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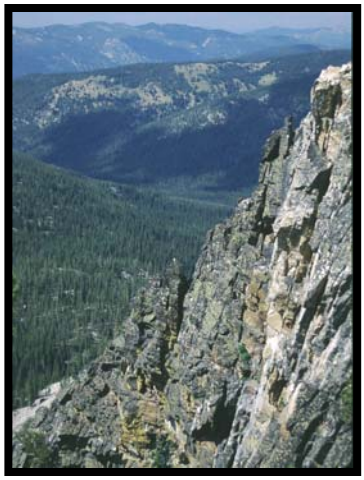
Southwest Idaho Ecogroup Land and Resource Management Plans

Draft Supplemental Environmental Impact Statement



Boise National Forest

Payette National Forest

Sawtooth National Forest

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Draft Supplement to the Final Environmental Impact Statement for the Southwest Idaho Ecogroup Land and Resource Management Plans

USDA Forest Service, Intermountain Region

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Abstract: This Draft Supplemental Environmental Impact Statement has been written to supplement the Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement completed in 2003. The Intermountain Region Forester received five appeals of the decision to implement Alternative 7 as described in the Record of Decision, with appellants contending that the Regional Forester violated the National Forest Management Act and the Hells Canyon National Recreation Area Act on the Payette National Forest by allowing grazing of domestic sheep within or near the range of bighorn sheep, thus threatening the viability of bighorn sheep through disease transmission.

On March 9, 2005, the Chief of the Forest Service concurred that the effects analyses and cumulative effects discussion pertaining to bighorn sheep presented in the Final Environmental Impact Statement did not adequately address viability and reversed the Intermountain Regional Forester's 2003 decision to approve revised management direction for the Hells Canyon Management Area as it pertains to bighorn sheep and its habitat. The Regional Forester was instructed analyze bighorn sheep viability in the Payette National Forest commensurate with the concerns and questions discussed in the appeal review and amend the 2003 Payette National Forest Land and Resource Management Plan accordingly to ensure bighorn sheep viability. The analysis was to be thorough enough to determine compliance with applicable laws and regulations, specifically the Hells Canyon National Recreation Area Act.

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Executive Summary

This Draft Supplemental Environmental Impact Statement (DSEIS) reanalyzes the effects of current and proposed Payette National Forest management on Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) (bighorn sheep) viability within the Payette National Forest. Specifically, the DSEIS presents additional information concerning the following:

- Viability of bighorn sheep at the planning unit scale
- Compliance with the Hells Canyon National Recreation Area (HCNRA)Act (PL 94-199)
- Compliance with 36 CFR 292.48 (domestic livestock grazing activities on Other Lands, Wild and Scenic Rivers, and Wilderness Lands in the HCNRA
- Compliance with the National Forest Management Act (NFMA)
- Compliance with 36 CFR 219.19 (ecological, social, and economic sustainability)

Currently, the effects of management alternatives 1B, 2, 3, 4, 5, 6, and 7 are documented in the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement (FEIS). However, this DSEIS analyzes the effects of these alternatives on bighorn sheep viability. These seven alternatives can be combined into two categories based on how they affect the risk of contact between domestic and bighorn sheep. The first category contains Alternatives 1B, 2, 5, and 7, which did not designate any acres on the Payette National Forest as unsuitable for grazing by domestic sheep or goats; all trailing routes remain open in these alternatives. The second category contains Alternatives 3, 4, and 6, which determined suitable rangeland in all of Management Area (MA) #1 and a portion of MA #2 that overlapped current bighorn sheep habitat as unsuitable for domestic sheep grazing. Areas inside and outside of current grazing allotments were determined to be unsuitable for domestic sheep grazing as were trailing routes from the areas.

To better address the issue of bighorn sheep viability, several alternative management approaches were developed and analyzed. In developing a reasonable range of alternatives, the Payette National Forest used public comments, science panel information, guidance from Fish and Game agencies, and available telemetry data on bighorn sheep movements to model the utility distributions (probability distributions) of bighorn sheep populations with 50 to 100 percent (in 10 percent increments) fixed kernal estimators. The objective was to describe the areas that bighorn sheep would be utilizing and/or moving through, known as herd home ranges, based on the actual occurrence data. These data were used to develop two geographic population ranges (GPRs): one for Hells Canyon and one for the Salmon River. The GPR term was created because the home range term is typically used for an individual, not a herd group or larger.

Alternative 7E determines all lands within the Payette National Forest as unsuitable for domestic sheep grazing and all trailing routes within the Payette National Forest as closed for domestic sheep use. Alternative 7G utilizes the GPRs and designates all land within the Hells Canyon and Salmon River GPRs as unsuitable for domestic sheep grazing and all trailing routes within the GPRs as closed for use. Alternative 7H designates the Hells Canyon and Salmon River GPRs and the area for 9 miles outside of the GPRs as closed for domestic

sheep grazing. All trailing routes within the GPRs and 9 mile area are considered unsuitable for domestic sheep use. Areas unsuitable for domestic sheep grazing in Alternative 7J were determined by overlaying a map of the probability for contact onto a map showing bighorn sheep habitat and removing the watersheds that occurred within the very high and high risk areas. Unsuitable areas were then adjusted for expected animal behavior. Trailing routes within the areas unsuitable for grazing were also considered unsuitable for domestic sheep use. Alternative 7K represented the similar use patterns as approved for the 2007 and 2008 grazing seasons. The only trailing route considered unsuitable for domestic sheep use was the Salmon River Driveway south of the intersection with the Hornet Creek Road and Marshal Mountain.

The effects analysis of these alternatives indicates that 7E, followed by 7H reduce the potential risk of contact between bighorn and domestic sheep to the greatest extent and may provide the greatest opportunity for tribal harvest in all traditional locations influenced by the Payette National Forest. However, they also have the largest effect on domestic sheep and goat allotments. Alternatives 7G and 7J minimize the potential risk of contact with intermediate effects to the livestock allotments and a greater opportunity for tribal harvest. However, some differences exist between 7G and 7J. Alternative 7G does not consider the modeled occupied habitat (GPR) to be suitable for domestic sheep grazing but does leave slightly more risk on the landscape outside of the alternative. Alternative 7J, however, leaves occupied habitat outside of the alternative, as much as 15 percent of the Hells Canyon GPR and 5 percent of the Salmon River GPR. Grazing in the GPR poses a potential risk not reflected by the other numbers for GPR. Alternative 7K and then Alternatives 3, 4, and 6 are ranked next for minimizing risk, although they both leave a substantial amount of risk on the landscape. These alternatives do have much smaller effects to livestock allotments, but greatly reduce the harvest ability for tribal members.

The economic impact of each alternative to the agriculture sector was analyzed for Riggins, Weiser, and Wilder. The economic analysis began by updating the community profiles and examining the headmonths for each alternative. Alternative 7E had the fewest headmonths at zero. The remaining alternatives had the following headmonths: Alternative 7G (27, 534), Alternative 7H (3,801), Alternative 7J (34,266), and Alternative 7K (51,434). The economic analysis then examined the outputs of the community economic models that included sales, earnings, and jobs. Sales are defined as the total transactions in dollars from direct and indirect economic activity, earnings are defined as the wage and salary payments (direct and indirect) for labor income to individuals, and jobs represent the total of both direct and indirect employment of workers. According to the model, Alternative 7 produces 37.2 jobs and $672,635 in earnings; Alternative 7E produces zero jobs and zero dollars in earnings; Alternative 7G produces 16.2 jobs and $302,462 earnings; Alternative 7H produces 2.4 jobs and $43,623 earnings; Alternative 7J produces 20.7 jobs and $387,229 earnings; and Alternative 7K produces 29.6 jobs and $540,625 earnings.

Supplemental Environmental Impact Statement Introduction

BACKGROUND

Completed in July 2003, the Southwest Idaho Ecogroup Land and Resource Management Plans FEIS and Record of Decision (ROD) were the product of regional planning efforts to revise the Payette National Forest Land and Resource Management Plan (Forest Plan) as required by the 1982 NFMA implementing regulations (36 CFR 201). The Intermountain Region Forester received five appeals of the decision to implement Alternative 7 as described in the ROD, with appellants contending that the Regional Forester violated NFMA and the HCNRA Act on the Payette National Forest by allowing grazing of domestic sheep within or near the range of bighorn sheep, thus threatening the viability of bighorn sheep through disease transmission. The HCNRA Act provides direction for the "administration, protection, and development" of the HCNRA (16 USC §460gg-4).

