particularly damaging around wet meadows, springs, seeps and streams. The term hummock and pedestal are used interchangeably.

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.

Scablands are recognized as among the most fragile ecosystems on the Ochoco National Forest. Damage to the soil and vegetation as a result of management activities is nearly impossible to mitigate. This is a result of their having very shallow soils which are subject to severe water saturation and frost heaving during winter, thus making regetation virtually impossible.Scablands in the Southside AMP Analysis Area comprise approximately 23,214 acres of the total 71,893 acres which is approximately 33 percent of the area.. Longterm data (45 to 50 years of monitoring) by Fred Hall, retired USFS ecologist, has shown that scablands throughout the ONF are some of the most stable ecosystems under dry season grazing. (Hall, Fred; 2002, personal communication and on-site monitoring on scablands)

Microbiotic crusts occur to some degree over most of the non-forested areas (scabland, juniper steppe, and shrub steppe), juniper woodland and dry pine areas. They are most evident in the springtime. Historically these crusts were probably more evident than today especially after the homestead period. Microbiotic crusts and the closely associated vesicular crust (a platy surface crust usually 1.5 to 3 inches, which is formed by raindrop, impact and contains vesicular pores) form a thin surface layer comprised of biotic and abiotic features. The vesicular crust along with the microbiotic crust (if present) provides a resistant layer to surface and rill erosion as well as wind erosion. Arid soils (such as on scablands, south facing shrub steppe, juniper steppe, juniper woodland and dry pine plant association groups) appear particularly vulnerable especially in regards to microbiotic crusts. These crusts are easily disturbed by livestock hoof action. This breaks up the crust and causes desiccation and increases susceptibility to wind and water erosion. (Harper and Marble, et al).

Direct and Indirect Effects Common to each Allotment

Wolf Allotment – In this allotment, an estimated 16 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 4 acres. Assuming a 100-foot riparian area (based on MA-F15 management area), there are 381 acres of riparian areas in this allotment. Livestock would cause compaction and displacement of about 1/10 percent of the riparian areas in this allotment.

No new water developments would be constructed, the total number of water developments in the Wolf Allotment would be 28 (12 springs and 16 ponds). 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 is 28 acres.

There are also approximately 46.5 miles of fence in the Wolf Allotment. Soil compaction and displacement would occur where motorized vehicles ranging from OHVs to pickups transport materials from roads to the site for maintenance. 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 55.8 acres of detrimental soils conditions exist as a result of fence construction in the past; and will remain as fence maintenance will be required in the future. In Alternative 4, there would be an additional 3.5 miles of fence resulting in slightly more compaction (a total of 125.5 acres).

Salting and mineral-protein supplement locations would also result in detrimental soil conditions. An estimated 40 salting/mineral-protein supplements sites would be located in the Wolf 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 0.09 acres.

In all, there would be an estimated 122 acres (.3% of the allotment area) of detrimentally impacted soil in the Wolf Allotment as a result of livestock grazing.

Heisler Allotment –There are approximately 16.5 miles of stream and livestock would detrimentally affect an estimated 4 acres out of 400 acres of riparian areas.

No new water developments are proposed but the existing 17 (13 ponds and 4 springs) water developments will remain. The estimated acres of detrimentally impacted soils associated with the existing and proposed developments would be 17 acres.

There are 12.8 miles of fence. Detrimentally impacted soils associated with fences are approximately 15.4 acres. There are 20 salting/mineral-protein supplements sites located in this allotment. Approximately 0.05 acres would be detrimentally affected by salting activities.

In all, there would be an estimated 36.5 acres (.4% of the allotment area) of detrimentally impacted soil as a result of livestock grazing.

Wind Allotment – There are an estimated 8.4 miles of stream that would be grazed by livestock in this allotment. Livestock grazing would detrimentally impact approximately 20 acres of the 203 acres of riparian areas in this allotment.

There are no new water developments proposed; the existing16 (14 ponds and 2 springs) water developments would remain. This would result in an estimated 16 acres of detrimental soil conditions.

An estimated 24.5 miles of pasture fence would remain. The area of detrimentally impacted soils associated with fences is approximately 29.4 acres.

Salting and mineral-protein supplement locations would also result in detrimental soil conditions. An estimated 30 salting/mineral-protein supplements sites would be located in the Wind Allotment. Approximately 0.07 acres would be detrimentally affected by salting activities.

In all, there would be an estimated 65.5 acres (.35% of the allotment area)of detrimentally impacted soil as a result of livestock grazing.

Direct and Indirect Effects of Individual Action Alternatives

Alternative 2: Proposed Action. Livestock grazing would be re-authorized and term grazing permits would be issued for five allotments on 69,892 acres. The number of days livestock spend on each allotment may be adjusted annually based on variations in weather and range readiness or unpredictable events such as wildfire and drought. The actual season of use may also be adjusted annually based on variations in weather and range readiness. The length of the grazing season will also depend on meeting utilization standards and stream bank alteration standards. Utilization, stubble height, and streambank alteration standards for this alternative are discussed in Chapter 2.

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. Range readiness criteria specifies that "Soils would be moist, but not wet enough that livestock would cause aeration, displacement or infiltration effects to soils that are not relieved by the over wintering (freeze/ thaw) process." The traditional range readiness definitions would not apply for early season use therefore, when it is determined that the above soil conditions have been met and there is enough forage for livestock, turn-out would begin.

Utilization standards would be 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).

By establishing a lower annual utilization rate and more restrictive stubble heights (see Table 2-2) than those currently permitted, there would be an increase in plant crown cover and litter, thereby increasing effective ground cover along banks. This would help increase surface roughness and should help reduce the amount of delivered sediment. For pastures rated at risk and unsatisfactory (Composite Pasture Resource Rating) (see range report by Steve Gibson) there is an even greater probability that there will be increased plant cover and litter such that the potential for delivered sediment will be less.

The more restrictive streambank alteration standards than currently permitted would help reduce the bank erosion component, which is where the highest percent of delivered sediment originates). The management standards by composite resource rating (see Table 2-3, page 14) for streambank alteration specify $\leq$ 10 percent for pastures with a satisfactory or at risk rating and a 0 to 5 percent level for pastures with an unsatisfactory rating. This will help reduce the level of bank sloughing and post holing along stream channels, which contribute to bank erosion.

With the more restrictive utilization rates, stubble height requirements, and a adaptive management strategy (Chapter 2, 11), and the increase in required monitoring (Chapter 2, pages 15-17), should allow management to adjust more rapidly in the future to any needed management adjustments, thus allowing resource conditions, especially riparian resources, to improve more rapidly then under current management .

Cumulative Effects Alternative 2

A complete listing of past, present and reasonable foreseeable actions can be found on pages 10 and 11 of Chapter 2.

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 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. 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 has 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.

Beavers historically helped maintain the functional nature of these riparian systems by slowing the flow, increasing roughness, trapping sediment, storing water, providing pool habitat and maintaining riparian hardwood associations. Beaver were largely trapped for their fur and to drain the boggy areas they maintained to allow for more grass and less bog for cattle to get trapped in.

Past timber harvest on Forest Service managed lands resulted in detrimental soil conditions on an estimated 3,640 acres or approximately 5 percent of the total 69,892 acres. There are approximately 400 miles of road in the Maury Mountains. Road construction has resulted in an estimated 725 acres or 1 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 4,589 acres of detrimental soil conditions.

Present and reasonably foreseeable projects include the Hardcorner Fuels, Sugar Creek Campground Vegetation Management, and the Upper Beaver Vegetation Management projects that propose a variety of commercial harvest, noncommercial thinning, and fuels reduction activities across the project area. These 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.

As a result all past, present, and likely future projects, when combined with the activities in Alternative 2, would result in less than 6% of the project area in a detrimentally compacted state. The soils report describes these effects on individual allotments and pastures, but the cumulative impact for any individual allotment never exceeds 6%.

Alternative 3: Current Management. Alternative 3 would re-authorize grazing on all three allotments covering 69,892 acres. Permits would be issued under the same terms and conditions as the existing permits. The permitted season and amount of use would not change. The number of days livestock spend on each allotment may be adjusted annually based on variations in weather and range readiness or unpredictable events such as wildfire and drought. The actual season of use may also be adjusted annually based on variations in weather and range readiness. The length of the grazing season will also depend on meeting utilization standards and stream bank alteration standards. Utilization, stubble height, and streambank alteration standards for this alternative are discussed in Chapter 2, Table 2-4, page 25.

Range readiness criteria for Alternative 3 specifies that the soil be firm enough to support livestock without creating compaction or breaking sod. 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. The traditional range readiness definitions would not apply for early season use therefore, when it is determined that the above soil conditions have been met and there is enough forage for livestock, turn-out would begin. These range readiness criteria, as those with Alternatives 2 and 4, would help avoid any negative impacts to scabland soils

Under Alternative 3 the allotments would be managed according to the standards established in the Forest Plan and term grazing permits (see Table 2-4, page 25, Current Management Standards for allotments in the Southside Allotments Project Area).

Grazing would continue as presently permitted. However, because Alternative 3 does not establish a lower annual plant utilization rate or more restrictive stubble heights (see Table 2-4), as do Alternatives 2 and 4, the increase in plant crown cover and litter would occur more slowly, thereby delaying effective ground cover development along banks. This in turn would delay the increase of surface roughness and the corresponding reduction in the amount of delivered sediment. In addition, for pastures rated at risk and unsatisfactory (Composite Pasture Resource Rating) (see range report by Steve Gibson) for witch there is an even greater probability that the increased plant

cover and litter such that the potential for delivered sediment will be less in Alternatives 2 and 4, will not be realized in alternative 3.

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Cumulative Effects – Alternative 3

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.

Because Alterative 3 does not incorporate the more restrictive utilization rates, stubble height requirements, or a adaptive management strategy (Chapter 2, page 11), or the increase in required monitoring (Chapter 2, pages 15-17), as do Alternatives 2 and 4, management would not be able to adjust as quickly to needed changes in management in the future. This would result in resource conditions, especially riparian resources, improving less rapidly.

Alternative 4: Regarding the potential impacts to soils, Alternative 4 has the same management actions as Alternative 2, except for the amount of fencing required. In Alternative 4, an additional 3 miles of fence will be constructed to split the Widow Pasture into two pastures with the northern pasture being called the Widow Pasture and the southern pasture being called the Quicksand Pasture. This will allow better control of grazing, which should reduce soils impacts to streambanks in the pastures; however, it will create an additional 3.5 acres of detrimental soil conditions do to the construction and maintenance of these fence line.

Cumulative Effects, Alternative4

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. Outside of the additional 3.5 acres of determental soil conditions ,created by the 3 miles of additional fencing, the cumulative effects are the same.

Water Quality and Aquatic Species

Affected Environment

The entire South Fork John Day River and its sub-watersheds are Designated Critical Habitat for Middle Columbia steelhead trout, a threatened species, and Essential Fish Habitat for Chinook salmon. This includes the South Fork Prong, Wind, North Fork Wind, Congleton (Squaw), South Fork Wind creeks and one unnamed tributary to South Fork Wind Creek within the Lower South Fork John Day 5th Field Watershed. The Wind Creek allotment's South pasture supports occupied Critical Habitat for Middle Columbia steelhead trout. Upper and Lower Beaver Creek watersheds and the Lower South Fork John Day watershed supports red-band trout, a Forest Service sensitive species. Columbia spotted frog, a Forest Service sensitive species and candidate species for listing under the Endangered Species Act, occurs within the project area. Suitable habitat exists in streams, springs, and reservoirs.

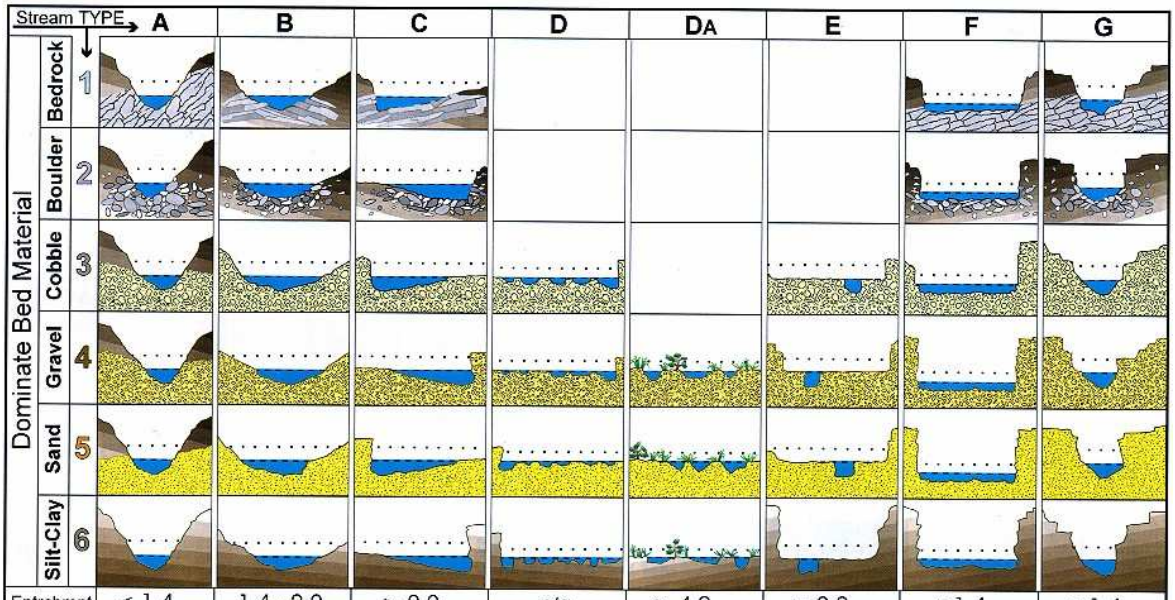
Streams in the project area that are tributary to the South Fork John Day River are not limited in quality due to temperature. There are six streams tributary to Beaver Creek that are listed by the State of Oregon under the Clean Water Act section 303 (d) for temperature impairment. These include Beaverdam, Dry Paulina, North Wolf, Powell, Sugar, and Wolf Creeks. Rager and Tamarack creeks are not State listed but temperatures exceed the State standard. Approximately 11% of the stream reaches in the Upper Beaver Creek watershed have banks greater than 20% unstable and 22% have banks that are between 10 and 20% unstable.

Data for this analysis was derived from surveys conducted on the Paulina Ranger District using Region 6 Level II protocol (USFS 2006), Bottom Line Surveys (USFS 2003), Proper Functioning Condition Surveys, and reports on file. This data is available for review in the project record and files on the Paulina Ranger District. Appendix C contains a table displaying the results of proper functioning condition surveys on six streams within the project area completed in 2006. Where specific stream data is lacking, inference based on adjacent streams is considered in the overall assessment. The analysis area for the effects discussion is the project area boundary.

The short term time line for this project effects analysis is zero to fifteen years. Long term time line for this analysis is fifteen to thirty years.

Much of the data collected has been analyzed against the Rosgen stream classification methodology to determine the health of the stream channel. The two figures below are cross sectional and plan views that show specific details of the Rosgen classification system.

Figure 3-1. Cross sectional and plan views of the Rosgen classification system.



	A	B	C	D	DA	E	F	G
Entrchmnt.	< 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

Figure 3-2. Longitudinal, cross-sectional, and plan views
of major stream types

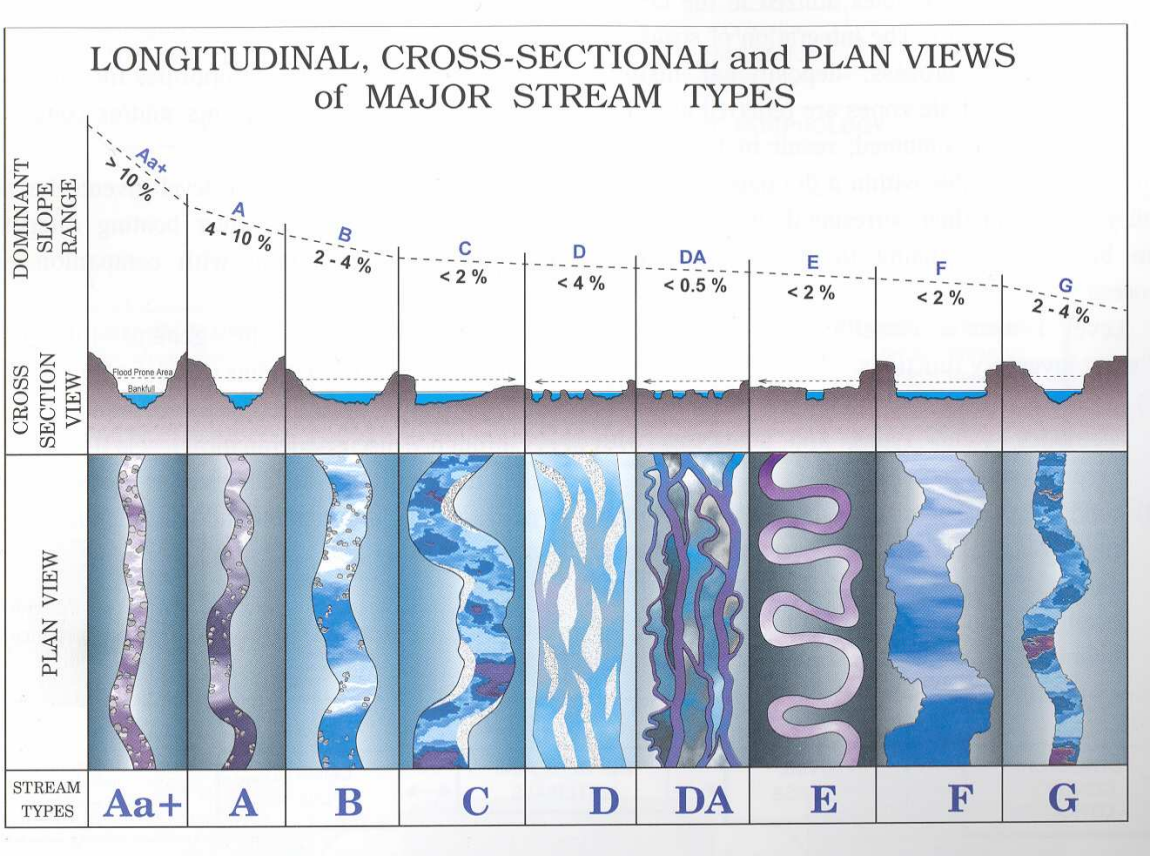


Table 3-2. Existing bank instability, shade, and width to depth ratios for streams within the Southside Allotment Project Area.

Stream	Allotment/ Pasture	Bank Instability In percent	Average Shade In percent	Width-Depth Ratio	Miles and Year
Bear	Heisler	5	30	-	1.4 1976
Beaverdam	Heisler	22	24	-	7.16 2005
Bellworm Canyon	Heisler	14	42	9:1	.7 2002
Bronco	Wind Creek	2	9	-	1.5 1979
Congleton	Wind Creek	2	38	-	1.3 1997
Dry Paulina	Wolf	14	70	-	- 1995
Heisler	Heisler	1	51	19:1	5.6 1997
Miles	Wolf	3	52	-	3 1993
Powell	Wolf	18	57	9:1	6.4 1994
Rager	Heisler	3	13	-	- 2005
South Fork	Wind Creek	-	-	15:1	- 1994
North Fork	Wind Creek	83	56	13:1	2.9 2002
Sugar	Wolf	25	19	-	- 2005
Wolf	Wolf	-	39	-	- 2005
North Fork Wolf	Wolf	14	62	7:1	5.3 1995
East Fork Wolf	Wolf	18	66	-	- 2006
Tamarack	Wolf	9	60	7:1	3.9 1993

Wind Creek Allotment

Streams within the Wind Creek allotment include Bronco, Wind, North Fork Wind, South Fork Wind, and Congleton Creeks and a portion of Beaverdam Creek. Wind Creek is approximately one and one-half miles long before being joined by its two major tributaries – South and North Forks of Wind Creek.

Bronco Holding Pasture

Bronco pasture is located downstream of the headwaters of Bronco Creek, an intermittent first-order stream with three reservoirs, each less than one acre located approximately every third of a mile. Bronco Creek does not support red-band trout and or anadromous fish. The reservoirs maintain habitat for frog and toad species. Field review (2006) indicated that bank stability is less than optimal based on observations made by a fisheries biologist.

North Pasture

Beaverdam, South Fork Prong and North Wind Creek, and the upper reaches of Congleton and Wind Creek are named streams within the North pasture. Except for those 3,070 acres that fall within the Beaverdam 6th field sub-watershed, the North pasture is within watersheds that have designated Critical Habitat for Middle Columbia steelhead trout. North Fork Wind Creek did not meet Forest Plan standards for shade in 2002, a decline from 1992 conditions in the anadromous portion of the pasture. Bank instability averaged 17 %; the Forest Plan desired condition is 20% or less.

South Pasture

South Fork Wind Creek sinuosity, width/depth ratio, and gradient indicated a functioning floodplain from the 2005 Properly Functioning Condition Survey. An earlier survey (1994 BLS) established that, based on morphological characteristics in the upper reaches of the South Fork Wind Creek the channel sensitivity to disturbance and erosion potential are high and where degraded, recovery potential is low (Rosgen, 1994). Further down slope these sensitivities were much less, resulting in more resilient fish habitat, especially when large wood debris was present. Proper Functioning Condition survey in 2005 indicated that Wind Creek is indeed functioning properly. Level II data (1992, 1993 and 2002) for North Fork Wind creek in the south pasture failed to meet shade and bank stability standards for PACFISH watersheds.

Wolf Creek Allotment

Reports from 1996 indicated that Forest Plan standards for the Riparian Management Area (MA-F15) within the allotment were not being met. Survey inventories from 1979, 1993, 1994, and 1995 found that approximately 95% of streams were below Forest Plan standards for shade. More recent inventories indicate that the shade component has not improved mostly due to streams still degrading into a Rosgen F channel type from a C type. Until this degradation stabilizes, riparian shade values will continue to not improve. Unstable banks are generally within the riparian management objective of 20%, averaging 14% from the 2002-2005 field surveys. Fisheries and water quality reports indicated that in 1996, unstable banks exceeded Forest Plan standards (Martin 1996).

Nichol Pasture

Nichol pasture includes large portions of East Wolf, Powell, Sugar, Rager and Tamarack creeks. Watershed analysis was completed in 2005 and includes Powell, Rager, Tamarack and Sugar Creeks in the central and eastern area of Nichol pasture. Survey data within the Powell, Sugar, Tamarack, and Rager Creek areas indicate the streams are functioning uncharacteristically from what one would expect from described morphology; reaches include headcuts, lack sufficient riparian vegetation and are below standard for shade. A large number of named and unnamed streams provide occupied habitat for red-band trout and may provide habitat for Columbia spotted frog.

Widow Pasture

Widow pasture includes all or parts of Widow, Dry Paulina, and North Wolf creeks. There are approximately 41 miles of perennial and intermittent streams and approximately 6 acres of mapped wetland features in this pasture. There are approximately 1,075 acres of RHCA and around fourteen miles of occupied red-band trout habitat.

Existing data indicates that shade and width to depth ratios are below Forest Plan standards on North Wolf and Dry Paulina creeks; instability of individual reaches is near or above riparian management objectives and based on the 2005 Properly Functioning Condition survey appears to be on an upward trend in the middle reach and at least a static or possibly a downward trend in the lower reach. Multiple gullies and headcuts are present. Data was unavailable for Widow Creek. Photographs indicate that where banks are degraded, channel infilling has occurred. Undisturbed, Dry Paulina Creek's B3 channel should contribute only small quantities of sediment. Similarly, the B and C channels in North Wolf should exhibit very low to moderate erosion (Rosgen, 1996). North Fork Wolf has shown an increase in bank instability in the lower reach. The proper functioning condition surveys in 2005 concluded that the failure of point bars to revegetate resulted in poor condition.

Shade and width to depth ratios are below Forest Plan and INFISH standards and RMO for streams within the Widow pasture. Individual reaches are near or above RMO for unstable bank. Shade is below standard on Dry Paulina (Table 3-2). Multiple gullies and headcuts were recorded and photographs of the area indicate that where banks have degraded, channel infilling has occurred, causing failure to meet the INFISH RMO for pool frequency. Similarly, those B and C channels in North Wolf would likely display the same types of increased width to depth ratios as channels widen from increased sediment loads.

Sugar Pasture

Sugar pasture includes Powell, Sugar, and Tamarack creeks and several unnamed tributaries. Survey data from 1993 through 2004 indicate static shade levels below Forest Plan standards and unstable bank conditions levels of approximately 14% in B and C channels. The 2005 proper functioning condition assessments indicated that Tamarack Creek and Sugar Creeks were functioning at risk because channels were entrenched. Erosion was considered excessive in at least one reach.

Sugar Holding Pasture

Sugar Creek downstream of the Sugar Creek Campground is an entrenched, fish-bearing parcel that has been used as a holding pasture since its acquisition by the Forest Service. Site review in 2006 showed that despite riparian planting in 2000, banks remain susceptible to the effects of high flows because riparian vegetation is poor. While shrub species planted earlier have survived, they are

still too young to provide the shade or bank stability that mature plants would provide. Hoof shear continues to affect overall bank stability. The B5-6 channel is moderately sensitive with low to moderate erosion potential and excellent recovery potential (Rosgen, 1994).

Bull Pasture

Informal field review of the Bull pasture was conducted prior to livestock turn-out in 2006. There are no named streams associated with this pasture, however the 2.6 mile tributary to Wolf Creek running parallel with Road 4290 and locally referred to as Clear Creek, is a fish-bearing intermittent stream partially supported by Dean and Survey Springs. This tributary's predominantly north to eastern aspect provides some year-round shading although areas of earlier timber sale have opened the stream to direct sunlight. Ungulate grazing has reduced the amount and age class of riparian shrub. Very little riparian vegetation is established. Bank instability, exposed tree roots, and sediment loading upstream of Road 4290-100 and again at 3810 indicate that Forest Plan objectives are unlikely to be met for bank stability and width to depth ratios.

Riparian Pasture

Data for the Riparian Pasture is severely limited although stream shading was reported as below Forest Plan standards in 1989. Proper Functioning Condition assessment made in 2005 indicated Sugar Creek in this pasture is functioning at risk. Sugar Creek exhibits bank instability and very poor riparian vegetation.

Miles Pasture

Miles includes four mapped water bodies (including Porcupine Reservoir) in addition to Miles Creek, a second-order tributary to Wolf Creek and mile-long tributary to Widow Creek. Comparison of data between 1993 and 2005 indicates shade levels have declined slightly in the lower reaches of Wolf Creek. However, unstable banks were reported as low within the Rosgen A channel.

Wolf Creek Enclosure

The Wolf Creek enclosure occupies upper Wolf Creek and was constructed to improve water quality and fish habitat (Martin, 1996). East Fork Wolf Creek in Nichol pasture and the USGS unnamed stream locally known as Clear Creek in the Bull pasture drains through the enclosure. Bottom Line Survey completed in 1994 reported the only occurrence of *Carex amplifolia* and the greatest abundance of alder among adjacent pastures. Wolf Creek supports 20.9 miles of occupied red-bank trout habitat, of which 6.6 miles are within the enclosure.

A comparison between data collected outside the enclosure in 2005 and data collected inside the enclosure in 2006 found that unstable banks averaged 15% outside the enclosure and unstable banks averaged 9% inside the enclosure. Channel structure was good based on well-developed floodplain with alder, willows and other shrubs. The stream has some limitations to its historic floodplain due to the presence of Forest road 3810.

Heisler Creek Allotment

Bear Pasture

Bellworm Creek shade levels in 2002 averaged 42% and bank stability averaged 14%. Recovery potential is considered poor (Rosgen, 1994). Bellworm's width varied between six and eleven times its depth.

East Pasture

East pasture is bisected with a high density of named and unnamed perennial and intermittent streams. Data for Heisler Creek (1997) indicate that shade is well below Forest Plan standards and widths to depth ratios are very high (USFS, 2005).

Beaverdam Creek does not meet Forest Plan shade standards and appears to be static as the stream continues to stabilize. While streamside sedges and rushes are establishing, vegetation that will provide shade (willows and alders) are either not yet establishing or just starting in small areas. Data (2005) indicate that Beaverdam Creek's average for bank instability among representative reaches is 34%. The range of values for substrate particle sizes less than 2mm. is 19% to 77% at five locations, which indicates that spawning habitat is being impacted by fine sediments. Unstable banks in the reaches are likely to be contributing to this impact.

North Pasture

North pasture's RHCA include Rager and Heisler Creeks and Blue Jay reservoir. Channel characteristics for Rager Creek indicate that streambank erosion potential is high. Red-band trout and amphibian species were recorded in 2000 data. Data from Heisler Creek (1997) indicate that riparian shade is well below Forest Plan standards and channel widening had occurred as evidenced by an increase in width to depth ratios.

South Pasture

South pasture is within the Upper Beaver Creek 5th field watershed, but is divided hydrologically into Powell and Beaverdam Creek 6th field sub-watersheds. South pasture has strong water resources including six reservoirs: Heisler #1 and #2, Bellworm, Bear Butte and Rock Springs Reservoirs, tributaries to Bellworm and Heisler Creek and a segment of Beaverdam Creek. Shade standards are not met. The stream channel is downcutting and sinuosity, which would act to allow spawning gravels to be retained at a higher rate, has been lost.

Shade/Temperature

The Forest Plan desired condition for shade along stream courses is 80% shaded surface or 100% of site potential. Stream temperature varies considerably on a seasonal and annual basis and is influenced by precipitation, seasonal air temperatures, and the influence of springs. Shading from vegetation and topography has the largest effect on stream temperatures. Hardwood shrubs are particularly valuable in shading stream channels as they provide a dense canopy close to the water's surface.

The Oregon Department of Environmental Quality has listed several project area streams for temperature impairment. Based on available data, 15 of 17 project area streams have not met the desired condition for total shade under INFISH and PACFISH.

Regular monitoring of stream temperatures during the past decade in the project area has determined that temperatures exceed the statutory standards of the State of Oregon in Beaverdam, Powell, Rager, Sugar, and Tamarack Creeks. The Oregon Department of Environmental Quality (ODEQ) stipulates that the average of the daily maximum stream temperature during any seven consecutive days shall not exceed 64°F (ODEQ 1995). The maximum seven-day average stream temperatures for Beaverdam, Powell, Rager, Sugar and Tamarack Creeks have consistently surpassed the 64°F standard.

Oregon Department of Environmental Quality has identified Beaverdam, Powell, and Sugar Creeks as non-compliant, water quality limited bodies of water.

Photograph 3-1. Reach B in North Wolf Creek illustrating bank instability, Widow Pasture, Southside Allotment Analysis Project, Crook County Oregon.

Stream Bank Stability

The Ochoco National Forest LRMP, as amended, states that stream channel instability should not exceed 20% for any particular stream drainage. This is consistent with Riparian Management Objectives established by the INFISH and PACFISH (USFS 1995). Management activities cannot increase current levels of unstable banks if they are above 20% and Forest activities must not inhibit the "near natural rate of recovery" (USFS 1995).

Occurrence of more than 20% of unstable banks are an indication of degraded aquatic habitat resulting in changes in substrate composition, and reduced ability of woody and riparian plants to increase and expand (USDA 1995[a][b]). Increases in fine sediment in streams due to erosion from unstable banks, and corresponding reduction in spawning and rearing success are indirectly tied to the amount of unstable banks within stream drainages. An eroding bank is characterized by any one or a combination of the following factors provided they occur at an elevation above the level of high-water flows: bare colluvial or alluvial substrates, exposed mineral soils, tension cracks or active sloughing of banks into the stream channel.

Where quantitative data exists, the amount of unstable banks in the allotments is above standard or shows evidence of trending towards exceeding standards. Stream surveys indicate that average unstable bank values are particularly high on Beaverdam and Bellworm Canyon Creeks. Heisler, Powell, and Sugar Creeks also have reaches with relatively high (>30%) values although overall

reaches are within satisfactory limits of less than 20% unstable banks. Another indicator of unstable banks is when reaches are "entrenched", which is a measure of how deep a stream is relative to its floodplain. If a stream can not reach its floodplain then erosion of the banks occurs at higher flows. Stream surveys indicate that entrenchment has occurred throughout the planning area in segments of Beaverdam, Powell, Tamarack, Sugar, Beaver, Bellworm Canyon, Heisler and North Fork Wind Creeks.

Surveys completed for National Forest lands within the Upper Beaver Creek Watershed (38% of streams within the watersheds) indicate that approximately 11% of the stream reaches have greater than 20% unstable banks and 22% have 10-20% unstable banks.

Substrate is important in the breeding and incubating of fish, but is also important in over wintering inland fish seeking thermal protection. Unstable banks can lead to changes in substrate, which in turn can reduce the frequency and quality of pools as infilling occurs and interstitial spaces between gravel and cobble occur. Changes in substrate that decrease the percentage of gravel and cobble or that armor the stream bed are associated with reduced survival of eggs and alevins, reduced primary and secondary productivity, interference with feedings, behavioral avoidance and breakdown of social organization, and pool filling.

Where data exist, some streams (Sugar, North Fork Wind and Rager creeks) within the Project area contain greater proportions of fine sands than what one would expect from the overall morphological classification of individual streams and reaches and which are greater than INFISH/PACFISH RMO. This occurrence is linked with the strong occurrence of unstable stream banks within those areas. Given the number of streams with reaches not meeting RMO for unstable banks, it is reasonable to conclude that substrate is also impaired.

Stream channel morphology is inextricably linked to riparian vegetation and riparian soils. Streams that are continuing to widen exhibit high levels of streambank instability and simplified in-channel habitat. As streambanks stabilize they may become re-vegetated, although often by early seral or upland species (undesirable). Collectively, these two measures describe how streams are adjusting to riparian and upland impacts. Streambank stability and width-to-depth ratios would also be expected to change over time as riparian and upland conditions improve or degrade. Width-to-depth ratios are a critical attribute of properly functioning systems because they enable the channel to maintain its pattern, profile, and dimensions. Wider, shallower streams heat up faster and have less pool habitat than narrower, deeper streams (Hawkins et al. 1998). Stable streambanks are also desirable because they hold riparian vegetation that traps and filters sediment and can provide undercut banks for fish cover.

Width to Depth Ratio

As width to depth ratio's increase streams are wider and shallower and are more influenced by ambient air temperature and are less influenced by shade due to width. Streams may also have narrow width to depth ratio's that are unwanted due to entrenchment of the channel. Most stream reaches within the project area exhibit higher than optimum width-to-depth ratios, high amounts of unstable banks and low amounts of shade as compared to Riparian Management Objectives outlined in Forest Plan amendments PACFISH/INFISH. Although natural potential varies both by stream type and local geomorphic and vegetative factors, the condition of many streams characteristics do not meet the desired conditions.

Standards from PACFISH/INFISH were used to make this determination, although it should be noted that width-to-depth ratios are expected to naturally vary by stream type and may not actually be appropriate for all reaches (Rosgen 1996). PACFISH/INFISH deems width-to-depth ratio

values of less than 10 to be desirable, however, this criterion is only used to describe existing condition and future analysis should examine width-to-depth ratios appropriate for each potential stream type. Many streams in the planning area however, still exceed the width-to-depth ratios expected for the stream type.

Table 3-3. Ratings for Each Stream by Pasture in its Current Condition within the Southside Allotments Project Area.

Pasture	**Stream**	**Bank Stability Problems**	**Shade Problems**	**Width to Depth Ratio Problems**	**Stream Function Call by Pasture**
Widow	Dry Paulina	X	-	-	AR
	North Wolf		X		AR
	Widow	ND	ND	ND	
Bull	No stream data	-	-	-	-
Miles	Miles	-	X	--	AR
	Wolf	-	X	-	AR
Wolf Creek Exclosure	Wolf	-	-	-	S
Riparian	Sugar	Isolated Spots	X	-	AR
	Wolf	-	X	-	AR
Nichol	Tamarack	X	X	-	NS
	East Wolf	-	X	-	AR
Sugar	Powell	Isolated Spots	X	-	AR
	Tamarack	Isolated Spots	X	-	AR
Sugar Holding	No stream data	-	-	-	-
North	Rager	-	X	Incised	NS
East	Heisler	Isolated Spots	X	-	AR

Pasture	Stream	Bank Stability Problems	Shade Problems	Width to Depth Ratio Problems	Stream Function Call by Pasture
Bear	Bellworm	-	X	-	AR
	Rager	-	X	Incised	NS
South	Heisler	Isolated Spots	X	-	AR
North Wind	Beaverdam	X	X	-	NS
	NF Wind Creek	-	X	-	AR
South Wind	NF Wind	-	X	-	AR
	SF Wind	Isolated Spots	X	-	AR
	Wind	-	-	-	S
	Congleton/Squaw	X	X	-	NS
Bronco	Bronco	ND	ND	ND	

S= Satisfactory; AR= At Risk; NS= Not Satisfactory; ND= No Data

The above rating is for each stream by Pasture in its current condition. If stream survey of Properly Functioning Condition survey information showed one of bank stability, shade, or width-to-depth ratios above Forest Plan Standards, then it was considered At Risk. If two or three parameters are not meeting standards then it was considered Not Satisfactory, and if none were exceeded it was deemed Satisfactory.

Environmental Consequences

A channel that can efficiently capture, store and transport its flow and sediment supply, and hydrologically function within its streambanks and floodplain would develop a stable pattern, dimension, and profile that neither aggrades nor degrades (Rosgen 1996). Rosgen (1996) details the progression of channel degradation that may occur due to excessive livestock grazing. In short, as streambanks are altered and riparian vegetation is reduced, the channel can no longer contain floods and becomes wider and shallower, causing an array of indirect changes to habitat.