On March 9, 2005, the Chief of the Forest Service (Chief) concurred that the effects analyses and cumulative effects discussion pertaining to bighorn sheep presented in the FEIS did not adequately address viability and reversed the Intermountain Regional Forester's 2003 decision to approve revised management direction for the Hells Canyon MA as it pertains to bighorn sheep and its habitat. The Chief stated that allowing continued domestic sheep grazing in or near occupied bighorn sheep habitat threatened the viability of bighorn sheep populations within the Hells Canyon area and across the Payette National Forest.

The HCNRA and the Hells Canyon MA are two separate and distinct delineations on a map. Only a small portion of the Hells Canyon MA overlaps into the HCNRA. However, the HCNRA does extend alongside the western boundary of the Hells Canyon MA for a considerable distance. Bighorn sheep have repeatedly been documented traversing back and forth across the boundaries of these two areas and coming into contact with domestic sheep allotments on the Payette National Forest during the permitted grazing season. Since the Chief instructed the Payette National Forest to conduct a viability analysis at the planning unit scale, the entire Payette National Forest was analyzed, which affected the Salmon River Mountain bighorn sheep population.

To address the issue of bighorn sheep viability, the Regional Forester was instructed to reanalyze bighorn sheep viability in the Payette National Forest; amend the FEIS accordingly; and evaluate and adopt, as necessary, changes in the Forest Plan (USDA Forest Service 2003) management direction for the Hells Canyon MA and adjacent areas. Specifically, the Regional Forester was instructed to complete a supplement (Supplemental Environmental Impact Statement [SEIS]) to the FEIS for the Southwest Idaho Ecogroup Revised Land and Resource Management Plans.

Development of the Supplemental Environmental Impact Statement

Typically, a DSEIS or SEIS does not contain a range of alternatives. However, in this situation, the Chief remanded only a small portion of the selected alternative—bighorn sheep viability on the Payette National Forest. Therefore, the Payette National Forest developed

several alternatives (7A through 7K) in addition to those analyzed in the FEIS. One of these alternatives, or a variation of one of the alternatives, will be selected and then will eventually become part of Alternative 7, the selected alternative in the ROD for the FEIS tied to the Forest Plan (USDA Forest Service 2003).

In the DSEIS, the alternatives from the FEIS—1B, 2, 3, 4, 5, 6, and 7—are considered in addition to the alternatives developed for this process—7A through 7K. Because the FEIS analysis for bighorn sheep viability was deemed inadequate, the FEIS alternatives and the action alternatives from the DSEIS will be analyzed, and the effects to bighorn sheep will be disclosed in this document.

Alternate management strategies to Alternative 7 were developed utilizing the issues developed and comments received on the FEIS and comments received on the products of the DSEIS process. The issues used for this process are found in the FEIS pages 1–14, 15, 19, and 23 and are as follows:

1. Terrestrial Wildlife Habitat and Species

Issue Statement 1: Forest Plan management strategies may affect habitat for terrestrial wildlife species, including species that are listed or proposed for listing under the Endangered Species Act, Region 4 sensitive species, species of special interest, species at risk, and Forest Management Indicator Species.

Issue Statement 2: Forest Plan management strategies may affect disruption, vulnerability, and disease risk to terrestrial wildlife species.

2. Rangeland Resources

Issue Statement: Forest Plan management strategies may affect rangeland resources, including lands considered suitable for livestock grazing and the form of livestock grazing management authorized under permit for the Forests.

3. Tribal Rights and Interests

Issue Statement: Forest Plan management strategies may affect the availability of resources and the use of traditional places important to American Indian rights and interests.

Terrestrial, Wildlife, Habitat, and Species

To better address the issue of bighorn sheep viability, several alternative management approaches were developed and analyzed. To develop a reasonable range of alternatives, the Forest Service developed a potential risk of contact model that incorporated three risk components: 1) where bighorn sheep are expected to be found, 2) where they may interact with domestic sheep, and 3) where habitat for bighorn sheep occurs. The potential risk of contact model was then used to analyze the effects of each alternative on bighorn sheep viability.

Tribal Rights and Interests

The *Tribal Rights and Interest* section of the FEIS included an analysis of the effects Forest Service management would have on the ability of the agencies to meet federal trust responsibilities. Of particular interest was the availability of traditional and/or culturally important terrestrial and aquatic plant and animal species in sufficient and desirable quantities. Cultural interests and uses are protected through various federal statutes, laws, policies, and regulations (Appendix H in USDA Forest Service 2003). The federal trust doctrine requires federal agencies to manage the lands under their stewardship with full consideration for tribal rights and interests, particularly reserved rights, where they have been exercised since time immemorial.

Availability of culturally important species, in particular bighorn sheep, depends on the persistence of the species over time. Species viability depends on the distribution of quantity and quality habitat (CFR §219.19) that is available to the bighorn sheep. The FEIS included an analysis of species in the *Terrestrial Wildlife Habitat and Species* section, which was used in determining effects to tribal rights and interests. However, a more thorough analysis for bighorn sheep is now complete and is provided in Chapter 3 of this DSEIS. As such, the federal tribal trust responsibilities are also being reassessed to determine the effects on the availability of bighorn sheep and on the use of traditional cultural properties.

Consistent with 36 CFR §219.20(a), this analysis will supplement the Tribal Rights and Interests section of the FEIS to 1) identify other affected tribes; 2) identify the effects on the availability of bighorn sheep; and 3) disclose the effects on the associated use of traditional cultural properties important to American Indian rights and interests.

Socio-Economic Analysis

Economic Modeling Specialists, Incorporated (EMSI) conducted a socio-economic analysis for the Payette National Forest for the alternatives described in the DSEIS, which included the job and earnings impact of various alternatives provided by the Payette National Forest. Specifically, the analysis had three primary goals:

1. Provide updated economic profiles for the communities of Riggins, Idaho and Weiser, Idaho.
2. Develop an economic profile for Wilder, Idaho.
3. Calculate the direct employment effects of several alternative range management scenarios.
4. Calculate the economic impacts of the alternative range management scenarios on the communities of Riggins, Idaho; Weiser, Idaho; and Wilder Idaho.

Consistent with 36 CFR §219.20(a), this analysis will supplement the Socio-economic Environment section of the FEIS.

Public Participation

The Notice of Intent (NOI) to prepare an SEIS and amend the Forest Plan (USDA Forest Service 2003) was published in the Federal Register in April 2007 (FR 72:18197–18198). Public scoping and involvement on the FEIS was extensive and spanned a 7-year period.

The risk for disease transmission from domestic sheep to bighorn sheep and the subsequent population declines was identified early and noted as a concern by the U.S. Fish and Wildlife Service (USFWS). It was assumed for the FEIS that disease transmission can occur. Only one comment was received during the 7-year period questioning that assumption. Tribal consultation, both informal and formal, was also extensive during the Forest Plan (USDA Forest Service 2003) development process.

To begin the SEIS process, the Forest Service completed an analysis on the risk for contact between domestic sheep and bighorn sheep on the Payette National Forest. The *Risk Analysis for Disease Transmission Between Bighorn Sheep and Domestic Sheep on the Payette National Forest* (risk analysis) (USDA Forest Service 2006a) was completed in February 2006 and released for a 96-day comment period. Sixty-two comments were received on the document. In November 2006, the Payette National Forest contracted the setup and facilitation of a science panel composed of veterinary, livestock, and wildlife experts to discuss the risk analysis and the science-based comments received on the risk analysis. The scientists provided the Forest Service with dialogue and a set of consensus statements (USDA Forest Service 2006b). Further science meetings were organized and held by the scientists to continue discussion on the disease transmission issue in Davis, California; Tucson, Arizona; Salt Lake City, Utah; and Boise, Idaho. The Western Association of Fish and Wildlife Agencies (WAFWA) also convened and discussed the issue.

Comments, concerns, insights, and information gathered from all of the public involvement efforts, science panels, and fish and game meetings were considered in developing the alternatives for bighorn sheep management.

The Forest Service has a long standing policy supporting the commitment to encourage cooperation among federal, state, local and tribal governments (USDA Forest Service 1998). Continuing on with the policy, as of August 2007, the DSEIS Interdisciplinary Team (IDT) was comprised of U.S. Department of Agriculture (USDA) Forest Service employees and representatives of cooperating states and sovereign tribes. The entities included the states of Idaho, Oregon, and Washington and the tribal governments of the Nez Perce Tribe, Shoshone–Bannock Tribes, Shoshone–Paiute Tribes, and the Confederated Tribes of the Umatilla Indian Reservation. The DSEIS IDT adopted roles and responsibilities. The Forest Service retained the authority to make the decisions for the SEIS, act as an expert, and author the document. The states and tribes were to act as technical experts, bringing their knowledge to the table, and to provide comments and review information.