Riparian plants help the channel maintain its pattern, dimension, and profile by stabilizing streambanks, trapping sediments, connecting the channel to the floodplain, and increasing roughness that dissipates the high energy of floods. Those species such as sedges, willows, and alders have greater root densities and are more desirable than grasses, forbs, and conifers for these purposes. A change in species composition or a reduction in their extent usually reduces the channel's ability to perform these maintenance functions.

Dramatic ecological variability exists within riparian areas of the Southside Allotments planning area. Riparian areas at low elevations on south-aspect slopes are extremely narrow, flows are flashier and often intermittent by mid-summer, and conifers generally contribute most to shading. Conversely, higher elevation streams contain more abundant shrub and sedge communities, exhibit both snowmelt-driven and spring-fed hydrographs, and flow cold year-round. Thus, the effects of grazing would be expected to vary at the reach scale across the landscape, depending on stream type, flow regime, vegetation components, and current condition. These effects are complicated by the annual variability in standard implementation (e.g., 0% or 40% utilization), permit administration, permittee compliance, and monitoring site selection.

It is important to note that this analysis is underpinned by the concept that most stream types would respond to livestock grazing differently from one another (Rosgen 1996), even when the magnitude, timing, duration, and intensity is the same. The *rate* of improvement or degradation among stream types is determined by their current geomorphological condition (i.e., functional class—Table 3-4) and the process follows a predictable progression until a new equilibrium is reached (Bengeyfield and Svoboda 1998). The process of stream type succession due to severe impacts is outlined in Table 3-5. Therefore, the magnitude, direction, and rate of change to streams expected under all four Alternatives are based on channel type and current condition analysis.

Methodology

This analysis would focus primarily on the effects of the Alternatives to width-to-depth ratios, shade, and bank stability. These three measures were chosen because they are affected most directly and quickly by livestock grazing and can be related to riparian vegetation and soil impacts. When impacted streams narrow and width-to-depth ratios decrease, other stream habitat measures such as pool frequencies, bank angles and large woody debris volumes are less directly or not as quickly affected by grazing, however, it is assumed that these other habitat variables would indeed be affected by livestock but changes would be removed in space and/or time. In other words, upstream impacts can manifest downstream and lag times often occur, making accurate prediction of these indirect effects difficult.

This methodology is based on the premise that livestock principally affect stream channels through the consumption of riparian vegetation and trampling of streambanks. As streambanks are trampled, sections may fracture and shear, particularly during high flow events when vegetation is not present to reduce this near-bank stress, and thus causes streambank instability. As riparian vegetation is trampled and/or consumed by livestock, it loses vigor and is decreased in extent, thus reducing the streams' ability to withstand high flows, causing bank shear, widening of the channel, and decreased shade which then increase stream temperatures. As channels widen and fine sediments increase due to bank erosion, pools may fill and decrease in both number and quality for fish. While pool frequencies are deemed important components of habitat by PACFISH/INFISH, these changes take place well after a stream has been impacted and would have already exhibited high bank instability and width-to-depth ratios.

PACFISH/INFISH RMOs also require <20% unstable stream banks. Stable streambanks provide for reduced erosion and fine sediment from the banks and can provide undercut banks for fish. Fish prefer undercut banks for hiding and resting cover but when streams become incised or excessively wide they no longer form undercuts. Not all streams or reaches are naturally undercut. Undercut banks only form when width-to-depth ratios are within an satisfactory range, making the latter an satisfactory surrogate. Lastly, while PACFISH/INFISH also calls for attaining natural levels of large woody debris, this habitat component is least affected of all the RMOs by livestock grazing. Fire suppression and upland forest management would more directly alter large woody debris levels and recruitment in riparian areas. Therefore, based on this information, the use of

width-to-depth ratios, shade, and unstable streambanks in this analysis as surrogates of these other attributes is scientifically appropriate.

The analysis for Alternatives 1, 2, 3 and 4 refers to Table 3-6 to describe the variable effects of livestock grazing on streams that are satisfactory, at risk, or not satisfactory. Instead of making functional classifications at the pasture-scale (as done to determine baseline conditions), this was done by stream, and in some cases, at the reach scale. Therefore, the geomorphic-reach scale is henceforth used in this analysis and functional class determinations at the pasture scale are no longer used.

Table 3-4. Functional class designations and reasons for impairment, Southside Allotment Project Area.

Stream/Reach Name	Bank Stability Problems?	Shade Problems?	Width-to-depth Ratio Problems?	Functional Class
Bear		X	ND	AR
Beaverdam	X	X		NS
Bellworm Canyon		X		AR
Bronco		X	ND	AR
Congleton	ND	X	ND	AR
Dry Paulina		X	ND	AR
Heisler	Isolated spots	X		AR
Miles		X		AR
Powell	Isolated spots	X		AR
Rager		X	incised	NS
South Fork Wind	ND	ND		S/AR
North Fork Wind	X	X		NS
Sugar	Isolated spots	X	ND	AR
Wolf	ND	X	ND	AR
North Fork Wolf		X		AR
East Fork Wolf		X	ND	AR
Tamarack	Isolated spots	X		AR

S= Satisfactory, AR= At-Risk, NS= Not Satisfactory, ND=No Data

If stream survey information showed one of bank stability, shade, or width-to-depth ratios above Forest Plan standards, then it was considered at risk. If two or three parameters are not meeting standards then it was considered not satisfactory, and if none were exceeding standards it was deemed satisfactory. This methodology is subjective and not supported by the scientific literature however, it is indicative of overall stream channel conditions because of the relative importance of these metrics to all other components of aquatic habitat. These determinations are generally confirmed by professional observations in the field. Furthermore, some generalization among reaches was necessary; if a stream showed any evidence of impairment the entire length was considered impaired, even if it may only apply to a portion of the reach.

Width-to-depth ratios were considered impaired when they exceeded values based on Rosgen stream channel type (Rosgen 1994) as opposed to the PACFISH/INFISH value of 10. It is important to note that width-to-depth ratios would be expected to vary naturally by stream type (Table 3-5 below) as opposed to the "one size fits all" of the value of 10 from PACFISH/INFISH. Even as described below from Rosgen (1994) where stream types B, C, D, and F all can have "typical" width to depth ratios of anything greater than 12, it is important to note that narrow width to depth ratios are preferred over wider ones due to route of sediment through the stream system, decreased stream temperatures, and increased pools. For example a Rosgen C type stream with a width-to-depth ratio of 15-18 is better for the above attributes than the same stream where the width-to-depth ratio is 25-30. The former area of the stream would have deep pools, would route sediment through the system better, and would be narrower for increase shade than the latter stream reach.

Table 3-5. Typical width-to-depth ratios by stream type and potential successional changes within the Southside Allotments Project Area ([1]Rosgen 1994, [2]Rosgen 2002; [3]USFS 2001).

Stream Type	Typical Width-to-depth Ratio[1]	Possible Altered Stream Succession Scenarios[2]
A	Low (<12)	Very resilient to change
B	Moderate (>12)	B ⇨ G ⇨ Fb ⇨ B
C	Mod. To High (>12)	C ⇨ D ⇨ C C ⇨ D ⇨ G ⇨ F ⇨ C C ⇨ G ⇨ F ⇨ Bc C ⇨ G ⇨ F ⇨ D ⇨ C C ⇨ G ⇨ F ⇨ C
D	Very High (>40)	D ⇨ C D ⇨ G ⇨ F ⇨ C
E	Very Low (<12)	E ⇨ C ⇨ G ⇨ F ⇨ C ⇨ E E ⇨ G ⇨ F ⇨ C ⇨ E E ⇨ G ⇨ B
Stream	Typical Width-to-	Possible Altered Stream

Type	depth Ratio[1]	Succession Scenarios[2]
F	Mod. To High (>12)	F ⇨ C F ⇨ Bc F ⇨ D ⇨ C F ⇨ C ⇨ E
G	Low (<12)	G ⇨ F ⇨ C G ⇨ F ⇨ Bc G ⇨ F ⇨ D ⇨ C G ⇨ F ⇨ C ⇨ E

Effects Common to Action Alternatives

Implementation of Alternatives 1, 2 and 4 would produce effects that are similar in trend, yet vary by degree within a 0-15 year timeframe. Alternative 3 was analyzed under the premise that future implementation would be similar to current implementation. Thus, Alternative 3 would only slowly recover streams that are at risk and not satisfactory reaches would remain static within this same time period. This determination is founded in the concept developed by Platts (1984) that livestock impacts to riparian areas and stream channels are directly related to the amount of time that cows spend in a riparian area and their stocking density. Simply put, if utilization levels are greater, the greater the risk that suppression of plant growth or damage to riparian areas would occur.

Expected time periods for recovery would vary by stream type and functional class. B-, C-, and E-stream types that are already near-functioning (i.e., width-to-depth ratios, shade, and bank stability only slightly above standards; Table 3-5) would likely exhibit recovery within 3-5 years under Alternative 1, 5-15 years under Alternatives 2 and 4, and >15 years for Alternative 3. Non-functioning B-, C-, and E-type reaches would also recover within 15 years under Alternative 1, but may take longer under Alternative 2 and 4, and longer still for Alternative 3. A-stream types are generally very resilient to livestock impacts and their current impairment and recovery is probably not closely tied to vegetative improvement. D-, F- and G-types must continue to decline somewhat as they adjust their pattern, dimension, and profile to a new, lower elevation (Table 3-5) (Rosgen 1996). This would likely occur over a 15-30 year period under Alternative 1, 15-40 years for Alternatives 2 and 4, and >40 years for Alternative 3. In all of these scenarios, once equilibrium is reached, proper vegetation (composition and extent) is necessary to maintain a stable sinuosity, dimension, and gradient. Importantly, however, timeframes for all Alternatives are contingent upon a spectrum of hydro-climatic conditions that includes both drought and flooding to re-achieve stability. Climatic extremes may slow or accelerate recovery in some streams and is dictated by a myriad of site-specific factors largely outside the scope of this analysis.

Under Alternatives 2 and 4, the adaptive management strategy would obviate the need to prescribe duration or stocking density at any set-level, but rather remove livestock when standards are reached each season. Monitoring data would be used to adjust annual thresholds for utilization, streambank alteration, and soil disturbance. Consistent implementation, appropriate monitoring sites, and prompt response to changing resource conditions would be critical components to success under Alternatives 2 and 4. Despite difficulties with implementation, utilization standards under Alternative 3 are not believed to be conservative enough to recover riparian vegetation, streambanks, and stream channels in a reasonable time period (i.e., <10 years).

Selection of Alternative 1 would not meet the purpose of continuing livestock grazing as would Alternatives 2, 3 and 4. Alternative 1 would meet the need to improve [aquatic] resource conditions most quickly among all Alternatives; Alternative 3 would not meet this need. The desired future condition of riparian vegetation, stream channels, streambanks, and water quality would be met most quickly under this Alternative 1, less quickly under Alternatives 2 and 4, and most slowly or not at all under Alternative 3.

Alternative 1: No Action – No Grazing

Direct and Indirect Effects

Under this Alternative, direct livestock impacts to redband and steelhead trout populations would not occur, nor would direct impacts to Columbia spotted frog occur. Larval and early morph Columbia spotted frog successful attainment of breeding age would be increased as vegetative cover and prey increased and affects to overall water quality were reduced. Trampling of redds and alevin fish by livestock would not occur. Trampling of egg masses and metamorphous Columbia spotted frog would not occur. Desiccation of eggs, which may occur through the action of post-holing would not occur.

Forest Plan standards and RMO (INFISH, 1995(a); PACFISH, 1995(b)) for aquatic species of concern would improve in the following ways within the first season: sediment entering the channels associated with reduced riparian vegetation from livestock access to the stream would decrease, an increase in vegetation would support additional cover and potential increases in prey species dependent on vegetation for food and breeding substrate would occur. Research on the rate of re-vegetation where livestock has been excluded or eliminated (Kauffman et al., 2004; Kauffman et al., 2002; Dobkin et al., 1998) indicates that positive changes in soil density and root biomass occur as well, allowing for greater water storage capacity in the soils. Where more than fourteen years has elapsed, bankfull width decreases within the range of 10 to 20%, and pool habitat increases within the range of 8-15% could be anticipated (Magilligan and McDowell, 1997). Within the first decade, improvements to width to depth ratios and decreases in channel entrenchment (Sarr, 2002) in combination with an increase in riparian shrubs would begin producing narrower, cooler stream temperatures.

Vegetation increases along streambanks would mediate unstable banks where existing tension cracks along the banks occur because riparian obligate shrubs (willows, alder) increase within five years (Kauffman, et al., 2002). Alternative 1 would promote the most rapid recovery in reaches that are currently at-risk and not-satisfactory. Alternative 1 would promote conditions that would move project area riparian areas towards full potential.

Wolf Creek riparian exclosure has been in place for 17 years. A comparison between data collected outside the exclosure in 2005 and data collected in 2006 within the exclosure indicates that in the 2.06 miles surveyed in 2005, unstable banks for right and left banks averaged 15 and 14.1%, while unstable banks within the exclosure area, bank instability in 5.04 miles averaged 9.6 and 8.4% for right and left banks. Alternative 1 would most likely have similar changes to stream habitats as a result of no grazing. There would be an increase in the amount of riparian vegetation retained at the end of each growing season thereby reducing unstable stream banks. Vigorous growth and expansion of riparian vegetation is needed to reduce width-to-depth ratios and maintain water tables

The time period for at least partial recovery of some functional habitat components could be expected within a decade for streams that are already near satisfactory functioning (see Table 3-6).

All not-satisfactory or highly impacted streams (see Table 3-6) may take several decades to recover. Where livestock were absent for more than five years, shrub cover was 88% greater than when livestock were present; this statistic would suggest that riparian hardwoods, severely impaired in most project area streams, could respond rapidly to Alternative 1 (Kauffman et al., 2002). Although improvement in bank stability and shade conditions could show improvements within the first five years following livestock removal, an estimated ten to thirty years of monitoring would be required to report measurable changes in many of the habitat indicators (channel features).

Improvement of width-to-depth ratios and bank stability would result in overall watershed condition improvements. However, where channel conditions are not-satisfactory (Rosgen D, G and F types) active restoration plans would remain an appropriate goal for aquatic species recovery.

Under Alternative 1, sediment deliveries to streams occurring when livestock break down stream banks would no longer occur; this Alternative would best meet PACFISH/INFISH guidelines for attainment of a "near natural rate of recovery" in all not-satisfactory and at-risk reaches. Some stream types (specifically D-, F- and G-) would not recover any faster under this Alternative than if livestock remained. These reaches must first undergo hydrologic stabilization that operates irrespective of livestock grazing (see Table 3-5 for some succession scenarios) (Rosgen 1996; Bengeyfield and Svoboda 1998; Lockwood and Lockwood 1993; Van Haveren and Jackson 1987; Harvey and Watson 1986). Once they reestablish appropriate sinuosity patterns and gradient and sediment balance, then vegetation would exert a greater influence on channel dimensions. D-, F-, and G-type streams would continue to decline under this Alternative in the <15 year time period.

Several studies provide insight into the results of removal of livestock (Kauffman et al., 2004; Dobkin et al., 1998; Sarr, 2002). Magilligan and McDowell (1998) compared conditions on exclosures in eastern Oregon which had been not grazed from 14 to 30 years. Results varied by site, but generally, width to depth ratios were reduced, and the number of pools was increased (Platts and Nelson, 1985). The stream channel within the exclosure was deeper at low flow and narrower at both bankfull and low-flow conditions.

There was evidence that some channel adjustment in the form of point bar formation and lateral migration was occurring as a higher sinuosity and lower gradient were obtained. Sarr (2002) found that factors such as watershed stability, climate and degree of channel incision affected the rate of vegetation and channel recovery, and therefore, gave no clear indication of the amount of time or order that recovery of formerly grazed sites would take. Most importantly was that improvements in channel morphology, riparian dependent species use (Dobkin, et al., 1998), and soil characteristics were improved and following 40 years of exclosure and restoration, a sparsely vegetated sage brush meadow was returned to a wet-meadow system similar to what soil data indicated was the original condition. This work was conducted on the Hart Mountain, Oregon National Antelope Refuge characterized by cold winters, hot summers and approximately 12 inches of precipitation annually.

It is reasonable to assume and supported in the literature that aquatic habitat across the Project area would move towards potential for shade, water quality, and bank stability. Width to depth ratios would be expected to decrease as vegetation re-growth stabilized banks and provided the channel with energy dissipating roughness, stream channel habitats would continue to improve for most stream reaches.

Cumulative Effects

There would be no adverse cumulative effects to water quality, threatened, endangered, candidate or sensitive aquatic species or their habitats from implementing Alternative 1.

Alternative 2 – The Proposed Action

Alternative 2 would promote stream channel recovery in all allotments but these rates would be very different from one another. Streams that are now satisfactory would continue to be so, at-risk streams would slowly improve, and not-satisfactory reaches would slowly degrade before showing improvement where they are not geomorphically limited. A summary of effects under this Alternative can be found in Table 3-6. Integral to this determination is the adaptive management component which includes annual changes in standards based on monitoring information. This monitoring would provide data to more precisely implement standards, determine existing condition, guide administrative decisions, and provide information about site-specific and reach-scale trends.

Direct and Indirect Effects

Every life history stage of Columbia spotted frog, from embryo to adult, has the potential to be affected by cattle grazing. Spotted frogs deposit floating egg masses that are not dependent on the support of vegetation, so the simple removal of aquatic and riparian vegetation by cattle is unlikely to affect egg masses. However, egg masses can be damaged or suffer desiccation as a result of trampling and post-holing. As larvae, spotted frogs are restricted to the same aquatic habitats that serve as the primary watering source for cattle.

Particularly important to larvae are changes in water quality that can result from cattle urination and defecation as well as physical disturbance of the water. However, larvae may be positively affected by enhancement of food supplies that may result from fecal deposits. Juvenile frogs may be particularly susceptible to trampling because they are not able to swim well enough to escape in deep water, and they prefer moist areas next to water bodies, the same place that cattle congregate. As adults, spotted frogs depend heavily on riparian vegetation for cover from predators. This vegetation is a food and cover resource for their insect prey. Therefore, the removal of vegetation through grazing may increase spotted frog vulnerability to predators and decrease available food sources (Howard and Munger, 2000).

Grazing generally does not begin on any of the Southside Allotments until June or later (after July 15th in Wind Allotment, South pasture). Pastures that are used earlier in the season would have a greater likelihood of direct effect to fish embryo, alevin and fry development. These early-use pastures include Miles, and Sugar pastures in the Wolf allotment, Bear and South in the Heisler allotment and the North pasture in the Wind allotment. There is some reduced likelihood that embryonic, alevin and fry could be affected by the entry timing of the Bull and Nichol pastures, Wolf allotment and East pasture in the Heisler allotment. Widow and Riparian in the Wolf allotment, North and Bear pastures in Heisler allotment and Wind allotment's South pasture are more certainly temporally separated from direct impacts since livestock do not usually enter these until August. Adult fish are more mobile and therefore able to escape trampling by livestock. In late-season pools where fish remain isolated, however, there is a potential for mortality when livestock 'keg up' in these water sources. There are no fish in the Bronco pasture therefore there are no direct effects to fish from use timing.

For Alternative 2, the trampling of red-band trout may occur because grazing is initiated during that time when red-band embryos and alevin are developing and when young fry are vulnerable (June-July). Similarly, trampling of Columbia spotted frog eggs and metamorphs can occur during this same time period. Under Alternative 2 there are no direct affects to steelhead trout because livestock are excluded from Middle Columbia River steelhead trout spawning habitat from February 15 through July 15.

The direct effect of implementing Alternative 2 would be annual incremental increases in riparian vegetation and soil conditions which could lead to improved riparian and instream conditions.

These improved vegetation and soils conditions would lead to direct reductions in width to depth ratio's, reductions in unstable banks, and increases in shade. Improved riparian and channel conditions are expected to result because a more broad array of triggers would be in place to monitor livestock timing, distribution and use rates. Affects to stream banks and RHCA soils would decrease because disturbance above the standards proposed would trigger changes in management.

Indirectly, implementing Alternative 2 would lead to improvements in channel conditions as vegetation becomes established, as livestock-related effects to soils decrease and as the occurrence of unstable banks decreases from the current levels. Within fifteen years, riparian shrubs could attain the height and structure needed to attain sufficient values as shade, cover, allochthonous input to support macroinvertebrate prey and as a filtering mechanism for sediments that may be instream or entering the channel through overland flow. As riparian shrubs attained maturity, bank stability would greatly improve and be more resilient to natural disturbances. Greater cover conditions for fish would occur both from shading and from instream root masses and the development of undercut banks. Shading would improve, which over time would lead to decreases in summer water temperatures. As banks stabilize and shading occurred, spawning and rearing habitat would improve. Additional deciduous vegetation would provide nutrient for stream macroinvertebrates, on which fish and frogs rely for food.

Where vegetation is sufficient to trap sediments, stream beds that are incised (Rosgen G and F types) may develop point bars that would begin the process of rebuilding stable banks and, in effect, narrowing the width to depth ratios while bringing the channel closer to its floodplain under the best of conditions. This effect would require twenty or more years because the process of trapping sediments and establishing successively greater areas of vegetation is akin to the concept of ecological succession spanning several age classes of vegetation.

Cumulative Effects

There would be no adverse cumulative effects to threatened, endangered, candidate or sensitive aquatic species or their habitats from implementing Alternative 2. Cumulative effects are similar to Alternative 1. While activities continue within the drainages vegetation management projects currently have little to no direct effect on stream channels as shade, stream banks, and channel configurations are protected. Upper Beaver with ~400 acres of thinning in RHCAs and roads within the project area probably have to most cumulative effect as they continue to narrow the streams in places which has led to down cutting in channels which decrease bank stability, decreases shade as riparian hardwood species die off, and can cause width to depth ratios to be out of balance for the natural stream type.

The District maintains an aggressive prescriptive fuels treatment program. Recent research (Bêche, et al., 2005) indicates that fuels management in riparian areas can produce short-term (within the year) changes in water chemistry, macroinvertebrate composition and decreases in periphyton. These changes are unlikely to pose major threats to aquatic species because of the limited sizes of prescriptive burns, their short duration and low intensities, and no ignition in RHCA and incidental backing of fire.

Past management in the cumulative effects analysis area, including timber harvest, a century of historic livestock use, big game grazing, fire suppression, wildfires, and road construction, have resulted in areas of degraded riparian conditions (USDA Forest Service 2001, USDA Forest Service 1999). Many stream channels have widened and incised, thus losing floodplain area and the associated vegetation that depends on wet conditions. Stream banks become raw with the loss of soil holding root masses provided by willows, sedges and rushes. As stream channel morphology changes and degrades, loss of sensitive plant habitat is imminent.

There are both beneficial and detrimental effects by these actions. Removing understory trees mimics the low intensity, frequent fires that occurred before European settlement. Current standards prevent harvest that reduces shade to the point of not meeting RMOs. Generally, timber harvest prior to the late 1980s did not vary treatment within riparian areas, therefore cutting timber up to the stream channel led to increased access to stream channels for livestock and therefore increases in bank erosion from hoof shear.

Road construction occurs in conjunction with timber harvest. Roads that cross or run parallel to streams have effects on the channel and vegetation. Roads alter stream drainage patterns by confining the stream, reducing the area within the floodplain, so floodplain interaction is disturbed, stream banks have additional pressure on them so erosion is increased and width to depth ratios may be altered. This in turn affects riparian habitat and its function. Roads also provide cattle easier access to streams.

Restoration projects that have and would take place within the project area have the potential to produce short term (0-15 years) negative effects to bank stability, riparian vegetation and riparian soils and may include: instream structure placement (pool habitat restoration), riparian revegetation, large wood placement, cutbank revetment, riparian exclosures, and large scale stream channel reconstruction. In the long-term (15+ years), these activities have the potential to improve vegetation, water quality and soils by direct application of restoration techniques to stream channels and riparian areas, and by improving hydrologic function by replacing culverts and decommissioning and replanting roads. These activities, while incurring short-term costs would ultimately improve watershed health, which in turn would be capable of supporting a greater number and diversity of aquatic species.

Alternative 3 – Maintaining the Current Allotment Management System

Alternative 3 reflects current management of the three allotments. There would be no change in current uses, numbers, grazing systems, except where annual operating provisions require them. As it is currently implemented, Alternative 3 would promote slow recovery in all allotments and, in some cases, not move individual reaches toward attainment of RMOs. Integral to this determination is the belief that current utilization is too high for measurable vegetative recovery and that incised reaches must undergo hydrologic recovery, which is expected to take many decades.

Direct and Indirect Effects

This alternative is the continuation of current grazing standards as set by the Ochoco National Forest Land and Resource Management Plan. Continuing livestock grazing at current standards is expected to perpetuate current conditions. Under current management, Forest Plan RMOs from PACFISH and INFISH have not been met, although standards associated with those RMOs have been met through changes prescribed yearly to permittees when RMOs have not been achieved.

Under Alternative 3, watershed and instream conditions would likely remain as they are and on their corresponding functional trajectory. Channel morphology would continue to fail those habitat conditions that have been identified as necessary to the recovery of anadromous and resident fish. In general, most streams within the project area are degraded. While some streams may be in fair to good condition, others are in decline; most do not meet two or more standards.

The ecological recovery potential of at-risk and not-satisfactory reaches, by stream type, is described in Table 3-6. The rate at which these reaches move toward regaining appropriate width-to-depth ratios and natural levels of streambank instability would be slower under Alternative 3 than Alternative 1 or Alternative 2. This is expected due to a higher utilization standard of up to 55% utilization in riparian areas (as long as stubble height thresholds are not exceeded), which is

expected to slow the growth of existing riparian vegetation and slow stream channel habitat improvement.

Current management of the Wind allotment's anadromous pastures would continue with an entry date of July 15th, when redds and alevins steelhead are no longer vulnerable to direct trampling. The North pasture (unoccupied habitat) would be used before the South pasture (occupied habitat). Indirect effects from Alternative 3 would include the loss of long term soil productivity on allotments and specific areas that are in fair to poor range condition or which lack sufficient vegetation. The current or an increased level of soil transport and sedimentation would occur. Downstream sediment loads would remain the same or increase, affecting the fisheries abilities to spawn and grow. Forage potential would likely decrease in areas in poor rangeland condition. Riparian areas in poor or degraded condition would continue to incur unnatural rates of bank erosion and require greater periods for recovering standards set out in the LRMP and INFISH/PACFISH. Riparian vegetation diversity would decrease or remain the same depending on current site conditions.

Risks associated with maintaining the current management is permitting the maintenance or further decline of aquatic species and their habitats. Stream temperature, shade, bank instability, substrate, vegetation would continue to fall below standards set by the LRMP, INFISH and PACFISH in the short term (0-15 years).

Current grazing management practices have not adjusted forage utilization levels to current conditions, resulting in very low occurrence of riparian shrubs capable of producing shade and unstable banks approaching or exceeding standards. Accelerated soil movement on allotments that are in fair to poor range condition would continue in the short-term (0-15 years). In the long-term (15+ years), this loss would depend on the overall trajectory of the reach. Those reaches/areas that are on a slow but increasing trend toward recovery would likely continue on that path. Those reaches/areas that are currently declining would likely continue on that downward path. Riparian areas identified as not-satisfactory and at-risk would continue to show signs of soil loss and limitations of woody riparian vegetation growth unless they were addressed under separate programs and practices. As soil and vegetation conditions increased, the likelihood of increases in headcuts and gully formation would increase.

Because of difficulties with implementation, utilization standards under Alternative 3 (the current management strategy) do not appear to be low enough to recover riparian vegetation, streambanks, and stream channels in a reasonable time period (i.e., <10 years).

Cumulative Effects

There would be cumulative effects associated with the implementation of this alternative. Cumulative effects descriptions would be the same as Alternative 2, but adverse cumulative effects would take place relative to unstable banks that would be maintained by the current grazing regime and roads within the project area that confine streams and cause unstable banks due to their proximity to streams. The current grazing regime would not, in most cases, improve bank stability ratings in the short term (0-15 years).

Alternative 4 – Modified Proposed Action

Direct and Indirect Effects

Alternative 4 would implement the adaptive management strategy and standards described in Alternative 2, with three additional permit modifications to the Wolf and Wind Creek allotments.

These modifications were identified through the scoping process for the Proposed Action initiated from December 15, 2005 to January 15, 2006. Three proposals were identified to improve range management in the two allotments.

Effects would be the same as Alternative 2 except for the effects from the three modifications. The components of this alternative are described below. Please refer to Alternative 2 description in Chapter 2 for information on the adaptive management strategy and the standards that would also apply to this alternative.

Modification 1: Wolf Creek Allotment – Widow Pasture Division

Alternative 4 proposes to divide the Widow Pasture of the Wolf Creek allotment with an east-west pasture fence, splitting the pasture roughly in half. This action would create two pastures where one currently exists. The northern of the two pastures would be known as Widow Pasture, retaining the current pasture's name. The resulting southern pasture would be known as Quicksand, named after a prominent landmark in the pasture, Quicksand Springs.

Direct and Indirect Effects

Modification 1: Wolf Creek Allotment – Widow Pasture Division

The division of the Widow Pasture into north and south pastures would affect management on the adjacent Miles and Bull pastures. Under current management (Alternative 3), livestock are rotated through the three pastures for approximately 122 days. Bull pasture is higher in elevation than Miles pasture. The grazing strategy is for early use of Miles pasture with later use of Bull pasture because, as a higher elevation pasture, its range resource is more palatable later into the season. Presently, Widow Pasture is the third pasture in the permittee's three-pasture rotation system (approximately August 7 to September 20). Dividing it into a northern and southern pasture would encourage use of the early-use lower pastures (Quicksand and Miles) and reserve the new Widow and Bull for use later in the season; in effect, the three-pasture rotation system would become a four-pasture system. This would have the potential to move the current livestock numbers through the pastures quicker and allow greater upland vegetation utilization of the existing Widow pasture. This strategy may improve upland forage utilization and may reduce impact on riparian areas.

Streams within all three pastures are below LRMP shade values. Alternative 4 would incorporate increased stubble-height and encourage more site-specific changes on an annual basis under Alternative 2's adaptive management strategies. Vegetation and banks associated with available water resources (i.e. springs and adjacent streams) may benefit from livestock presence for a shorter duration, but this is largely dependent on variables such as water year and actual livestock behavior. Assessment of conditions within the Widow pasture was 'functioning at risk' (PFC, 2005), failing LRMP and RMO for shade, and in one reach, bank stability, while Miles failed shade objectives. Data was unavailable for Bull pasture.

Positive benefits could occur where greater control of livestock use within riparian areas metered out the duration, intensity and initiation of livestock grazing. Livestock generally enter Miles in early June, rotating through Bull (early July) and Widow (early August) through the end of September. The number of cow/calf pairs, the overall length of the grazing season and the location of these activities would not change.

Indirectly, an impact to the habitat which may impede an individual fish or frog's ability to over summer decreases the population's fitness to withstand large scale natural occurrences. Widow pasture's assessment is "'functioning at risk". Any rating below "properly functioning" is not

sustainable (Prichard et al., 1993), although the associated trend is important in those reaches below "properly functioning. Changes as proposed under this alternative would have the potential to move the trend of this pasture towards properly functioning because habitat elements of unstable banks, width to depth ratio's and shade would likely improve with this modification in these pastures. Livestock would move through the southern pastures more quickly, which could reduce grazing pressure on vegetation and provide better forage outside of the riparian areas.

General early season (here generalized as through June) browse conditions may improve in the southern pastures (Quicksand and Miles) because livestock distribution would be more dispersed, with greater use of uplands, at a time where better natural water distribution and moderate air temperatures coincide. During mid-July through the end of the grazing season, livestock use of riparian areas could be heavier than previously in what remained of Widow Pasture because the overall size of Widow Pasture would be reduced to approximately half of its previous area. However, duration of the livestock within this pasture would be reduced. Livestock densities would not change but area would change. Conditions for red-band trout and Columbia spotted frog may improve in the Quicksand and Miles pastures because of those adaptive management actions (increases in stubble height, increases in monitoring and use of aquatic habitat surveys for the purpose of range monitoring).

Modification 2: Wolf Creek Allotment – Riparian Corridor

The Riparian Corridor on Wolf Creek is an approximate 1,437 acre livestock exclosure located along the upper reaches of Wolf Creek in the Wolf Creek allotment. The exclosure begins at the crossing of the Miles/Bull pasture division fence on Wolf Creek and follows Wolf Creek up to its headwaters, connecting with the Wolf Creek/Rock Creek allotment boundary fence to the north. The exclosure contains approximately 9 miles of occupied red-band trout habitat and 417 acres of RHCA. This pasture has been rested since around 1989 to improve fisheries habitat and water quality (Martin, 1996).

Kauffman et al. (2004) compared ecosystem properties along the Middle Fork John Day River system between one that had been managed for sustainable livestock production and another that had been excluded for 9-18 years. Earlier work (Kauffman et al., 1983) showed difference in species composition between grazed and non-grazed sites within three years in a moist meadow community. Measurable reductions in non-native species such as meadow timothy and aster (*Aster foliaceus*) occurred within two to three years in the absence of grazing. Cottonwood saplings and willows measurably increased within two years of exclosure. Grazing pressure on seedlings was reported to have produced non-reproducing communities among alder, cottonwood, and willows.

This earlier report suggested that where grazing was to occur, early-season grazing was preferable to late season use because the palatability and nutritive value of riparian plants were higher than on upland areas and would be preferred by livestock. It has been recommended that fencing be utilized as a method of protecting riparian resources; livestock distribution short comings resulted in up to 80% of total forage consumed by livestock coming from the riparian areas. Where upland forage utilization averaged 8-12 percent, riparian forage was over-utilized (Gillen et al., 1985) indicating that the preferential use of the RHCA by livestock may require fencing or reduction in numbers where animal units cannot be managed to reduce the amount of time within the RHCA.

Fencing is a direct method of altering livestock grazing patterns (Bailey, 2004) and is considered to be 'passive restoration' (Kauffman et al., 2002). However, reintroduction of grazing in previously excluded riparian areas set the riparian habitat back to pre-exclosure conditions within a short amount of time (Kauffman et al., 1983; Kauffman et al., 2002).

Direct and Indirect Effects

Of the total acres that would be returned to pasture use, approximately 417 acres are within RHCA. There are 895.9 acres of slopes less than 35% and 512.1 acres of slopes greater than 35%. Livestock that preferentially use bottomlands would continue to do so; as slope increases, use would decrease.

Returning the exclosure area to livestock use would result in an increase in unstable banks and associated sediment input, reduce existing riparian vegetation (decreasing shade), and would result in widening of the stream (increase width to depth ratios) due to hoof sheer, post-holing and loss of riparian vegetation within the floodplain. Anticipated effects to riparian vegetation and width-to-depth ratios from bank chiseling (hoof sheer) and post-holing would decrease available shade. While these impacts would occur it is important to understand that implementation of the adaptive standards will maintain conditions with RMOs from PACFISH/INFISH.

Because the adaptive management strategy would be in effect should this Alternative be chosen, the level of negative effects would be decreased because effects would be addressed annually and livestock would not be allowed to graze down vegetation to the levels seen under the current management strategy. There would be some additional bank instability although the amount is not expected to mirror current management. There may be some loss of riparian shrub as livestock gain access to young willows.

The indirect effect of returning the 1,437 acres of land to active livestock grazing following approximately 20 years of exclosure would negatively impact several habitat values (e.g. shade, riparian vegetation, bank stability) and remove approximately nine miles of protected spawning and rearing habitat for the red-band trout.

Based on available literature which documents the changes in riparian habitat that occur following the exclusion of livestock from riparian areas (Kauffman et al, 2004), it is reasonable to believe that baseline conditions for indicators such as bank stability, shade, substrate, pools per mile that may have accrued during the 17 years of livestock absence would decrease. The level of the decrease and the amount of time that conditions would require immediate changes in management largely depends on the successful implementation of the adaptive management model, livestock preference for micro-sites. Current unstable banks within the exclosure (5%) would increase but would not be expected to attain the current value (15%) found in the grazed reaches of Wolf Creek.

The body of literature documenting the differences in stream channel and vegetation and the effects of grazing on trout and Columbia spotted frog indicate that returning the excluded area to active grazing would decrease bank stability, increase cut bank conditions, fine sediments, and increase non-native species composition (Kauffman et al., 1983). Careful application of the adaptive management strategy, consistent implementation, appropriate monitoring sites, and prompt response to changing resource conditions would be critical components to success under this alternative.

Modification 3: Wind Creek Allotment – North and South Pasture Season-of-use adjustment

The current management and pasture rotations within the Wind Creek Allotment have a season of use that is restricted from February 15th through July 15th. This restriction provides protection to spawning steelhead from disturbance and protection of redds until such time as fry emerge from the spawning gravels. The Wind Creek subwatershed, which includes portions of the South and North pastures within the Wind Creek Allotment, is occupied Designated Critical Habitat for the Threatened Mid-Columbia ESU steelhead trout.

Current management initiates grazing in the North pasture after June 15th and rotates livestock into the South pasture after July 15th where grazing continues until the end of the grazing season, typically in late August-early September. Alternative 4 proposes to reverse the rotation between the North and South Pastures. The South Pasture would be entered at around June 15th and grazed until July 15-30th. Grazing cattle would then be moved into the North Pasture through the end of the grazing season. Early season range use may be best for utilization of upland forage and discouragement of livestock from loitering in riparian areas.

Direct and Indirect Affects

Allowing range use of the South pasture prior to July 15th may directly impact steelhead adults, redds and juveniles that may be present during livestock use. Livestock may prefer to remain up-slope where early-season grasses are available, which would decrease the extent of affects to developing steelhead.