Disease Review

Considerable debate about the science has surrounded the disease transmission issue since the SEIS process began. Even so, the preponderance of science literature still supports the notion that the issues are significant and warrant consideration of effects analysis and management direction.

Bighorn sheep are a New World species and are closely related to domestic sheep, which are an Old World species. Domestication and intense artificial selection have probably helped domestic sheep develop a resistance to important diseases (Jessup 1985; USDA Forest

Service 2006a). However, bighorn sheep can be highly susceptible to diseases carried by domestic sheep.

A long history of large-scale, sudden, all-age die-offs in bighorn sheep exists across Canada and the United States, many associated with domestic animal contact (Shackleton 1999). Although limited knowledge of transmission dynamics exists (Garde et al. 2005), extensive scientific literature supports the relationship between disease in bighorn sheep populations and contact with domestic sheep, including both circumstantial evidence linking bighorn die-offs in the wild to contact with domestic animals and controlled experiments where healthy bighorn sheep exposed to domestic sheep displayed subsequently high mortality rates (Foreyt 1989, 1990, 1992; Foreyt et al. 1994; Onderka et al. 1988; Onderka and Wishart 1988; Garde et al. 2005).

In a summary of risk to wild sheep from *Pasteurella* and *Mannheimia* spp., Garde et al. (2005) makes the following conclusions:

- These bacteria can cause pneumonia in bighorn sheep, but there are benign commensal strains in the upper respiratory tract
- Domestic sheep, goats, and llamas have been reported with these bacteria species
- Wild sheep and mountain goats have been reported with these bacteria species
- Transmission is by direct contact and aerosolization
- These bacteria species do not persist in the environment
- Acute-to-chronic die-offs in bighorn sheep can result in low to 100 percent mortality, although they can be present in healthy sheep
- These bacteria are considered opportunistic and can result in pneumonia outbreaks
- These bacteria can cause clinical disease in domestic sheep and goats but are rarely primary pathogens

Pertinent Findings

While much of the evidence for competition between domestic sheep and bighorn sheep is circumstantial, it is sufficient to have prompted the following discussions.

Payette Science Panel Findings and Recommendations

A science panel was convened in November 2006 to provide additional science-based information regarding disease transmission and the associated risks for the Payette National Forest. Although focused specifically on the Payette risk analysis, the panel's conclusions are applicable to all areas where domestic sheep or goats and bighorn sheep co-exist. The panelists, who were scientists from the livestock and wildlife disease communities, focused on disease and mortality concerns and jointly developed the following statements (USDA Forest Service 2006b):

1a. Scientific observation and field studies demonstrate that "contact" between domestic sheep and bighorn sheep is possible under range conditions. This contact increases the risk of subsequent bighorn sheep mortality and reduced recruitment, primarily due to respiratory disease.
1b. The complete range of mechanisms/causal agents that lead to epizootic disease events cannot be conclusively proven at this point.
1c. Given the previous two statements, it is prudent to undertake management to prevent contact between these species.
2. Not all bighorn sheep epizootic disease events can be attributed to contact with domestic sheep.
3. Gregarious behavior of bighorn sheep and domestic sheep may exacerbate the potential for disease introductions and transmission.
4. Dispersal, migratory, and exploratory behaviors of individual bighorn sheep traveling between populations may exacerbate the potential for disease introduction and transmission.
5. There are factors (for example, translocation, habitat improvement, harvest, weather, nutrition, fire, interspecies competition, and predation), some that can be managed and some that cannot, that can influence bighorn sheep population viability.
6. Pasteurellaceae and other bacteria, viruses, and other agents may occur in healthy, free-ranging bighorn sheep.

Western Association of Fish and Wildlife Agency Findings

In January 2007, WAFWA—a group of 23 state and provincial wildlife agencies from the western United States and western Canada—established a Wild Sheep Working Group (WSWG). Comprised of bighorn sheep managers and veterinarians, WSWG was requested to provide a comprehensive, west-wide assessment of all facets of wild sheep management. The following conclusions from their June 21, 2007, final report, which WAFWA unanimously endorsed in July 2007, are relevant to this disease overview:

1. Over the past 30 years, there has been a steadily increasing body of anecdotal and empirical evidence underscoring the potential risk of disease transmission from domestic sheep and goats to wild sheep.
2. There is a preponderance of evidence, taken collectively from a wide variety of observations that indicates significant risk of disease transmission from domestic sheep and goats to wild sheep exists.
3. Effective separation (both temporal and/or spatial) between wild sheep and domestic sheep and goats should be a primary management goal of state and provincial agencies responsible for wildlife management.
4. We concur with statements developed and adopted by the interdisciplinary Payette National Forest Science Panel (listed above).
5. We recognize that it is impossible to achieve zero risk of contact or disease transmission: however, we also recognize there are many ways to work proactively toward minimizing or eliminating interaction between these species.
6. We developed management guidelines for use by all agencies, organizations, domestic producers, and private land owners.

Management Recommendations

The separation, either spatially, temporally, or both of bighorn sheep from domestic sheep has been recommended by leading bighorn sheep disease experts (Schommer and Woolever 2001; USDA Forest Service 2006b; WAFWA 2007). Experts also recommend developing site-specific solutions for each bighorn sheep population and domestic sheep allotment and developing a management strategy appropriate for the complexity of the management situation (Schommer and Woolever 2001; WAFWA 2007). Each of the alternatives takes this approach; however, given the complexity of the issue on the Payette National Forest, each alternative has pros and cons associated with minimizing the risk of contact between domestic and bighorn sheep. Data are limited and it is hard to draw inferences about a wide-ranging species such as the bighorn sheep.

Chapter 1
Purpose and Need

INTRODUCTION

The purpose of the 2003 Final Environmental Impact Statement (FEIS) for the Payette National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service 2003) was to revise the previous Forest Plan (USDA Forest Service 1988) to meet legal and regulatory requirements and to address changes, issues, and concerns that had arisen since it was originally released. The need for the revision was identified as the legal timeframe for revision had arrived, and significant change in conditions and demands in the areas covered by the Forest Plan (USDA Forest Service 1988) had been identified. The Preliminary Analysis of the Management Situation Summary (USDA Forest Service 1997) identified the threat for disease transmission from livestock to bighorn sheep as a potential reason for population decline. This concern translated into a need for change topic revision of the Forest Plan (USDA Forest Service 1988) and was further validated during regulatory agency consultation with the U.S. Fish and Wildlife Service (USFWS). As such, bighorn sheep were identified as a species of special interest for the Forest Plan revision effort. The bighorn sheep need for change topic was then translated into a significant issue used in effects analysis, alternative formulation, and development of management direction. Significant issues tied to the bighorn sheep viability concern included the following:

1. Terrestrial Wildlife Habitat and Species

Issue Statement 1: Forest Plan management strategies may affect habitat for terrestrial wildlife species, including species that are listed or proposed for listing under the Endangered Species Act, Region 4 sensitive species, species of special interest, species at risk, and Forest Management Indicator Species.

Issue Statement 2: Forest Plan management strategies may affect disruption, vulnerability, and disease risk to terrestrial wildlife species.

2. Rangeland Resources

Issue Statement: Forest Plan management strategies may affect rangeland resources, including lands considered suitable for livestock grazing and the form of livestock grazing management authorized under permit for the Forest.

3. Tribal Rights and Interests

Issue Statement: Forest Plan management strategies may affect the availability of resources and the use of traditional places important to American Indian rights and interests.

In addition to the USFWS concern over the viability of bighorn sheep, several comments from tribal governments and the public were received supporting concern for the species. It was assumed during the FEIS analysis that disease transmission from domestic sheep was a threat to bighorn sheep as this was supported by laboratory research and the overwhelming

majority of published science. It continues to be recognized that the exact mechanisms of the transfer are not fully understood.

The Payette National Forest included direction to the Forest Plan (USDA Forest Service 2003) as a guideline and an objective for the Hells Canyon Management Area (MA) #1 that read:

> Guideline—Within bighorn habitat emphasis areas, close sheep allotments as they become vacant, or convert then to cattle where appropriate, to eliminate the risk of disease transmission from domestic to wild sheep. Do not convert cattle allotments to sheep allotments within occupied bighorn sheep habitat.
>
> Objective—Coordinate with Idaho Department of Fish and Game, Oregon Department of Fish and Game, and domestic sheep permittees to reduce the risk of disease transmission between domestic and wild sheep.