Indirectly, spring use could result in better distribution of livestock, and reduce browsing pressure on riparian shrubs (e.g. alder, willows, water birch), which should decrease width to depth ratios and unstable banks, and increase shade in the long term as woody riparian species increase in size and vigor due to decreased browsing. Utilizing upland vegetation may also reduce soil compaction associated with livestock. Conversely livestock that may be drawn to the riparian areas could begin to utilize riparian vegetation earlier in the season and potentially cause increases in unstable banks due to the higher soil moistures and increased susceptibility to soil compaction and bank trampling (chiseling).

The North pasture is higher in elevation and generally has greater snow coverage when livestock enter it. This leaves greater concentration of livestock to snow-less areas until melt occurs, which encourages livestock to keg up wherever conditions allow leading to uneven utilization of resources. Changing the turn-out dates would move livestock into the pasture when snows were gone and vegetation has several weeks' growth on it. Available forage outside the riparian areas would ultimately decrease the amount of time livestock would spend in the riparian area. The adaptive management strategy would provide tools to more precisely implement standards, determine existing condition, guide administrative decisions, and provide information about site-specific and reach-scale trends, which if properly implemented would reduce this potential to very low levels. Some channel instability would be increased earlier in the season than previously occurred although major streams within the pasture may contain sufficient stabilizing features (boulders) that could prevent lateral migration of the channel.

While no one management approach is best for all situations, spring grazing has shown promise in many areas of the western United States. The combination of succulent upland forage, cooler spring temperatures, and near-by water sources encourages a more dispersed grazing pattern (Ehrhart and Hansen, 1998). Livestock grazing under proper strategies with controlled intensities, timing, and animal distribution can permit grazing use of riparian stream ecosystems and foster satisfactory results. Willows in riparian areas grazed in the spring are generally less affected by livestock grazing than when grazing occurs later in the season. Erhart and Hansen (1998) report that riparian areas grazed in the spring usually have less livestock occupancy.

Cumulative Effects

Cumulative effects to Threatened, Endangered, Candidate or Sensitive aquatic species or their habitats from implementing Alternative 4 would be similar to Alternative 2.

Table 3-6. Comparison by alternative of the relative rates of stream channel habitat recovery over a 0-15 year time period for the Southside Allotment Project Area.

Stream	**Stream Type**	**Functional Class**	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**
Bear Creek	unknown	AR	↑	↗	→	↗
Beaverdam	C, B	NS/AR	NS↘, AR↗	NS↘, AR↗	NS↘, AR↗	NS↘, AR↗
Bellworm Canyon	A	AR	↑	↑	↗	↑
Bronco	C	AR	↑	↗	→	↗
Congleton	unknown	AR	↑	↗	→	↗
Dry Paulina	C, E	AR	↗	→	↘	→
Heisler	B	AR	↑	↑	↗	↑
Miles	A	AR	↑	↑	↗	↑
Powell	B	AR	↑	↑	↗	↑
Rager **	F	NS	↘	↘	↘	↘
South Fork Wind	A	A/AR	↑	AR↗	AR→	AR↗
North Fork Wind	B	AR	↗	↗	→	↗
Sugar Creek	B, C	AR	↑	↑	↗	↑
Wolf Creek	A, B, C	AR	↑	↑	↗	↑
North Fork Wolf	B, C, E	AR	↑	↑	↗	↑
East Fork Wolf	B, C	AR	↑	↑	↗	↑
Tamarack	B,C	A, AR, NS	AR↗, NS↘	AR↗, NS↘	AR↗, NS↘	AR↗, NS↘
SUM			**12↑, 4↗, 0→, 3↘**	**8↑, 7↗, 1→, 3↘**	**0↑, 10↗, 5→, 4↘**	**8↑, 7↗, 1→, 3↘**

Table 11-□.These projections are speculative since data was not available to determine functional class. **Decreasing trend is a result of stream channel current condition will continue to degrade until it stabilizes and then will be an upward trend. Upward trend in any alternative will occur beyond the life of this document.

Symbology: ↑: Upward trend ↗: Upward, slower →: No change ↘: Slightly downward UKN: Unknown NS: Not-Satisfactory AR: At-Risk A: Satisfactory

Forest Service Pacific Northwest Sensitive Plant Species

There are no known occurrences of federally listed endangered or threatened plants within the analysis area. The Ochoco National Forest has no habitat recognized as essential for listed or proposed plant species recovery under the Endangered Species Act.

Extensive surveys have occurred for vascular sensitive plants within the Southside Allotments project area. Limited surveys have been conducted for nonvascular plants. There are 17 plant species on the Regional Forester's Sensitive Species List (July 2004) that occurs or has suitable habitat within the project area (Table 3-7). The other species on the Regional Forester's list are not addressed here due to lack of habitat (see the Botany Biological Evaluation in the analysis file). Of the species that have potential habitat within the Southside Allotments, there are seven species present. Table 3-8 lists the number of populations and the total acreage summarized by Allotment.

Sensitive plant population data used in the analysis was obtained from the Oregon Natural Heritage Program database and District records. Guidance for managing populations comes from species viability assessments (see the Botany Biological Evaluation), the Ochoco NF Draft Species Management Guide for *Calochortus longebarbatus* var. *peckii* (Kagan 1996), and literature. Other species Conservation Assessments, such as *Botrychium* Species on the Mount Hood NF, are also used for management guidance

Table 3-7. Regional Forester's Sensitive Plant Species with Suitable Habitat within the Southside Allotments

Species	Common Name	Habitat
*Achnatherum hendersonii**	Henderson's ricegrass	Low sage scabland
*Astragalus tegetarioides**	Deschutes milkvetch	Ponderosa pine/juniper woodland
*Botrychium ascendens**	Upswept moonwort	Open meadows/springs
Botrychium crenulatum	Crenulate moonwort	Open & shaded meadows/springs
Botrychium minganense	Mingan moonwort	Open & shaded meadows/springs
*Botrychium montanum**	Mountain moonwort	Open & shaded meadows/springs
*Botrychium paradoxum**	Twinspike grapefern	Open meadows and springs
Botrychium pinnatum	Northwestern moonwort	Open & shaded meadows/springs
*Calochortus longebarbatus var. peckii**	Peck's mariposa lily	Seasonally wet, open riparian areas and meadow edges
Carex hystericina	Porcupine sedge	Wet edges of streams and springs
Carex interior	Inland sedge	Wet edges of streams
Dermatocarpon luridum	Silverskin lichen	Submerged in perennial streams
Scouleria marginata	Margined black knotmoss	Submerged in perennial streams
Thelypodium eucosmum	World thelopody	Western juniper/sagebrush

Table 11-□.U.S. Fish and Wildlife Species of Concern

Affected Environment

Suitable plant habitat for suspected and documented sensitive species is extensive within the Southside Allotment project area. Human use has affected the project area through modifications such as soil compaction and construction of roads, which are effectively permanent. Other effects such as erosion, dropping water tables, and activities such as fire suppression and recreational use are likely to continue, which may limit opportunities for achieving desired conditions.

Many of the rare plant populations in the project area occur in riparian areas. Some of these riparian zones are in a degraded state due to several factors, one of which is concentrated livestock use. One of the goals of the Southside Allotment project is to improve riparian function through changes in grazing standards.

Environmental Effects

This section displays the direct, indirect and cumulative effects of the activities proposed for each alternative. Direct and indirect effects are based on the Project Area, which contains Forest Service Administered land within the Wolf, Wind and Heisler Allotments. Cumulative effects are based on the Project Area and the surrounding private and BLM land. Species are grouped by habitat type to those occurring within riparian areas (including meadows) and upland areas. Short-term impacts are defined for this analysis as those effects lasting less than 5 years. Long-term impacts are defined as those lasting more than 15 years.

Table 3-8. Documented Sensitive Plant Populations in the Southside Allotments Project Area.

Allotment Species	**Wolf** Populations Acres	**Heisler** Populations Acres	**Wind** Populations Acres	 Total
Achnatherum hendersonii	14 45.1 acres	7 34.4 acres	5 8.3 acres	26 87.8 acres
Astragalus tegetarioides	1 11.0 acres			1 11.0 acres
Botrychium crenulatum	6 1.4 acres			6 1.4 acres
Botrychium minganense	3 1.4 acres			3 1.4 acres
Botrychium montanum	6 1.5 acres			6 1.5 acres
Calochortus longebarbatus var. peckii	16 216.2 acres	5 37.6 acres		21 253.8 acres
Carex interior	3 0.4 acres			3 0.4 acres
Dermatocarpon luridum	1 0.25 acres			1 0.25 acres
Total	50 277.3 acres	12 72.0 acres	5 8.3 acres	67 357.6

The effects of livestock grazing to sensitive plant habitat and resulting species viability is based on several data sources as being representative of overall existing conditions, including:
Level II Stream Surveys (USDA 2001), which measured stream bank stability and width/depth ratios.

- Ochoco National Forest ecology plots (Riegel 2004), which measured soil condition parameters and plant species composition.
- Range paced transects and condition and trend plots, which measured soil stability, ground cover and species composition.
- Proper functioning condition surveys (USDA 1998), a multi-disciplinary approach to assessing overall riparian conditions.
- Monitoring vegetation in riparian areas (USDA 2000), which measures vegetation composition, woody species regeneration, and streambank stability.
- Informal rare plant monitoring of populations and habitat, and personal observation.

Direct and Indirect Effects – Alternative 1

Term grazing permits in all allotments would be cancelled within two years. All range improvements and fences would be abandoned or removed.

This alternative would result in a biological evaluation determination of "No Impact" for all species. The elimination of grazing within the allotments would provide security of sensitive plant populations and habitat for the long-term viability of these rare species. Direct impacts of plant consumption and trampling associated with livestock use would no longer occur. Sensitive plants would recover from chronic herbivory, which would result in increased population density, vigor, and opportunity to propagate.

Riparian Habitat

Riparian habitat for species including Peck's mariposa lily, porcupine and inland sedge, the nonvascular plants, and moonworts would benefit from the No Action Alternative. Indirect effects attributed to livestock include grazing-associated changes in species composition, noxious weed establishment, and decreased soil moisture due to soil compaction and lack of plant litter. All but five of the pastures in the project area are considered at risk due largely to early seral species, unstable streambanks and/or soil erosion. Major streams within the allotments were assessed as to overall condition using the Proper Functioning Condition method (USDA 1998); most stream reaches were found to be either in an upward trend or static. Eliminating grazing would help improve the rate at which recovery would occur. Clary and Webster (1989) summarize that in general, vegetation recovery after grazing elimination occurs within 5 to 15 years for plant communities in good condition. Some of the riparian areas, including sections of Beaverdam Creek and Sugar Creek, are close to meeting desired conditions; eliminating grazing in these areas is expected to improve sensitive plant habitat within 15 years. Areas that are at risk with a static trend would recover from grazing at a slower rate, beyond 15 years.

Riparian habitat must be in good condition to support stable populations of rare plants. Areas with an abundance of annual and non-native plants do not hold soil moisture and nutrients like deep-rooted, sod-forming species such as native sedges, rushes and shrubs. Stream channels that have down-cut have lost connection with the floodplain, leaving riparian plants lacking moisture requirements necessary for long-term sustainability. Livestock grazing is one factor that can contribute to degraded riparian conditions, which in turn affects rare species viability.

In the very long-term (30 years) when plant communities have met desirable conditions of species composition, vigor, and cover and stream channel physical attributes are functioning normally, lack of grazing may affect some sensitive plant habitat. Many of these rare plants are early to mid seral species which require periodic disturbance and open sunlight to thrive. Light intensity grazing can keep habitat more open.

Upland Habitat

The No Action Alternative would provide the greatest protection for sensitive plants and habitat compared to the livestock grazing proposed in the other alternatives. Direct impacts to plants such as trampling would not occur. Native plant communities would become more vigorous and recover faster than with continued livestock grazing. This, along with beneficial activities described in the cumulative effects section (ex. Tree density reduction) is expected to help maintain long-term viability of sensitive species.

Habitat for Deschutes milkvetch, transparent milkvetch, and Henderson's ricegrass are less vulnerable to grazing effects than riparian species due to habitat location and growth form, but they

would also benefit from long-term (15+ years) recovery from indirect effects. Indirect effects include soil erosion and changes in species composition to increasers such as yarrow, asters, and meadow foxtail. Unlike the milkvetches and ricegrass, world thelopody is a highly palatable, upright, showy species that is vulnerable to herbivory.

Cumulative Effects – Alternative 1

Past management in the cumulative effects analysis area, including timber harvest, a century of historic livestock use, big game grazing, fire suppression, wildfires, and road construction, have resulted in areas of degraded riparian conditions (USDA Forest Service 2001, USDA Forest Service 1999). Many stream channels have widened and incised, thus losing floodplain area and the associated vegetation that depends on wet conditions. Stream banks become raw with the loss of soil holding root masses provided by willows, sedges, and rushes. As stream channel morphology changes and degrades, loss of sensitive plant habitat is imminent. The key to genetically diverse and demographically healthy plant populations is the maintenance of habitat distribution and connectivity (Marcot and Murphy 1992).

Activities within the project area that have incrementally added to the condition described above include: Aqua, Brer Rabbit, Bottoms, Butte, Dippy Beaver, Dusty Well, Hat Springs, Hog Wallow, Morgan, Ringsmeyer, Robin, Sugar, TNT, Tower, Wind Creek, Windy John and Yuma Timber Sales. Major activities under these actions are listed in Table 2-1; page 12. These timber sales occurred between 1985 and 2002. Precommercial thinning occurred from 1976 to the present. There are both beneficial and detrimental effects by these actions. Removing understory trees mimics the low intensity, frequent fires that occurred before European settlement. Harvest helps keep the amount of overstory shade low, reduces competition, and keeps plant communities in an early successional state, which is beneficial to upland rare species habitat. Precommercial thinning within Peck's lily habitat and prescribed burning increases sunlight to the forest floor and reduces competition.

Detrimental effects include soil compaction and the creation of bare ground. Recent timber harvest generally does not have direct effects to sensitive plant populations because populations are avoided. However, detrimental indirect effects from changes in microclimate and soil compaction do affect rare plants, particularly moonworts. Generally, timber harvest prior to the late 1980's did not vary treatment within riparian areas, cutting timber up to the stream channel.

Road construction occurs in conjunction with timber harvest. Roads that cross or run parallel to streams have effects on the channel and vegetation. Roads alter stream drainage patterns by confining the stream, reducing the area within the floodplain, so floodplain interaction is disturbed. This in turn affects riparian habitat and its function. It is speculated that Peck's mariposa lily is spread by bulblets moving downstream during high water flow. Roads, even temporary roads that cross drainages can affect bulblet dispersal. Roads and clear cuts also provide cattle easier access to streams occupied by sensitive plants.

Various other small projects have had localized impacts to sensitive plants and habitat, including spring developments, riparian exclosures, campgrounds, culvert replacement, and fence construction. A recent exclosure on a main tributary of Wolf Creek has resulted in increased cattle pressure upstream within moonwort populations, causing intensive utilization of vegetation, soil, and microsite effects from "post-holing" by livestock. This has had an effect on the populations and habitat; there appears to be a species composition change to earlier seral species and invasion by noxious weeds.

The 747 Fire burned within the northeast part of the project area the summer of 2002. The fire occurred mostly in the North Pasture of the Wind Allotment. In this area it was a high intensity fire; herbaceous vegetation and plant litter were consumed down to bare soil, and resulted in tree death over much of the area. Vegetation has recovered well over the last three years, and has gone through several successional changes. Despite some colonization by non-aggressive noxious weeds (mullein and bull thistle), and invasive plants such as cheatgrass, upland sensitive plant habitat is expected to fully recover. Sensitive plant habitat within the South Prong drainage will be slower to fully recover due to soil sediment affects.

Present activities on Forest Service Administered land within the project area include natural fuels burning and precommercial thinning, noxious weed control, and livestock grazing. The Hardcorner Fuels Project began implementation this year within the Wind Allotment. When completed, burning will occur on 4,428 acres and understory thinning on 840 acres. The Runway Timber Sale, which is a pine thinning of 62 acres within the Wolf Allotment, was completed in 2007. The Rager Wildland Urban Interface project proposes natural fuels burning and precommercial thinning on 4,000 acres adjacent to the Rager Ranger Station. Refer to the noxious weed report for detailed information on noxious weed conditions across the allotments.

The lower portions of the subwatersheds are mostly privately owned, with minor amounts of other federally owned land. Most of the land base is being used for rangeland cattle grazing. Minor amounts of land are set aside for irrigated hay fields. The amount of sensitive plant occurrence and condition of habitat is unknown. Some large meadow areas, such as along Beaver Creek adjacent to the forest boundary, appear to be in good condition; there is an abundance of shrubs and other riparian vegetation. Lower in the watershed, channelization and wide shallow streams are evident. Noxious weeds are on the increase on private land in both riparian and upland habitats; medusahead rye is of particular concern. Medusahead is an aggressive annual grass that has the potential to seriously degrade the habitat of Henderson's ricegrass, Deschutes milkvetch, and world thelopody.

Future projects include herbicide spraying of noxious weeds across the Ochoco National Forest. This effort is tiered to the programmatic Region 6 Preventing and Managing Invasive Plants EIS. This Regional EIS gives Forests the ability to use newer herbicides; the Ochoco NF analysis would be site specific for treatment of all weed sites on the District. Having the ability to choose the most effective herbicide based on noxious weed species and the ability to treat all known infestations, if necessary, would reduce the spread potential of weeds. Other planned activities include the Upper Beaver Vegetation Management project and the Sugar Creek Campground Vegetation project. Sugar Creek will be implemented in 2008; Upper Beaver is planned for 2009.

Direct and Indirect Effects – Alternative 2

This alternative proposes different utilization rates, stubble height, and streambank alteration depending on whether the pasture is considered in satisfactory, at risk, or unsatisfactory condition. The above management standards are generally more restrictive than Forest Plan standards (Alternative 3).

Alternative 2 would result in a biological evaluation determination of "May impact individuals or habitat but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species" for all sensitive species with habitat in the Southside Allotments. Livestock grazing has a two-fold effect on rare plants: 1) Direct physical impacts from plant consumption and trampling, and 2) Indirect ecological impacts through changes in habitat microclimate and selective grazing that changes species composition. Physical impacts result in loss of plant vigor, a decline in reproduction, and occasionally up-rooting (Stoddart et al 1975).

Indirect impacts from grazing pressure changes plant species composition by favoring less palatable species, reducing the cover of native plants, and allowing invasion by non-native plants. Changes to soil surface characteristics also occurs (Hann et al 1997), including soil compaction and related reduction in water infiltration, reduced soil litter, and disruption of cryptogrammic soil crust (Stoddart et al 1975).

Mitigation measures are a part of alternative design. The measures proposed (see Chapter 2), such as keeping salt blocks ¼ mile away from sensitive plant locations would somewhat reduce direct effects to populations and habitat.

Riparian Habitat

Livestock grazing under Alternative 2 would impact Peck's mariposa lily, porcupine and inland sedge and moonworts. The Southside Allotments project area contains approximately 4% of the global population of Peck's mariposa lily. Direct impacts to the plants occur from trampling and consumption of the basal leaf. Grazing of the basal leaf each year can reduce the life of an individual by limiting the amount of photosynthate available for bulb renewal (Fiedler 1987). Intensive lengthy and repetitive grazing can also change the microclimate of streams and meadows in the long-term due to streambank disturbance, soil compaction, and vegetation changes. Peck's mariposa lily appears to require a particular moisture regime. The requirements of this condition are not well known due to lack of study, however observations show that altering the hydrology of stream channels is one of the largest threats to the species (Fredricks 1989). Peck's lily habitat occupies many of the riparian areas within the allotments. Some of these areas are currently not meeting desired conditions due to poor streambank stability, lack of vegetative cover, and low ecological indicator species such as arnica and bulbous bluegrass.

Peck's mariposa lily does appear to tolerate some grazing pressure and there are indications that grazing can facilitate habitat in a mid-seral successional stage that benefits this plant. However, physical attributes of riparian areas need to be in good condition for this effect to be beneficial. Adaptive management proposed in Alternative 2 sets utilization and disturbance standards based on range condition. Due to the current condition of rangeland within the allotments, mostly in an at-risk condition, all but five pastures (Miles, Bronco, South-Wind, North-Heisler, and Bear) are expected to have more restrictive grazing standards, would have less grazing impacts and would move towards desired conditions more quickly than Alternative 3.

Grazing also affects moonwort, porcupine and inland sedge, riparian moss and lichen habitat through changes in microclimate and trampling. A direct effect of vegetative loss due to herbivory appears to be incidental for moonwort; although some moonwort populations, such as those on the tributary of Wolf Creek along the 4290 road, receive heavy grazing pressure and consumption. Repeated removal of the sporangia before dispersal could reduce reproductive potential over time (Beatty et al 2003). Habitat modification from grazing also affects moonwort populations. These species occupy rare, ecologically diverse habitats, and rely on mycorrhizal fungi for water and nutrients. This mycorrhizal relationship is very sensitive to changes in soil moisture, changes in temperature and humidity, or light regime (Potash 1998). Changes to the grazing standards proposed in this alternative are expected to result in minor benefits to moonworts.

Porcupine sedge and inland sedge are palatable species; both direct effects of consumption and modification of habitat through long-term indirect effects are threats to these species. Both require a persistent water source connected to a water table, free of channelization and out of balance width-depth ratios. Less grazing pressure associated with Alternative 2 standards would benefit these species in the long-term.

Silverskin lichen and margined black knotmoss are less likely to be subjected to direct effects from grazing. They are probably not palatable, however it is possible cattle could scrape the rocks they attach to with hooves while watering in the stream channel. The silverskin lichen site on Wolf Creek is somewhat protected from livestock hooves due to steep topography surrounding the site. Indirect threats to these species are those actions that alter water quality – including chemistry, temperature, level, and sediment load (Lesher et al. 2000). Aquatic systems are particularly responsive to chemical stress.

The length of time livestock spend in riparian habitat increases the potential for detrimental effects. Alternative 2 would impart more stringent utilization and require greater stubble height in all but five pastures in the project area, which is expected to result in somewhat less time spent in riparian habitat

Upland Habitat

Plant phenology is important when discussing grazing effects. Direct effects to milkvetch are expected to be minor. Deschutes milkvetch and transparent milkvetch are prostrate plants and herbivory would be incidental. No grazing of this sensitive milkvetch has been observed at the site in the Wolf Allotment. Deschutes milkvetch occupies forested and shrub transition habitat, while transparent milkvetch occupies scabland habitat. Cattle do not tend to congregate in these places for any length of time and vegetation utilization is not usually detrimental. Upland vegetation standards for this alternative are associated with shrub species; herbaceous utilization and subsequent indirect effects of compaction are not expected to change.

Henderson's ricegrass is a small bunchgrass that occurs on shallow scablands with little vegetation; the greatest potential for impacts comes from soil disturbance. If conditions are moist, livestock walking through these clay soils can cause changes in microclimate surrounding individual ricegrass plants, interrupt moisture flow, and reduce infiltration through compaction. This is especially true for most of the Southside Allotments area; scabland habitat is abundant, with 97% of the documented ricegrass populations on the district, and large quantities of suitable habitat. Again, under this alternative, utilization and disturbance is not expected to change.

World thelopody occurs on sparse, dry pine and juniper slopes; probable habitat for occupation occurs in the Wind Allotment on lower slopes draining into the South Fork of the John Day River. This species is highly palatable to livestock, which may prevent plants from reproducing. Effects to habitat are expected to be minor; cattle do not spend much time in these forage-limited environments.

Cumulative Effects – Alternative 2

Cumulative effects of past, present and future forest activities on sensitive plants and habitat are the same as those analyzed under Alternative 1. Additional future activities include the continuation of grazing proposed under Alternative 2. Riparian and upland habitat would not move toward desired conditions at the same rate as with an elimination of livestock. Grazing effects would continue to incrementally add to present human-use related conditions. Watersheds in the Ochoco Mountains are spring-fed systems, the headwaters of which occur on National Forest land. Having riparian areas in good condition in the headwaters is critical to overall watershed health. If a pasture is considered unsatisfactory or in an at-risk condition Alternative 2 proposes somewhat more restrictive grazing standards than are currently in use. At this time, five pastures are considered satisfactory and the rest are considered at risk. Those pastures in an at-risk condition are expected to slowly improve over the long-term. The proposed standards are primarily targeted toward riparian areas; therefore the uplands are expected to continue in their current satisfactory state. One

could logically conclude there would be more grazing pressure in the uplands as a result of less time spent in riparian areas. This could negatively affect Deschutes and transparent milkvetch, Henderson's ricegrass and world thelopody habitat in the long-term, while improving habitat for riparian rare plants.

Direct and Indirect Effects – Alternative 3

This alternative is the continuation of current grazing standards as set by the Ochoco NF Land and Resource Management Plan. Continuing livestock grazing at current standards is expected to perpetuate current conditions and would result in a biological evaluation determination of "May impact individuals or habitat but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species" for all sensitive species with habitat in the Southside Allotments.

Riparian Habitat

All but five pastures are considered at risk. This indicates that vegetation is not at potential and stream conditions are vulnerable due to cutbanks, headcuts, and/or wide and shallow channels. The physical conditions within riparian areas effect vegetation (Kauffman and Krueger 1984), and rare plant habitat. Continued grazing impacts may contribute to affects on long-term viability of Peck's mariposa lily. This is based on current and projected trends in riparian area function, which is related to the survival of this rare plant. The Wolf Allotment contains several important populations, one pasture (Widow) is on the low end of the at-risk category for riparian areas due to channel type. These are low gradient, meandering streams of deep alluvium that are susceptible to streambank width/depth ratio instability, resulting in downcutting (Andazola 2006). Loss of riparian vegetation, an excess of early seral vegetation, and declining wetted area next to the stream channel results. This condition is expected to decline further if current grazing levels are maintained, indirectly affecting populations through loss of habitat function. Wetted area within riparian zones has decreased from incised stream channels, decreasing the amount of Peck's lily habitat and therefore increasing the potential for effects from grazing.

Continuing current management standards is also expected to detrimentally effect populations of moonworts in the long-term. These small fern-like plants occur in meadows and springs/boggy areas adjacent to streams. Over-utilization of these areas by livestock, such as observed on the Wolf Creek tributary along the 4290 road, can change species composition from deep-rooted perennial plants such as sedges and rushes to shallow-rooted plants including Kentucky bluegrass and annual forbs. This decreases the water holding capacity of the area, shrinking the size of meadows, thus making both direct and indirect effects more probable. For moonwort populations to expand, habitat must be in good condition with mycorrhizal relationships, described under Alternative 2, intact and present at the receiving end of spore dispersal (Beatty et al. 2003). Continued degredation of riparian habitat under Alternative 3 is expected to cause a slow decline in moonwort habitat. This is not expected to affect the viability of these species due to their widespread distribution and the small percentage of total population within the project area.

Detrimental effects to porcupine and inland sedge, knotmoss and silverskin lichen habitat is expected under this alternative in at-risk pastures. Long-term indirect effects to stream morphology and riparian vegetation would continue, from livestock's role in cumulative impacts to streams as a result of current grazing management. This is based on the same rationale as the effects to Peck's mariposa lily habitat. As riparian area function decreases, the amount of habitat decreases and it is less likely to support rare species. Lichens are good indicators of water quality and constancy of stream flow (Lesher et al. 2000). Long-term indirect effects such as stream

downcutting and changes to water quality through feces introduction may affect nonvascular plant habitat.

Upland Habitat

As in Alternative 2, direct effects to rare upland species is expected to be minimal. Maintaining livestock grazing at current management levels may however result in degraded habitat. Six of the 13 pastures are rated in an at-risk condition for upland vegetation, due to invasive species such as cheatgrass and ventenata grass, amount of bare ground, and decreasing amounts of palatable plants. In the long-term if grazing management is maintained at current trends, palatable forage species would continue to be over-utilized. This can result in a two-fold effect: 1) species composition would continue to change to early seral plant communities dominated by annuals and less palatable plants; 2) cattle would have to range further to find forage, which is expected to cause more utilization and trailing through rare upland species habitats. In degraded conditions, native plant communities are more susceptible to invasion by exotic plants such as ventenata grass and medusahead rye (Hann et al 1997).

Cumulative Effects – Alternative 3

Cumulative effects of past, present and future forest activities on sensitive plants and habitat are the same as those analyzed under Alternative 1. Under Alternative 3 riparian and upland habitat would move toward desired conditions slower than with elimination of livestock, or with the more-restrictive standards proposed in Alternative 2. Grazing effects would continue to be an incremental increase to present human-use related conditions, and improvement would probably take more than 15 years, or remain static. Sensitive plant populations, especially Peck's mariposa lily, would be vulnerable to decline in numbers and vigor in the long-term.

Direct and Indirect Effects – Alternative 4

This alternative proposes several changes to the grazing scheme, including:

- ✓ Allowing use in the Wolf Exclosure pasture
- ✓ Adding a fence to split the Widow Pasture into two pastures (Widow and Quicksand)
- ✓ Changing the Wind Allotment rotation to using the South Pasture early season instead of the PACFISH-related late season use.

The adaptive management proposal from Alternative 2 would apply to Alternative 4. This alternative would result in a biological evaluation determination of "May impact individuals or habitat but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species" for all sensitive species with habitat in the Southside Allotments.

Riparian Habitat

The above changes would have an effect on riparian sensitive species habitat. The Wolf Exclosure is a narrow pasture, 1,400 acres in size encompassing approximately 5.5 miles of Wolf Creek. The proposal is to graze within the exclosure for 40 days (40% of the permitted time on the allotment) with 40 pair of cattle. Livestock have not grazed this exclosure since 1988. Riparian vegetation is in fairly good condition, with sedges and rushes dominating the herbaceous component, and there is good shrub establishment throughout. This stream is a narrow v-shaped canyon with a major gravel road running parallel above the stream the entire length. There are no documented rare plants within this exclosure; therefore no direct effects to individuals would occur. There is habitat for Peck's mariposa lily (limited), inland and porcupine sedges, silverskin lichen, and black margined knotmoss. As this is a steep, confined narrow canyon with slopes averaging 35%, it is

likely that livestock would remain along the creek the entire duration while in the pasture. Observations elsewhere on the district (Jackson Creek) of similar topography reveal that cattle trail up and down the creek and do not attempt to use the side slopes.

There is a high likelihood that cattle grazing this confined area would cause negative effects in the short-term from bank sloughing, soil compaction and vegetation trampling. Long-term effects include stream channel degradation, increased amounts of bare soil, and reduced aerial extent of riparian vegetation (Hann et al. 1997). The exclosure is a small area (<4%) within the allotment that is currently unavailable for grazing. Allowing 40 days of livestock grazing within 4% of the allotment acreage, where use would be confined due to topography, would result in detrimental effects to rare plant habitat.

The proposal to separate the Widow Pasture by an east-west fence would split the large (8,700 acres) area in half. The pasture has a 1,000' elevation difference, and the Permittee feels that using the lower, south end earlier in the year would allow more control of livestock to utilize upland forage before curing and reduce use in the riparian areas. This would be a positive effect on Peck's mariposa lily populations, the bulk of which lie within the Widow Pasture. Less time spent along creeks would reduce the possibility of basal leaf consumption and trampling. Habitat for the other rare species would also improve in the long-term with less use.

The proposed change to graze South Wind Pasture early in the season is also expected to be a positive change for riparian habitat. This portion of the allotment is lower elevation, and similar to the Widow situation, upland forage becomes less palatable in late summer, causing livestock to graze along streams.

Upland Species

The proposed changes in this alternative would result in increased use in upland habitat, which could result in more soil disturbance and compaction within Deschutes milkvetch habitat. Increased herbivory could exacerbate the at-risk pastures into a downward trend through species composition changes to less desirable plants and those more weedy in nature. It is unlikely this effect would cause a decline in viability of this species. As long as normal range-readiness guidelines are used this change is not expected to affect habitat of transparent milkvetch, Henderson's ricegrass, or world thelopody, which occur on scablands. Scablands are not expected to see a substantial increase in livestock use.

Cumulative Effects – Alternative 4

Cumulative effects of past, present and future forest activities on sensitive plants and habitat are the same as those analyzed under Alternative 1. With the exception of the Wolf Exclosure pasture, riparian habitat would move toward desired conditions more quickly than Alternatives 2 or 3, but slower than with complete elimination of livestock. Riparian habitat within the Wolf Exclosure would be negatively affected by the introduction of livestock grazing in the long-term. This is particularly true due to the cumulative impacts from the road running parallel to the stream. This artificially confines the channel, and increases sediment delivery. Many places along the road have a steep fill slope bordering the stream terrace. Because of vehicle traffic and human activity, there are many noxious weed infestations along the road. In addition, there are Canada thistle populations within the riparian area itself.

Summary

Termination of livestock grazing (Alternative 1) is expected to enhance rare plant species viability, and move the allotments toward the desired future condition faster than the other alternatives. This includes desired conditions of upland and riparian plant communities, and moving toward removing species from the Sensitive Species List. However, this does not meet the purpose of the project as stated in Chapter 1 of the EA. Livestock grazing under Alternative 2 would affect rare species and habitat, while slowly moving toward desired conditions, and therefore ensuring rare species viability in the future (>50 years). Most pastures are close to being in satisfactory condition, and some have an upward trend. Continuing grazing as currently implemented (Alternative 3) would affect rare species, and vegetative conditions are expected to remain static in the long-term. Alternative 4, has several proposals that would be result in improved riparian and upland habitat, however the use of the exclosure pasture would outweigh these benefits in the long-term, making Alternative 2 the most desirable for rare species.

Management Indicator Species: Primary Cavity Excavators

The Forest Plan identifies primary cavity excavator (PCE), pileated woodpeckers and Northern flicker species as Management Indicator Species for habitats and associated wildlife species where snags and dead wood habitats are an important feature. In assessing the potential effects of the proposed alternatives, it was determined that only those species using hardwood habitats and hardwood snags (cottonwood and aspen) to a large extent would be affected by the activities proposed in each of the three allotments. As such, only the red-naped sapsucker and the downy woodpecker are addressed in this assessment. This is based upon literature descriptions of their habitat needs, which is cited in the discussions below. All other PCE species, the pileated woodpecker and the Northern flicker would not be impacted by the grazing activities proposed with this action.

Time Frames

Short Term – 0-5 years; period of time in which direct and indirect effects of grazing actions in any one year would be detectable and measurable.

Mid Term – 5-30 years; period of time in which direct effects would no longer be detectable, but indirect effects would still be present; time frame in which certain habitat components for the following species would be expected to be developed.

Long Term – 30+ years; period of time in which indirect effects are melded into and generally indistinguishable from other cumulative direct and indirect affects of other actions and management activities.

Affected Environment

Red-Naped Sapsucker and Downy Woodpecker

Red-naped woodpecker populations appear to be statistically stable across their range and downy woodpecker populations appear to be declining across their range for the past 26 years (Table 3-11) based upon North American Breeding Bird Survey information (Sauer et. Al. 2007). Because of a paucity of data in survey routes closest to the analysis area (Logdell #69013 and Barnhouse #69213) a summary of survey data for Oregon was looked at for local trends in population of these two birds. Declines in population trend of both species for Oregon are shown in Table 3-9 for all time periods except red-naped sapsucker from 1966 to 1979. Until 1983, red-naped sapsucker and red-breasted sapsucker were considered to be color variants of the yellow-bellied sapsucker in many states, including Oregon, so no data was collected for these birds. None of the trends are

considered to be significant (P>0.5) except for downy woodpecker from 1980 to 2006 where a population decline of nearly 3 percent per year was significant at the 95% confidence interval.

Table 3-9. North American Breeding Bird Survey Trend Results Range-Wide

1966-2006 Trends				1966-1979 Trends			1980-2006 Trends		
Species	Trend*	P-value **	Number of survey routes	Trend	P-value	Number of survey routes	Trend	P-value	Number of survey routes
Red-naped Sapsucker	1.08	0.308	274	2.74	0.496	49	1.51	0.104	266
Downy Woodpecker	-0.14	0.385	2688	0.30	0.558	1357	-0.51	0.005	2547

Table 3-10. North American Breeding Bird Survey Trend Results for Oregon

1966-2006 Trends				1966-1979 Trends			1980-2006 Trends		
Species	Trend*	P-value **	Number of survey routes	Trend	P-value	Number of survey routes	Trend	P-value	Number of survey routes
Red-naped Sapsucker	-3.03	0.572	22	---	---	---	-4.20	0.403	21
Downy Woodpecker	-2.43	0.102	46	-3.01	0.482	13	-2.96	0.001	45

*Estimated trend, summarized as a % change/year.
**Because the trends are estimates, a statistical test was conducted to determine whether the trend is significantly different from 0, and results of the test are presented as p values, indicating the significance of the trend. P greater than 0.05 indicates that the null hypothesis cannot be rejected and that the trend is different from 0.

Red-naped Sapsuckers breed in higher montane forests and mixed woodlands, particularly aspen groves. It avoids woodland edges (Dobkin et al. 1995). In breeding areas, this species drills sap wells in conifers, aspen or willow, and defends a constantly maintained network of wells from other species and other sapsuckers (Walters et al. 2002). It also forages for insects, particularly ants, when feeding young.

Most breeding activity takes place in May and June. Typically, a single brood is raised, but the species will re-nest following nest failure. Cavity nests are placed in either live or dead trees. Aspens are highly favored for nest locations, but sapsuckers will also nest in areas where aspens are not present (Li and Martin 1991, Daily 1993). Dead trees are more often used in coniferous forests (McClelland and McClelland 2000). In several studies, all or almost all nest trees were infected with heartwood decay fungus (Crocket and Hadow 1975, Daily 1993, Walters et al. 2002). Larger-diameter trees are favored for nesting. The same nest-cavity may be re-used from year to

year, but more commonly a new cavity is excavated in the same nest tree, often higher up as fungal infection spreads (Walters et al. 2002). In winter and during migration, Red-naped Sapsuckers may be found in a variety of lower-elevation habitats, including orchards and pine-oak and juniper woodlands.