Several entities appealed the 2003 FEIS stating that the Forest Service violated National Forest Management Act (NFMA) and the Hells Canyon National Recreation Area (HCNRA) Act on the Payette National Forest by allowing grazing of domestic sheep in or near the range of bighorn sheep, thus threatening the viability of bighorn sheep through disease transmission. One appellant stated, "The Hells Canyon National Recreation Area Act…requires livestock grazing to be compatible with native wildlife protection…the selected alternative fails to address the issues of ongoing conflicts of domestic sheep grazing and wild bighorn sheep in a way that assures the ultimate survival of the bighorn population in a manner sufficient to meet its obligation under the HCNRA Act."

The Appeal Reviewing Officer found the following:

> The Payette Forest Plan (USDA Forest Service 2003) does not contain any direction for protecting or maintaining bighorn sheep or their habitat in the Hells Canyon MA, in particular for the protection of bighorn sheep from the documented current and likely future threat of disease transmission from domestic sheep. By permitting the presence of domestic sheep within occupied bighorn sheep range, the Payette National Forest does not appear to be managing the habitat to maintain viable populations of bighorn sheep.
>
> Based on the above analysis, the viability of bighorn sheep populations within the Hells Canyon area, and across the Payette National Forest, appears to be threatened by allowing continued grazing of domestic sheep in or near occupied bighorn sheep habitat. As documented in the FEIS and relevant scientific literature, without immediate removal of domestic sheep from occupied bighorn sheep habitat, bighorn within that habitat are likely at risk of extirpation. Bighorn sheep habitat is contiguous between the Payette National Forest and National Forest System land to the north, east and south, and bighorn sheep appear to move between the two identified habitat areas (Hells Canyon and Snake River) within the Payette National Forest. Transmission of disease to bighorn sheep on the Payette National Forest that are part of the Hells Canyon population will place the entire Payette National Forest population at substantial risk.

> While the Hells Canyon MA is thus not specifically included in the HCNRA Act, it is clear that by permitting the presence of domestic sheep within adjacent occupied bighorn sheep range, and with documented movement of bighorn sheep between the NRA and the Payette National Forest, the Payette National Forest is not managing livestock grazing in the Hells Canyon MA in a manner compatible with the protection and maintenance or bighorn sheep or their habitat in the HCNRA.

The Appeal Reviewing Officer's decision stated the following:

> Serious questions are raised in the SW Idaho Ecogroup FEIS, supported by applicable scientific literature, about the viability of bighorn sheep populations in the Hells Canyon MA (MA#1) of the Payette National Forest, and indeed across the Payette National Forest. However, the effects analysis does not address bighorn sheep viability. Management direction in the Payette NF LRMP for the Hells Canyon MA does not adequately provide for habitat to insure the maintenance of a viable bighorn sheep population within the Payette National Forest (36 CFR 219.19). It also does not adequately protect bighorn sheep populations and habitat in the Hells Canyon NRA (36 CFR 292.48). I find the Payette National Forest LRMP is not in compliance with NFMA regulations concerning wildlife viability of bighorn sheep, and may not be in compliance with the Hells Canyon NRA Act and its implementing regulations. The Regional Forester's decision to approve revised management direction in the Payette LRMP for the Hells Canyon MA is reversed.
>
> The Regional Forester is instructed to do an analysis of bighorn sheep viability in the National Forest commensurate with the concerns and questions discussed above, and amend (supplement) the SW Idaho Ecogroup FEIS accordingly. Changes to the management direction of the Payette LRMP for MA #1 (Hells Canyon) and adjacent areas shall be evaluated, and adopted as necessary to ensure bighorn sheep viability. The analysis should be extensive enough to support determinations of compliance with applicable law and regulation, specifically the Hells Canyon NRA Act, 36 CFR 219.19 and 36 CFR 292.48.

This set of instructions from the Appeal Reviewing Officer created an additional purpose and need for this Draft Supplemental Environmental Impact Statement (DSEIS) that will be discussed in the section below. It must be pointed out that the HCNRA and the Hells Canyon MA are two separate and distinct delineations on a map. Only a small portion of the Hells Canyon MA overlaps into the HCNRA. However, the HCNRA does extend alongside the western boundary of the Hells Canyon MA for a considerable distance. Bighorn sheep have repeatedly been documented traversing back and forth across the boundaries of these two areas and coming into contact with domestic sheep allotments on the Payette National Forest during the permitted grazing season. In instructing the Payette National Forest to conduct a viability analysis at the planning unit scale, the entire Payette National Forest was analyzed which also affects the Salmon River Mountain bighorn sheep population.

Considerable debate about the science has surrounded the disease transmission issue since the Supplemental Environmental Impact Statement (SEIS) process began. Even so, the preponderance of science literature still supports the notion that the issues are significant and warrant consideration of effects analysis and management direction.

Decisions to be Made in the Final Supplemental Environmental Impact Statement Process

The SEIS assessment involves conducting a viability analysis for bighorn sheep on the Payette National Forest. The assessment includes a review of the available bighorn sheep source habitat, its distribution across the Payette National Forest, and how contiguous it is. Additional considerations include how bighorn sheep are now and how have they used the habitat at a landscape scale internal to the Payette National Forest and between adjacent federal lands. The relative risk for contact with permitted domestic sheep is also considered.

The Responsible Official for this analysis, amendment, and decision is the Payette National Forest Supervisor. Given the information gathered in the above analyses, the Responsible Official decides which alternative to select as the Agency Preferred for the DSEIS and what Forest Plan amendment management direction is developed.

Decisions to be made for the Final SEIS and Amendment to the Forest Plan (USDA Forest Service 2003) include the following:

1. What alternative to select for implementation
2. What management direction to develop that will assist with implementing the selected alternative
3. Does the selected alternative and its implementation language comply with federal law and regulation, in particular NFMA and the HCNRA Act.

Consistent with 36 CFR §219.20(a), the following pages will supplement the National or Regional Issues section, page 1-31, of Chapter 1 of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

National or Regional Issues

The Payette National Forest received several appeals on the 2003 Record of Decision for the FEIS on the Forest Plan (USDA Forest Service 2003). One appeal point dealt with bighorn sheep viability and the effects of disease transmission from domestic sheep to bighorn sheep on the rapidly declining populations. The Appeal Reviewing Officer in the Washington Office remanded the direction found in the Forest Plan (USDA Forest Service 2003) regarding bighorn sheep management. The Chief of the Forest Service (Chief) instructed the Regional Forester to analyze bighorn sheep viability in the Payette National Forest commensurate with the concerns and questions discussed in the appeal review and amend the Forest Plan (USDA Forest Service 2003) accordingly to ensure bighorn sheep viability. The analysis was to be thorough enough to determine compliance with applicable laws and regulations, specifically the HCNRA Act, 36 CFR 219.19, and 36 CFR 292.48.

The purpose of this DSEIS and Draft Amendment to the Forest Plan (USDA Forest Service 2003) is to respond to the instructions received from the Appeal Reviewing Officer on March 9, 2005 regarding appeals to the 2003 ROD.

The first need for this DSEIS and Draft Amendment to the Forest Plan (USDA Forest Service 2003) is to conduct a bighorn sheep viability analysis on the Payette National Forest that looks at the effects of disease transmission from domestic to bighorn sheep, evaluates

how the effects impact the persistence of bighorn sheep populations over time; and adds language to the Forest Plan (USDA Forest Service 2003) adequately addressing the management concern. For the second need, the analysis will determine whether or not the Payette National Forest is providing adequate bighorn sheep habitat, well distributed across the planning unit, to provide for a viable population of bighorn sheep as required by NFMA:

NFMA—36 CFR 219.19

> *36 CFR 219.19—"Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area."*
>
> *36 CFR 219.27—"The minimum specific management requirements to be met in accomplishing goals and objectives for the National Forest System are set forth in this section. These requirements guide the development, analysis, approval, implementation, monitoring and evaluation of forest plans.*
>
> *(a) Resource Protection. All management prescriptions shall—* […]
>
> *(6) Provide for adequate fish and wildlife habitat to maintain viable populations of existing native vertebrate species and provide that habitat for species chosen under Sec. 219.19 is maintained and improved to the degree consistent with multiple–use objectives established in the plan;"*

For the third need, the analysis will determine compliance with the HCNRA Act. Domestic sheep grazing allotments currently cross over and into or are immediately adjacent to the HCNRA. Analysis needs to be completed to determine if Payette National Forest management is compatible with the HCNRA Act as stated below:

Hells Canyon National Recreation Area Act

The HCNRA Act (PL 94-199) was enacted on December 31, 1975, and the Act provides direction for the "administration, protection, and development" of the HCNRA (16 USC §460gg-4). According to the HCNRA Act, grazing is identified as one of several traditional and valid uses of the recreation area, and the continuation of grazing can occur as compatible with the provisions of the HCNRA Act.