Preference for aspen habitat and avoidance of woodland edges makes Red-naped Sapsucker vulnerable to any processes resulting in fragmentation or decline of aspen patches. In Nevada, this species disappeared for over a decade from the Toiyabe Range due to aspen cutting and extensive road-building for logging (Dobkin and Wilcox 1986). Degradation of woodland and montane riparian areas over the past decades due to livestock grazing and fire suppression has reduced available habitat (Dobkin et al. 1995).

Downy Woodpeckers typically inhabit broadleaved and mixed forests, especially those with black cottonwood and willow. They are also often found in residential areas, along rivers and streams, and in orchards, city parks, and even agricultural areas as long as there are sufficient trees nearby. They are sometimes found in conifer forests after the breeding season and especially in burned areas. However, downy woodpeckers generally prefer deciduous environments in contrast to hairy woodpeckers, which may often be found in coniferous forests.

Downy woodpeckers are common and widespread throughout their range and seem to have adapted to human-inhabited areas. They can take advantage of second-growth and ornamental plantings, which has resulted in greater numbers of downy than hairy woodpeckers in the highly populated zones of western Oregon. There are three recognized subspecies in Oregon: those found in the far eastern portions of the state, those found along the eastern slopes of the Cascades, and those found in western Oregon. Although the North American Breeding Bird Survey information shows downy woodpeckers in population decline, anecdotal literature sources relate this bird as having stable or even increasing populations. Population declines are also anecdotally attributed to timber harvest practices of reducing snag habitat by many literature sources.

A little over 70 individual aspen sites exist in the Project Area in small patches of less than ¼ acre to several acres in size totaling approximately 25 acres. They are generally mature or over mature trees with limited to non-existent reproduction in the understory. Suitable nesting habitat is present and often utilized by red-naped sapsuckers and downy woodpeckers. Each allotment contains some aspen habitat in the form of scattered patches along stream channels and with upland seeps and springs. They are widely scattered and generally do not contribute to a larger hardwood habitat feature. Individual patches may support a pair of sapsuckers or woodpeckers, but birds are likely to rely upon adjacent hardwood (alder and willows) and conifer habitats to meet foraging needs. In most cases there are not enough larger aspen trees to support foraging needs for these species.

Cottonwood habitat occurs on 13-17 sites in the Project Area totaling approximately 3 acres. Individual sites are often composed of a single or several individual trees. Individual trees may provide suitable nesting habitat, however foraging habitat provided by surrounding hardwoods and conifers would be required for these trees to be utilized. Individual stands do not contain enough trees to sustain foraging needs for local populations. These habitats do not contribute measurably to either species' populations.

Conifer habitats may provide some habitat needs for red-naped sapsuckers and downy woodpeckers in the Project Area. Sighting records indicate both species are present.

Direct and Indirect Effects – Alternative 1

Red-Naped Sapsucker and Downy Woodpecker

The primary effects of Alternative 1 on habitat for the red-naped sapsucker and downy woodpecker would be in an increase in aspen and cottonwood recruitment due to the lack of grazing on aspen and cottonwood sprouts and seedlings. Studies on neighboring forests comparing excluded and non-excluded aspen sites show a measurable difference in sucker recruitment between areas grazed by cattle and areas excluded from cattle grazing (Cobb and Vavra 2003).

In the short term, increased sprouting of seedlings and suckers would be anticipated for aspen in existing stands. The extent of increase would be dependent upon the level of browsing by wild ungulates. Existing nesting habitat would remain unchanged.

Cottonwood may experience additional sprouting or seedling development, but would likely be less dramatic than with aspen due to the limited extent of its distribution. Individual seedlings may be noted in the short term. Existing nesting habitat would remain unchanged.

The effects to the red-naped sapsucker and downy woodpecker nesting and foraging habitat would be minimal. Acres of suitable habitat would be largely unchanged and the quality of snags and live nesting trees would be largely unchanged.

Mid Term

In the mid term, aspen habitat would be expected to expand and increase in size (area covered), age class and age diversity, and diversity of structure in the middle and lower canopies. This increase assumes a return of natural disturbance regimes, such as fire, to the forests. Additional sapling, pole, and small log sized aspen trees would develop in the mid term. Results documented by Cobb and Vavra (2003) indicate the possibility of increases of the magnitude of hundreds to thousands of aspen stems per acre developing with the reduction or absence of browsing pressure. Total number of aspen habitats and communities would remain unchanged. With no resumption of disturbance factors, it is likely that there would be a continued decline in habitat extent, even with no livestock grazing.

In cottonwood habitats, habitat changes would be less dramatic. New, individual sapling and pole sized cottonwood trees would be anticipated in the vicinity of existing cottonwood trees. However, this may only be of the magnitude of one to several individual trees per existing site. New sites may begin to develop as seedlings sprout away from the parent trees. Such new habitats would not be available for cavity excavators until late into the mid term.

The effects to the red-naped sapsucker and downy woodpecker would be measurable in the later mid-term, given the disturbance assumption. The existing conditions of nesting and foraging habitat would improve later in the mid term as larger trees develop from saplings and sprouts. As developing saplings and small trees increase in size, additional foraging and nesting habitats would increase. Acres of suitable habitat would gradually increase in the aspen habitats in the absence of cattle browsing. The extent of expansion would vary between individual stands, depending upon other limiting factors, such as the area of riparian influence, soil conditions, and the extent of deer and elk browsing. The increase in suitable habitat, through access to more nesting trees and snags, and foraging areas, however, may not measurably expand the populations of these species in the mid term.

While more nesting and foraging habitats would be available, it would not come through dramatic expansion of habitat. Thus, territorial interactions and other limits on populations may limit the number of new reproducing pairs supported by these changes. Marshall et al. report densities of red-naped sapsuckers in hardwood habitats as less than 3 birds per 100 acres (2003). They also report downy woodpecker densities in hardwood habitats as 3.6 pairs per 100 acres (Marshall et al. 2003). Because of the relatively low densities these species seem to tolerate, it would take dramatic increases in suitable habitat to increase the numbers of individuals or pairs that the project area would be able to support. That would not occur in the mid term. Habitat quality for existing pairs would improve, but habitat for more pairs would not be available.

Long Term

In the long term, continued development of stand structure and stand size would be expected in existing aspen stands, within the limitations of the habitat, and assuming a return of natural disturbance processes and browsing pressure of other ungulates. By this time frame, additional nesting and foraging trees and snags would be present in these aspen stands. Individual stands/aspen habitats would not increase across the project area; existing habitats would develop and mature into higher quality habitat.

In the cottonwood, a measurable increase in individual trees would be noted. However, it would not be dramatic, or result in effective changes to habitat conditions. Individual seedlings that sprouted in the short term would develop in size to support some nesting and foraging activity, and serve as replacement trees for any lost pre-existing cottonwood trees.

Effects to red-naped sapsuckers and downy woodpeckers would be similar to the mid term effects discussed above, at least early into the long term (30-50 years). Habitat quality in aspen, willows and alder habitat would continue to improve, providing more and better nesting and foraging habitat for existing pairs of each species. However, habitat expansion would continue to be incremental, without substantial increases in order to provide habitat for more breeding pairs. Again, territorial interactions between pairs would limit population expansion. Later into the long term (50-100 years), continued increases in habitat may occur such that habitat for more pairs would be available. That, however, would be dependent upon other forces and habitat limitations outside cattle grazing. Limitations on habitat function (riparian conifer habitat, changes to stream channel morphology, capability of the landscape) may prevent meaningful expansion of habitat such that populations for these species increase. Again, habitat quality would improve, but overall habitat availability to support additional pairs may not occur.

Cumulative Effects – Alternative 1

Under Alternative 1, there would be no federal action to add effects to the environment within the Project Area. The following discussion describes the consequences of the No Action alternative.

The absence of grazing would reverse some of the effects described above, as the absence of herbivory would increase reproductive effort of existing aspen and cottonwood habitats. Since aspen and cottonwood are both early successional species, allowing natural disturbance processes to occur (especially fire) will ultimately determine how much improvement in hardwood habitat will occur. Improvements to stream channel habitats would also improve habitat for aspen and cottonwood. In absence of livestock impacting stream channel characteristics in some reaches of the Project Area, recovery of stream channel function and elevation of water tables would improve potential habitat conditions, and may result in expansion of aspen and cottonwood habitat.

With improvement to aspen and cottonwood habitat in the absence of cattle grazing and the diminishing of cumulative effects on those habitats, the cumulative effects to red-naped sapsuckers and downy woodpeckers would also diminish. Gradual improvements to habitat condition described in the direct and indirect effects section would improve habitat for the species.

Direct and Indirect Effects – Alternative 2

Red-Naped Sapsucker and Downy Woodpecker

Alternative 2 would continue grazing of livestock under the adaptive management approach described in Chapter 2 of the EA. The Standards described in Table 2-2 indicate that utilization for riparian hardwood would not occur (once hardwood utilization by cattle was detected through monitoring, grazing of that pasture would cease and the cattle would be moved). For upland hardwood species, Table 2-2 indicates that varying levels of utilization of hardwoods would be permitted, based upon the CPRR for each pasture. For those pastures rated as Satisfactory, a utilization standard of up to 20% for hardwoods may be set. For pastures rated as At Risk, a utilization standard of 10-15% for hardwoods may be set. For pastures rated Unsatisfactory, a utilization standard of < 10% for hardwoods may be set. The EA identifies the CPRR for each of the pastures in the Project Area.

Short Term

In the short term, existing stand conditions in aspen habitats would be maintained as they currently exist. Some new sprouting would occur, however, they would remain susceptible to browsing my cattle. Monitoring protocols and the management standard requiring livestock moves once hardwood utilization occurs may provide some relief from browsing and allow suckers to develop and grow. There are concerns, however, that new sprouts near ground level may escape utilization detection and continue to be suppressed. Upland stands, which make up many of the aspen sites in the Project Area, would be susceptible to browsing. Depending upon the CPRR, up to 20% of the annual growth on accessible aspen shoots could be browsed. This would continue to limit new stand development and the rate that it occurs.

Cottonwood may experience additional sprouting or seedling development, but would likely be less dramatic than with aspen due to the nature of their reproduction. Individual seedlings may be noted in the short term. Existing cottonwood are found in stream channel/riparian areas, and thus would find some protection through the utilizations standards for riparian hardwoods. New seedlings would be less affected by browsing in the general absence of livestock utilization

In the short term, effects to the red-naped sapsucker and downy woodpecker would be minimal. The existing conditions of nesting and foraging habitat would be largely unchanged in the short term. Acres of suitable habitat would be largely unchanged, and the quality of snags and live nesting trees would be largely unchanged. As described above, a measurable change in the number of individual seedlings/saplings would be expected in aspen and cottonwood. However, such trees would not be available for nesting or foraging in the short term, as additional time would be needed for them to grow and mature and be available to these species.

Mid Term

In the mid term, aspen habitats would be expected to expand and increase in size (area covered), age class and age diversity, and diversity of structure in the middle and lower canopies. The extent that stand expansion occurs would depend upon the amount of cattle utilization that occurs and the suppression of new sucker development as a result of livestock grazing. In riparian areas,

protections afforded by the management standards for riparian hardwood utilization would allow for sucker development and stand expansion. Undetected use of new suckers may limit the rate and extent of that expansion. By the late mid-term, some new aspen trees may be large enough to provide suitable nesting habitat. This would depend upon presence of heart rot infections or other mortality agents. Total number of aspen habitats and communities would remain unchanged.

In cottonwood habitats, habitat changes would be less dramatic. New, individual sapling and pole sized cottonwood trees would be anticipated in the vicinity of existing cottonwood trees. However, this may only be of the magnitude of one to several individual trees per existing site. New sites may begin to develop as seedlings sprout away from the parent trees. Such new habitats would not be available for cavity excavators until late into the mid term.

The effects to the red-naped sapsucker and downy woodpecker would be measurable. The existing conditions of nesting and foraging habitat would improve later in the mid term as larger trees develop from saplings and sprouts. As developing saplings and small trees increase in size, additional foraging and nesting habitats would increase. Acres of suitable habitat would gradually increase in the aspen habitats in. Continued livestock browsing in the upland, as well as undetected use in the riparian areas would slow the rate of that expansion, particularly when compared to Alternative 1. The extent of expansion would vary between individual stands depending upon the amount of utilization each stand is exposed to, as well as other limiting factors, such as the area of riparian influence, soil conditions, and the extent of deer and elk browsing. The increase in suitable habitat, through access to more nesting trees and snags, and foraging areas, however, may not measurably expand the populations of these species in the mid term.

While more nesting and foraging habitats would be available, it would not come through dramatic expansion of habitat. Thus, territorial interactions and other limits on populations may limit the number of new reproducing pairs supported by these changes. Marshall et al. report densities of red-naped sapsuckers in hardwood habitats as less than 3 birds per 100 acres (2003). They also report downy woodpecker densities in hardwood habitats as 3.6 pairs per 100 acres (Marshall et al. 2003). Because of the relatively low densities these species seem to tolerate, it would take dramatic increases in suitable habitat to increase the numbers of individuals or pairs that the project area would be able to support. That would not occur in the mid term with Alternative 2. Habitat quality for existing pairs would improve, but habitat for more pairs would not be available.

Long Term

In the long term, continued development of stand structure and stand size would be expected in existing aspen stands, within the limitations of the habitat and browsing pressure of cattle and other ungulates, particularly in upland areas. By this time frame, additional nesting and foraging trees and snags would be present in these aspen stands. Individual stands/aspen habitats would not increase across the project area; existing habitats would develop and mature into higher quality habitat. Those habitats that maintain effective exclosures preventing or reducing browsing pressure on new suckers would also develop and improve habitat conditions.

In the cottonwood, a measurable increase in individual trees would be noted. However, it would not be dramatic, or result in effective changes to habitat conditions. Individual seedlings that sprouted in the short term would develop in size to support some nesting and foraging activity, and serve as replacement trees for any lost pre-existing cottonwood trees.

Effects to red-naped sapsuckers and downy woodpeckers would be similar to the mid term effects discussed above, at least early into the long term (30-50 years). Habitat quality in aspen, willows and alder habitat would continue to improve, providing more and better nesting and foraging

habitat for existing pairs of each species. However, habitat expansion would continue to incremental, with out substantial increases in order to provide habitat for more breeding pairs. Again, territorial interactions between pairs would limit population expansion. Later into the long term (50-100 years), continued increases in habitat may occur such that habitat for more pairs would be available. That, however, would be dependent upon other forces and habitat limitations, including cattle browsing. Limitations on habitat function (riparian conifer habitat, changes to stream channel morphology, capability of the landscape) may prevent meaningful expansion of habitat such that populations for these species increase. Again, habitat quality would improve, but overall habitat availability to support additional pairs may not occur.

Cumulative Effects – Alternative 2

The Cumulative Effects section for Alterative 1 describes the cumulative effects of past, present, and reasonably foreseeable future actions in the Project Area. Alternative 2 would contribute to the cumulative effects of past, present, and reasonably foreseeable future actions on red-naped sapsuckers and down woodpeckers. Alternative 2 would result in browsing of upland aspen habitats, which would affect the rate of replacement and expansion of existing aspen habitats. In the late mid to long term, those affects would be realized by populations of these cavity excavators, when comparing to the effects of Alternative 1 in the same time frames. Habitat expansion and improvement would be expected even with the cumulative effects of this alternative and other actions. For the red-naped sapsucker and downy woodpecker, acres of suitable habitat would not change to the extent that additional reproductive pairs would find available aspen and cottonwood habitat in the project area.

Direct and Indirect Effects – Alternative 3

Red-Naped Sapsucker and Downy Woodpecker

Alternative 3 would continue grazing of livestock cattle as it is currently managed and described in Chapter 2 of the EA. The Standards described in Table 2-2 indicate that utilization for riparian hardwood would not occur (once hardwood utilization by cattle was detected through monitoring, grazing of that pasture would cease and the cattle would be moved). For upland aspen habitats, a specific standard for hardwoods is not identified in the Forest Plan. However, the Forest Plan does discuss and set standards for shrub utilization, and it refers to percent utilization of existing year's growth. Table 4-31 in the Forest Plan identifies shrubland community utilization for satisfactory allotments as 40%, and 0-25% for unsatisfactory allotments.

Short Term

In the short term, existing stand conditions in aspen habitats would be maintained as they currently exist. Some new sprouting would occur, however, they would remain susceptible to browsing my cattle. Monitoring protocols and the management standard requiring livestock moves once hardwood utilization in riparian areas occurs may provide some relief from browsing and allow suckers to develop and grow. There are concerns, however, that new sprouts near ground level may escape utilization detection and continue to be suppressed. Upland stands, which make up many of the aspen sites in the Project Area, would be susceptible to browsing. Up to 50% of annual growth may be consumed with this alternative. Given the existing condition and the application of this management strategy since the Forest Plan inception, it is unlikely measurable improvement in upland aspen habitats would occur. Very little reproduction of upland aspen habitats would occur. Exceptions would be those habitats that maintain effective exclosures preventing or reducing browsing pressure on new suckers.

Cottonwood may experience additional sprouting or seedling development, but would likely be less dramatic than with aspen due to the nature of their reproduction. Individual seedlings may be noted in the short term. Existing cottonwood are found in stream channel/riparian areas, and thus would find some protection through the utilizations standards for riparian hardwoods. New seedlings would be less affected by browsing in the general absence of livestock utilization

In the short term, effects to the red-naped sapsucker and downy woodpecker would be minimal. The existing conditions of nesting and foraging habitat would be largely unchanged in the short term. Acres of suitable habitat would be largely unchanged, and the quality of snags and live nesting trees would be largely unchanged. As described above, a measurable change in the number of individual seedlings/saplings would be expected in aspen and cottonwood in the riparian areas. However, such trees would not be available for nesting or foraging in the short term, as additional time would be needed for them to grow and mature and be available to these species.

Mid Term

In the mid term, little expansion of aspen habitats would be expected. Browsing by livestock, as well as the cumulative effects of other actions would continue to suppress reproduction in these stands. Some new growth would likely occur, however, the number of suckers exceeding a suppressive browse height would only work to replace existing trees, rather than expand the stands. Exceptions would be those habitats that maintain effective exclosures preventing or reducing browsing pressure on new suckers.

In cottonwood habitats, habitat changes would be even less dramatic. New, individual sapling and pole sized cottonwood trees would be anticipated in the vicinity of existing cottonwood trees. However, this may only be of the magnitude of one to several individual trees per existing site. New sites may begin to develop as seedlings sprout away from the parent trees. Such new habitats would not be available for cavity excavators until late into the mid term.

The effects to the red-naped sapsucker and downy woodpecker would be measurable. The existing condition of aspen habitats would be maintained in the short to early mid-term, and decline into the late mid-term. Over this time period, habitat for the species would decline as the absence of replacement trees fails to replace older mature aspen as they die and disappear. Few aspen would provide fewer foraging and nesting habitats for the species. Cottonwood trees may develop into suitable nesting habitats; however, their limited abundance would not affect populations either through expansion or maintaining of existing numbers of pairs.

Long Term

In the long term, aspen habitats in the Project Area would continue to decline or disappear. Continued effects of livestock browsing in the upland areas would prevent replacement of disappearing mature trees; the smallest habitats would be most vulnerable. Exceptions would be those habitats that maintain effective exclosures preventing or reducing browsing pressure on new suckers.

In the cottonwood, a measurable increase in individual trees would be noted. However, it would not be dramatic, or result in effective changes to habitat conditions. Individual seedlings that sprouted in the short term would develop in size to support some nesting and foraging activity, and serve as replacement trees for any lost pre-existing cottonwood trees.

Effects to red-naped sapsuckers and downy woodpeckers would be a decline in suitable aspen habitat in upland areas. Riparian habitats would likely maintain current conditions, or possibly

continue a general downward trend, depending upon the extent of browsing that occurs and the cumulative effects described below. Habitat for the species would decline across the project area.

Cumulative Effects – Alternative 3

The Cumulative Effects section for Alterative 1 describes the cumulative effects of past, present, and reasonably foreseeable future actions in the Project Area.

Alternative 3 would contribute to the cumulative effects of past, present, and reasonably foreseeable future actions on red-naped sapsuckers and down woodpeckers. Alternative 3 would result in browsing of upland aspen habitats, which would affect the rate of replacement and expansion of existing aspen habitats. Upland aspen communities not protected by exclosures would be expected to decline and disappear in the long term, further reducing available habitat for the red-naped sapsucker and downy woodpecker. In the late mid to long term, those affects would be realized by declining populations of these cavity excavators, when comparing to the effects of Alternative 1 in the same time frames. Riparian areas would be expected to maintain their existing aspen and cottonwood habitats.

Direct and Indirect Effects – Alternative 4

Red-Naped Sapsucker and Downy Woodpecker

The direct and indirect effects of Alternative 4 would be similar to Alternative 2, as the same grazing standards and adaptive management strategy would be applied. The primary differences include the proposal to change the grazing rotation in the Wind Creek Allotment and to allow grazing in the Riparian Corridor pasture of the Wolf Creek Allotment as described in Chapter 2 of the EA.

Wind Creek Allotment Pasture Rotation

The alternative proposes to change the pasture rotation schedule in the allotment. Presence of ESA listed steelhead spawning habitat in the South Pasture has precluded it's use prior to July 15 as per direction from the Programmatic Consultation and the Project Design Criteria identified in that consultation. The purpose of this restriction is to prevent take of steelhead through the disturbance of spawning steelhead and active redds. Currently, cattle enter the North Pasture in early June, and graze there through the middle/end of July. After July 15th, cattle are moved to the South Pasture where they would graze through the end of their term, or as conditions allow.

The timing of grazing has the potential to influence the effects on aspen and cottonwood. Browsing of aspen and cottonwood by livestock generally occurs later in the summer, as grasses and other forage cure out and become less palatable. Pastures where late season grazing occurs have the greatest potential for browsing of aspen and cottonwood.

With implementation of Alternative 4, cattle browsing of cottonwood and aspen would decline. Early season grazing would reduce the browsing pressure by cattle in the pasture, and would enhance sucker development and reproduction of both habitat types. The effect on these species, however, would be minimal, as new habitats would not be created, only improvements to existing ones. Cumulative effects of other actions and activities would continue to limit the expansion and new development of additional habitats in the pasture. Existing habitat conditions would improve, and be sustainable for a longer time period.

In the North Pasture the change in rotation to a late season grazing period would increase cattle browsing of aspen and cottonwood. This would be particularly true in the upland aspen communities where some browsing is permitted. Effects would be the same as those described in Alternative 2, with the replacement of existing mature trees slowed, but not completely prevented. Over the mid to long term, habitat quality and condition would improve for the red-naped sapsucker and the downy woodpecker, but no additional habitat would result, and thus would not allow for population expansion.

Wolf Creek Allotment, Riparian Corridor Pasture

Habitat for these species within the Riparian Corridor Pasture is poor. Nesting habitat is primarily composed of conifer snags, mostly small diameter ponderosa pine, located within the riparian areas. Hardwood species present include willows and alder, and possible some remnant aspen clones and smaller individual cottonwood trees. Preferred hardwood nesting habitat is generally not available.

This alternative would maintain the existing poor habitat condition in this pasture. The stocking levels, season of use, and length of use proposed would not be conducive to rehabilitating or improving hardwood habitats for these species. It would be unlikely that this proposal would be able to meet the standards prescribed for this alternative pertaining to hardwood utilization in the riparian areas given the timing, length of use, and stocking levels described. Suitable habitat would not likely develop in this

Wolf Creek Allotment, Widow Pasture Division

Habitat for these species within the Widow Pasture is poor. Surveys for PFC conducted in the summer of 2005 found very little hardwood habitat in the pasture. Most existing hardwood habitat is in the form of willows and alder. Scattered aspen clones are also present, though not abundant. Evidence of historic cottonwood habitat, along with associated beaver activity, is present. However, no live cottonwood trees were noted. As with the Riparian Corridor Pasture, nesting habitat in this pasture is provided by smaller diameter conifer snags.

This alternative would likely improve riparian habitat management by dividing this pasture into two smaller pastures. This would improve the ability to manage and move livestock in response to seasonal conditions of forage and hardwood utilization pressures. Existing hardwood habitats would improve. However, it is unlikely this would result in much change of habitat for these species. The slow rate of change, coupled with the lack of cottonwood habitat, and poor scattered condition of aspen, would not result in measurable changes for this species for the duration of the project implementation. Other factors, including conifer encroachment in riparian areas, down cutting of stream channels, roads, and other factors would continue to suppress hardwood development beyond any gains made in improved grazing management.

Cumulative Effects – Alternative 4

The Cumulative Effects section for Alterative 1 describes the cumulative effects of past, present, and reasonably foreseeable future actions in the Project Area.

Red-Naped Sapsucker and Downy Woodpecker

Wind Creek Allotment Pasture Rotation

The change in rotation of the North and South pastures as proposed would result in cumulative effects to the Wind Creek allotment. Indirect effect would be anticipated action, and thus contribute cumulatively to the effects of other actions in the past, present and reasonably foreseeable future. The cumulative effects contributed by this alternative, however, would be less when compared previous grazing practices and the other alternatives. As described in the direct and indirect effects section, the indirect effects to riparian habitat would be reduced due to changes in timing of grazing in the two pastures. In the South pasture in particular, grazing pressures and effects on hardwood habitats would be further reduced, and thus contribute less to the cumulative effects of past, present, and reasonably foreseeable future actions.

Wolf Creek Allotment, Riparian Corridor Pasture

The grazing of the Riparian Corridor Pasture as proposed in this alternative would contribute to the cumulative effects of past, present and reasonably foreseeable future actions. This pasture has been in a "rest" state for the better part of the last 10-15 years. This has worked to reverse some of the cumulative effects of the grazing that occurred prior to the pasture's development. Reinitiating grazing, particularly as it is proposed, would likely reverse any gains in habitat improvement, and continue to contribute adverse cumulative effects to the site. Habitat is currently poor in the pasture for red-naped sapsuckers and downy woodpeckers, and would not improve as a result of these cumulative effects on the habitat.

Wolf Creek Allotment, Widow Pasture Division

This alternative would continue to result in cumulative effects to the pasture and habitat for these species. The level of cumulative effects, however, would be reduced when compared to previous grazing effects and the other action alternatives. Improved management of what would become two pastures would reduce the effects of grazing on hardwood habitat, and thus the cumulative effects on those habitats.

Summary

Alternative 1 would result in no direct or indirect effects to red-naped sapsuckers or downy woodpeckers. The absence of cattle browsing would allow successful recruitment of suckers and seedlings for aspen and cottonwood and over the mid to long term, improve habitat condition and quality for these species. Existing habitats would expand to some degree. Alternative 1 would not add to the cumulative effects of past, present, and reasonably foreseeable future actions. The cumulative effects of those other actions have limited the quality, quantity and distribution of habitat for these species, and would continue to do so. Existing habitats would be maintained, and likely improve in the long term; however the cumulative effects of other actions would likely prevent development of new habitats with out additional management actions (planting, beaver re-introduction, stream channel restoration).

Alternative 2 would result in indirect effects to red-naped sapsuckers and downy woodpeckers through effects to aspen and cottonwood stands in the Project Area. Browsing by cattle would be limited to upland stands of aspen, where up to 20% of new leader growth may occur. This would affect the rate of stand improvement over time. Aspen stand densities would increase over time, but at a slower rate. In the mid to long term, habitat quality in the form of more foraging and nesting trees would be available in existing habitats. Existing habitats would be maintained, and

likely improve in the long term; however the cumulative effects of other actions would likely prevent development of new habitats with out additional management actions (planting, beaver re-introduction, stream channel restoration).

Alternative 3 would result in indirect effects to red-naped sapsuckers and downy woodpeckers through effects to aspen and cottonwood stands in the Project Area. Browsing by cattle would continue at current levels. Upland habitats in particular would continue to decline as cattle browsing, combined with the cumulative effects of other actions, prevent new sucker development and replacement of existing mature trees. Over time, as mature trees die and are not replaced by new production; individual habitats would decline and ultimately disappear. This would reduce the number of habitats for these two species. With the exception of those habitats protected by effective exclosures, upland habitats would continue to disappear.

Alternative 4 would have similar effects to Alternative 2 as described. Site specific difference in effect would occur in the South and North Pasture of the Wind Creek Allotment and the Riparian Corridor Pasture of the Wolf Creek Allotment. In the South Pasture of Wind Creek Allotment, cattle browsing of aspen and cottonwood would be further reduced with an early season grazing strategy. The rate at which the South Pasture habitats improve and expand would be greater. North Pasture, however, would see more cattle browsing pressure due to the late season grazing strategy, particularly in the upland areas. This would slow the improvement of habitat quality. In the Riparian Corridor Pasture, the proposal would result in adverse effects to the few aspen and cottonwood habitats in the pasture. Effects would be similar to those described for Alternative 3. Existing habitats, unless protected by exclosures, would decline in the short to mid term, and likely disappear in the long term, reducing habitat for the sapsucker and woodpecker.

Conclusions

Alterantive1 would provide for the highest quality habitat of the four alternatives over the mid to long term. Alternative 2 would continue and upward trend in habitat quality over the mid to long term, but at a slower rate than Alternative 1. Alternative 3 would maintain existing conditions over the short to mid term, and would likely result in a downward trend in habitat quality and quantity over the long term. Alternative 4 would be similar to alterative 2, with the exception of downward trends in habitat in the Riparian Corridor Pasture. In the Wind Creek Allotment, habitat enhancement would increase in a faster trend in the South Pasture, and slower in the North pasture, due to the change in pasture rotation.

LRMP Standards

The alternative proposed would not affect directly snag densities for the red-naped sapsucker or the downy woodpecker. Indirect effects to the species through effects to future snag recruitment, however, would occur. Alternatives 1, 2, and 4 would meet LRMP standards in the future, as all three alternatives would provide for future snag recruitment. Nesting habitat would be maintained or increase over the long term with these three alternatives. Alternative 3 would not Meet LRMP standards in the future, as cattle browsing would contribute to the lack of replacement green trees in aspen stands over the long term. Nesting habitats would decline in Alternative 3.

Desired Condition

Alternative 1 would best meet the desired condition for this red-naped sapsuckers and the downy woodpecker. Alternatives 2 and 4 would also meet a desired condition in the long term, but at a slower rate than Alternative 1. Alternative 3 would not meet the desired condition for these species.

Migratory Bird Treaty Act – Migratory Birds

Affected Environment

The Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington (Altman 2000) provides a basis for management considerations, conservation strategies, and specific species considerations for habitats on the Ochoco National Forest and in the project area. The conservation strategy identifies eight general habitat types, eighteen different habitat attributes, and eighteen different land and migratory bird species that service as indicators of habitat condition for those specific habitats. Table 3-11 below identifies the eight general habitats/habitat types/focal species that are present in the project area and have the potential for livestock grazing effects.

Table 3-11. Habitat, Habitat Features, and Focal Species of Concern

Habitat	Habitat Attribute	Focal Species
Dry forest	Open Understory-Regeneration	Chipping Sparrow
Mesic Mixed Conifer	Dense Shrub Layer	MacGillivray's Warbler
Riparian Woodland	Large Snags	Lewis' Woodpecker
Riparian Woodland	Canopy Foliage Cover	Red-eyed Vireo
Riparian Woodland	Understory Shrub Cover	Veery
Riparian Shrub	Dense Shrub Patches	Willow Flycatcher
Steppe Shrublands	Patches	Vesper Sparrow
Aspen	Large Trees/Snags w/ Regeneration	Red-Naped Sapsucker

The red-naped sapsucker and the Lewis' woodpecker are addressed in the Management Indicator Species Section for primary cavity excavators. Please refer to that section for more details. The remaining species and habitats would be addressed here.

The US Fish and Wildlife Service have also identified a list of species that are of concern from a population and/or habitat perspective. This list is in response to a 2001 Executive Order signed by former president William J. Clinton. Species are listed by geographic area, called Bird Conservation Regions (BCR). The project area is represented by BCR 10, Northern Rockies Region of the United States. A total of 28 species are identified on that list. Of those 28 species, three occur or are suspected to occur in the project area and have the potential to be affected by the alternatives proposed. They are as follows:

Lewis' woodpecker
Red-naped sapsucker
Brewer's sparrow

The Brewer's sparrow is a sagebrush obligate species, with similar habitat requirements to the greater sage-grouse and the vesper sparrow. Potential affects to Brewer's sparrow would be addressed with the vesper sparrow.

Dry Forest – Open Understory-Regeneration – Chipping sparrow: Dry and moist forest ponderosa pine plant associations represent approximately 16,793 acres of habitat in the project area and are distributed through out each of the allotments. The stand conditions and structure development of these areas varies. Most of this habitat occurs in a pole to small saw log sized age development. Many of these habitats have received intensive harvest and thinning treatments and are relatively open in canopy closure. Thinning activity and use of prescribed fire have worked to open up

understory habitat conditions conducive to the chipping sparrow. Patches of reproduction are scatted through out these habitats, at different stages of development. Habitat is generally abundant and well distributed for this species and habitat type.

Mesic Mixed Conifer – Dense Shrub Layer – MacGillivray's warbler: There are approximately 258 acres of moist mixed conifer habitat exists in the project area. Habitat is scattered amongst the three allotments, located primarily in the southern ends of each. Additional habitat may be found in Douglas fir plant associations above 5,000 feet. Most of this potential habitat is located near Wolf Mountain. Overly dense tree canopies are the major factor for the lack of shrub layer as most understory species require sunlight reaching the forest floor. Also the most common shrubs in this plant community such as Ceanothus form dense stands after significant fire events. To a lesser degree, historic ungulate and livestock grazing, forest management, prescribed fire and other actions may have contributed to reduced shrub understories in these habitats. Habitat condition for MacGillivray's warbler is generally poor or not present in the project area.

Riparian Woodland – Large Snags – Lewis' Woodpecker: As discussed in the MIS section of effects, cottonwood habitats are limited in the project area. Existing habitats are widely scattered and small, generally consisting of a single tree. Thirteen to seventeen sites are known in the Project Area, and make up less than 3 acres of total habitat. Large cottonwood snags are largely absent in the Project Area.

Riparian Woodland – Canopy Foliage Cover – Red-eyed vireo: As discussed with the red-naped sapsucker in the management indicator species section, riparian woodland habitat is relatively rare, and in poor condition. Based upon field surveys, GIS queries, and aerial photo interpretation, it is estimated that there is approximately 413 acres of willows and/or alder shrub and woodland habitat in the Project Area. This is less than 1% of the Project Area This is based upon an estimated 22.75 miles of stream/riparian habitat occupied by willows and/or alder, and an average width of riparian/hardwood habitat of approximately 150'.Habitat for the red-eyed vireo is limited in the project area, confined to patches of habitat along perennial streams in each allotment. Distribution in the project areas is generally poor.

Riparian Woodland – Understory Shrub Cover – Veery: This habitat feature follows the same theme of riparian woodland-canopy foliage cover habitat. Habitat is poorly distributed, impacted by past management activities including livestock grazing, timber harvest, alterations to riparian habitat, loss of beaver, road construction, and recreation. Understory shrub cover is generally lacking due to ungulate herbivory (including livestock and wild ungulates). Habitat for the Veery is in poor condition and poorly distributed.

Riparian Shrub – Dense Shrub Patches – Willows flycatcher: This habitat also follows along the lines of other riparian woodland habitat conditions. The habitat is limited within the project area, and that which is present is heavily impacted by past management actions. Dense shrub patches are relatively rare, and usually small in size. Some ungulate exclosures contain high quality habitat, but these are few and far between. Habitat for the willows flycatcher has a patchy distribution, with patches generally widely scattered.

Steppe Shrublands – Patches – Vesper sparrow and Brewer's sparrow: The vesper and Brewer's sparrows occupy mountain big sagebrush shrub-steppe communities. These species are common in the Great Basin region, located south of the project area. Habitat within the project area is very limited. Approximately 867 acres of mountain big sagebrush habitat exists in the project area, scattered throughout the project area in small isolated patches. Individual habitats are fragmented, with average size being 12-18 acres each. Most of these communities are a part of a ponderosa pine or juniper woodland plant community (approximately 624 acres), and as a result encroached

by conifers (see the greater sage-grouse analysis in this report). This habitat condition is not suitable for the Brewer's sparrow, which selects for open, pure sagebrush shrub-steppe habitats. The vesper sparrow, however, finds favorable habitat conditions in these conifer/shrub-steppe habitats. Habitat condition for the vesper sparrow is generally good and distributed through out most of the project area. The Brewer's sparrow has approximately 243 acres of suitable habitat present in the Project Area. Habitat condition is generally good for that species in these habitats, but the habitat is not abundant or well distributed in the project area.

Direct and Indirect Effects – Alternative 1

This alternative would not result in direct or indirect effects to land birds and Neotropical migrants. Habitat would not be further affected with the lack of livestock grazing. Some improvement in the riparian woodland, riparian shrub, aspen, and mesic mixed conifer-dense shrub later habitats would result with the reduction in herbivory. Continued herbivory by wild ungulates would continue to affect these habitats and may limit them from reaching their full potential (Riggs et al. 2000). Species dependent upon hardwood habitats would see some habitat expansion, but it may not be enough to see changes in populations or their distribution, at least in the short to mid term (0-50 years).

Dry forest and steppe shrubland habitats likewise would not be affected. Their existing condition would be maintained with this alternative. With the lack of livestock grazing, foraging habitat in the dry forest habitats may improve with the increase in leaf litter and resulting increase in insects, and seed production with more of the grasses developing to seed.

The duration of these effects would continue indefinitely unless the decision was revisited or a new analysis was completed that authorized grazing on the allotments in the project area.

Cumulative Effects – Alternative 1

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

Livestock grazing has modified vegetation communities in the riparian and upland areas. Particularly detrimental was the sheep grazing that occurred in the late 1800s and early 1900s before grazing was actively controlled by the Forest Reserve and National Forest management of the project area. Since then, grazing has switched from sheep to all cattle livestock operations. Implementation of increasingly stringent standards over the past 100 years has also stopped the rapid downward trends of these allotments, and in some cases, reversed those trends into a gradual upward trend in habitat function. In riparian areas, historic livestock grazing has contributed to the decline of hardwood communities, changes in meadow habitat through the down cutting of stream channels and lowering of water tables, changes in species composition and diversity, and introduction and spread of noxious weeds. With the exception of noxious weeds, alterations to riparian habitat have occurred within all riparian areas in the project area. The effects are particularly acute in the perennially flowing streams systems in the project area. Noxious weed spread is limited in the Project Area. Further discussion is available in the EA.

Livestock grazing has also affected upland areas as well. Species composition, particularly in regards to bunch grass and some forb communities were altered in part by livestock grazing. This is particularly true for the stiff and low sagebrush communities in the project area. Changes in species compositions, from desirable to less desirable species has resulting in poor condition

ratings. Further discussion is available in the EA. In some of the forested communities, historic sheep grazing may also have influenced the increases in stand densities and changes and tree species compositions, particularly in the more mesic conifer sites.

Fire suppression and the resulting changes in forest structure and species composition have affected land bird habitat as well. Combined with timber harvest, and interactions with historic livestock grazing, fire suppression has, in general, allowed the development of denser stands with compositions leaning towards shade tolerant, fire intolerant tree species. For land bird species that select for those habitats, habitat quality and quantity increased. Species that select for more open, early seral mature habitats, habitat quality and distribution declined. Fire's role in the regeneration of hardwood communities, particularly in aspen, was also disrupted and has contributed to the decline in aspen habitats in the project area.

Willows and alder may be similarly affected in some portions of the project area. Present activities on Forest Service land within the project area include natural fuels burning and precommercial thinning, noxious weed control, and livestock grazing. The Hardcorner Fuels Project began implementation this year within the Wind Allotment. When completed, burning would occur on 4,428 acres and understory thinning on 840 acres. In some ways, these treatments would reverse some of the effects of past fire suppression. The Upper Beaver Creek Watershed, which covers parts of all three allotments, is the next planning area for vegetation and fuels treatments. No proposals are yet available, but implementation would likely occur in the next 4-6 years.

Timber harvest and thinning has altered forested habitats. The general trend has been the decline in larger, mature trees, being replaced by younger, denser stands. Stand densities are relative, and in many cases, the thinning of those young stands has made them less dense. Species composition has also changed and influenced by timber harvest. Similar to fire suppression, changes in stand structure and species compositions of forest habitats from timber harvest actions has affected the species diversity, distributions and populations of land bird species in the project area. Sixteen timber sales have occurred in the project area within the last 20 years, and include the Aqua, Brer Rabbit, Bottoms, Butte, Dippy Beaver, Dusty Well, Hat Springs, Hog Wallow, Morgan, Ringsmeyer, Robin, Sugar, TNT, Tower, Wind Creek, Windy John and Yuma Timber Sales. A total of 14,675 acres of forested habitat were affected by those sales. A variety of harvest strategies were implemented including clear cut harvests, seed-tree and shelterwood harvests, understory and selective thinnings, and other similar actions. The Upper Beaver Creek Watershed is scheduled for vegetation project planning in the next two years, with a likely implementation date of 4-6 years out. No proposals are yet available for that planning area.

The loss of beaver in the watershed has affected riparian habitat and the function of hardwoods and meadow complexes in the project area. Declines in the hardwood communities, exacerbated by livestock grazing and fire suppression, can be attributed to the trapping and removal of beavers in the project area. Likewise, overall riparian habitat function, particularly in meadow areas, has declined as a result of channel down cutting and a drop in the water table. This has affected the vegetation communities that exist in the project area, and thus the species of land birds that are present. Beaver played a key role in maintaining the function of those meadow complexes by stabilizing erosion, controlling stream flow in the spring, and promoting bank stabilizing hardwoods and sedge communities.

Road construction has affected riparian habitat function through the bisection of riparian areas with fill and culverts, and confinement of stream channel movement in the flood plain. This, combined with the above actions, has altered riparian habitat function and contributed to poorer habitat conditions for a variety of land birds that use riparian areas.

Alternative 1 would not result in cumulative effects to land bird habitat in the project area. This alternative would terminate grazing in the project area, removing the grazing of livestock as a disturbance factor that alters habitat conditions for land bird species. This would apply in both the riparian areas and uplands. In absence of livestock grazing, some vegetation communities would change. Hardwood communities would see some improvement and expansion where riparian and upland habitat conditions would allow and wild ungulate browsing did not continue to suppress these communities. Habitats for species dependent upon riparian woodland and shrub communities would likely see some improvement and expansion. This would benefit those species and possibly expand their populations and distribution in portions of the project area. Some bunch grass communities in the shrub-steppe habitats may also re-develop and expand as well.

Mesic mixed conifer-shrub understory habitats would see little change as wild ungulate browsing would continue to suppress that shrub understory development. Little change in species presence, diversity, or populations for species, such as the MacGillivray's warbler would occur with this alternative.

Dry forest habitats would see little overall change with out the cumulative effects of livestock grazing.

Direct and Indirect Effects – Alternatives 2, 3, and 4

Direct effects of nest disturbance and loss with livestock grazing may occur, although the extent of that effect would likely be minor and likely immeasurable. Indirect effects to vegetation conditions would occur with both alternatives. The following effects are anticipated for each of the vegetation communities reviewed:

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

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

Mesic Mixed Conifer: The action alternatives would result in small indirect adverse effects to habitat for the MacGillivray's warbler and other similar species. Livestock grazing, cumulative to wild ungulate browsing would continue to suppress upland hardwood and shrub communities within the mesic mixed conifer habitat types (Riggs et al. 2000). Habitat for this species would not expand or improve since management activities which would significantly improve this habitat (conifer thinning and prescribed fire) are not part of the action alternatives.

Alternative 2 has more stringent utilization standards for the utilization of upland shrub species. However, it is anticipated that deer and elk would compensate, resulting in increased herbivory by those species. This would result in little change in upland shrub habitat conditions in these mesic mixed forest types (Riggs et al. 2000).

Riparian Woodland and Shrub: The action alternatives would continue to adversely affect riparian woodland and shrub habitats in the project area. Currently poorly or non-functioning habitats would not improve dramatically with Alternative 3. Alternatives 2 and 4 would result in an improving trend in riparian woodland and shrub habitats, as the adaptive management strategy in this alternative would reduce utilization of hardwoods and improve overall riparian habitat function. Alder, willows and cottonwood communities would slowly expand and improve in size and age-class diversity. Given the relatively small size of this habitat type in the Project Area, effective changes would not be dramatic.

With Alternative 3, red-eyed vireo, Veery, and willows flycatcher habitat would either maintain existing condition or potentially decline over time. Alternatives 2 and 4 would result in an improving trend for habitat of these three species. The South Pasture of the Wind Creek Allotment would see a greater improving trend with Alternative 4 as a result of changes in pasture rotation. The Riparian Corridor Pasture of the Wolf Creek Allotment would have similar effects as Alternative 3 under the 4th Alternative because of the intense grazing that would occur in that pasture.

Steppe Shrublands: None of the action alternatives would result in measurable effects to existing mountain big sagebrush shrub-steppe habitat in the project area. These habitats comprise a very small portion of the project area. Utilization levels in these habitats are generally low, primarily due to early desiccation of palatable grasses and forbs. The physical structure of the shrub-steppe habitat would not appreciably change. Grass and forbs and cover associated with them also would not change appreciably. Habitat for the vesper and Brewer's sparrows would maintain in their current conditions with implementation of either alternative.

The duration of these effects would continue so long as grazing was continued on these allotments per the decision to implement either action alternative.

Cumulative Effects – Alternatives 2, 3, and 4

Past, present, and reasonably foreseeable future actions affecting hardwood habitats within the Westside Project Area are described under the cumulative effects section for Alternative 1. All of those actions are pertinent here as well, though their effects would be different.

Dry Forest: The action alternatives would result in cumulative effects to the dry forest habitat conditions described in this analysis. Livestock grazing would continue to contribute to changes in forest structure and species composition as it has in the past. The extent of that influence is minor, is influenced by past, present and reasonably foreseeable future actions. Livestock grazing would also continue to affect understory development and composition, particularly in the herbaceous plant component, but also in the hardwood shrub species as well. This would continue to affect the quality of foraging habitat for some land birds, and the quality of nesting habitat for others. These effects would be cumulative to past livestock grazing, fire suppression and past timber management actions in the project area. The level of cumulative effects would be less with Alternatives 2 and 4 with the lower utilization levels expected with the adaptive management strategy proposed.

Mesic Mixed Conifer: The action alternatives would result in cumulative effects to habitat for land birds in the mesic mixed conifer forest habitats. The effects would come primarily in the suppression of hardwood and shrub communities in these habitats. Livestock grazing, as well as changes in forest communities from fire suppression and timber harvest, have altered understories in these community types. Continued suppression of those communities would result in adverse affects to land birds that utilize those habitats for nesting, foraging and cover from predators.

Although not a federal action, wild ungulate herbivory would continue to affect and suppress this habitat condition in the project area. Little difference between Alternatives 2, 3, and 4 would be anticipated due to the compensatory herbivory of wild ungulates.

Riparian Woodland and Shrub: The action alternatives would result in cumulative effects to habitat for land birds in the riparian shrub and woodland habitats. The presence of livestock grazing would continue to suppress, and other wise affect, hardwood habitat development, and contribute to the cumulative effects on that feature of the habitat with Alternative 3. Alternatives 2 and 4, with the adaptive management strategy proposed, along with additional and different standards for bank stability, upland shrub utilization, and herbaceous utilization would result in a reduced level of cumulative effects on those habitats when compared to Alternative 3. Upward trends would continue, and perhaps increase in rate with Alternatives 2 and 4.

Steppe Shrubland: Alternatives 2, 3, and 4would continue to contribute to the cumulative effects of other activities on the shrub-steppe communities. The level of effects contributed, however, would likely be small because of the low level of utilization and use of these habitats by livestock grazing. Season of use of pastures (early vs. late) would influence the overall level of effect that would occur, with greater cumulative effects occurring with early season of use. Alternatives 2 and 4, with their adaptive management strategy and modified standards for utilization based upon functional classification, would likely see an improving trend in some habitats with increases in some species types, like bunch grasses.

The duration of cumulative effects associated with Alternatives 2, 3, and 4 would persist as long as allotment permits were active and grazed.

Summary

Alternative 1 would not result in direct or indirect effects to habitat for migratory birds. The absence of livestock grazing would improve habitat conditions for each of the species groups described above. Habitat area, however, may not improve dramatically such that measurable increases in populations would occur. Those species dependent upon hardwood habitats would see improved habitat conditions; however, dramatic expansion of habitat would not likely occur. Other factors, such as conditions of riparian areas, cumulative effects of past activities, and deer and elk browsing would likely preclude substantial habitat expansion. This alternative would not add to the cumulative effects of past, present or reasonably foreseeable future actions, and in fact my reverse or lessen some of those other cumulative effects.

Alternatives 2, 3, and 4 would result in indirect effects to migratory bird species through habitat modification. All three alternatives would likely result in effects to riparian hardwood communities. Alternative 3 would be the most adverse, while Alternatives 2 and 4 would have less effect due to the adaptive management process, as well as reduced utilization standards of upland areas and the implementation of PACFISH/INFISH standards for riparian hardwoods. Likewise, dry forest dependent species, particularly those that nest on the ground, may be affected in each of the three alternatives by the lack of or reduced vegetation cover for nesting. Again, Alternative 3 would have the greatest level of effect, while Alternatives 2 and 4 would have less effect due to more stringent utilization standards. Similar effects would be noted for the mesic mixed conifer habitats, as Alternatives 2 and 4 would have upland hardwood standards in place, while Alternative 3 would not.

Desired Condition

Alternative 1 would better meet a desired condition for migratory birds in the Southside Allotments. The absence of livestock grazing would move habitats in all types toward a desired condition. Other limitations, however, may prevent full achievement of desired habitat conditions in the Project Area under any time frame.

Alternatives 2 and 4 would move habitat towards a desired condition in the long term (greater than 30 years). However, the rate of improvement would be less than Alternative 1. Further, other limitations would likely prevent full achievement of desired habitat condition in the Project Area.

Alternative 3 would not move some habitats towards a desired condition. Riparian hardwood habitats in particular would not improve towards a desired condition. Upland habitat areas may improve towards a desired condition; however, the rate of improvement would be the slowest of the 4 alternatives.

Migratory Bird Treaty Act

All four alternatives would comply with the Migratory Bird Treaty Act.

Other Wildlife Species

Rocky Mountain Elk and Mule Deer

Affected Environment

Rocky Mountain elk and mule deer are common large ungulate species in the Project area, as well as throughout the Paulina Ranger District and Ochoco National Forest. The project area is within the Ochoco Wildlife Management Unit managed by the Oregon Department of Fish and Wildlife (ODFW). Current population levels and the management objectives for deer and elk populations are listed in Table 3-12.

Table 3-12: Management Unit Objectives and Current Populations for Rocky Mountain Elk and Mule Deer in the Ochoco Management Unit, 2004.

Species	Management Unit Objective	Population (2004)
Rocky Mountain Elk	2,600 elk	4,000 elk
Mule Deer	20,500 deer	17,000 deer

Rocky Mountain elk populations currently exceed the management unit objective by 1,400 animals. The ODFW is currently reviewing big game management plans, and may propose an increase in the elk management objective for the Ochoco unit. The management objective may increase to 4,500 elk for the unit. In recent years, elk populations have been as high as 5,000 animals. Mule deer populations are 3,500 animals below management objectives. Distribution across the management unit and the project area is spotty and dependent upon habitat quality and disturbance factors.

The Ochoco National Forest Land and Resource Management Plan (LRMP) contains standards and guidelines for managing habitats for both Rocky Mountain elk and mule deer. These standards and guidelines prescribe acceptable road densities, cover quantity and quality, and also provide for sufficient forage to meet ODFW management objectives for Rocky Mountain elk and mule deer.

Since none of the alternatives affect cover quantity or road density, these habitat components will not be further discussed.

Forage reservations were also decided in the LRMP to meet the state big game standard. The specific use levels by livestock in order to reserve forage for mule deer and Rocky Mountain Elk are displayed in the description of Alternative 3, Chapter 2, Table 2-4. The utilization standards in this table are taken directly from the LRMP.

All alternatives either meet LRMP forage reservation standards, as is the case in Alternatives 2, 3 and 4 or exceed standards as in Alternatives 1. Additionally, current Rocky Mountain elk populations exceed ODFW management objectives and mule deer populations are very near that objective and it is highly likely that forage availability is not limiting population size. Over-winter survival of young mule deer is very low in this unit and winter habitat on adjacent private lands, hunting effects, and mortality due to predation are probably more important factors determining present mule deer populations.

Fisheries and Aquatic Resources

Affected Environment

The entire South Fork John Day River and its sub-watersheds are Designated Critical Habitat for Middle Columbia steelhead trout, a threatened species. The South Fork Prong, Wind, North Fork Wind, Congleton, and South Fork Wind creeks and one unnamed tributary to South Fork Wind Creek are contained in this area. Steelhead have been observed (one fish sighted in 2002) in Wind Creek in the South Pasture of the Wind Creek allotment. Middle Columbia steelhead trout are not documented in the Wind Creek allotment's North pasture. Steelhead do not occur in streams in the project area tributary to the South Fork Crooked River.

The South Fork John Day River is 303(d) listed for impaired temperature. None of the tributaries to the South Fork John Day River within the project area are listed for temperature impairment. Tributaries to the South Fork Crooked River including Beaverdam, Dry Paulina, North Wolf, Powell, Sugar and Wolf creeks are listed (ODEQ, 2006). Temperatures in Rager and Tamarack creeks are above Clean Water Act standards, but have not been formally designated as impaired (USFS, 2005).

Columbia spotted frogs were observed as late as 2005 during field reviews conducted for this project (Jim David, personal conversation March 23, 2006). Suitable habitat for Columbia spotted frog exists in streams, wetlands, seeps, springs and reservoirs within the project area.
Table 3-13 identifies species, status and occurrence in the project area for all threatened or endangered and USFS Region Six Sensitive Species for the Ochoco National Forest. Species that do not occur within the project area are not discussed in this report.

Table 3-13. Threatened and sensitive aquatic species occurring within the Southside Allotment Project Area.

Species	Status of species or habitat	Within Project Area?	Allotment/Pasture
Red band trout *Oncorhynchus mykiss □almatian.*	Sensitive	Y	Heisler, Wolf and Wind
Malheur mottled sculpin *Cottus bairdii*	Sensitive	N	Not found within the Project area
Columbia spotted frog *Rana luteiventris*	Sensitive	Y	Heisler, Wolf and Wind

Species	Status of species or habitat	Within Project Area?	Allotment/Pasture
West Slope cutthroat trout *Oncorhynchus almati lewisii*	Sensitive	N	Not found within the Project area
Mid-Columbia River spring Chinook *Oncorhynchus tshawytscha*	Sensitive EFH	Y	Wind
Bull trout *Salvelinus confluentus*	Threatened	N	Not found within the Project area
Mid-Columbia River steelhead trout *Oncorhynchus mykiss* .	Threatened; Critical Habitat designated	Y	Wind/South Pasture

Threatened Species

Middle Columbia River ESU steelhead trout

Steelhead trout have inhabited the Wind Creek drainage since the 1960s (McMullin, 1999) and includes both Wind and South Fork Wind Creek. Difficult spring access and limited funding limits survey opportunities.

Columbia spotted frog

Columbia spotted frog has been a Candidate species for listing under the ESA since 1993 and is a Forest Service Sensitive species.

R6 Forest Service Sensitive Species

Red-band trout

Red-band trout is a sub-species of rainbow trout and is widely distributed through the project area. Red-band trout habitat requirements are similar to other trout species; optimal water temperatures are 54-64º F., but as a native fish, they are adapted to the region's higher water temperatures. Red-band may survive temporary exposure to 85º F. waters where cooler flows from seeps, springs and tributaries provide thermal refugia.

Red-band populations within the Crooked River Basin are extremely suppressed, yet are some of the strongest populations of this native fish species. Populations are highly fragmented; connectivity between sub-populations is poor due to a suite of factors including off-Forest water diversion, agricultural practices, urbanization and thermal and physical barriers. It was estimated that of the remaining seven percent of strong red-band native populations in the Crooked River, public lands are the physical and genetic refugia of this species (Grover and Hodgson, 1999) underscoring the importance of improving habitat for the species. Detailed red-band population information is not available for the Project area. Data from an adjacent watershed on the Paulina Ranger District that similarly feeds into the Crooked River Basin indicates a large reduction in the population occurred between 1997 and 2003 (Hodgson, 2003). Very little data was available for red-band trout populations within the Lower South Fork John Day watershed, but based on habitat data in the Wind Creek allotment, populations would face similar conditions.

The greatest factors affecting the fish's life history within the project area are flow, bank stability, temperature, and by extension, shade. Flows are highly variable within the allotments. Primary runoff typically occurs between late-March and mid-May although ground water resources (base flow) remain available in several project area streams throughout the year. High reaches may become dry. The lower reaches of Sugar, Powell, Widow, East and North Fork Wolf, North Fork Wind, Wind and Rager Creeks maintain flow on Forest Service administered lands during most

years, while Wolf Creek provides year-round habitat. Perennial springs along several named and unnamed streams provide isolated habitat for fish of various age classes or supply thermal refugia to streams that are otherwise temperature impaired for spawning or rearing. Occupied streams within the project area are primary spawning and rearing habitat. Should these resources become unavailable, there is little to no downstream habitat capable of making up for loss of this habitat on federal lands (Stuart et al., 1996).

Heritage Resources

Affected Environment

The Areas of Potential Effects (hereafter referred to as the Project Area) for Heritage Resources for the Southside Allotments Environmental Analysis are the places where livestock congregate within the boundaries of the Heisler, Wind Creek, and Wolf Creek allotments on the Paulina Ranger District. Regional Heritage direction for large scale grazing Annual Monitoring Plans (AMP) is to concentrate analysis on those areas where livestock congregate.

The geography of the Paulina Ranger District contributed to its use over thousands of years by tribal bands and also historically by Euro-Americans. The southern half of the District borders an interface between the lower grasslands below and, above, the forested foothills of the Ochoco Mountains. This interface was visited and used often by tribal bands for seasonal habitation and both ecological areas were used for resource gathering. Subsequently, today these areas also reflect a high probability for finding the remains of this use in the archaeological record. Interspersed in the forested foothills are rock flats supporting a varied population of traditional plants, and also springs that afforded water and hunting opportunities. Historically, these lower foothills were an entrance way into the Forest for grazing, hunting, and early-day homesteading and logging.

The existing condition of archaeological sites within the Project Area varies. Euro-American sites (wooden structures, log troughs) are better protected against logging, livestock grazing, and road building due to their location and structural qualities, however weathering from age and fires affect their integrity. The majority of prehistoric sites within the Project Area have undergone decades of disturbance to their surface and subsurface from livestock grazing, logging, road building, and surface collecting.

The areas within the three grazing allotments where livestock congregate were analyzed for past heritage survey coverage. All archaeological sites within these areas were identified and analyzed for their eligibility to the National Register of Historic Places and for specific damage listed in their site records from livestock grazing. The following data was compiled:

Land within the three grazing allotments: 70,380 acres
Approximate acreage of land where livestock congregate (Project Area) within the allotments: 693 acres
Total number of past Heritage inventories within the Project Area: 10
Number of those past Heritage surveys adequate for present SHPO standards: 4
Project Area land with SHPO-adequate past inventories: 693 acres
Land within the Project Area still needing Heritage inventories: 0 acres
Total number of archaeological sites within the three allotments: 72
Sites within the livestock congregation areas: 17
Sites within the livestock congregation areas with recorded livestock damage: 12
Euro-American (historic) sites: 0
Prehistoric sites: 12

Of those 12 sites, those that have been evaluated as Eligible to the National Register or are deemed potentially Eligible: 12

The types of specific damage mentioned in site records from livestock include the following:

• The trampling and displacement of surface artifacts: when cattle congregate at watering places (streams, springs, developed ponds, watering troughs) they can break fragile obsidian artifacts lying on the surface of the ground. Breakage can render these artifacts unrecognizable and therefore useless to site interpretation and chronology dependent on typology of the artifact/tool. In addition, the action of these animals congregating can displace surface artifacts from their place of deposition, also making site interpretation difficult to impossible.

The trampling of subsurface artifacts: where soils are easily eroded, the congregation of livestock can break and/or disturb subsurface artifacts by the compaction and/or churning of the subsurface soils. A large part of archaeology is based on when cultural materials were deposited across the landscape through space and time; the churning of the soil removes an artifact's provenience and removes its place in the chronology of that site.

The denuding of vegetation on stream terraces by the congregating of livestock, making cultural materials within sites open for surface collecting.

The damage component that is of most concern and that offers the most opportunity for improvement would be the protection of archaeological sites and their surface and subsurface materials adjacent to streams, springs, developed ponds, and at salt licks. The measure used to characterize this damage component would be the assessment of those qualities of an archaeological site that contribute to its eligibility to the National Register of Historic Places, specific to disturbance from livestock and livestock-grazing activities. The objective to be attained is the prevention of disturbance to ground surface cultural artifacts, and to preserve the integrity of the site's subsurface materials (by definition, those cultural materials lying at least 10 centimeters below the surface of the ground) against damage from livestock.

Current day tribal use of this watershed includes harvesting of roots, bulbs, and other vegetation for food, medicinal, and ceremonial purposes, and also hunting and fishing. These uses are protected for the tribes who signed the 1855 Treaty with the Tribes of Middle Oregon. This treaty, signed by Wasco and Sahaptin-speaking Indians living along the mid-Columbia River and its tributaries, ceded title to ten million acres of land to the United States but reserved the right to continue using the land for traditional purposes.

Environmental Consequences

The evaluation criteria to be used in analyzing the effects of the alternatives on Heritage Resources is the assessment of the disturbance, from livestock and livestock grazing related activities, to those qualities of an archaeological site that contribute to its eligibility to the National Register of Historic Places. The affected resources to be measured are those archaeological sites known to exist within areas where livestock congregate within the Project Area. The evaluation criteria would be both qualitatively and quantitatively measurable: during the field recording of an archaeological site, its remaining integrity, or quality, is assessed dependent on the number of damage agents to that site over its lifetime. From that assessment, a percentage is given as to the amount of that site that has not been adversely impacted or destroyed from the combination of damage agents. A pasture by pasture analysis of archaeological sites incurring livestock damage may be found in the Heritage section of the project file for this analysis.

Alternative 1 – No Action/No Grazing

Direct and Indirect Effects

Term grazing permits in all allotments would be cancelled within two years. All range improvements and fences would be abandoned or removed. With this Alternative, those sites presently incurring damage from livestock would no longer be adversely affected by the trailing of livestock to water sources, however, large wildlife ungulates would continue to use these same trails. Livestock, and large ungulates, would no longer be attracted to salting areas where the surface of the ground is substantially affected. The continual introduction of noxious plant species from livestock would be removed, protecting the traditional use plant populations in areas around springs and on rock flats. Existing noxious weed populations would continue to be of a concern to these plant populations. Archaeological sites, in areas along streams where erosion has already taken place due to livestock congregating, would continue to erode unless rehabilitative measures were taken. Terraces along streams, where archaeological sites are often found and where livestock prefer to congregate, would revegetate over a number of years, helping to conceal surface artifacts. This Alternative conforms to those federal laws and guidelines for the protection of NRHP-eligible sites. This Alternative would have no impact on the treaty rights of Warm Springs tribal members.

Cumulative Effects

The No Action Alternative would not contribute additional cumulative effects from grazing, however, surface and subsurface cultural materials on the Paulina Ranger District, both historic and prehistoric, have felt the effects of both natural and man-caused activities for thousands of years, sometimes since the day the materials were deposited into the archaeological record. Wildfires, flooding, erosion, and weathering are just some of the natural damage agents that deteriorate archaeological sites. With this Alternative, archaeological sites would continue to be damaged from natural causes and also from man-caused agents unless protective measures were implemented.

Alternative 2 – Proposed Action

Direct and Indirect Effects

With this adaptive management strategy, monitoring would aid in the identification and assessment of livestock damage to archaeological sites. Specific damage from livestock would be documented and mitigation measures would be implemented to protect those qualities of a site that make it eligible to the National Register. The design criteria proposed with this Alternative would reduce the damage currently affecting sites from livestock grazing. Existing noxious weed populations would continue to be of a concern to traditional plant populations. With adaptive management, archaeological sites would be protected from further erosion along streams where erosion has already taken place due to livestock congregating. With this Alternative's adaptive management, terraces along streams, where archaeological sites are often found and where livestock prefer to congregate, would revegetate faster, helping to conceal surface artifacts. With the design criteria included for Alternative 2, this Alternative conforms to those federal laws and guidelines for the protection of NRHP-eligible sites. This Alternative would have no impact on the treaty rights of Warm Springs tribal members.

Cumulative Effects

Mitigation measures with this Alternative would prevent damage currently affecting archaeological sites within these allotments; however the cumulative effects of natural elements, logging, road building, grazing, surface collecting and/or illegal digging, and natural fuels reductions would still be reflected in these sites.

Alternative 3

Direct and Indirect Effects

This Alternative is the continuation of current grazing standards as set by the Ochoco National Forest Land and Resource Management Plan. The same direct and indirect effects for Alternative 2 would also apply to this Alternative for Heritage Resources. With the design criteria included for Alternative 3, however, this Alternative conforms to those federal laws and guidelines for the protection of NRHP-eligible sites. This Alternative would have no impact on the treaty rights of Warm Springs tribal members.

Cumulative Effects

The same cumulative effects for Alternative 2 would apply for this Alternative.

Alternative 4

Direct and Indirect Effects

This Alternative proposes changes to the current grazing plan:

- Use within the Wolf Exclosure pasture
- Changing the Wind Allotment rotation
- Splitting the Widow pasture into two pastures

The adaptive management approach proposed in Alternative 2 would also apply to this Alternative. The same advantages of the adaptive management approach outlined above under Alternative 2 would also apply here. The Wolf Exclosure has not been grazed since 1988. This riparian area has been surveyed many times in the past for cultural materials; no archaeological sites are known to occur within this steep stream channel.

Cumulative Effects

The same cumulative effects for Alternative 2 would apply for this Alternative.

Summary

No livestock grazing (Alternative 1) would offer the most protection to archaeological sites. Alternative 2, with its adaptive management strategy, would ensure that, even though grazing was still occurring, sites would be monitored for possible damage and measures would be taken to protect them. Alternative 3, with continuing our current grazing program, would offer the least protection to archaeological sites. The normal visiting and updating of sites with adjacent future projects would be the only way to ensure that monitoring of livestock congregation areas is taking place. Alternatives 2 and 4 both include proposed design criteria that would offer protection to those qualities of a site that make it eligible to the National Register of Historic Places. None of the four Alternatives would impact the treaty rights of Warm Springs tribal members.

Potential for Noxious Weed Spread

Noxious weed is a legal term designated by state and county weed control laws. These species have the ability to spread into natural habitats where they alter plant communities by displacing native species. Noxious weeds are introduced to the United States; there are no native biological agents to keep them in check. In sufficient numbers they can reduce biological diversity, increase fire risk, poison livestock, and reduce the quality of wildlife forage.

Most noxious weed infestations on the Paulina Ranger District are being treated using an integrated approach of control methods including hand pulling and grubbing, herbicides, and biological agents. Some infestations are treated using herbicides in accordance with the 1995 and 1998 Ochoco NF Integrated Weed Management Environmental Assessments (Weed EA). Prevention is a key part of the integrated approach to weed control. Measures commonly taken on the district include washing of off-road equipment and using weed-free hay and seed. See the Noxious Weed Report Appendix for more site specific prevention analysis.

All noxious weeds within the Southside Allotments are Class B weeds by the state of Oregon. Class B weeds are those considered economically important and receive intensive treatment on a case-by-case basis; spotted knapweed is determined to be a Class T weed, meaning it receives treatment priority.

Affected Environment

For the purposes of this analysis a qualitative discussion of noxious weed spread would be provided. The existence, introduction, and spread of weeds are difficult to quantify and attribute specifically to any one vector on a landscape. As a result, this effects analysis would provide a qualitative assessment of the alternatives on the potential for weed spread as a function of: 1) Cattle as a physical vector of weed introduction and spread of existing weed populations; 2) Cattle effects on native plant communities and the susceptibility for weed introduction. Most noxious weed infestations begin on disturbed areas, such as road shoulders, harvest landings, and recreation sites.

All animals (domestic and wildlife) can transport viable weed seeds in their digestive tract or attached to their hair and hooves (Parks et al 2004). Areas of soil disturbance or overgrazed areas are more susceptible to weed establishment than areas occupied by healthy native vegetation (Hann et al 1997). All but five of the pastures in the Southside Allotments are considered at risk due to a variety of factors including early seral vegetation, presence of invasive plants, and amount of soil disturbance. Noxious weed presence is a symptom of deteriorating rangeland health. A goal of this project is to improve the function of rangeland plant communities through improved grazing standards.

Noxious weed occurrence within the Southside Allotments is low to moderate compared to the rest of the District. Population, as used here, describes a noxious weed occurrence which can be as small as one plant, to as large as thousands of plants but spatially separated from other occurrences. Currently there are 89 populations encompassing 98 acres (<1% of the project area). See Table 3-14 for a list of weeds present. These weed sites range from a handful of plants, acres of scattered individuals, to areas with complete noxious weed cover. Weed inventories have been completed on roads and major streams; other inventories occur through project botanical surveys, Crook County Weed Control and Forest Service personnel travel within the allotment areas.

Table 3-14. Noxious Weed Occurrence within the Southside Analysis Project Area.

Species	Common Name	Morphology	Acres
Cardaria draba	Whitetop	Rhizomatous perennial	3.37
Centaurea biebersteinii	Spotted knapweed	Short-lived perennial	19.21
Centaurea diffusa	Diffuse knapweed	Herbaceous annual to perennial	4.10
Cirsium arvense	Canada thistle	Perennial with adventitious root buds	19.20
Cynoglossum officinale	Houndstongue	Herbaceous biennial or short-lived perennial	1.81
Dipsacus fullonum	Teasel	Herbaceous biennial	0.50
Hypericum perforatum	St. John's-wort	Rhizomatous perennial	1.1
Linaria dalmatica	Dalmatian toadflax	Perennial with adventitious root buds	0.01
Linaria vulgaris	Yellow toadflax	Perennial with adventitious root buds	0.5
Phalaris arundinacea	Reed canarygrass	Perennial rhizomatous grass	11.0
Potentilla recta	Sulfur cinquefoil	Herbaceous perennial	17.0
Salvia aethiopis	Mediterranean sage	Herbaceous biennial	5.50
Taeniatherum caput-medusae	Medusahead	Annual grass	14.60
Total			97.91

The morphology of noxious weeds determines how a plant reacts to different control methods. Hand-pulling whitetop, dalmatian and yellow toadflax, St. John's-wort, and Canada thistle is not effective, they are species that increase in density using manual control because new plants form from any root segments left in the soil after pulling the mature plant. Teasel, med sage, and common houndstongue are biennial plants that can be reduced in numbers with diligent, twice-yearly manual pulling. Medusahead can be controlled by diligent hand pulling, however it is impractical due to the fact that it is a grass. Spotted and diffuse knapweed, sulfur cinquefoil, and reed canarygrass are perennial plants that have deep root structures and do not respond well to manual control. Only 36 of the 98 acres present in allotments can be treated with herbicides under the current authority of the Weed EA. Weed populations discovered or introduced after 1998 cannot be controlled with herbicides. Table 3-15 lists the weed species and acreage by allotment.

Wolf Allotment

The Wolf Allotment has the bulk of weed infestations within the project area. This is due in part to its large size and the fact that it contains several campgrounds and major collector roads providing access to the district. Approximately 17 acres of the 67 acres present (25%) are treated with herbicide, and population numbers have decreased. Those populations of perennial plants that cannot be controlled by herbicide due to lack of environmental analysis are stable to slowly expanding. The reed canarygrass population is expanding. Most of it is excluded from cattle grazing; expansion is due to spread by water. Five of the seven pastures noxious weed risk ratings are low or moderate due to amount of weeds present where cattle influence spread. Two pastures, Widow and Sugar, are high risk (see Appendix B for pasture risk ratings).

Heisler Allotment

There are only two known noxious weed populations in this allotment. Both are medusahead sites in the same general area between Rager and Heisler Creeks in the Bear Pasture. These sites are contained through hand pulling and are stable at this time; the noxious weed risk is rated as moderate. The other pastures are rated as low risk.

Wind Allotment

Half of the weed acreage in this allotment is one population of spotted knapweed that has been treated with herbicide and is now reduced to a handful of plants each year, as the seed bank continues to deplete. Fire suppression equipment introduced a large medusahead infestation at the Turnpike Material Source in 2002. Herbicide spraying began in 2006 in an attempt to control the infestation. It is an aggressive site, which is spreading to the northeast and the west. Cattle and recreation activities by the public disturbs the dry seed heads, which then scatter in the wind. The Permittee also uses the area to park horse trailers and other vehicles. The other noxious weed sites in the allotment are slowly expanding.