The HCNRA Act and its implementing regulations require that the Payette National Forest manage livestock grazing in the Hells Canyon MA in a manner compatible with the protection and maintenance of bighorn sheep or their habitat within the HCNRA. This requirement was considered and used in developing the alternatives.

Significant Issues

Significant issues identified in the FEIS that carry forward into this analysis include the following:

1. Terrestrial Wildlife Habitat and Species

Issue Statement 1: Forest Plan management strategies may affect habitat for terrestrial wildlife species, including species that are listed or proposed for listing under the Endangered Species Act, Region 4 sensitive species, species of special interest, species at risk, and Forest Management Indicator Species.

Issue Statement 2: Forest Plan management strategies may affect disruption, vulnerability, and disease risk to terrestrial wildlife species.

2. Rangeland Resources

Issue Statement: Forest Plan management strategies may affect rangeland resources, including lands considered suitable for livestock grazing and the form of livestock grazing management authorized under permit for the Payette National Forest.

3. Tribal Rights and Interests

Issue Statement: Forest Plan management strategies may affect the availability of resources and the use of traditional places important to American Indian rights and interests.

Chapter 2
Alternatives Considered

INTRODUCTION

This Draft Supplemental Environmental Impact Statement (DSEIS) contains alternate management options developed in response to the direction outlined in the March 9, 2005, Decision for Appeal of the Payette National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service 2003). Specifically, the Appeal Reviewing Officer found that the management direction in the Forest Plan (USDA Forest Service 2003) does not adequately provide for habitat to ensure the maintenance of a viable bighorn sheep population within the within the Payette National Forest (36 CFR 219.19). She also found that the Forest Plan (USDA Forest Service 2003) does not adequately protect bighorn sheep populations and habitat in the Hells Canyon National Recreation Area (HCNRA) (36 CFR 292.48). The Payette National Forest was found not compliant with National Forest Management Act (NFMA) regulations concerning wildlife viability of bighorn sheep and may not be compliant with the HCNRA Act and its implementing regulations. The management direction for Hells Canyon Management Area (MA) #1 was reversed and the Payette National Forest was instructed to amend the Forest Plan (USDA Forest Service 2003) as necessary to ensure viability for bighorn sheep.

The Forest Plan (USDA Forest Service 2003) was developed to implement Alternative 7 from the Final Environmental Impact Statement (FEIS). Because the direction tied to bighorn sheep management was found inadequate and was reversed, the Payette National Forest developed alternate management strategies to Alternative 7 for bighorn sheep. In this document, the alternatives from the FEIS—1B, 2, 3, 4, 5, 6, and 7—are considered part of the range as are those developed for this process, 7A through 7K. Because the FEIS analysis for bighorn sheep viability was deemed inadequate, the FEIS alternatives and the action alternatives from the DSEIS will be analyzed and the effects to bighorn sheep disclosed in this document.

Alternate management strategies to Alternatives 7 were developed utilizing the issues developed and comments received on the FEIS and comments received on the products of the Supplemental Environmental Impact Statement (SEIS) process. The issues used for this process are found in the FEIS (pages 1-14, 15, 19, 20, and 23) and are as follows:

1) Terrestrial Wildlife Habitat and Species

Issue Statement 1: Forest Plan management strategies may affect habitat terrestrial wildlife species, including species that are listed or proposed for listing under the Endangered Species Act, Region 4 sensitive species, species of special interest, species at risk, and Forest Management Indicator Species.

Issue Statement 2: Forest Plan management strategies may affect disruption, vulnerability, and disease risk to terrestrial wildlife species.

2) Rangeland Resources

Issue Statement: Forest Plan management strategies may affect rangeland resources, including lands considered suitable for livestock grazing and the form of livestock grazing management authorized under permit for the Forest.

3) Tribal Rights and Interests

Issue Statement: Forest Plan management strategies may affect the availability of resources and the use of traditional places important to American Indian rights and interests.

Public scoping and involvement on the FEIS was extensive and spanned over a 7-year period. The risk for disease transmission from domestic sheep to bighorn sheep and the subsequent population declines was identified early on and noted as a concern by the U.S. Fish and Wildlife Service (USFWS). It was assumed for the FEIS that disease transmission can occur. Only one comment was received during the 7-year period questioning that assumption. Tribal consultation, both informal and formal, was also extensive during the Forest Plan (USDA Forest Service 2003) development process.

To begin the SEIS process, the Forest Service completed an analysis on the risk for contact between domestic sheep and bighorn sheep on the Payette National Forest. The *Risk Analysis for Disease Transmission Between Bighorn Sheep and Domestic Sheep on the Payette National Forest* (risk analysis) (USDA Forest Service 2006a) was completed in February 2006 and released for a 96-day comment period. Sixty-two comments were received on the document. In November 2006, the Payette National Forest contracted the setup and facilitation of a science panel composed of veterinary, livestock, and wildlife experts to discuss the risk analysis and the science-based comments received on the risk analysis. The scientists provided the Forest Service with a guiding set of consensus statements that have become known as the "Payette Principles" (USDA Forest Service 2006b). Further science meetings were held in Davis, California; Tucson, Arizona; Salt Lake City, Utah; and Boise, Idaho. The Western Association of Fish and Wildlife Agencies (WAFWA) also convened and discussed the issue.

Comments, concerns, insights, and information gathered from all of the public involvement efforts, science panels, and fish and game meetings were considered for the alternatives for bighorn sheep management. The section below on alternatives will address only developing the alternate bighorn sheep strategies as the remainder of Alternative 7 was left intact.

Chapter 2, *Alternatives Considered*, will follow the format from the FEIS and will only contain the discussion regarding Alternatives 7A through 7K. Discussion about Alternatives 1B through 7 is provided in the FEIS. As with the FEIS, Chapter 2 will include the following:

- Development of the Reasonable Range of Alternatives
- Alternatives Considered but Eliminated from Detailed Study
- Alternatives Considered In Detail

- Comparison of Alternatives
- Preferred Alternative.

Maps of each of the alternatives are also included.

Consistent with 36 CFR §219.20(a), the following pages will supplement the Development of Reasonable Range of Alternatives section, pages 2-1 through 2-131, of Chapter 2 of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

DEVELOPMENT OF REASONABLE RANGE OF ALTERNATIVES

To develop a reasonable range of alternatives for bighorn sheep management, the Payette National Forest utilized all public comments, tribal and regulatory agency consultation, and the Appeal Decisions instructions received on the FEIS and Forest Plan (USDA Forest Service 2003). In addition, the Payette National Forest utilized the following: comments received on the risk analysis (USDA Forest Service 2006a); the Payette Science Panel statements (USDA Forest Service 2006b), which were developed through consensus; the findings from science meetings held in California, Arizona, Utah, and Idaho; the guidelines developed by the WAFWA; and the input and dialogue from the recognized cooperators at the DSEIS Interdisciplinary Team (IDT) meetings.

Typically, reasonable alternatives meet two criteria: 1) they fulfill purpose and need for the proposed action and 2) they address the significant issues. For this DSEIS, Alternative 7 is carried into detailed study although the Appeal Reviewing Officer found it to not be compliant with the NFMA for bighorn sheep management. In this case, it will be used for the purpose of comparison only.

Significant issues utilized for alternative development included the following:

1) Terrestrial Wildlife Habitat and Species

Issue Statement 1: Forest Plan management strategies may affect habitat for terrestrial wildlife species, including species that are listed or proposed for listing under the Endangered Species Act, Region 4 sensitive species, species of special interest, species at risk, and Forest Management Indicator Species.

Issue Statement 2: Forest Plan management strategies may affect disruption, vulnerability, and disease risk to terrestrial wildlife species.

2) Rangeland Resources

Issue Statement: Forest Plan management strategies may affect rangeland resources, including lands considered suitable for livestock grazing and the form of livestock grazing management authorized under permit for the Forest.

3) Tribal Rights and Interests

Issue Statement: Forest Plan management strategies may affect the availability of resources and the use of traditional places important to American Indian rights and interests.