Table 3-15. Gross Acres of Noxious Weeds by Allotment

Weed Species	Wolf	Heisler	Wind
Reed canarygrass	11.0	-	-
Whitetop	3.4	-	-
Spotted knapweed	4.21	-	15.0
Diffuse knapweed	4.1	-	-
Canada thistle	12.51	-	6.7
Houndstongue	1.81	-	-
Teasel		-	0.5
St. John's-wort	1.10	-	-
Dalmatian toadflax	0.01	-	-
Yellow toadflax		-	0.5
Sulfur cinquefoil	16.0	-	1.0
Medusahead	7.1	2.25	5.5
Mediterranean sagebrush	5.50	-	-
Total	66.64	2.25	29.2

Adjacent lands

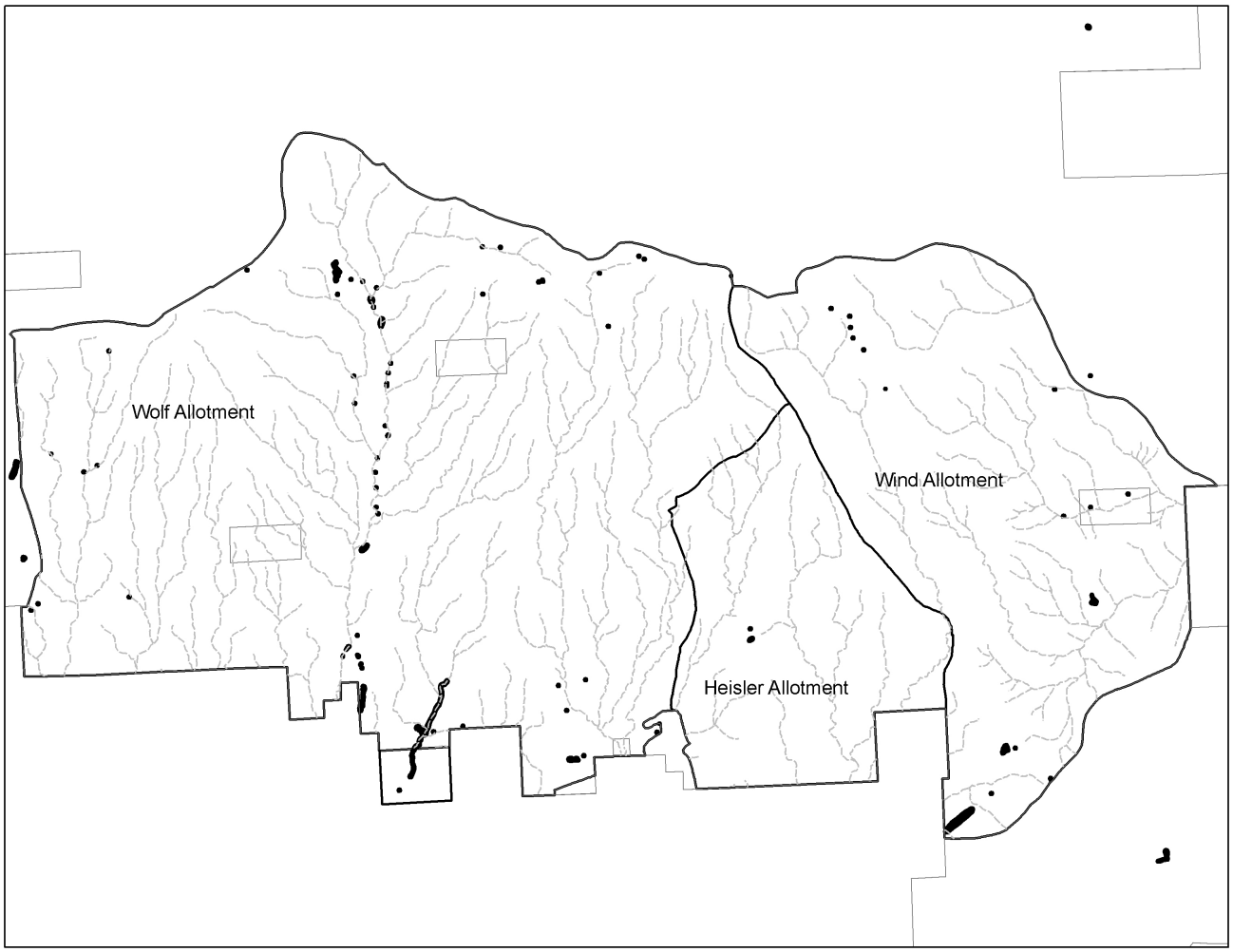
Noxious weed presence outside of the project area is also important due to the way weeds are spread from long distances through vectors such as vehicles and wildlife. South and east of the project area there are increasingly more populations of medusahead occurring on private land. This would be a serious threat to native plant communities within the allotments in the future. The South Fork John Day River corridor east of the Wind Allotment is also an area of concern for weed spread into that allotment. Dalmatian toadflax populations on Bureau of Land Management

administered land have exploded in the last two years and are moving upslope towards National Forest land. Houndstongue coming from the Roba Grazing Allotment is moving into the Wolf Allotment in small pockets, despite diligent control efforts. This is mainly due to down fences between the allotments and cattle movement between allotments.

Environmental Effects

Effects analysis of the alternatives assumes that weed infestations covered under the 1998 Weed EA would continue to be treated with herbicide as needed each year. Treatment of some infestations not covered under the Weed EA would be treated by manual methods when that method is effective. Over the last 10 years the Paulina Ranger District has been averaging 25 new weed sites per year, and two new weed species per year, based on data since 1995. The rate of spread of existing sites depends on species and type of treatment. Weed sites treated with herbicides decline, weed sites left untreated increase, and those treated manually increase slowly or remain stable depending on the species (NRIS database 2005). This analysis uses current practices concerning number of cows on each allotment, season of use, and pattern of use. A risk assessment (Noxious Weed Appendix to this report) was prepared for action alternatives, and most were found to be a moderate or low risk for the potential spread and introduction of noxious weeds. The relative risk is different for each allotment as described below. In the analysis, short-term is defined as a period less than 15 years, and long-term is a period greater than 15 years.

Map 3-1. Noxious Weeds in the Southside Allotments Project Area.



The cumulative effects analysis area for noxious weeds is larger than the project area. Vectors not confined to an area, such as animals, wind, and human activity, all transport weeds. The analysis would be based on the Ranger District, and adjacent public domain and private land.

Direct and Indirect Effects – Alternative 1

The no action alternative cancels Term Grazing Permits within two years. No livestock grazing would take place within the project area. This would result in a decline of acreage occupied by noxious weeds throughout the planning area.

For most noxious weeds to become established there needs to be a vector of introduction and a receptive seed bed, usually bare ground or a non-vigorous native plant community. This is a primary reason why weeds become established along roadsides, vehicles being the vector and the bare road shoulder the seed bed. Under Alternative 1, livestock, which can be a primary vector of weed spread, would be removed and less ground would be disturbed. Native plant community recovery because of rest from grazing pressure would reduce the amount and establishment potential of noxious weeds. Livestock grazing over decades results in repetitive overuse in some

areas. Over utilization of forage reduces plant vigor, which results in a decrease in litter accumulation, which in turn reduces site productivity and soil fertility. Perennial bunchgrasses such as Idaho fescue and bluebunch wheatgrass do not have high seedling vigor nor do they readily recover from grazing (DiTomaso 2004).

Removal of livestock grazing would result in immediate increases in standing plant litter material and plant vigor. Vegetation communities in good condition have greater ability to recover following disturbance. Soils with good vegetation ground cover have greater water holding capacity, higher microbial activity and higher fertility. Bare ground attributed directly to cattle would recover, becoming established with native perennial plants thus reducing the amount of available seedbed for noxious weeds. Each allotment would respond differently to recovery potential and timeframe.

Wolf Allotment

Cattle are a concern as a vector of spread of existing noxious weed populations in this allotment. The potential for cattle to spread or introduce weeds would be eliminated in this alternative. Noxious weed treatment would continue, and the efficacy of treatment would improve for many species. The risk of further spread of houndstongue from the Roba Allotment may continue due to cattle movement between allotments. Cattle transport houndstongue seed in their hair and hooves (De Clerck-Floate 1997)

Native plant community recovery after the elimination of grazing and continued weed treatment would result in fewer acres of noxious weeds. This allotment covers a large area encompassing a range of plant communities ranging from Idaho fescue/bluebunch wheatgrass plains to mixed conifer at high elevations. Plant communities change considerably over short distances based on soil depth and productivity because of aspect and topography. Climate plays an important role in vegetation recovery after livestock-grazing pressure is removed. Mesic sites recover faster (Belsky 2000, Hann et al 1997). The Nichol and Bull pastures are higher elevation and receive more precipitation (up to 23"/year), and are therefore expected to respond more quickly to cessation of grazing. These pastures are considered to be in an at-risk condition based on the Composite Pasture Resource Rating (Appendix B). Several riparian areas in the Nichol pasture, such as Powell Creek, may take longer to recover (>15 years) due to high incidence of early seral vegetation and non-native plants.

Evaluation of the weed risk for the Wolf Allotment concluded that cattle effects on weed risk vary by pasture from low to high. Presence of weed infestations susceptible to spread by grazing weighs heavily on overall risk. Pastures with susceptible weed species, Widow and Sugar, are also at high risk for continued weed invasion, as these pastures have plant communities in low ecological condition, making the area vulnerable to colonization from noxious weeds. As expected, watering areas such as springs, have high amounts of bare ground and annual, weedy vegetation, and are vulnerable to noxious weed invasion.

The Miles, Sugar, Riparian and Widow Pastures are lower elevation and generally receive precipitation ranging from 15 to 19 inches per year. The Miles pasture is currently in satisfactory condition, the others are in an at-risk condition. Many riparian areas are vulnerable to noxious weed infestations because of early seral plant communities and exposed soils. Eliminating grazing would help move these areas to desired conditions of late seral vegetation including sedges, rushes and shrubs that have extensive root systems. Recovery of riparian areas may take longer than the uplands, as there are factors other than vegetation that play a role in recovery, such as channel morphology and water flow regimes. Little is known about the recovery time for these factors (Clary 1989). Clary and Webster (1989) summarize that, in general, vegetation recovery after

grazing elimination occurs within 5 to 15 years. Based on current vegetation condition and moisture regimes within the allotment, it is within reason that all pastures would be in an overall satisfactory condition in the short-term (less than 15 years). This would be beneficial in terms of reducing the risk of noxious weed establishment. Native plant communities would increase in vigor and be more resilient to noxious weed invasion. Rest from grazing results in plants having the ability to produce seed for propagation, maintain healthy carbohydrate levels (which improves survival during precipitation fluctuations), and allows litter accumulation sufficient for soil protection.

Heisler Allotment

There are few noxious weed sites within the allotment; however, cattle are still a concern as a vector of medusahead spread, especially since there is a salting area adjacent to a medusahead site. Implementing the no grazing alternative would eliminate the possibility of cattle spreading this weed. Removing cattle from the area would also reduce the risk of noxious weed introduction as cattle can transport noxious weed seed in their hair and hooves when transported or herded into the allotment.

Eliminating grazing would allow vegetation recovery to a sustainable condition, which helps compete against noxious weed invasion. This allotment lies in the middle of the project area, elevation ranges from 4200 feet to 5200 feet, and 17 – 19" of precipitation per year. There are extensive scablands in the Bear, South and East pastures. North Africa grass (*Ventenata dubia*) is a non-native invasive grass that is increasing across the District and this allotment, especially in scabland areas. The reason for the increase is unclear; it does appear to coincide with disturbance. Evaluation of the weed risk for the Heisler Allotment determined that cattle effects on weed risk are low at this time. The overall amount of noxious weeds present is low, and riparian vegetation overall is in a condition able to resist colonization from noxious weeds. As expected, watering areas such as springs, have high amounts of bare ground and annual, weedy vegetation, and are vulnerable to noxious weed invasion. The Bear pasture is rated in satisfactory condition and the other pastures are rated as at-risk, for various reasons including low ecological status vegetation in some riparian areas and bare ground in the uplands. These pastures are close to satisfactory at present; recovery without grazing pressure is estimated to occur rapidly, in less than 15 years.

Wind Allotment

Noxious weed infestation in this allotment is increasing each year, with medusahead being the most concern. Some of these sites are a result of the 747 Fire that burned in 2002. Eliminating cattle grazing would help reduce spread of weeds. The medusahead sites occur on areas of residual clay soil, where seed is easily transported in hooves when wet. Cattle moving through the area in summer and fall also break off mature, dry seed heads that scatter in the wind, enlarging the infested area.

The Canada thistle and teasel populations would decrease as plant communities recover from grazing and gain increased resilience to disturbance. The allotment lies in the east portion of the project area with most of the topography draining into the South Fork John Day River. The allotment covers a wide variety of plant community types from extensive scablands to high elevation moist mixed conifer. Elevation ranges from 3,500 feet to 6,000 feet and precipitation ranges from 15" to 25" respectively. The Bronco holding pasture is in satisfactory condition. The North pasture is rated as at-risk due to stream channel morphology, cutbanks, and excessive amounts of bare ground. Vegetation would recover at a faster rate with the removal of cattle. Native plants would gain vigor without chronic herbivory and direct effects of trampling would not occur. This would in turn, increase the resilience of plant communities from invasion of noxious

weeds and other non-native plants. This is especially important due to the allotment's proximity to private and other agency land to the east, which have increasing amounts of noxious weed populations.

Evaluation of the weed risk for the Wind Allotment determined that cattle effect on weed risk for the majority of the allotment is moderate (low for the small Bronco holding pasture). Presence of weed infestations (medusahead) susceptible to spread by grazing is higher in the South pasture compared to the North pasture. The South pasture has plant communities in low ecological condition along Beaverdam Creek, making the area vulnerable to colonization from noxious weeds. Elsewhere, like Wind Creek and lower South Fork Wind Creek, riparian vegetation is in good condition. With the elimination of grazing, the pastures are expected to recover in the short-term. Some riparian areas such as along Beaverdam Creek, may take longer to recover.

Cumulative Effects – Alternative 1

Past management activities including timber harvest, prescribed burning, road construction, hunting, and a century of historic livestock grazing have contributed to the introduction and spread of noxious weeds. Most infestations occur along major travel routes, indicating vehicles are the primary vector. Many stream channels have widened and incised, thus losing the amount of floodplain area and the associated vegetation that depends on wet conditions. Stream banks become raw with the loss of soil holding root masses provided by willows, sedges and rushes. As stream channel morphology changes and degrades, riparian areas become more susceptible to non-native plant invasion.

There are both beneficial and detrimental effects resulting from past activities (Table 2-1). Removing understory trees mimics the low intensity, frequent fires that occurred before European settlement. Harvest helps keep the amount of overstory shade low, reduces competition and encroachment on meadows and scablands. Detrimental effects include soil compaction, the creation of bare ground, areas susceptible to the introduction of noxious weeds. Road construction occurs in conjunction with timber harvest. Roads, and the harvest landings associated with them, become lastingly altered, and invite vehicle traffic that often results in weed infestations.

Also associated with timber harvest is slash reduction burning, which occurs over most acres of harvest. There has also been natural fuels reduction burning (Table 2-1) in the allotments. When plant communities contain native vegetation in good condition, with adequate stored carbohydrates, burning can be beneficial by reducing thick layers of litter and organic matter, and an increase in productivity a few years later (Miller and Findley 2001). Burning that is too hot, with poor soil moisture, that occurs within degraded plant communities can damage vegetation to the point of death from heating meristems and buds, especially fine stemmed bunchgrasses (such as Idaho fescue) (Miller and Findley 2001). There are several places in the project area that have been altered by undesirable outcomes from burning, such as the North pasture of Wind Allotment from the Wind Creek Timber Sale burning. This burning resulted in large tracts of non-native grasses such as Japanese brome and cheatgrass (see Photograph 3-2).

The 747 wildfire burned within the northeast part of the project area in July 2002. The fire occurred mostly in the North Pasture of the Wind Allotment. It was a high intensity fire; herbaceous vegetation and plant litter were consumed down to bare soil, and resulted in tree death over much of the area. Vegetation has recovered well over the last three years and has gone through several successional changes. Despite some colonization by non-aggressive noxious weeds (mullein and bull thistle) and invasive plants such as cheatgrass, upland plant habitat is expected to fully recover. Fire suppression efforts introduced several noxious weed sites and spread existing sites within the allotments.

Present activities on National Forest System land within the project area include natural fuels burning and precommercial thinning, recreation, noxious weed control, and livestock grazing. The Hardcorner Fuels Project began implementation this year within the Wind Allotment. When completed, burning would occur on 4,428 acres and understory thinning on 840 acres. Several campgrounds are present in the project area, which have chronic noxious weed problems. New infestations and new species occur each year. These campgrounds are also attractive to cattle due to the proximity of water, especially Sugar Creek Campground, and are over utilized every year, helping to spread weeds and deteriorate vegetation.

The lower portions of the subwatersheds are privately owned with minor amounts of other federally owned land. Much of the land base is being used for rangeland cattle grazing. The amount of acreage occupied by noxious weeds is unknown, but it is increasing in both riparian and upland habitats. Medusahead rye is of particular concern; there are large tracts south of the Heisler Allotment and east of the Wind Allotment. The No Action Alternative would be a positive prevention measure for reducing the spread of noxious weeds, which is important since noxious weed control measures are limited.

Photograph 3-2. Site dominated by introduced grasses as a result of high intensity fire within the Wind Creek allotment, Paulina Ranger District, Grant County, Oregon.

Direct and Indirect Effects – Alternative 2

This alternative proposes new management standards, based on pasture condition to improve grazing lands within the three allotments. These standards do not differentiate use by plant community type and therefore reduces forage utilization by 5 to 15 percent compared to Alternative 3. Alternative 2 also gives a utilization standard for upland shrub use and slightly higher stubble height requirements in riparian areas at the end of grazing use for pastures in at-risk or unsatisfactory condition. All other grazing parameters are the same as Forest Plan standards as amended by PACFISH/INFISH. Required monitoring of pasture condition is vital to the success of this proposal.

Mitigation measures to help prevent noxious weeds are the same for all action alternatives. These measures mostly include education materials and maps of weed sites for Permittees. One measure of note describes keeping livestock in a small holding area when coming from a pasture infested with noxious weeds to allow seed passage through the digestive tract (and fall off hair and hooves). When implemented, this would reduce the effect of cattle spreading weeds, especially houndstongue.

The proposed management standards would not affect cattle as a physical vector of noxious weed introduction and spread in the short-term because the same numbers of cows are expected to graze the allotments. Cattle would continue to impact noxious weed sites occupied by species vulnerable to spread by livestock such as houndstongue, medusahead, St. John's-wort, and knapweed.

Native plant communities should benefit from the proposed standards. For example, pastures in an at-risk condition could have utilization rates imposed from 20 to 35% versus 45 to 55% under current standards. This would leave more standing plant material, which increases plant litter and gives the plants more opportunity for photosynthetic recovery. Stubble height in riparian areas would also increase from 4 inches to 5 inches, with the same result. Boyd et al. (2004) report that

grass and sedge regrowth respond positively with increased stubble height when grazed early in the year. Regrowth was less in July than in June; it is reasonable to assume that late season grazing (August-September) may not provide sufficient stubble heights to meet standards, therefore intensity of use should be monitored, and adjustments made.

The adaptive management strategy of Alternative 2 is expected to promote native plant community recovery within riparian areas in all the allotments. The proposed standard of 20 to 35 percent utilization in at-risk pastures fits with data suggesting that 24 to 32 percent utilization of riparian graminoids equaled a residual 6-inch stubble height, which may be the minimum necessary to protect riparian function (Clary and Webster 1989). For example, within the north pasture of Wind Allotment, along Beaverdam Creek, this alternative gives the opportunity to choose utilization at 20%, which should result in a higher residual stubble height than 6 inches. This would help move toward desired conditions and an upward trend, resulting in more resilient riparian communities which would be less susceptible to noxious weed invasion.

Cumulative Effects – Alternative 2

Past and future actions affecting noxious weed populations within the Southside project area are described under the Alternative 1 cumulative effects section. The project area ranges from allotments with very few noxious weeds to an allotment with numerous small infestations, all of which occur in a variety of ecosystems. Obviously livestock impacts, both as a physical vector of spread and herbivory effects on native plants, would be different across the project area. Due to current vegetative conditions, rangeland would recover from the cumulative effects of disturbance such as timber harvest, fire, road construction and long-term livestock use, at a slower rate under a grazing scheme compared to no grazing. The longer the duration of recovery, the more susceptible the project area is to noxious weed invasion and the resulting consequences to resources. Adaptive management under Alternative 2 provides a range of use rates that can shorten this recovery period if more stringent standards are implemented.

Direct and Indirect Effects – Alternative 3

This alternative proposes keeping grazing implementation and standards at current levels, as regulated by the Forest Plan and the Annual Operating Provisions. Similar to Alternative 2, the Forest Plan also gives the manager the ability to lower utilization rates based on pasture condition; however, the usual practice is to simply reduce the stocking level in the allotment if previous year's standards are not met. Current trends in vegetative condition are expected to continue in the short-term where only five of the 14 pastures within the allotments are in satisfactory condition

There is a complex interrelationship between climate, vegetation potential, soil productivity, disturbance and noxious weeds. In this analysis, grazing is the disturbance analyzed. There is much debate on the nature, extent and direction of change in the environment but it is clear that one of the influences is livestock grazing pressure (Hemstrom et al 2001). Grazing pressure changes plant species composition by favoring less palatable species, reducing the cover of native plant species, allowing invasion by non-native plants and changing soil surface characteristics (Hann et al 1997). Noxious weed presence in riparian areas and uplands support the conclusion of vulnerable ecosystems. Noxious weeds in these areas are an indication that rangelands have lost the capability for ecological resilience; they are a symptom of weakened forage and reduced productivity (Pyle 2004, DiTomaso 2004).

For the most part, people have introduced noxious weeds in the project area; they start on road shoulders and spread from there. Several pastures in the Wolf Allotment have weeds away from roads, which increases the risk of spread by cattle. An example is houndstongue in the Widow

Pasture. This weed is easily spread by cattle (DeClerck-Floate 1997), as evident by the aggressive populations in the adjoining Roba Allotment. Although weeds are established and spread by a variety of sources, cattle can be a major vector. This alternative would exacerbate the existing noxious weed condition and maintain rangeland in a less than desirable condition. Cattle can directly disturb the soil causing bare ground and conditions favorable to invasive plants. Bare ground greatly increases the risk that noxious weed seed transported by the cows themselves or any other means would quickly become established compared to an area occupied by native vegetation. Effects of livestock include trampling of vegetation, reduction of litter, accelerated erosion on bare soil, and decreasing plant cover, all of which have the potential to increase the risk of weed establishment. Substantial litter reduction can cause a subsequent increase in bare ground (Schulz and Leininger 1990). Soil compaction is another indirect effect concerning weeds. Compaction disturbs the soil crust and increases the bulk density which in turn increases erosion (Kleiner and Harper 1977).

Mitigation measures to help prevent noxious weeds are the same for all action alternatives. These measures mostly include education materials and maps of weed sites for Permittees. One measure of note describes keeping livestock in a small holding area when coming from a pasture infested with noxious weeds to allow seed passage through the digestive tract (and fall off hair and hooves). When implemented, this would reduce the effect of cattle spreading weeds, especially houndstongue.

Cumulative Effects – Alternative 3

See the Cumulative Effects section under Alternative 1 for past and future activities that may affect acres of noxious weeds within the allotments. Continuing grazing as currently managed would continue a very slow upward trend in range condition from degradation resulting from practices in the 1800's. Noxious weed introduction however, is occurring at a very fast rate and the combination of these processes is not compatible. Maintaining pastures in an at-risk condition in the long-term would incrementally contribute to overall ecosystem decline due to invasive plants. The first 10 years of a noxious weed invasion are the slowest, after 10 years the population increases exponentially (Sheley pers. comm.). Some of the sites on the District that are spread by cattle, notably houndstongue were discovered in 1995. They have been steadily increasing since then and can affect forage, as in the Roba Allotment. Consequences of noxious weed invasion are well documented on effects to wildlife, soil stability, plant diversity, insects and butterflies. In addition the livestock industry is impacted. In 1999, it was estimated weeds in rangelands caused a loss of $2 billion annually in the U.S. Weeds lower the quantity and reduce the quality of forage, poison animals, increase the cost of managing and producing livestock, and reduce land value (DiTomaso 2004). Houndstongue in particular is a problem for cattle management. The forage is toxic to livestock and the barbed seeds attach to cattle, causing irritation and potential market losses (De Clerck-Floate 1997). Cumulatively, noxious weeds would spread because of increasing demands for recreation on the district, and increasing populations on adjacent lands. Maintaining current pasture conditions is expected to exacerbate noxious weed spread.

Direct and Indirect Effects - Alternative 4

Alternative 4 would implement the adaptive management strategy from Alternative 2. In addition three permit modifications would be made to the Wolf and Wind Allotments: 1) Construct an east-west fence roughly through the middle of the Widow pasture, Wolf Allotment, 2) Allow grazing in the riparian exclosure on Wolf Creek in the Wolf Allotment, and 3) Change the current pasture rotation in the Wind Allotment to permit early grazing in the South pasture versus the North pasture.

The proposal to divide the Widow Pasture by an east-west fence would split the large (8,700 acres) area in half. The pasture has a 1,000' elevation difference, and the Permittee feels that using the lower, south end earlier in the year would allow more control of livestock to utilize upland forage before curing, and reduce use in the riparian areas. This, in conjunction with higher utilization standards and stubble height requirements should accelerate an upward trend in vegetation conditions, leading to increased resilience against noxious weed invasion. These areas would be incorporated into the rotation with the Miles and Bull pastures. The noxious weed risk assessment for the Widow pasture under the other alternatives is ranked as high risk. When separated, Widow has a moderate risk and Quicksand has a high risk of effects from noxious weeds. Several streams in the Quicksand pasture (ex. lower Widow Creek) have simple plant communities with early to very early seral species composition. Reducing the pressure on riparian vegetation would accelerate species composition changes to diversity that is more complex. Maintaining a diversity of plant functional groups within the community enhances resistance to noxious weed invasion (Pokorny 2005). Grazing this lower elevation area earlier in the year would also allow better regrowth potential of grasses and sedges and improve plant vigor.

The proposal to allow grazing in the Wolf Exclosure would have a detrimental effect on vegetation condition and increase the potential for negative effects to plant communities from noxious weed invasion. The exclosure is a narrow area, about 1,400 acres in size, encompassing approximately 5.5 miles of Wolf Creek. The proposal is to graze within the exclosure for 40 days (40% of the permitted time on the allotment) with 40 pair of cattle. Livestock have not grazed this exclosure since 1988. Riparian vegetation is recovering and on an upward trend for the most part, with sedges and rushes dominating the herbaceous component, and there is good shrub establishment throughout. This stream is a narrow v-shaped canyon with a major gravel road running parallel above the stream the entire length. There are a high percentage of weeds sites in proportion to the land area because of the road. Cattle would act as an additional vector of spread of these weeds and put additional pressure on an already stressed riparian ecosystem due to road influence. As this is a steep, confined narrow canyon with slopes averaging 35%, it is likely that livestock would remain along the creek the entire duration while in the pasture. Observations elsewhere on the district (Jackson Creek) of similar topography conclude that cattle trail up and down the creek and do not attempt to use the side slopes.

There is a high likelihood that cattle grazing this confined area would cause negative effects in the short-term from bank sloughing, soil compaction and vegetation trampling. Long-term effects to the riparian area include stream channel degradation, increased amounts of bare soil, and a reduction in aerial extent of vegetation (Hann et al. 1997). The exclosure is a small area (<4%) within the allotment that is currently unavailable for grazing. Allowing 40 days of livestock grazing within 4% of the allotment acreage, and with use confined due to topography, would likely result in long-term adverse effects to native vegetation, increasing the potential for noxious weed spread. The week risk assessment for the exclosure ranks as high.

The proposal to graze the South pasture of the Wind Allotment early in the season does not affect cattle as a vector of spread and introduction, however it is expected to reduce grazing pressure in riparian areas, which would move vegetation to a satisfactory condition more quickly and would be a positive change for riparian habitat.

This portion of the allotment is lower elevation, and similar to the Widow Pasture situation, upland forage becomes less palatable in late summer, causing livestock to graze along streams. The vast majority of the South pasture area is dominated by low shrub/grassland/western juniper plant communities; a result of clay soils and lower precipitation rates. These plant communities occurring at lower elevations mature more quickly than at higher elevation. Utilizing the forage while palatable would accomplish two things: allow regrowth of forage, increasing plant vigor, and

utilize more land area other than just riparian areas. Noxious weed risk remains the same, but should lessen in the long-term as riparian areas respond to less grazing pressure.

Cumulative Effects – Alternative 4

Cumulative effects of past and future forest activities on noxious weed populations and their effects are the same as those analyzed under Alternative 1. Additional future activities include the continuation of grazing proposed under Alternative 4. With the exception of the Wolf Exclosure pasture, riparian and upland habitat would move toward desired conditions more quickly than Alternatives 2 or 3; but slower than with complete elimination of livestock. Re-introducing livestock grazing in the Wolf Exclosure would negatively affect riparian habitat in the long-term. This is particularly true due to the cumulative impacts from the road running parallel to the stream. This artificially confines the channel, and increases sediment delivery. Many places along the road have a steep fill slope bordering the stream terrace. Because of vehicle traffic and human activity, there are many noxious weed infestations along the road. In addition, there are Canada thistle populations within the riparian area itself. Grazing the exclosure would add another vector of weed spread and introduction.

Summary

Eliminating grazing under the No Action Alternative would reduce the potential for spread and introduction of noxious weeds by cattle. Native vegetation would also recover from grazing effects. Irwin et al. (1994) explored the concept that long-term herbivory in the Blue Mountains may have reduced economic carrying capacities, and that trends in productivity may be masked by precipitation variation. They conclude that the current plant-herbivore subsystem is probably not stable, and objectives should be evaluated carefully for densities of domestic herbivores (and big game). Achieving stated goals of rangeland improvement in the purpose and need is more likely when tailored to landscapes. Adaptive management proposed in Alternative 2 would monitor pasture condition based on multiple resources, and would adjust or tailor grazing standards according to pasture condition. This would move towards desired conditions more quickly than Alternative 3. Continuing livestock grazing at existing management standards as proposed in Alternative 3, is expected to remain static in the long-term, where native plant community function is at risk and lacks resilience to disturbance. This is expected to result in an increase in noxious weeds as vectors and weeds on adjacent lands increase. Alternative 4 has several proposals that would result in improved riparian and upland habitat making them more able to resist colonization by invasive species; however, the use of the exclosure pasture would outweigh these benefits in the long-term, making Alternative 2 the most desirable for managing noxious weed risk.

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Chapter 4

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Glossary of Acronyms, Abbreviations, and Terms

Allochthonous: The word refers to energy source or nutrient coming from the outside the stream system which may be in the form of leaves, sticks, cones, bark, branches, and logs that fall or get washed into the stream, which begins a breakdown process by fungi and bacteria. Allochthonous material feeds macroinvertebrates, which feed fish.

Airshed - A geographical area that because of topography, meteorology, and climate shares the same air.

Alternative - In an EA/EIS, one of a number of possible options for responding to the purpose of and need for action.

AMP - Allotment Management Plan (livestock grazing).

AUM - Animal unit month; based on the amount of forage required by an adult cow for one month (26 pounds dry matter per day, Forest Plan).

BA - Biological Assessment

BE - Biological Evaluation

Best Management Practices (BMPs) - Practices designed to prevent or reduce water pollution, including sedimentation.

BLM - Bureau of Land Management

Canopy - In a forest, the branches from the uppermost layer of trees; in a shrub or grassland, the uppermost layer of shrubs; in a riparian area, the layers of vegetation that project over the stream.

Canopy Cover – The areas of the ground covered by a vertical projection of the canopy. Used to describe how open or dense a stand of trees is, often expressed in 10 percent increments.

CFR – Code of Federal Regulations.

cfs (cubic feet per second) – a method of measuring volume or capacity; a cubic foot is 1,728 cubic inches or 0.028 cubic meters.

Closed Road – Generally, local roads that are physically closed (signs, gates, and earthen berms) to public use.

Collector Road - Roads that serve smaller lands areas than a Forest arterial road, and usually connected to an arterial road or public highway. These roads collect traffic from local Forest roads and/or terminal facilities. The location and standard are influenced by both long-term multi-resource service needs, as well as travel efficiency. These roads may be operated for either constant or intermittent service, depending on land use and resource management objectives for the area.

Compaction - Packing together soil particles by exerting force at the soil surface and increasing soil density. Making soil hard and dense, decreasing its ability to support vegetation because the soil can hold less water and air and because roots have trouble penetrating the soil.

Connectivity - The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation (the opposite of fragmentation).

Cover - (1) Trees, shrubs, rocks, or other landscape features that allow an animal to partly or fully conceal itself. (2) The area of ground covered by plants, litter, and coarse fragments, including tree crowns and shrubs that are in direct contact with the ground.

Cultivator - an implement to loosen soil while crops are growing.

Cumulative Effects - Impacts on the environment resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively major actions taking place over a period of time.

CWE – Cumulative Watershed Effects; substantial, adverse influences on water quality and biological resources that arise from the way watersheds function, and particularly from the ways that disturbances within a watershed can be transmitted and magnified within channels and riparian habitats downstream of disturbed areas.

Design Elements – measures taken to reduce the potential for negative impacts on a resource from a project activity.

Detrimental Soil Conditions – There are four categories describing detrimental soil conditions: compaction, displacement, puddling and severely burned soil or charring. Compaction is defined as an increase in soil bulk density of 20% or more from the undisturbed level for volcanic ash soils and 15% or more for residual soils. Displacement is often described as the removal or mixture of topsoil or humus from the A horizon. Puddling is the breakdown of soil structure under wet conditions. Severely burned soil or charring can be described as having the top layer of mineral soil greatly changed in color, usually to red, and the next one-half inch blackened from organic matter charring by heat conducted through the top layer.

Developed Recreation - Recreation that requires facilities that in turn result in concentrated use of an area; for example, a campground.

Dimension - A term that refers to the cross-sectional profile of a stream.

Direct Effects - Impact on the environment that is caused by an action and occur at the same time and place.

Discing - to cultivate with a disc harrow or similar implement

Dispersed Recreation - Recreation that does not occur in a developed recreation sites; for example, hunting or backpacking.

Diversity - The distribution and abundance of different plant and animal communities and species within an area.

EA – Environmental Assessment

Ecosystem - A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

EIS - see Environmental Impact Statement

Embeddedness The degree to which fine sediments surround and cement coarse substrates on a streambed. This comparison is used to assess habitat capability for spawning and feeding, incubating and over-wintering fish, as well as for their prey base. Embeddedness provides an indication of how easily substrate moves at various flows, linking it to water quality measures including stream turbidity

Endangered Species - A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a major portion of its range.

Endangered Species Act (ESA) - An act, passed by Congress in 1973 that directed all Federal departments and agencies to seek to conserve endangered and threatened species. Actions authorized, funded, or carried out by Federal departments and agencies should not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat. The act also mandates conferencing with the appropriate agencies.

Environment - The combination of external physical, biological, social, and cultural conditions affecting the growth and development of organisms and the nature of an individual or community.

Environmental Consequences – Effects as a result of an action. Included are direct effects, which are caused by the action and occur at the same time and place; indirect effects, which are caused by the action and are later in time or further removed in distance but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and the related effects on air, water, and other natural systems, including ecosystems. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if, on balance, the agency believes the effects would be beneficial.

Erosion – The detachment and removal of soil material from its original location.

Essential Fish Habitat (EFH) – The Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996, established procedures to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. The Act requires Federal agencies to consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.

Evolutionarily Significant Unit (ESU) – An ESU is a Pacific salmon population or group of populations that is substantially reproductively isolated from other populations of the same species that represents an important component of the evolutionary legacy of the species.

Exclosure - A structure, generally a fence, that prohibits cattle and/or wildlife from a designated area.

Forest Cultivator - large V bar curved tooth harrow usually pulled as a separate unit. Used to rip to 12-14 inches.

Forest Plan (Land and Resource Management Plan) - A document that guides natural resource management and establishes standards and guidelines for a National Forest; required by the National Forest Management Act.

Forest Plan Amendment #2 (Regional Forester's Interim Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales or Eastside Screens) - Originally signed in 1994 and amended in 1995. The objective of this direction was to provide an approach for maintaining future planning options concerning wildlife habitat associated with late and old structural stages, fish habitat, and old forest abundance. The direction was intentionally restrictive, reflecting a conservative interpretation of riparian, wildlife, and ecosystem needs for the short term. The direction applies to timber sales. The Interior Columbia Basin Ecosystem Management Project would supersede the Eastside Screens.

FSM – Forest Service Manual

Fragmentation (habitat) - The breakup of a large land area (such as a forest) into smaller patches isolated by areas converted to a different land type (the opposite of connectivity).

FS - Forest Service

Fuels – Includes living plants; dead, woody vegetative materials; and other vegetative materials capable of burning.

General Forest Management Area – see Management Area.

Ground Cover - Perennial vegetation plus litter and coarse fragments (greater than 2 mm in size), including tree crowns and shrubs, that are in direct contact with the ground. Based on the erosion hazard class, effective ground cover is between 20% and 75% of ground covered the first year after management activities.

Gully - An erosional term used to describe concentrated erosion in the vertical direction. Gullies are generally deeper than they are wide.

Habitat - A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

Heritage Resources - The remains of sites, structures, or objects used by humans in the past. They may be historic, prehistoric or architectural in nature.

Historic Range of Variability – changes in forest vegetation, specifically, the comparison of its current condition with what it was like historically.

Hydrolic Subsoiler - toothed ripper or harrow that allows teeth to rise over rocks, etc. by means of an affixed nitrogen cylinder that compresses under a maximum mechanical loading to prevent tooth from breaking off.

IDT - Interdisciplinary Team

Inactivated (Road) - A road that is managed in a stored or closed category for long-term intermittent use. Generally, a traffic service level D single purpose type road that remains open to motorized off-highway vehicles. An inactivated road can be hydrologically stabilized or hydrologically closed.

Indirect Effects - Impacts on the environment that are caused by an action and are later in time or farther removed in distance.

INFISH - Interim Inland Native Fish Strategy for the Intermountain, Northern, and Pacific Northwest Regions (Forest Service). A strategy intended to provide interim direction to protect habitat and populations of resident fish outside of anadromous fish habitat in eastern Oregon, eastern Washington, Idaho, western Montana, and portions of Nevada. The Decision Notice/Finding of No Significant Impact for this strategy was signed July 28, 1995.

Instream Structures – Boulders, logs, or other artificially placed materials that are used to enhance or improve existing fish habitat by altering stream velocity and depth or to provide physical cover.

Interdisciplinary Team (IDT) - A team of people that collectively represent several disciplines and whose duty it is to coordinate and integrate the planning process.

Intermittent Stream - A stream that flows only at certain times of the year when it receives water from other streams or from surface sources such as melting snow.

Irretrievable - A category of impacts that applies to losses of production or commitment of renewable resources. For example, while a linear piece of land is being used as a road, some or all of the timber production there is "irretrievably lost." If the road was rehabilitated after use and soil compaction was reduced, timber production could resume; therefore, the loss of timber production during the time the road was in use is irretrievable but not irreversible, because it is possible for timber production to resume if the piece of land is no longer used as a road.

Irreversible - A category of impacts that applies to non-renewable resources, such as minerals and archaeological sites. Losses of these resources cannot be reversed. Irreversible effects can also refer to effects of actions on resources that can be renewed only after a very long period of time, such as the loss of soil productivity.

Issue - A matter of controversy, dispute, or general concern over resource management activities or land uses. To be considered a "major " or "key" issue, it must be well defined, relevant to the proposed action, and within the ability of the agency to address through alternative management strategies.

Jump - A vertical transition within a stream that may prevent fish passage.

LRMP – Land Resource Management Plan (Forest Plan).

Landtype – An inventory map unit with relatively uniform potential for a defined set of land uses. Properties of soils, landform, natural vegetation, and bedrock are commonly components of landtype delineation used to evaluate potentials and limitations for land use.