One key assumption carried over from the 2003 FEIS is that disease transmission from domestic sheep to bighorn sheep is a threat to the wild sheep species. The overwhelming majority of published science supports this assumption and transmission from domestic sheep to bighorn sheep has been proven in laboratory settings. Transmission has yet to be disproven in a laboratory setting. Even with the controversy over the issue, scientists from both sides of the issue have agreed that the prudent action is to keep the two sheep species separated.

Risk of Contact Model

Prior to development of the alternatives, the Payette National Forest conducted three critical baseline analyses: 1) a modeled effort to look at where the depressed populations of bighorn sheep have utilized the Payette National Forest and surrounding areas over the last 10 to 25 years (geographic population range [GPR]); 2) a risk for contact between bighorn sheep and permitted domestic sheep on the Payette National Forest (risk analysis [USDA Forest Service 2006a]); and 3) a modeled bighorn sheep source habitat map.

Geographic Population Range

To develop a GPR, the Payette National Forest utilized available telemetry data on bighorn sheep movements to model the utility distributions (probability distributions) of bighorn sheep populations with 50 to 100 percent (in 10 percent increments) fixed kernal estimators, following the methods of Clifford et al. (2007). The objective was to describe the areas that bighorn sheep would be utilizing and/or moving through, known as herd home ranges, based on the actual occurrence data. The herd home range and GPR analysis that we completed in this DSEIS follows the process found in the Clifford et al. (2007) paper. We decided to follow this process because the main issue with bighorn sheep on the Payette is disease transmission, which is what Clifford et al. (2007) paper was designed to analyze. The Clifford et al. (2007) paper designed a process of quantitatively measuring the risk of a disease event with in three populations of California bighorn sheep in the Sierra Nevada range in a management context. This is the only published work that focuses on disease transmission within a management context.

Two GPRs were developed: one for Hells Canyon populations and one for the Salmon River population (Figure W-9a from *Terrestrial Wildlife Habitat and Species*). The term GPR was created by the DSEIS IDT because the home range term is typically used for an individual, not a herd group or larger. A GPR, as defined by this project, is a range in which a group larger than a herd, but smaller than a metapopulation, occupies or has occupied the habitat in the past. It is the Forest Service's closest approximation of occupied habitat at this time. The GPR for the Hells Canyon population was created by merging all of the final herd home range 100 percent volume contours. The Salmon River GPR was developed using a different technique since there is only a 0.06 percent level of telemetry and observation in the Salmon River herds compared to the Hells Canyon herds. Idaho Department of Fish and

Game (IDFG) biologists provided a map showing a GPR based on their best professional judgment and the known data at the time. When the first map was provided, approximately 150 locations existed in the Salmon River area. More telemetry and observational data were collected from the Taylor Ranch study and more field surveys, which provided 310 total points. A new step was added to create a home range analysis with all 310 points. This home range analysis was identical to the Hells Canyon fixed kernel and volume contours from 50 to 100 percent in 10 percent increments. The one modification used was in the band width selection because of the nonherd nature and low density of the points. The band width came from a least squares cross-validation calculation. The two separate products were spatially merged into the final product, which was reviewed by the DSEIS IDT and Cooperators and approved by the Line Officer.

Risk Analysis of Disease Transmission between Domestic Sheep and Bighorn Sheep on the Payette National Forest

The objective of the risk analysis (USDA Forest Service 2006a) was to provide decision makers with information about the likelihood of disease transmission from domestic sheep to bighorn sheep for specific sheep allotments on the Payette National Forest. This analysis was completed in February 2006 and utilized bighorn sheep experts, state fish and game biologists familiar with the landscape and use patterns of the bighorn sheep, and Forest Range Specialists familiar with domestic allotment management on the Payette National Forest to discuss and independently rate each allotment for its risk for contact with bighorn sheep. To develop the risk analysis, an expert panel rated the risk of disease transmission according to the following factors: distance between the sheep allotment[1] and nearest bighorn sheep populations, amount of Geographic Information System (GIS)-modeled bighorn sheep habitat within the sheep allotment and between the allotment and the nearest bighorn sheep herd, expert knowledge of the amount and quality of bighorn sheep habitat, presence of incidental bighorn sightings in or near allotments, expert knowledge about bighorn sheep distributions and movements near the allotments, and characteristics of each sheep allotment.

The risk analysis assigned each allotment to a very high, high, moderate, low, or very low risk rating based on the likelihood of direct contact between bighorn and domestic sheep. For the potential risk of contact model, each rating is treated as varying exponentially from very low to very high as a mathematical relationship that infers the increasing potential rates of contact and subsequent risk for disease transmission between those categories, which is consistent with the assumptions used in applying the risk analysis ratings.

Source Habitat

In 2003, an interagency memorandum of understanding (MOU) was signed to cooperatively implement "The Interior Columbia Basin Strategy" to guide the amendment and revision of forest plans. This MOU stated that "management plans shall address ways to maintain and secure terrestrial habitats that are comparable to those classified by the science findings as

[1] The Surdam On/Off Allotment (158 acres) was not included in the expert panel risk assessment because the risk assessment team leader was not aware of the existence of the allotment at the time of the December 14, 2005, risk analysis.

"source habitats." Therefore, this DSEIS uses source habitat to assess conditions for bighorn sheep. Source habitats are those characteristics of macrovegetation that contribute to positive population growth for a species in a specified area and time (Wisdom et al. 2000). Wisdom et al. (2000) describe source habitats for bighorn sheep in alpine, subalpine, upland shrubland, and upland herbland community groups. Alpine and subalpine community groups are primarily summer range and upland herbland and shrubland are used in both seasons, depending on elevation (Wisdom et al. 2000). Old-forest and stand initiation stage of whitebark pine and stand initiation stage of other forested cover types are other source habitat.

To assess the current source habitat available for bighorn sheep, the existing vegetation layer from the national LANDFIRE layer (The National Map LANDFIRE 2006) was used. This information was utilized since it goes beyond the boundaries of the Payette National Forest and is useful for analyzing wildlife habitat and corridors across landscapes. The vegetative cover types used by the Hells Canyon Restoration Committee (Hells Canyon Bighorn Sheep Restoration Committee 2004) and Wisdom et al. (2000) were crosswalked into the LANDFIRE ecological systems (NatureServe 2004) to identify summer and winter source habitat. Winter source habitat is a subset of summer source habitat in that it encompasses only those areas below 4,500 feet on southerly aspects.

Overall Risk Model

These three components were then "added" to each other to produce a map of the relative risks of contact across the Payette National Forest—the potential for the risk of contact is a function of where bighorn sheep are (the GPR), where they may interact with domestic sheep (the allotments), and where habitat occurs (the presence or absence of source habitat). When these are added together, incremental relative risk ratings can be applied across the Payette National Forest. The components are added to evaluate the influence of all three of them together. Adding is just a simplified way of evaluating the three together; multiplying or some other function would not change the relative risks of each alternative, just the scale at which they are evaluated. Using the relative risk, a risk ratio of the relative risk remaining on the landscape to the amount removed from the landscape was developed. The higher the absolute value of the ratio, the less risk posed by an alternative.

The Payette National Forest developed different options using the above products to result in a range of alternatives that vary in their degree of protection for bighorn sheep. The Payette National Forest also identified areas suitable for domestic sheep grazing based on bighorn sheep lambing areas, known occurrences or current occupancy, travel corridors, and potential barriers to bighorn sheep movement.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Alternative 7A

Alternative 7A was developed by the Payette National Forest after carefully considering the risk analysis (USDA Forest Service 2006a). According to the analysis, a portion of the Smith Mountain Allotment is rated as very high risk and a portion of the Curren Hill Allotment is rated as high risk. The risk analysis rated the following entire allotments as

high risk: French Creek, Bear Pete, and Marshall Mountain (USDA Forest Service 2006a). Alternative 7A designates the very high risk portion of the Smith Mountain Allotment and the high risk portion of the Curren Hill Allotment as unsuitable for domestic sheep grazing.

This alternative utilizes only one component of the Salmon River GPR—a map provided by IDFG biologists showing the GPR based on best professional judgment and the known data at the time. The portions of the following allotments that fall within the IDFG delineation are determined to be unsuitable for domestic sheep grazing: Shorts Bar, Hershey Lava, French Creek, North Fork Lick Creek, Little French Creek, Vance Creek, Marshal Mountain, Bear Pete, Josephine, Victor-Loon, Twenty Mile, Fall/Brush, and Lake Fork.

Trailing routes that fall within the Smith Mountain and Curren Hill allotments and those allotments within the IDFG delineation are determined to be closed to use by domestic sheep.