Listed Species - A wildlife or plant species listed under the authorization of the Endangered Species Act as threatened or endangered.

Listed (Streams) – Streams listed on the 303(d) List by Oregon Department of Environmental Quality (ODEQ) as water quality limited.

Local Road - Local roads are usually one-lane roads constructed to serve a dominant use or resource. Local roads do not access large land areas since they are more site-specific than arterial and collector roads.

LRMP - Land & Resource Management Plan (see Forest Plan)

Management Area - a unit of land allocated to emphasize a particular resource, based on the capability of the area. Expressed as MA F20, MA F22, etc.

Management Direction - A statement of goals and objectives, management prescriptions, and associated standards and guidelines for attaining them.

Management Indicator Species (MIS*)* - Vertebrate species whose population changes are believed to best serve as an index of a biological community's response to the effects of land management activities or are important for fishing, hunting and trapping.

MIS – see Management Indicator Species

Mitigation - Measures designed to counteract environmental impacts or to make impacts less severe.

National Environmental Policy Act (NEPA) - An act, passed by Congress in 1969 that declared a national policy to encourage productive harmony between humans and their environment. This act requires the preparation of environmental impact statements for Federal actions that are determined to be of major significance (see 40 CFR [Code of Federal Regulations] 1500-1508 for implementing regulations. See also FSH [Forest Service Handbook] 1909.15, the FS Environmental Policy and Procedures Handbook.)

NEPA - see National Environmental Policy Act

NLAA - Not Likely to Adversely Affect

NMFS - National Marine Fisheries Service

Non-forest Land – Lands that have never had or that are incapable of having 10% or more of the area occupied by forest trees, or lands previously having such cover and currently developed for non-forested use.

NRHP – National Register of Historic Places

No Action Alternative - The most likely condition expected to exist in the future if current management direction were to continue unchanged.

NTU – Nephrometric Turbidity Unit: How turbidity is expressed. Turbidity is the degree to which suspended material in the water impedes light penetration.

ODEQ – Oregon Department of Environment Quality

ODFW - Oregon Department of Fish & Wildlife

Old Structure - A forest stand with moderate to high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees, high incidence of large trees, some with broken tops and other indications of old decaying wood (decadence), numerous large snags; and heavy accumulations of downed wood. For ponderosa pine stands, large diameter trees with incidences of snags and old decaying wood may indicate old structure. Canopy densities may actually be low with fewer trees per acre present than other plant associations.

OSHA - Oregon Occupational Safety & Health Association

Overstory - The upper canopy layer of trees.

PACFISH – Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (commonly referred to as PACFISH).

PAG – See Plant Association Group

Pattern - A term that refers to the plan-view of a stream.

PBA - Programmatic Biological Assessment

PDC - Project Design Criteria

Periphyton: Microscopic underwater plants and animals that are firmly attached to instream surfaces like rocks and large woody debris. Fish and macroinvertebrates may use periphyton as a food source.

Perennial - A plant that lives for three or more years.

Perennial Stream - A stream that flows water year round.

Plant Associations - Climax plant community types

Plant Association Group (PAG) - A group of plant associations that share similar productivities, disturbance regimes, and responses to disturbance. Eight major plant association groups have been described on the Ochoco National Forest.

Plant Communities - A homogeneous unit in respect to the number and relationship of plants in tree, shrub, and ground cover strata.

Prescribed Fire – A wildland fire burning under specified conditions that would accomplish certain planned objectives. The fire may result from either planned or natural ignitions. The Regional Forester must approve proposals for use of natural ignitions for this purpose.

Post-holing - A term used to describe soil disturbance from wildlife and livestock that results in "post-hole like" depressions.

Profile - A term that refers to the longitudinal profile of stream.

Proposed Action - A proposal made by the Forest Service to authorize, recommend, or implement an action on National Forest System lands to meet a specific purpose and need.

Puddling – A term used to describe standing water on the soil surface resulting from platiness or lack of structure in soil.

Relative Erosion Rate (RER) – portrays average sediment load changes attributable to forest management practices and natural disturbance factors.

Riparian Management Objectives (RMO) – INFISH key habitat elements.

Ripping -generic term for using toothed implements to loosen earth or rock. May be used singly as in large long rippers behind tractors or in straight bar gangs or V bar gangs either on a tractor or on a trailer. Depths commonly range from 1 to 3 feet.

RHCA - see Riparian Habitat Conservation Area

Riparian Area - An area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

Riparian Habitat Conservation Area (RHCA*)* - A portion of a watershed where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCA include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems by (1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams, (2) providing root strength for channel stability, (3) shading the stream, and (4) protecting water quality.

RMO – see Riparian Management Objectives

Scarification - term used to describe usually shallow (<12 inches discing), harrowing or cultivating.

Scoping - The early stages of preparation of an environmental assessment or environmental impact statement used to solicit public opinion, receive comments and suggestions, and determine the issues to be considered in the development and analysis of a range of alternatives. Scoping may involve public meetings, telephone conversations, mailings, letters, and other contacts.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation – The action or process of forming or depositing sediments.

Sediment Yield – Sediment that is eroded from adjacent land into a body of water.

Sensitive Species - Species identified by a Regional Forester for which population viability is a concern because (a) of substantial current or predicted downward trends in population numbers or density, or, (b) of substantial current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Seral Stage – A plant or animal community that is transitional in stage of succession, being either short- or long-term. If left alone, the seral stage would pass and another plant or animal community would replace it.

Short-Term Effects – For timber management planning, those effects which would not be substantial beyond the RPA planning horizon of 50 years. For DEQ water quality, short-term effects are defined as two days or less. Generally, short-term effects are within the planning period.

Silviculture - The practice of manipulating the establishment, composition, structure, growth, and rate of succession of forests to accomplish specific objectives.

Species - A population or series of populations of organisms that can interbreed and reproduce freely with each other but not with members of other species.

Stand - A group of trees in a specific area that is sufficiently alike in composition, age, arrangement, and condition to be distinguishable from the forest in adjoining areas.

Stand Density Index (SDI): the general term stand density is a measure of the amount of tree vegetation on a unit of land area and can be the number of trees per acre, the basal area per acre, or other parameters such as average stand density index (SDI) per area. SDI is based on the relationship between tree size and the number of trees per acre and is indexed to a stand having a 10 inch diameter at breast height (dbh) average tree size.

Stream Class - A classification system for streams. **Class I** are perennial or intermittent streams containing one or more of the following characteristics: (1) are the direct source of water for domestic use; (2) are used by large numbers of fish for spawning, rearing, or migration; and/or (3) contain enough flow to have a major influence on water quality of a Class I stream. **Class II** are perennial or intermittent streams containing one or more of the following characteristics: (1) are used by moderate numbers of fish for spawning, rearing, or migration; and/or (2) flow enough water to have a moderate influence on downstream quality of a class I or II stream. **Class III** are all other perennial streams not meeting Class I or II definitions. **Class IV** are all other intermittent streams not meeting Class I, II, or III definitions.

Subwatershed - An area mostly bounded by ridges or other similar topographic features contributing water, organic matter, dissolved nutrients, and sediments to a lake or stream. One or more subwatersheds make up one watershed.

Succession - A series of dynamic changes by which one group of organisms succeeds another through stages leading to potential natural community or climax. An example is the development or series of plant communities (called seral stages) following a major disturbance.

Threatened Species - Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a major portion of their range.

Tillable - capable of being tilled, fractured, discing, ripped - varies with equipment capabilities.

Tillage - the operation of tilling land, to plow, sow seed and raise crops.

TMDL - Total Maximum Daily Load – The state establishes a Total Maximum Daily Load (TMDL) allocation plan. A TMDL allocation plan establishes limits on the quantity of a pollutant that enters a stream from a specific land user or group of users.

Understory – May include grass, forbs, shrubs, small trees (such as seedlings and saplings), and other plants found beneath the overstory tree canopy.

USDA - United States Department of Agriculture.

USDI - United States Department of Interior.

USFWS - United States Fish & Wildlife Service

VEM - Viable Ecosystems model (VEM) is the method used on the Ochoco N.F to apply ecosystem concepts to project-level planning. This system compares existing vegetation with site potential (or biophysical environment) and historic conditions. The VEM is designed to be applied at both the forest and the sub-watershed scale.

Watershed – An area mostly bounded by ridges or other similar topographic features contributing water, organic matter, dissolved nutrients, and sediments to a lake or stream. A watershed is made up of two or more subwatersheds.

WEPP – Water Erosion Prediction Project; a model to estimate potential soil erosion and sediment yield.

W/D - Width to Depth Ratio

Winged Subsoiler - toothed ripper or harrow that has teeth that are T shaped in cross section which lifts the soil and loosens it more than standard teeth.
WQRP - Water Quality Restoration Plan

Xeric – Of, characterized by, or adapted to an extremely dry habitat.

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Bibliography

Anderson, B. 1989. Background Information on the EHA Model. Unpublished, on file at the SO, Ochoco National Forest.

Altman, B. 2000. Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington. Oregon-Washington Partners in Flight. Boring, OR. 86 p.

Baker, M.B., 1988. Hydrologic and Water Quality Effects of Fire. Proceedings: Effects of Fire in Management of Southwest Natural Resources (Tucson, AZ, November 14-17, 1988). P 31-42

Barrett, J.W. 1979. *Silviculture of Ponderosa Pine in the Pacific Northwest: The State of Our Knowledge*. USDA For. Serv. Gen. Tech. Rep. PNW-97. 106 p.

Barrett, J.W. 1981. *Twenty-Year Growth of Thinned Ponderosa Pine in the Methow Valley of Northern Washington.* USDA Forest Service, Pacific NW Research Station, PNW-RP-286. 13 p.

Barrett, J. 1982. *Growth of Ponderosa Pine Saplings Thinned to Five Spacings in Central Oregon*. USDA Forest Service, Pacific NW Research Station, PNW-RP-301. 18 p.

Barrett, J.W., and L.F. Roth. 1985. *Response of Dwarf Mistletoe-Infested Ponderosa Pine to Thinning.* USDA Forest Service, Pacific NW Research Station, PNW-RP-331. 19 p.

Bêche, L.A. 2004. Unpublished dissertation. *The Effects of Riparian Prescribed Fire on Aquatic and Riparian Communities in a Mixed-Conifer Forest Watershed*. Sierra Nevada, California, USA. University of California at Berkeley. 78 p.

Bêche, L.A., S.L. Stephens and V.H. Resh. 2005. *Effects of Prescribed Fire on a Sierra Nevada (California, USA) Stream and its Riparian Zone*. Forest Ecology and Management. 218 (2005) p. 37-59

Belsky, A.J. and Jonathan L. Gelbard. 2000. Livestock Grazing and Weed Invasions in the Arid West. Published by the Oregon Natural Desert Association. Bend, Oregon.

Beschta, R.L.; Bilby, R.E.; Brown, G.W.; [and others], 1987. Stream temperature and aquatic habitat; fisheries and forestry interaction. Pages 191-232 in: Salo, E.O., Cudy, T.W., eds. Forestry and fisheries interactions. Contribution 57. Seattle, WA: University of Washington Institute of Forestry.

Black, S.H. 2005. *Logging to Control Insects: The Science and Myths Behind Managing Forest Insect 'Pests'*. The Xerces Society for Invertebrate Conservation, Portland, OR. 82 p.

Block, Michael L. Morrison, and M. Hildegard Reiser, Eds. 1994. *The Northern Goshawk: Ecology and Management.* Proceedings of a Symposium of the Cooper Ornithological Society, Sacramento, CA. Studies of Avian Biology No. 16. 136 Pp.

Boyd, C.S., et al. 2004. Production and Regrowth of Riparian Sedge/grass Communities. Eastern Oregon Agricultural Research Center. Special Report 1052, p. 32-39.

Britton, D.L., 1991. The benthic macroinvertibrate fauna of a South African Mountain Stream and its response to fire. South African Journal of Sci. 17(1/2), P 51-64. ISSN 1018 3469.

Brookes, M. H., R.W. Campbell, J.J. Colbert, R.G. Mitchell, and R.W. Stark. 1987. *Western Spruce Budworm.* USDA Forest Service, Cooperative State Research Service, Technical Bulletin No. 1694. 198 p.

Bull, Evelyn L. 2005 *Ecology of the Columbia Spotted Frog in Northeastern Oregon*. Gen Tech. Rep. PNW-GTR-640. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 6 p.

Bull, Evelyn L. and Janet E. Hohmann. 1992. *Final Report: Northern Goshawks in Northeastern Oregon.* USDA Forest Service. PNW Research Station. La Grande, OR. pp. 34.

Bull, Evelyn L. and Janet E. Hohmann. 1994. *Breeding Biology of Northern Goshawks in Northeastern Oregon.* Studies in Avian Biology No. 16:103-105.

Busse, M.D., S.A. Simon, and G.M. Riegel. 2000. *Tree-Growth and Understory Responses to Low-severity Prescribed Burning in Thinned Pinus ponderosa Forest of Central Oregon*. Science 46: 258-268.

Busse, M.D., and G.M. Riegel. 2005. *Long-Term Trends in Soil Quality: Who Would Speak for the Soils of Central Oregon?* Unpublished. 15 p.

Chitwood, L. 2005. Deschutes National Forest Geologist. Personal Communication.

Cilimburg, A. C., and K. C. Short. 2005. *Forest Fire in the U. S. Northern Rockies: a Primer*. Accessed March 15, 2004 from http://www.northernrockiesfire.org.

Clary, W.P. and Bert F. Webster. 1989. Managing Grazing of Riparian Areas in the Intermountain Region. Intermountain Research Station General Technical Report INT-263. USDA Forest Service.

Clary, W.P., 1999. Stream channel and vegetation responses to late spring cattle grazing. Journal of Range Management (52) 3, May 1999. p.218-227

Cobb, L. and M. Vavra. 2003. *Stand Characteristics of Selected Aspen Sites on the Prairie City Ranger District, Malheur National Forest*. Report to the Prairie City Ranger District, Malheur National Forest. Eastern Oregon Agriculture and Research Center. Burns, OR. 94 p.

Cochran, P. H. 1992. *Stocking Levels and Underlying Assumptions for Uneven-aged Ponderosa Pine Stands*. USDA Forest Service, Pacific Northwest Research Station, Research Note PNW-RN-509. 10 p.

Cochran, P. H. and James Barrett. 1993. *Long-term Response of Planted Ponderosa Pine to Thinning in Oregon's Blue Mountains*. Western Journal of Applied Forestry 8(4): 126-132.

Cochran, P. H., J.M. Geist, D.L. Clemens, R.R. Clausnitzer, and D.C. Powell. 1994. *Suggested Stocking Levels for Forest Stands in Northeastern Oregon and Southeastern Washington*. USDA Forest Service Pacific Northwest Research Station Research Note PNW-RN-513. 21 p.

Cochran, P. H. and J.W. Barrett. 1999. *Growth of Ponderosa Pine Thinned to Different Stocking Levels in Central Oregon: 30-Year Results*. USDA Forest Service Pacific Northwest Research Station Research Paper PNW-RP-508. 27 p.

Cochran, P.H. and J.W. Barrett. 1999. *Thirty-five Year Growth of Thinned and Unthinned Ponderosa Pine in the Methow Valley of Northern Washington*. USDA For. Serv. PNW-RP-502. 24 p.

Cook, John G.; Bruce K. Johnson; Rachel C. Cook; Robert A. Riggs; T. Decurtio; Larry D. Bryant; and L. L. Irwin. 2004. *Effects of Summer-Autumn Nutrition and Partrition Date on the Reproduction and Survival of Elk*. *Wildlife Monographs*. 155:1-61.

Crockett, A. B., and H. H. Hadow. 1975. Nest site selection by Williamson's and Red-naped Sapsuckers. Condor 77:365–368.

Croft, L., W.R. Owen, J.S. Shelly. 1997. *Interior Columbia Basin Ecosystem Management Project Analysis of Vascular Plants*. USDA Forest Service publication.

Currens, K.P and S.L. Stone. 1988. *A Genetic Comparison of Rainbow Trout (Salmo gairdneri) Above and Below Izee Falls in the John Day River, Oregon*. Oregon Cooperative Fishery Research Unit; Oregon State University, Corvallis, Oregon

Daily, G. C. 1993. Heartwood decay and vertical distribution of Red-naped Sapsucker nest cavities. Wilson Bull. 105:674–679.

David, J., 2000. Harvest Review - *Soils Monitoring: Black Bear Timber Sale*. Letter to Black Bear IDT, File Code 2550.

David, J., 2002. *Deep EIS Soils Report - Existing Condition and Alternative Analysis*.

David, James. 2006. Ochoco National Forest Soil Scientist. Personal communication.

Daw, Sonya K. and Stephen DeStafeno. 2001. *Forest Characteristics of Northern Goshawk Nest Stands and Post-Fledging Areas in Oregon.* Journal of Wildlife Management 65(1):59-65.

DeByle, N.V. and Packer, P.E., 1972. Plant nutrient and soil losses in overland flow from burned forest clearcuts. Watersheds in Transition, Proc. Symposium AWRA & Colorado Stae Univ., p.296-307.

DeClerck-Floate, R. 1997. Cattle as Dispersers of Hound's-tongue on Rangeland in Southeastern British Columbia. Journal of Range Management 50(3), May 1997.

Deppmeier, Matthew. 2006. Deschutes National Forest Silviculturist. Personal communication and Silviculture report for the Willows Pine Vegetation Management EA.

DeStafeno, Stephen and E. Charles Meslow. 1992. *Annual Report: Status, Distribution, and Habitat of Northern Goshawks in Eastern Oregon.* Oregon Cooperative Wildlife Research Unit, Oregon State University. Corvallis, OR. pp. 12.

Dickson, James G, Ed. 1992. *The Wild Turkey: Biology and Management.* Stackpole Books. Mechanicsburg, PA. 463 Pp.

DiTomaso, J.M. 2004. Invasive Weeds in Rangelands: Species, Impacts, and Management. Weed Science: Vol. 48, No. 2, pp. 255-265.

Dobkin, D. S., A. C. Rich, J. A. Pretare, and W. H. Pyle. 1995. Nest-site relationships among cavity-nesting birds of riparian and snowpocket aspen woodlands in the northwestern Great-Basin. Condor 97:694–707.

Dobkin, D. S., and B. A. Wilcox. 1986. Analysis of natural forest fragments: riparian birds in the Toiyabe Mountains, Nevada. Pp. 293–299 *in* Wildlife 2000: modeling habitat relationships of terrestrial vertebrates (J. Verner, M. L. Morrison, and C. J. Ralph, eds.). Univ. of Wisconsin Press, Madison, WI.

Dolph, R. E. 1982. *Growth and Vigor Information in Thinned Second-growth Ponderosa Pine Stands on the Deschutes and Ochoco National Forests*. USDA Forest Service, Pacific Northwest Region, Forest Pest Management, Portland, OR. Unpublished report. 11 p.

Eglitis, A. 2004. Healthy forest restoration act as applied to the Ochoco N.F. Letter to the Forest Supervisor, Ochoco N.F. 14 p.

Fiddler, G. O., T.A. Fiddler, D.R. Hart, and P.M. McDonald. 1989. *Thinning Decreases Mortality and Increases Growth of Ponderosa Pine in Northern California*. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. Research Paper PSW-194, 7 p.

Fiedler P.L. 1987. Life History and Population Dynamics of Rare and Common Mariposa Lilies (*Calochortus* Pursh: Liliaceae). Journal of Ecology (1987) 75, 977 995.

Filip, G. M. and C. L. Schmitt. 1990. *Rx for Abies: Silvicultural Options for Diseased Firs in Oregon and Washington*. USDA Forest Service, Pacific NW Research Station, General Technical Report PNW-252. 34 p.

Fontaine, B., 1998. A letter Dated December 12, 1998 attachment to August 11, 1997 monitoring report. Trout Creek watershed monitoring, precommercial thinning within RHCA – results. File designation:1950 Environmental Analysis. USDA Forest Service, Lookout Mountain Ranger District, Prineville, OR.

Furniss, M.J., S.A. Flanagan, B. McFadin. 2000. *Hydrologically-connected Roads: An Indicator of the Influence of Roads on Chronic Sedimentation, Surface Water Hydrology, An Exposure to Toxic Chemicals*. Stream Notes, July 2000. Stream Systems Technology Center. USDA Forest Service, Rocky Mountain Research Center, Fort Collins, CO. 8 p.

Gordon, Caroline. 2003. Ochoco National Forest Geologist. Personal communication.

Goyer, C.C., M.R. Wagner, and T.D. Schowalter. 1998. *Current and Proposed Technologies for Bark Beetle Management*. Journal of Forestry 96(12): 29-33.

Graham, R.T., A.E. Harvey, T.B. Jain, and J.R. Tonn. 1999. *The Effects of Thinning and Similar Stand Treatments on Fire Behavior in Western Forests*. USDA Forest Service, Pacific NW Research Station, PNW-GTR-463. 27 p.

Graham, R.T., S. McCaffrey, and Theresa B. Jain. Eds. 2004. *Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity*. RMRS-GTR-120. USDA Forest Service.

Gresswell, R.E., 1999. *Fire and Aquatic Ecosystems in Forested Biomes of North America.* Transactions of the American Fisheries Society 128:193-221.

Grier, C.C. 1989. *Effects of Prescribed Springtime Underburning on Production of Nutrient Status of a Young Ponderosa Pine Stand*. P. 71-76 in Symp. proc. Multiresource Management of Ponderosa Pine Forest.

Hall Fred. 1987. *Growth Basal Area Handbook*. USDA Forest Service, R6-Ecol-181b-1984. 84 p.

Hall, Fred. 1989. *Plant Association and Management Guide for the Ochoco and Southern Blue Mountain Areas*. USDA-FS R6 ECOL TP-000-90. Portland, Oregon.

Hall, R. C.; Davis, G. R. 1968. *Mountain Pine Beetle Epidemic at Joseph Creek Basin, Modoc National Forest*. USDA Forest Service, Division of Timber Management, California Regional Office. San Francisco, Unpublished.

Hann, W.J. et al. 1997. *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins*. Volume II, Chapter 3: Landscape Dynamics of the Basin. PNW-GTR-405. USDA Forest Service.

Hann, W., M. Beighley, P. Teensma, T. Sexton, M. Hilbruner. 2004. *A Cohesive Strategy for Protecting People and Sustaining Natural Resources: Predicting Outcomes for Program Options.* Presented at the "Fire, Fuel Treatments and Ecological Restoration Conference; April 16-18 2002; Fort Collins, CO 36 p. Accessed on March 24, 2006 at http://www.frcc.gov

Harvey, A.E.; Geist, J.M.; McDonnald, G.I. [and others]. 1994. Biotic and abiotic processes in eastside ecosystems: the effects of management on soil properties, processes, and productivity. USDA Forest Service Gen. Tech. Rep. PNW-GTR-323, Pacific Northwest Research Station.

Hemstrom, M.A., J.J. Korol, and Wendel J. Hann. 2001. Trends in Terrestrial Plant Communities and Landscape Health Indicate the Effects of Alternative Management Strategies in the Interior Columbia River Basin. Forest Ecology and Management 5504 (2001) 1-21.

Hibbert, A.R., 1965. Forest Treatment Effects on Water Yield. In W. E. Sopper & H. W. Lull (Eds.), Int. Symp. For. Hydrology, P. 527-543. Pergamon Press, New York.

Hook, Paul 2003. Sediment Retention in Rangeland Riparian Buffers, Journal of Environmental Quality 32:1130-1137.

Hubbard, R.K., G.L. Newton and G.M. Hill. 2004. *Water Quality and the Grazing Animal*. Journal of Animal Sciences, Vol. 82 (E. Suppl.) E255-E263

Irwin, L.L. et al. 1994. Effects of Long-Term Grazing by Big Game and Livestock in the Blue Mountains Forest Ecosystems. Pacific Northwest Research Station General Technical Report PNW-GTR-325. USDA Forest Service.

Johnson, Bruce K.; Alan A. Ager; James H. Noyes; and Norman J. Cimon. 2005. *Elk and Mule Deer Response to Variation in Hunting Pressure*. Pages 127-138 *in* Wisdom, M.J., technical editor. *The Starkey Project: a synthesis of long-term studies of elk and mule deer*. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Alliance Communications Group, Lawrence, Kansas, USA.

Johnson, C. and R.R. Clausnitzer. 1992. *Plant Associations of the Blue and Ochoco Mountains*. USDA For. Serv. R6-ERW-TP-036-92. 164 p.

Kilgore, Bruce.M., Curtis, George A. 1987. *Guide to Understory Burning in Ponderosa Pine in the Intermountain West*. US Forest Service Technical Report INT-233.

Kleiner, E.F. and K.T. Harper. 1977. Soil Properties in Relation to Cryptogamic Groundcover in Canyonlands National Park. Journal of Range Management 30(3), May 1977.

Kolb, T. E., P.Z. Fule, M.R. Wagner, W.W. Covington. 2001. *Six-Year Changes in Mortality and Crown Condition of Old-Growth Ponderosa Pines in Ecological Restoration Treatments at the G. A. Pearson Natural Area*. P. 61-66 In: R.K. Vance, C.B.Edminster, W.W. Covington, J.A. Blake, comps. Ponderosa pine ecosystems restoration and conservation: Steps toward stewardship, April 25-27, 2000; Flagstaff, AZ. Proceedings RMRS-P-22. Ogden, UT: U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Landsberg, J.D. 1992. *Response of Ponderosa Pine Forest in Central Oregon to Prescribed Underburning*. PH.D. diss. Oregon St. U., Corvallis, OR. 282 p.

Li, P., and T. E. Martin. 1991. Nest-site selection and nesting success of cavity-nesting birds in high elevation forest drainages. Auk 108:405–418.

Lilieholm, Robert J.; James N. Long; and Susan Patla. 1992. *Assessment of Goshawk Nest Area Habitat Using Stand Density Index.* Studies in Avian Biology No. 16:18-23.

Lynch, J.A., E.S. Corbett, and K. Mussallem. 1985. Best management practices for controlling nonpoint-source pollution on forested watersheds. Journal of Soil and Water Conservation, 40:164-167.

Mafera, D. 2006. Ochoco National Forest, Paulina Ranger District Botanist. Personal Communication.

Marshall, David B. 1992. *Status of the Northern Goshawk in Oregon and Washington.* Audubon Society of Portland. Portland, OR. pp. 34.

Marshall, David B., Matthew G. Hunter, and Alan L. Contreras Eds. 2003. *Birds of Oregon: A General Reference.* Oregon State University Press. Corvallis, OR. 768 Pp.

Martin, K. 2006. Historical Information Willows Pine Summary Report. White paper summary of historic records within the Willows Pine Analysis Area.

McClelland, B. R., and P. T. McClelland. 2000. Red-naped Sapsucker nest trees in northern Rocky Mountain old-growth forest. Wilson Bull. 112:44–50.

McGrath, Michael. 1998. *Northern Goshawk Habitat Analysis in Managed Forest Landscapes.* Thesis submitted for Degree of Master of Science. Oregon State University. Corvallis, OR. 127 Pp.

McNabb, D., and H. Froehlich, 1983. Conceptual Model for Predicting Forest Productivity Losses from Soil Compaction. Proceedings of the Society of American Foresters National Convention, pp. 261-265.

Miller, M. and J. Findley. 2001. Fire Effects Guide. National Interagency Fire Center. National Wildfire Coordinationg Group, Great Basin Area Cache. Boise, Idaho.

Minshall, G., J. Brock, D. Andrews, and C. Robinson. 2001. *Water Quality, Substratum and Biotic Responses of Five Central Idaho (USA) Streams During the First Year Following the Mortar Creek Fire*. International Journal of Wildland Fire 10:185-199.

National Marine Fisheries Service. 1996. *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale*. US Department of Commerce.

National Oceanographic and Atmospheric Administration. NMFS. August 1996. 16 p.

Oliver, W.W. 1979. *Growth of Planted Ponderosa Pine Thinned to Different Stocking Levels in Northern California*. USDA Forest Service, PSW Forest and Range Experiment Station, PSW-147. 11 p.

Owens, Dave 2002. Fire planner. Ochoco National Forest. US Forest Service. Personal communication.

Parks, C.G., M.J. Wisdom and John G. Kie. 2004. *The Influence of Ungulates on Non-native Plant Invasions in Forests and Rangelands: A Review*. USDA Forest Service, Pacific Northwest Research Station, La Grande, Oregon.

Pilliod, D.S., R.B. Bury, E.J. Hyde, C.A. Pearl, P. S. Corn, 2003. *Fire and Amphibians in North American.Forests*.. Ecology and Management. 178 (2003) 163-181

Pokorny, M.L., et al. 2005. Plant Functional Group Diversity as a Mechanism for Invasion Resistance. Restoration Ecology. 13(3):1-12.

Pollet, J. and P.N. Omi. 2002. *Effect of Thinning and Prescribed Burning on Crown Fire Severity in Ponderosa Pine Forests*. International Journal of Wildland Fire 11:1-10.

Powell, D.C. 1999. *Suggested Stocking Levels for Forest Stands in Northeastern Oregon and Southeastern Washington: An Implementation Guide for the Umatilla National Forest*. USDA For. Serv. Tech. Pub. F14-SO-TP-03-99. 300 p.

Powell, David. 2000. *Potential Vegetation, Disturbance, Plant Succession, and Other Aspects of Forest Ecology.* US Forest Service Technical Report F14-SO-TP-09-00

Pyle, Wilf (Editor). 2004. Managing Saskatchewan Rangeland, Revised Edition. Government of Saskatchewan, Regina Saskatchewan, Canada.

Reshin, E.B., C.J. Clishe, A.T. Loch, and J.M. Bell. 2006. Effectiveness of timber harvest practices for controlling sediment related water impacts. Journal of the American Water Resources Association, October 2006, p. 1307-1327.

Reynolds, Richard T.; Russel T. Graham; M. Hildegard Reiser; Richard L. Bassett; Patricia L. Kennedy; Douglas A. Boyce, Jr.; Greg Goodwin; Randall Smith; and E. Leon Fisher. 992. *Management Recommendations for the Northern Goshawk in the Southwestern United States.* Gen. Tech. Rep. RM-217. Ft. Collins, CO; USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station. 90 Pp.

Rothermel, R.C., Wilson, Jr. R.A., Morris, G.A., Sackett., S.S. 1986. *Modeling Moisture Content of Fine Dead Wildland Fuels*. US Forest Service Research Paper INT-359

Roundy, B.A., 1999. *Lessons from Historical Rangeland Revegetation for Today's Restoration*. Revegetation with native species: Proceedings, 1997 Society for Ecological Restoration Annual Meeting. Fort Lauderdale, Florida November 12-15, 1997. USDA Forest Service Rocky Mountain Research Station. Proceedings RMRS-P-8, April 1999 p. 33-38

Rowland, Mary M.; Michael J. Wisdom; Bruce K. Johnson; and Mark A. Penninger. 2005. *Effect of Roads on Elk: Implications for Management in Forested Ecosystems*. Pages 42-52 *in* Wisdom, M.J., technical editor. *The Starkey Project: a synthesis of long-term studies of elk and mule deer*. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Alliance Communications Group, Lawerence, Kansas, USA.

Sartwell, C. and R.E. Stevens. 1975. *Mountain Pine Beetle in Ponderosa Pine: Prospects for Silvicultural Control in Second-Growth Stands*. Journal of Forestry 73: 136-140.

Sartwell, C. and R.E. Dolph. 1976. *Silviculture and Direct Control of Mountain Pine Beetle in Second-Growth Ponderosa Pine.* USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Research Note PNW-268. 8 p.

Sauer, J. R., J. E. Hines, and J. Fallon. 2007. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2006. Version 10.13.2007. USGS Patuxent Wildlife Research Center, Laurel, MD*

Saveland, James M.; Neuenschwander, Leon F. 1989. *Predicting Ponderosa Pine Mortality from Understory Prescribed Burning.* Symposium proceedings, Prescribed Fire in the Intermountain Region. Washington State University.

Schulz, T.T. and W.C. Leininger. 1990. Differences in Riparian Vegetation Structure Between Grazed Areas and Exclosures. Journal of Range Management, 43(4), July 1990.

Sheley, Roger. 2005. Weed Scientist. Personal communication.

Schmid, J.M. and S.A. Mata. 1992. *Stand Density and Mountain Pine Beetle-Caused Tree Mortality in Ponderosa Pine Stands*. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Research Note RM-515. 4 p.

Scott, D.W. 1996. *A Rationale and Procedure for Determining Imminent Susceptibility of Stand to Insects in the Blue and Wallowa Mountains of Southeastern Washington and Northeastern Oregon.* USDA-For. Serv. Pac. NW Reg., Blue Mtns. Pest Mgt. Serv. Center, BMZ-96-15. 17 p.

Sheay, R.W. 1993. *Effects of Prescribed Fire and Silvicultural Activities on Fuel Mass and Nitrogen Redistribution in Pinus Ponderosa Ecosystems of Central Oregon.* Masters Thesis submitted to Oregon State University.

Simpson, M., D. Zalunardo, A. Eglitis, D.C. Wood, D. Roy, and S. Johnson. 1994. (Draft) *Ochoco Viable Ecosystems Management Guide.* USDA Forest Service, Ochoco NF. 108 p. plus appendices.

Soil Disturbance Assessment Form, Ochoco National Forest.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitski. 1996. *An Ecosystem Approach to Salmonid Conservation.* TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, OR. (Available from the National Marine Fisheries Service, Portland, Oregon.)

Spencer, C. N., and F. R. Hauer. 1991. *Phosphorus and Nitrogen Dynamics in Streams During a Wildfire*. Journal of the North American Benthological Society 10:24-30.

Spencer, C. N., K. O. Gabel, and F. R. Hauer. 2003. Wildfire Effects on Stream food webs and nutrient dynamics in Glacier National Park, USA. Forest Ecology and Management 178:141-153.

Stone, J.E., T.E. Kolb and W.W. Covington. 1999. *Effects of Restoration Thinning on Pre-settlement Pinus ponderosa in Northern Arizona.* Restoration Ecology 7(2): 172-182.

Sussmann, Peter. 2006. Deschutes National Forest Soil Scientist. Personal communication, and Soils Report for the Willows Pine Vegetation Management EA.

Swezy, D.M., and J.K. Agee. 1990. *Prescribed Fire Effects on Fine-Root and Tree Mortality in Old-growth Ponderosa Pine.* Can. J. For. Res. 21: 626-634

Tiedeman, A.R., Helvey, J.D., and Anderson, T.D., 1978. Stream chemistry and watershed economy following wildfire and fertilization. Journal Environ. Qual., Vol. 7, no. 4. p 580-589.

Thomas, Jack Ward, ed. 1979. *Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington*. USDA Forest Service, Agriculture Handbook No. 553. US Government Printing Office, Washington, D.C. 512 Pp.

Trombulak, S.C. and C.A. Frissell. 2000. *Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities*. Conservation Biology V.14, No. 1, February 2000.

USDA, 1977. *Soil Resource Inventory*, Ochoco National Forest.

USDA, R1/R4, 1981. "Guide for Predicting Sediment Yields from Forested Watersheds", USDA Forest Service, Region 1 and Region 4.

USDA. 1988. Pacific Northwest Region, Forest Service. General Water Quality Best Management Practices, Introduction, Page 1.

USDA. 1989. *Ochoco National Forest Land Resource Management Plan.*

USDA, R1, 1992. WATSED, Water yield and sediment model. Range, air, watershed and ecology staff unit, Region 1, USDA Forest Service & Montana cumulative watershed effects cooperative.

USDA. 1992. Forest Service Manual 2670 Threatened, Endangered, and Sensitive Plants and Animals.

USDA. 1993. Forest Ecosystem Management Team. *An Ecological, Economic and Social Assessment.*

USDA. 1998. Forest Service Manual 2500, R-6 supplement 2500-98-1. Portland, OR: USDA Forest Service, Pacific Northwest Regional Office.

USDA, Malheur NF, 1998. Upper South Fork John Day River Limited Watershed Analysis.

USDA. 1998. Ochoco National Forest and Crooked River National Grassland Integrated Noxious Weed Management Environmental Assessment.

USDA 2002. Natural Resource Information System (NRIS) database. Invasive Plant Inventory, Monitoring and Mapping.

USDA. 2003. *Murray Salvage Environmental Assessment*. Ochoco National Forest. Paulina Ranger District.

USDA. 2005. *Preventing and Managing Invasive Plants*. Final Environmental Impact Statement. Pacific Northwest Region Invasive Plant Program. R6-NR-FHP-PR-02-05.

USDA (a). 2005. *Upper Beaver Creek Watershed Assessment*. Draft. Ochoco National Forest, Paulina Ranger District.

USDA. 2005. Forest Service Summary of the "*Logging to Control Insects: The Science and Myths Behind Managing Forest Insect 'Pests'*." Unpublished. 3 p.

USDA, Ochoco NF, 2006. Commercial Road Rules. Pages 26.

USDA. 2006. Fire Effects Information System. Accessed on March 28, 2006 at http://www.fs.fed.us/database/feis/index.html

USDA. Intermountain Forest and Range Experiment Station, Gen. Tech. Rep. INT-133. 112 p.

USDA Natural Resource Conservation Service. 2006. Plants Database. http//plants.usda.gov.

US Fish and Wildlife Service. 1999. *Endangered and Threatened Wildlife and Plants*. 50 CFR 17.11 and 17.12, reprint December 31, 1999.

US Fish and Wildlife Service. Interagency Implementation Team (IIT), 2000. Grazing Implementation Monitoring Module, USFWS, NMFS, Forest Service, and BLM.

US Fish and Wildlife Service. 2002. *Birds of Conservation Concern 2002*. Division of Migratory Bird Management. Arlington, VA. 99 Pp.