Alternative 7A was removed from detailed consideration by the DSEIS IDT and Cooperators in lieu of Alternative 7G, which used all components of the Salmon River GPR. The DSEIS IDT and cooperators believed that Alternative 7A did not utilize all available and pertinent data.

Alternative 7B

The risk analysis was also used to develop Alternative 7B, which designates the following areas as unsuitable for domestic sheep grazing: the very high rated portion of the Smith Mountain Allotment and all allotments that were rated as high risk, including Curren Hill, French Creek, Bear Pete, and Marshall Mountain. This alternative also designates some lands outside of the GPRs as unsuitable for domestic sheep grazing. Finally, this alternative removes trailing route use inside of closed areas identified by either allotment closure or GPR closure.

When first developed, the Forest Service believed Alternative 7B accurately reflected current grazing practices on the Payette National Forest for 2007. However, on further examination, the Forest Service learned that Alternative 7B only reflected how the west side of the Payette National Forest was grazed in 2007, not the east side. Therefore, this alternative was removed from detailed consideration by the DSEIS IDT and Cooperators in lieu of Alternative 7K, which more closely though not exactly reflected how the west and east sides of the Payette National Forest were grazed in 2007.

Alternative 7C

The HCNRA Act and the HCNRA Comprehensive Management Plan (CMP) were considered when developing this Alternative. The HCNRA Act states "Where domestic livestock grazing is incompatible with protection, restoration, or maintenance of fish and wildlife or their habitats;…the livestock use shall be modified as necessary to eliminate or avoid the incompatibility. In the event an incompatibility persists after modification or modification is not feasible, the livestock use shall be terminated." Wildlife Standard Wld-S8 in the CMP states "Prevent the spread of diseases from domestic sheep by maintaining separation of the two species. Vacant allotments would not be stocked with domestic sheep unless a vaccine or other technique is found that eliminates the incompatibility." Alternative 7C designates all Payette National Forest lands within the HCNRA as unsuitable

for domestic sheep grazing. Alternative 7C also removes trailing route use within the HCNRA.

Two Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) (bighorn sheep) metapopulations currently exist on the Payette National Forest, one within the Hells Canyon of the Snake River and the other among the Salmon River Mountains (USDA Forest Service 2006a). This alternative was removed from detailed consideration by the DSEIS IDT and Cooperators because it did not address domestic sheep grazing on areas utilized by the Salmon River metapopulation.

Alternative 7D

Alternative 7D considers all lands within the modeled Hells Canyon GPR on the west side of the Payette National Forest unsuitable for domestic sheep grazing. Portions of the following allotments that fall within the Hells Canyon GPR are considered unsuitable: Curren Hill, Smith Mountain, Boulder Creek, and Price Valley.

Similar to Alternative 7A, this alternative utilizes one component of the Salmon River GPR—a map provided by IDFG biologists showing the GPR based on best professional judgment and the known data at the time. Utilizing this component, this alternative designates portions of the following allotments that fall within the IDFG delineation as unsuitable for domestic sheep grazing: Shorts Bar, Hershey Lava, French Creek, North Fork Lick Creek, Little French Creek, Vance Creek, Marshal Mountain, Bear Pete, Josephine, Victor-Loon, Twenty Mile, Fall/Brush, and Lake Fork.

This alternative was removed from consideration by the DSEIS IDT and Cooperators in lieu of Alternative 7G, which removed domestic sheep grazing from both the modeled Hells Canyon GPR and the Salmon River GPR. Alternative 7D does not utilize all available and pertinent data.

Alternative 7F

Current Bureau of Land Management (BLM) guidelines (Desert Bighorn Council Technical Staff 1990) recommend a minimum 8.4-mile wide buffer strip between ranges used by domestic and bighorn sheep. This alternative utilizes those management guidelines for the Hells Canyon metapopulation and designates lands within modeled and mapped ranges of individual rams and within 8.4 miles of known locations on the west side of the Payette National Forest as unsuitable for domestic sheep grazing. For the west side of the Payette National Forest, this alternative designates portions of the following allotments that fall within the bighorn sheep ram home range as unsuitable for domestic sheep grazing: Curren Hill, Smith Mountain, Boulder Creek, and Price Valley. The ram home range was created by merging the home range analysis for all collared rams that came onto the Payette National Forest.

The Forest Service took a slightly different approach for the Salmon River metapopulation when developing this alternative. Instead of using the BLM guideline of 8.4 miles, the Forest Service used the 9-mile buffer recommended by WAFWA. This alternative designates areas within 9 miles of all known bighorn sheep locations identified prior to August 2007 as

unsuitable for domestic sheep grazing, which affects portions of the following allotments: Marshall Mountain, Bear Pete, Brundage, Jug Handle, and Victor-Loon.

In addition, this alternative designates trailing routes that fall within this alternative as closed to domestic sheep use.

The DSEIS IDT and Cooperators removed this alternative from detailed consideration because domestic sheep suitability was determined according to two different standards: a 9-mile buffer within the Salmon River metapopulation and the ram GPR for the Hells Canyon metapopulation. The ram GPR was developed as described above, but included the telemetry points for rams only.

Alternative 7I

This alternative designates lands within all modeled source habitat and all areas within 1 mile of modeled source habitat within the entire Payette National Forest as unsuitable for domestic sheep grazing.

The DSEIS IDT and Cooperators removed this alternative early in the process because experts believed it would be difficult for the wildlife managers to implement and the modeled GPRs already included the suitable source habitat currently known to be used by bighorn sheep.

ALTERNATIVES CONSIDERED IN DETAIL

The Appeal Reviewing Officer instructed the Regional Forester to further analyze and evaluate the viability of bighorn sheep for all the alternatives in the Forest Plan (USDA Forest Service 2003). As such, in addition to analyzing the new alternative, the original alternatives are also reviewed.

Elements Common to All Alternatives

The alternatives considered in detail all pertain exclusively to lands within the Payette National Forest, not to the other Ecogroup Forests or to the surrounding National Forests or BLM lands.

Alternatives 1B, 2, 5, 7

The seven alternatives evaluated in the FEIS could be combined into two categories based on how they affected the risk of contact between domestic and bighorn sheep. The first category contains Alternatives 1B, 2, 5, and 7, which did not designate any acres on the Payette National Forest as unsuitable for grazing by domestic sheep. All trailing routes remained open in these alternatives.

Alternative 7 was chosen as the alternative to be implemented. To meet the appeal requirements related to the potential impacts of disease transmission from domestic sheep on the Forest, modifications to Alternative 7 are analyzed in Chapter 3. Because this alternative was found to not be compliant with the NFMA, it cannot be selected as the final decision.

For Alternative 7, zero acres are identified as unsuitable for domestic sheep grazing and 100 percent of the total relative risk remains on the landscape, with a risk ratio of zero.

Alternatives 3, 4, 6

These alternatives were also proposed in the FEIS and are grouped together as the second category of alternatives that determined suitable rangeland portions of the Smith Mountain Allotment overlapping current bighorn sheep habitat was unsuitable for domestic sheep grazing. MA #1 outside of grazing allotments was also determined to be unsuitable for domestic sheep grazing. No trailing routes are closed.

Issues Used to Develop this Alternative

Terrestrial Wildlife Habitat and Species Issue 2: These alternatives address disease transmission from domestic sheep to bighorn sheep by determining 6,113 acres as unsuitable for domestic sheep grazing.

Rangeland Resources: These alternatives affect rangeland resources by determining 6,113 suitable acres as unsuitable for domestic sheep grazing.

Tribal Rights and Interests: Alternatives 3, 4, and 6 greatly reduce the harvest ability for tribal members.

Alternative 7E

Alternative 7E designates no area within the Payette National Forest as suitable for domestic sheep grazing, and leaves no trailing routes open to use within the entire Payette National Forest. The following allotments are affected by this Alternative: Smith Mountain, Curren Hill, Boulder Creek, Price Valley, Surdam, Shorts Bar, Hershey-Lava, French Creek, Bear Pete, Marshall Mountain, Vance Creek, Little French Creek, Josephine, Victor-Loon, Grassy Mountain, Slab Butte, Cougar Creek, Twenty Mile, Brundage, Bill Hunt, Fall/Brush Creek, North Fork Lick Creek, Lake Fork, and Jughandle.

Issues Used to Develop this Alternative

Terrestrial Wildlife Habitat and Species Issue 2: This alternative addresses disease transmission from domestic sheep to bighorn sheep by determining 2,300,253 acres unsuitable for domestic sheep grazing and closing all trailing routes within the Payette National Forest.