Utah State University Extension. 2001. *Factors Influencing Grazing Tolerance. No. 3.1.2. Behavioral Education for Human, Animal, Vegetation and Ecosystem Management*.

Van Wyk, D.B., 1982. Influence of prescribed burning on nutrient budgets on mountain fynbos catchments in S. W. Cape Rep. of South Africa. Gen. Tech. Rep. PSW-58. Berkeley, CA: Southwest Forest and Range Experiment Station, Forest Service, USDA.

Walters, E. L., E. H. Miller, and P. E. Lowther. 2002. Red-breasted Sapsucker (*Sphyrapicus ruber*) and Red-naped Sapsucker (*Sphyrapicus nuchalis*). *In* The Birds of North America, No. 663 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Wisdom, M.J., technical editor. *The Starkey Project: a synthesis of long-term studies of elk and mule deer*. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Alliance Communications Group, Lawrence, Kansas, USA.

Wisdom, Michael J.; Alan A. Ager; Haiganoush K. Preisler; Norman J. Cimon; and Bruce K. Johnson [2]. 2005. *Effects of Off-Road Recreation on Mule deer and Elk*. Pages 67-80 *in* Wisdom, M.J., technical editor. *The Starkey Project: a synthesis of long-term studies of elk and mule deer*. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Alliance Communications Group, Lawrence, Kansas, USA.

Wisdom, Michael J.; Norman J. Cimon; Bruce K. Johnson; Edward O. Garton; and Jack Ward Thomas. 2005. *Spatial Partitioning by Mule Deer and Elk in Relation to Traffic*. Pages 53-66 *in*

Woodbridge, Brian and Christina D. Hargis. 2005. *Northern Goshawk Inventory and Monitoring Technical Guide*. USDA Forest Service, Washington D.C. 63 Pp.

Wykoff, W.R., N.L. Crookston, and A.R. Stage. 1982. User's guide to the Stand Prognosis Model. USDA-Forest Service. Intermountain Forest and Range Experiment Station, Gen. Tech. Rep. INT-133. 112 p.

Zika, P.F. 1992. *Draft Management Guide for Rare Botrychium Species for the Mount Hood National Forest.* Unpublished report submitted to the Ochoco National Forest. Oregon Natural Heritage Program, Portland, OR.

Zika, Peter F., R. Brainerd and B. Newhouse. 1995. *Grapeferns and Moonworts (Botrychium, Ophioglossaceae) in the Columbia Basin.* An unpublished report submitted to the Eastside Ecosystem Management Project, U.S. Forest Service, Walla Walla, WA.

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APPENDIX A

Capability, Sustainability, and Suitability

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Capability, Sustainability, and Suitability

Capability

Forest Service Manual 1905 (10) 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. Capability depends upon current conditions and site characteristics 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)**.** Therefore, grazing capability is a reflection of the physical limitations (slope, accessibility, tree canopy cover, distance to water, site forage production) to grazing a given area. Within the Paulina Ranger District most "scab flats" (characterized by low or rigid sagebrush) do not produce adequate forage to be considered capable range. Distance to water was not considered in the calculations of capable range below.

Due to conifer canopy cover exceeding 70 percent and slope exceeding 40 percent our GIS calculated that 15,014 acres were determined to be, "not capable for grazing" (capable range limits were derived from a Pacific Northwest white paper revised 3/06/03). Of the remaining area, 12,245 acres were determined to be "not capable for grazing" due to limited forage production. Therefore, 42,633 acres of the 69,892 total acres (61 percent) within the three allotments under analysis meet the definition of capable range. Capable range by pasture and allotment is outlined in Table A-1 below.

Sustainability

Determination of stocking levels for "grazing sustainability" are first dependent upon management strategy, and then are most appropriately determined by ability to meet management standards and guidelines, as well as resource conditions with stocking adjusted based upon monitoring results. Depending upon the implementation, adjustments have been made over time on the Paulina Ranger District to determine "sustainable" grazing levels under current management strategies and plant association distributions and conditions.

Suitability

Forest Service Manual 1905 (91) 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 alternatives uses foregone…" This analysis was conducted during the development of the Land and Resource Management Plan for the Ochoco National Forest, and made suitability and management direction determinations based upon Management Area designation (LRMP p. 4-45 through 4-118). Management areas within which livestock grazing was determined to be "unsuitable" are listed below:

- MA-F13 (Developed Recreation Areas (Core Areas Only), 33 acres) - Continue to keep campground closed to grazing (LRMP p. 4-76).

During the analysis for the FEIS, resource and socio-economic factors were evaluated relative to range suitability determinations. As part of this evaluation: Alternative 1 proposes to close 69,892 acres to domestic livestock grazing, Alternative 2, 3 and 4 would not close any additional areas to domestic livestock grazing, therefore, only selection of Alternative 1 would further limit existing suitability determinations.

Table A-1. Capable range by pasture and allotment, Southside Allotment Project Area.

ALLOTMENT	PASTURE	TOTAL ACRES	NOT CAPABLE DUE TO SLOPE AND TREE COVER	ADDITIONAL NOT CAPABLE DUE TO LIMITED PRODUCTION	CAPABLE ACRES	PERCENT CAPABLE RANGE
Wind Creek	North	8,775	1,128	577	7,070	81%
	South	9,248	1,792	2,858	4,598	50%
	Bronco	627	109	75	443	71%
	Allotment Total	**18,650**	**3,029**	**3,510**	**12,111**	**65%**
Wolf Creek	Bull	5,980	1,289	279	4,412	74%
	Miles	2,445	411	739	1,295	53%
	Widow	8,697	2,167	1,618	4,912	56%
	Nichol	12,935	2,850	1,098	8,987	69%
	Riparian	3,606	331	489	2,786	77%
	Sugar	6,505	1,449	1,781	3,275	50%
	Sugar Holding	488	172	132	184	38%
	Wolf Creek Riparian Corridor	1,436	373	64	999	70%
	Allotment Total	**42,092**	**9,042**	**6,200**	**26,850**	**64%**
Heisler	South	1,983	1,289	504	190	10%
	North	2,490	266	660	1,564	63%
	East	3,339	995	1,021	1,323	40%
	Bear/Rager	1,338	393	350	595	44%
	Allotment Total	**9,150**	**2,943**	**2,535**	**3,672**	**40%**
PROJECT AREA TOTAL		**69,892**	**15,014**	**12,245**	**42,633**	**61%**

Appendix B

Composite Pasture Resource Rating Explanation

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Composite Pasture Resource Rating

As the purpose and need for action described within this analysis indicates, there is a need to move resource conditions within the Southside Allotments Group (Wolf Creek, Heisler, and Wind Creek Allotments) towards desired conditions. In order to achieve this objective livestock impacts within these grazing allotments must be managed in such a way as to maintain or move the conditions of the various resources (or resource features) towards desired levels or conditions. The basic unit within which livestock are managed is the allotment pasture. There is a relatively high level of control of livestock, and their associated effects to the environment, on a pasture by pasture basis. Therefore, in order to determine the degree of livestock management change needed within each pasture, or alternately, in order to categorize pastures containing resources that might be most susceptible to livestock grazing impacts, the interdisciplinary team for the Southside Allotments Group analysis developed a methodology for compiling the resource conditions within each pasture. The team labeled the methodology the Composite Pasture Resource Rating system (CPRR system), and the resultant categorization as the Composite Pasture Resource Rating (CPRR). It is important to understand that this methodology does not, and never was intended to, determine a "pasture condition", rather it was only intended to be used as a tool to group pastures for the application of different livestock management standards. The CPRR system compiled five different resource (feature) conditions and one multiple resource assessment giving each of these six criteria the following relative weights in determining each pasture's rating:

- Stream Channel Condition 20%
- Riparian Vegetative Condition 20%
- Upland Vegetative Condition 15%
- Noxious Weed Risk 10%
- Proper Functioning Condition Assessment 20%
- Soils Condition 15%
-

Each resource specialist within the interdisciplinary team responsible for the stewardship of the data for their respective resource conditions was responsible for placing the "average" condition of that resource (feature) within one of three categories ranging from closest to desired condition which was called "Satisfactory", to furthest from desired condition which was called "Unsatisfactory", with one category in between called "At Risk" (refer to individual resource reports and summaries for a description of how this was done for each criteria). Once this was done for each of the six criteria the weighting was applied, mathematically generating a CPRR (using the same nomenclature as described above). In those instances where there was neither adequate data nor professional observation to make a determination for a specific criterion, that criterion was not considered in the CPRR and the other criteria were given proportionately greater weight in determining the CPRR.

The following tables and charts display:

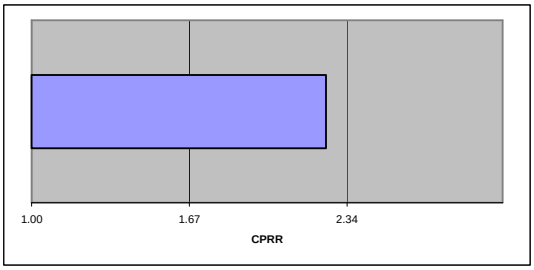
- How each criterion was rated for each pasture under analysis:
    - The presence of a number 1 adjacent to each criterion is placed within one of three category columns: Satisfactory, At Risk, or Unsatisfactory. This represents the "average" condition of this resource (feature) within the pasture being described.
- Criteria used to determine a CPRR for a pasture:
    - In some cases there was insufficient data and professional familiarity with the conditions of a given resource (feature) within a pasture to make a determination of the "average" resource (feature) condition within a pasture. Where this occurred that criterion received no weight and the other criterion received proportionately greater weight in the determination of a CPRR for the pasture.

- Pasture CPRR rating on a continuum:
    - The bar graph to the right of each table indicates the CPRR for each pasture as rated on a continuum. The vertical lines on each chart represent crossing the threshold from "Unsatisfactory" to "At Risk" and from "At Risk" to "Satisfactory".

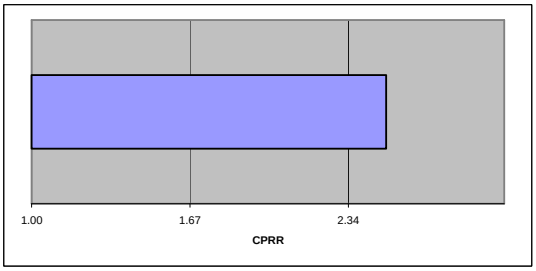
WOLF

		3	2	1

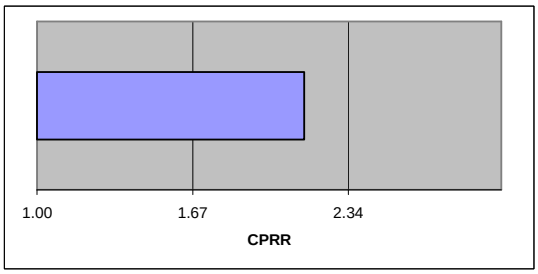
Bull	factor	sat	at risk	unsat
stream channel	0%			
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	0%			
soils	15%		1	
	60%			



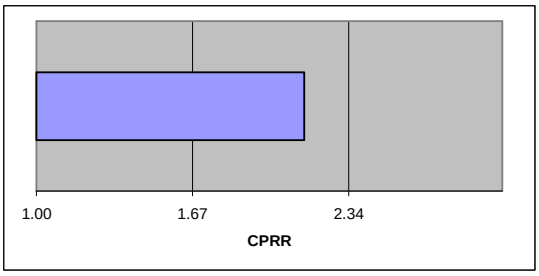
Miles	factor	sat	at risk	unsat
stream channel	20%	1		
riparian veg	0%			
upland veg	15%		1	
noxious weed risk	10%	1		
pfc	0%			
soils	15%		1	
	60%			



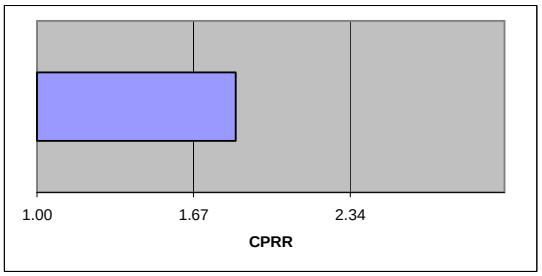
Nichol	factor	sat	at risk	unsat
stream channel	20%	1		
riparian veg	20%			1
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		1	
	100%			



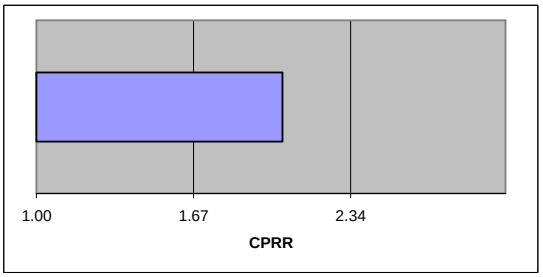
Riparian	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		1	
	100%			



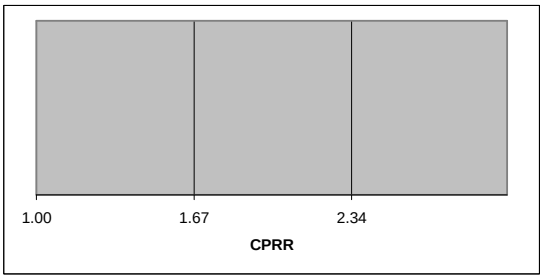
Sugar	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%			1
upland veg	15%	1		
noxious weed risk	10%			1
pfc	20%		1	
soils	15%		1	
	100%			



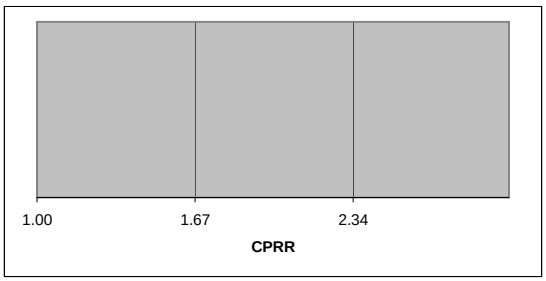
Widow	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%			1
pfc	20%		1	
soils	15%		1	
	100%			



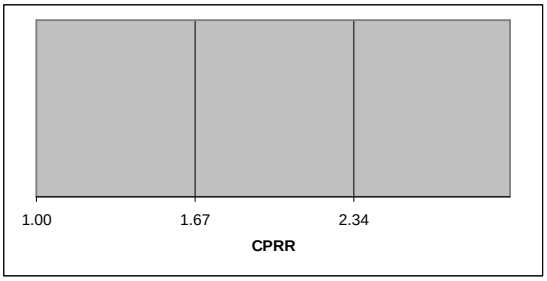
Wolf Creek Exclo.	factor	sat	at risk	unsat
stream channel	20%		missing	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%			1
pfc	20%		1	
soils	15%		missing	
	100%			



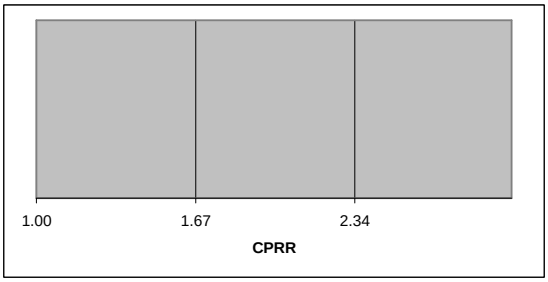
Quicksand (Alt 4)	factor	sat	at risk	unsat
stream channel	20%		missing	
riparian veg	20%			1
upland veg	15%	1		
noxious weed risk	10%			1
pfc	20%		1	
soils	15%		missing	
	100%			



Widow (Alt 4)	factor	sat	at risk	unsat
stream channel	20%		missing	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		missing	
	100%			



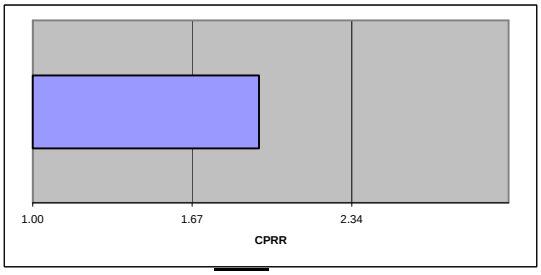
Sugar Holding	factor	sat	at risk	unsat
stream channel	20%		missing	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		missing	
	100%			



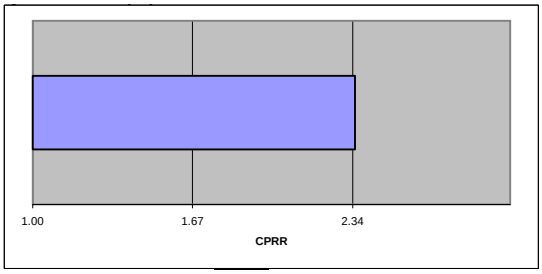
WIND

3 2 1

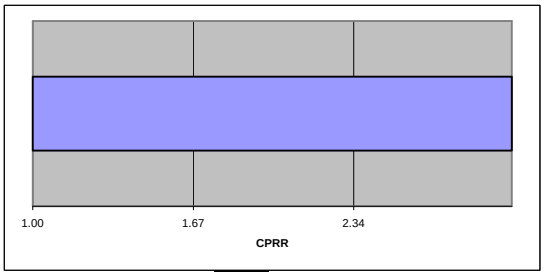
North	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%			1
soils	15%		1	
	100%			



South	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%	1		
soils	15%		1	
	100%			



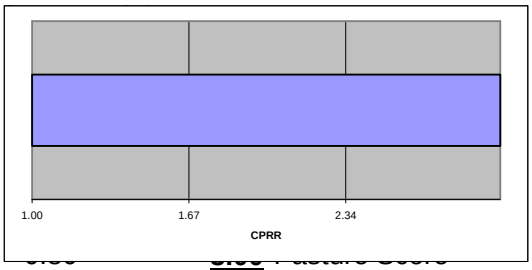
Bronco	factor	sat	at risk	unsat
stream channel	20%	1		
riparian veg	0%			
upland veg	15%	1		
noxious weed risk	10%	1		
pfc	0%			
soils	15%	1		
	60%			



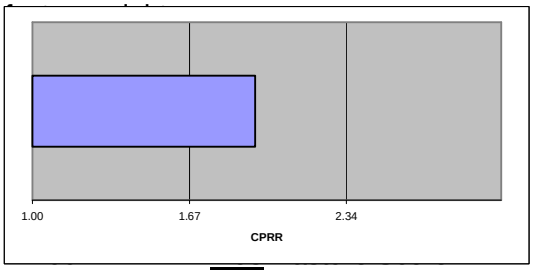
HEISLER

		3	2	1

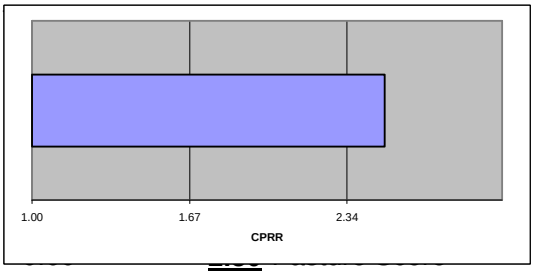
Bear	factor	sat	at risk	unsat
stream channel	20%	1		
riparian veg	20%	1		
upland veg	15%	1		
noxious weed risk	10%	1		
pfc	0%			
soils	15%	1		
	80%			



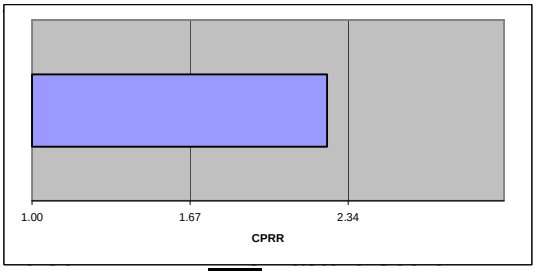
South	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%			1
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		1	
	100%			



North	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	0%			
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	0%			
soils	15%	1		
	60%			



East	factor	sat	at risk	unsat
stream channel	0%			
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%	1		
soils	15%			1
	80%			



As the purpose and need for action described within this analysis indicates, there is a need to move resource conditions within the Southside Allotments Group (Wolf Creek, Heisler, and Wind Creek Allotments) towards desired conditions. In order to achieve this objective livestock impacts within these grazing allotments must be managed in such a way as to maintain or move the conditions of the various resources (or resource features) towards desired levels or conditions. The basic unit within which livestock are managed is the allotment pasture. There is a relatively high level of control of livestock, and their associated effects to the environment, on a pasture by pasture basis. Therefore, in order to determine the degree of livestock management change needed within each pasture, or alternately, in order to categorize pastures containing resources that might be most

susceptible to livestock grazing impacts, the interdisciplinary team for the Southside Allotments Group analysis developed a methodology for compiling the resource conditions within each pasture. The team labeled the methodology the Composite Pasture Resource Rating system (CPRR system), and the resultant categorization as the Composite Pasture Resource Rating (CPRR). It is important to understand that this methodology does not, and never was intended to, determine a "pasture condition", rather it was only intended to be used as a tool to group pastures for the application of different livestock management standards. The CPRR system compiled five different resource (feature) conditions and one multiple resource assessment giving each of these six criteria the following relative weights in determining each pasture's rating:

- Stream Channel Condition 20%
- Riparian Vegetative Condition 20%
- Upland Vegetative Condition 15%
- Noxious Weed Risk 10%
- Proper Functioning Condition Assessment 20%
- Soils Condition 15%

Each resource specialist within the interdisciplinary team responsible for the stewardship of the data for their respective resource conditions was responsible for placing the "average" condition of that resource (feature) within one of three categories ranging from closest to desired condition which was called "Satisfactory", to furthest from desired condition which was called "Unsatisfactory", with one category in between called "At Risk" (refer to individual resource reports and summaries for a description of how this was done for each criteria). Once this was done for each of the six criteria the weighting was applied, mathematically generating a CPRR (using the same nomenclature as described above). In those instances where there was neither adequate data nor professional observation to make a determination for a specific criterion, that criterion was not considered in the CPRR and the other criteria were given proportionately greater weight in determining the CPRR.

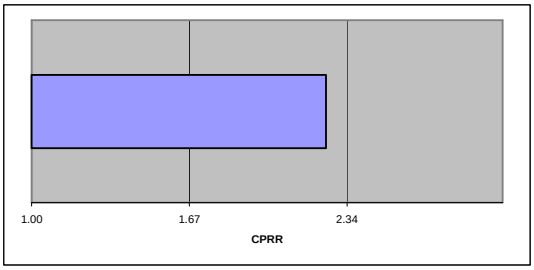
The following tables and charts display:

- How each criterion was rated for each pasture under analysis.
    - The presence of a number 1 adjacent to each criterion is placed within one of three category columns: Satisfactory, At Risk, or Unsatisfactory. This represents the "average" condition of this resource (feature) within the pasture being described.
- Which criteria were used to determine a CPRR for a pasture.
    - In some cases there was insufficient data and professional familiarity with the conditions of a given resource (feature) within a pasture to make a determination of the "average" resource (feature) condition within a pasture. Where this occurred that criterion received no weight and the other criterion received proportionately greater weight in the determination of a CPRR for the pasture.
- What each pasture CPRR rated on a continuum.
    - The bar graph to the right of each table indicates the CPRR for each pasture as rated on a continuum. The vertical lines on each chart represent crossing the threshold from "Unsatisfactory" to "At Risk" and from "At Risk" to "Satisfactory".

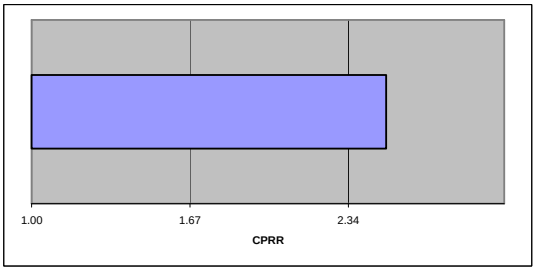
WOLF

3 2 1

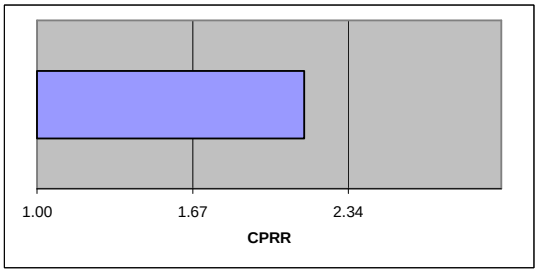
Bull	factor	sat	at risk	unsat
stream channel	0%			
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	0%			
soils	15%		1	
	60%			



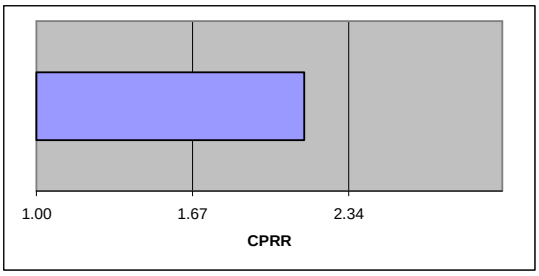
Miles	factor	sat	at risk	unsat
stream channel	20%	1		
riparian veg	0%			
upland veg	15%		1	
noxious weed risk	10%	1		
pfc	0%			
soils	15%		1	
	60%			



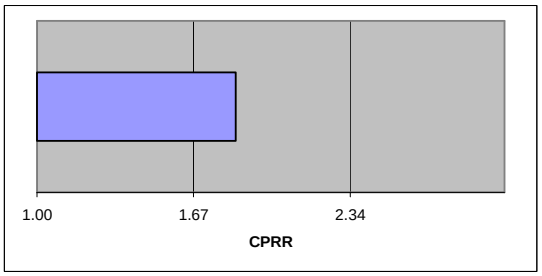
Nichol	factor	sat	at risk	unsat
stream channel	20%	1		
riparian veg	20%			1
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		1	
	100%			



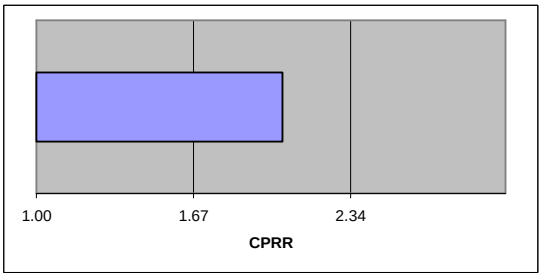
Riparian	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		1	
	100%			



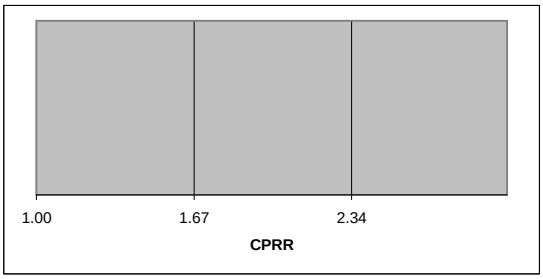
Sugar	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%			1
upland veg	15%	1		
noxious weed risk	10%			1
pfc	20%		1	
soils	15%		1	
	100%			



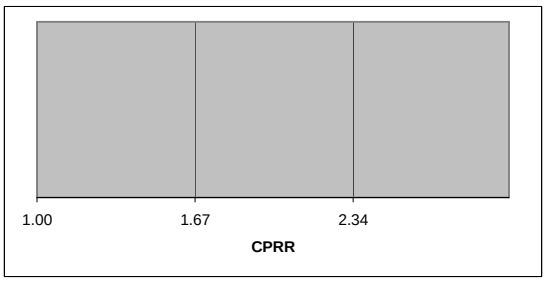
Widow	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%			1
pfc	20%		1	
soils	15%		1	
	100%			



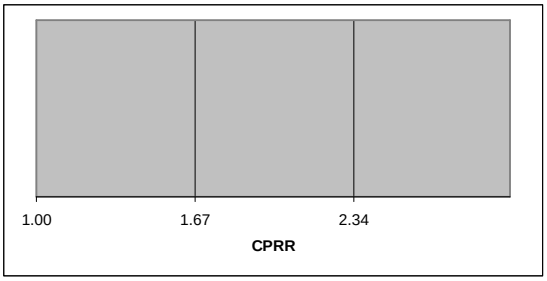
Wolf Creek Exclo.	factor	sat	at risk	unsat
stream channel	20%		missing	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%			1
pfc	20%		1	
soils	15%		missing	
	100%			



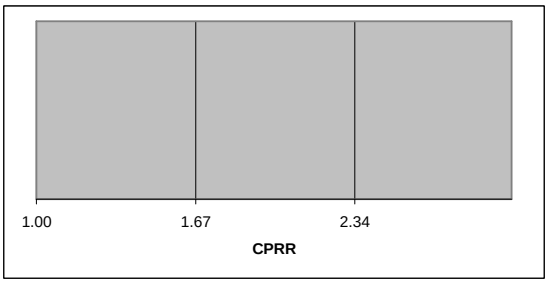
Quicksand (Alt 4)	factor	sat	at risk	unsat
stream channel	20%		missing	
riparian veg	20%			1
upland veg	15%	1		
noxious weed risk	10%			1
pfc	20%		1	
soils	15%		missing	
	100%			



Widow (Alt 4)	factor	sat	at risk	unsat
stream channel	20%		missing	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		missing	
	100%			



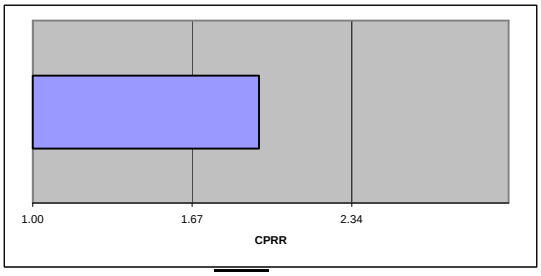
Sugar Holding	factor	sat	at risk	unsat
stream channel	20%		missing	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		missing	
	100%			



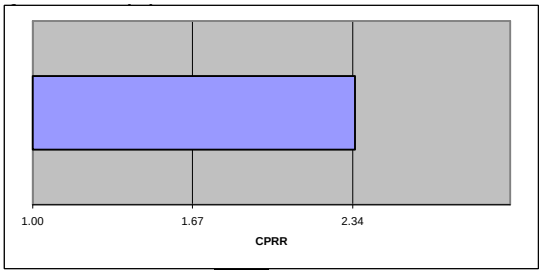
WIND

3 2 1

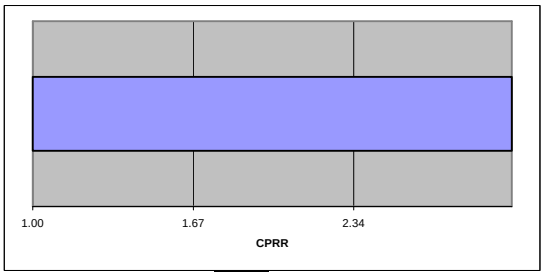
North	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%			1
soils	15%		1	
	100%			



South	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%	1		
soils	15%		1	
	100%			



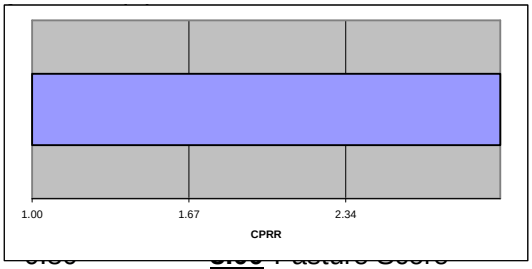
Bronco	factor	sat	at risk	unsat
stream channel	20%	1		
riparian veg	0%			
upland veg	15%	1		
noxious weed risk	10%	1		
pfc	0%			
soils	15%	1		
	60%			



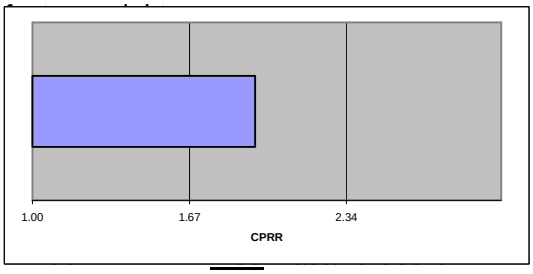
HEISLER

	3	2	1

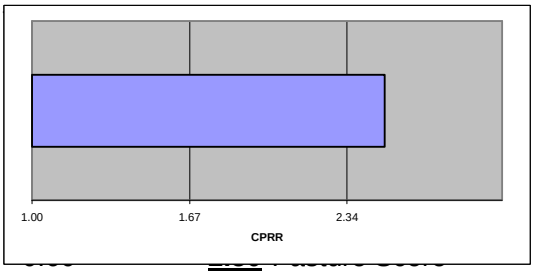
Bear	factor	sat	at risk	unsat
stream channel	20%	1		
riparian veg	20%	1		
upland veg	15%	1		
noxious weed risk	10%	1		
pfc	0%			
soils	15%	1		
	80%			



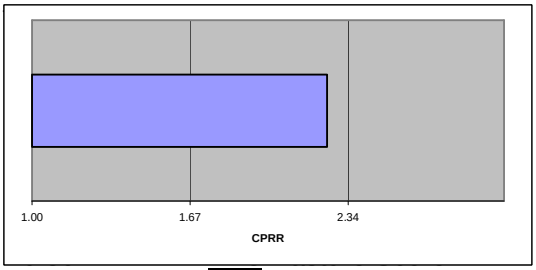
South	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	20%			1
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%		1	
soils	15%		1	
	100%			



North	factor	sat	at risk	unsat
stream channel	20%		1	
riparian veg	0%			
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	0%			
soils	15%	1		
	60%			



East	factor	sat	at risk	unsat
stream channel	0%			
riparian veg	20%		1	
upland veg	15%	1		
noxious weed risk	10%		1	
pfc	20%	1		
soils	15%			1
	80%			



Appendix C

Summary of PFC Assessments

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Summary of PFC Assessments

During the summer of 2005, a Proper Functioning Condition assessment and analysis was completed for six (6) streams in the Southside Allotments Analysis area (Analysis Area). At least one stream was selected from each of the three grazing allotments (Heisler, Wolf Creek, and Wind Creek). Each stream is thought to be representative of the various stream and riparian systems in the Analysis Area. The following is a summary of the functional rating and apparent trend of each of the reached assessed for PFC. Additional information on each reach and its functional rating can be found in Appendix A of this document.

Table C-1. Proper Functioning Condition Assessment and Analysis

Stream	Reach	Functional Rating	Apparent Trend
North Wolf Creek	Reach A	Functional-At Risk	Not Apparent
	Reach B	Functional-At Risk	Upward/Downward[1]
	Reach C	Functional-At Risk	Upward
Sugar Creek	Reach A	Functional-At Risk	Not Apparent
	Reach B	Functional-At Risk	Upward
	Reach C	Proper Functioning Condition	N/A
	Reach D	Functional-At Risk	Upward
	Reach E	Functional-At Risk	Not Apparent
Tamarack Creek	Reach A	Functional-At Risk	Not Apparent
	Reach B	Proper Functioning Condition	N/A
	Reach C	Functional-At Risk	Not Apparent
	Reach D	Nonfunctional	N/A
	Reach E	Proper Functioning Condition	N/A
	Reach F	Functional-At Risk	Not Apparent
Beaverdam Creek	Reach A	Functional-At Risk	Not Apparent
	Reach B	Nonfunctional	Upward
	Reach C	Proper Functioning Condition	N/A

	Reach D	Functional-At Risk	Upward
Wind Creek	Reach A	Proper Functioning Condition	N/A
	Reach B	Proper Functioning Condition	N/A
	Reach C	Proper Functioning Condition	N/A
South Fork Wind Creek	Reach A	Functional-At Risk	Not Apparent
	Reach B	Functional-At Risk	Not Apparent
	Reach C	Proper Functioning Condition	N/A

[1] – Upward – aggrading, point bars building, vegetation developing; Downward – active headcuts.

Table C-2. Existing conditions for unstable banks, shade and width to depth ratio within the Southside Allotment Project Area.

		Unstable Banks		Shade		Width:Depth Ratio	
Stream	**Year Data Collected**	**% Unstable Bank (range)**	**Miles Surveyed**	**Average Shade %**	**Miles Surveyed**	**W:D Ratio**	**Miles or Reach**
Bear	1976	<5	1.4	30	1.4		
Beaver-dam	1976	22 (4-59)	2.5	24	2.5		
	1979	11 (0-50)	9.5	20	9.5		
	2005	19.9-44	7.16	45-53	7.16	13-23	
Bellworm Canyon	2002	14 (0-75)	0.7	42	0.7	6-11	0.7
Bronco	1976	13 (7-20)	1.8	23	1.8		
	1979	2 (0-5)	1.5	9	1.5		
Congleton	1996			20-77	3.4		
	1997	1.6	1.3	37.6	1.3		
Dry Paulina	1995	14	unknown	69.8	unknown		
Heisler	1976	10 (2-33)	1.5	30	1.5		
	1993			28	6.35		
	1997	1 (0-30)	5.6	51	5.6	11-26	5.6
Miles	1993	0-5.2	3.0	36-68	3.0		
Powell	1979	6 (0-15)	4.2	13	4.2		
	1993	14 (1-47)	6.9	55	6.9		

	1994	4-31	6.4	50-63	6.4	2-16	6.4
Rager	1979	3 (0-5)	2.5	13	2.5		
	1993			55	6.9		
	2005	0-5	unknown	13	unknown		
South Fork Wind	1994					11-19	
North Fork Wind	2002	83	2.9	51-61	2.9	16-19	
Sugar Creek	1979	10 (0-50)	8.3	19	8.3		
	2005	0-50	unknown	19	unknown		
Wolf Creek	1989			39-59	2.8		
	2005			23-55	3.6		
North Fork Wolf	1995	8.6-19.7	5.3	57-66	5.3	4-10	
East Fork Wolf Creek	1993	3.5-19	3.1	30-60	3.1	10-15	
	2006	18.4	unknown	66.33	unknown		
Tamarack	1979	4 (0 -6)	3.8	14	3.8		
	1993	9 (1-28)	3.9	56-64	3.9	2-11	

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