Rangeland Resources: This alternative has the greatest affect on rangeland resources by determining 100,310 suitable acres as unsuitable for domestic sheep grazing.

Tribal Rights and Interests: Because Alternative 7E removes all risk for contact between bighorn and domestic sheep on the Payette National Forest; it may provide the greatest long–term ability to harvest bighorn sheep in all traditional locations influenced by the Payette National Forest.

Alternative 7G (Agency Preferred Alternative)

Alternative 7G utilizes the GPRs as boundaries and designates all land within the Hells Canyon and Salmon River GPRs as unsuitable for domestic sheep grazing. The following allotments are affected by this Alternative: Smith Mountain, Curren Hill, Boulder Creek, Price Valley, Shorts Bar, Hershey-Lava, French Creek, Bear Pete, Marshall Mountain, Vance Creek, Little French Creek, Josephine, Victor-Loon, Twenty Mile, Fall/Brush Creek, North Fork Lick Creek, and Lake Fork. This alternative also closes all trailing routes within the GPRs.

Issues Used to Develop this Alternative

Terrestrial Wildlife Habitat and Species Issue 2: This alternative addresses disease transmission from domestic sheep to bighorn sheep by determining 1,172,564 acres unsuitable for domestic sheep grazing and closing all trailing routes within the GPRs.

Rangeland Resources: This alternative affects rangeland resources by determining 61,842 suitable acres as unsuitable for domestic sheep grazing.

Tribal Rights and Interests: Alternative 7G considers no land within the GPRs as suitable for domestic sheep grazing, thus reducing contact between the two species and potentially providing for greater tribal harvest opportunity.

Alternative 7H

Similar to Alternative 7G, this alternative considers the portions of allotments that exist within the Hells Canyon and Salmon River GPRs as unsuitable for domestic sheep grazing. However, this alternative also designates the area contained within a 9-mile buffer around each GPR as unsuitable. The following allotments are affected by this Alternative: Smith Mountain, Curren Hill, Boulder Creek, Price Valley, Surdam, Shorts Bar, Hershey-Lava, French Creek, Bear Pete, Marshall Mountain, Vance Creek, Little French Creek, Josephine, Victor-Loon, Grassy Mountain, Slab Butte, Cougar Creek, Twenty Mile, Brundage, Bill Hunt, Fall/Brush Creek, North Fork Lick Creek, Lake Fork, and Jughandle.

Issues Used to Develop this Alternative

Terrestrial Wildlife Habitat and Species Issue 2: This alternative addresses disease transmission from domestic sheep to bighorn sheep by determining 2,039,586 acres unsuitable for domestic sheep grazing.

Rangeland Resources: This alternative affects rangeland resources by determining 94,231 suitable acres as unsuitable for domestic sheep grazing.

Tribal Rights and Interests: This alternative greatly increases the potential area for tribal members to hunt in traditional areas since it has only a minimal potential for the risk of contact between bighorn and domestic sheep.

Alternative 7J

This alternative was developed by the Cooperators and presented to the Forest Service during an DSEIS IDT and Cooperators meeting. The intent of this alternative was to locate

landmarks, such as watershed divides, from which to manage separation. The thought was that stray domestic sheep tend to wander downhill when separated from the band. Keeping the permitted sheep from going over a divide may be a way to manage them and avoid "downhill drift" into bighorn sheep herds. Areas considered unsuitable for domestic sheep grazing were altered to adjust for expected animal behavior (downhill movement patterns) and to include a portion of the Little Salmon River 4th hydrologic unit. This alternative determines the following areas to be unsuitable for domestic sheep grazing: the Brownlee 4th field hydrologic unit, the Hells Canyon 4th field hydrologic unit, a portion of the Little Salmon 4th field hydrologic unit, a portion of the Weiser 4th field hydrologic unit, the combination of 4th field west side and 4th and 6th on the east side near Lick Creek, the Lower Salmon 4th field hydrologic unit, the Middle Salmon/Chamberlain 4th field hydrologic unit, the South Fork Salmon 4th field hydrologic unit, the Lower Middle Fork Salmon 4th field hydrologic unit, the Upper Middle Fork Salmon 4th field hydrologic unit, and two 6th field hydrologic units of the North Fork Payette 4th field hydrologic unit around Lick Creek summit. Trailing routes within the hydrologic units listed above and the entire Salmon River driveway were also considered closed to domestic sheep use. The following allotments are affected by this alternative: Smith Mountain, Curren Hill, Boulder Creek, Price Valley, Shorts Bar, Hershey-Lava, French Creek, Bear Pete, Marshall Mountain, Little French Creek, Josephine, Victor-Loon, North Fork Lick Creek, Lake Fork, and Jughandle.

Issues Used to Develop this Alternative

Terrestrial Wildlife Habitat and Species Issue 2: This alternative addresses disease transmission from domestic sheep to bighorn sheep by determining 1,837,441 acres unsuitable for domestic sheep grazing and by closing trailing routes within the area considered unsuitable for domestic sheep use and the entire Salmon River driveway.

Rangeland Resources: This alternative affects rangeland resources by determining 58,785 suitable acres as unsuitable for domestic sheep grazing.

Tribal Rights and Interests: While this alternative provides for greater opportunity for tribal harvest, it does still retain some risk.

Alternative 7K

Alternative 7K implements recent court settlements to determine the areas that are unsuitable for domestic sheep grazing and represents similar use patterns as approved for the 2007 and 2008 grazing seasons. In this alternative, the following areas are considered unsuitable for domestic sheep grazing: all of the Curren Hill Allotment; the Smith Mountain Allotment in the 6th field hydrologic units rated as very high in the risk analysis (USDA Forest Service 2006a); the Shorts Bar Allotment, the northern portion of the Hershey Lava Allotment; and the entire French Creek Allotment. In addition to trailing routes within the areas noted above, this alternative designates the Salmon River Driveway south of the intersection with the Hornet Creek Road and Marshal Mountain as closed to domestic sheep use.

Issues Used to Develop this Alternative

Terrestrial Wildlife Habitat and Species Issue 2: This alternative addresses disease transmission from domestic sheep to bighorn sheep by determining 122,231 acres unsuitable for domestic sheep grazing and by closing the trailing routes within the areas considered unsuitable for domestic sheep use and the Salmon River Driveway south of the intersection with the Hornet Creek Road and Marshall Mountain.

Rangeland Resources: This alternative affects rangeland resources by determining 24,981 suitable acres as unsuitable for domestic sheep grazing.

Tribal Rights and Interests: Alternative 7K greatly reduces the harvest ability for tribal members since this alternative continues to have a high risk for the potential risk of contact between domestic and bighorn sheep.

COMPARISON OF ALTERNATIVES

Comparison of Alternative Effects on Resource Issue and Indicators

Terrestrial Wildlife Habitat and Species

Issue Statement 2: Forest Plan alternatives and direction may affect disruption, vulnerability, and disease risk to terrestrial wildlife species.

Indicator 3 for Issue 2: Acres of suitable domestic sheep range within bighorn sheep habitat.

Effects on Bighorn Sheep: To meet appeal requirements related to the potential impacts of disease transmission from domestic sheep on the Payette National Forest, modifications were made to Alternative 7 (the implemented alternative), which affected the amount of suitable domestic sheep range within bighorn sheep habitat (Table 2-19a).

Alternatives 3, 4, and 6 designate 82,003 acres as unsuitable for domestic sheep grazing, all from within the Hells Canyon GPR. This alternative designates 8 percent of summer source habitat (231,410 fewer acres than Alternative 7G) and 13 percent of winter source habitat (113,359 fewer acres than Alternative 7G) as unsuitable for domestic sheep grazing. Finally, no trailing routes were considered closed to domestic sheep. The risk model indicates that 89 percent of the total relative risk remains on the landscape for these alternatives, and these alternatives have a risk ratio of 0.12.

Compared to Alternative 7G, Alternative 7E designates no area within the Payette National Forest as suitable for domestic sheep grazing, thus reducing the risk of contact to the maximum extent possible as shown by the relative risk rating that approaches infinity. Alternative 7E designates 2,300,253 acres (100 percent of the Payette National Forest) as unsuitable for domestic sheep grazing, and similar to Alternative 7G, this alternative designates all land (1,172,564 acres) within both GPRs as unsuitable for domestic sheep grazing. This alternative designates 100 percent of summer source habitat (119,178 more acres than Alternative 7G) and 100 percent of winter source habitat (56,989 more acres than Alternative 7G) as unsuitable for domestic sheep grazing. Finally, all trailing routes are

considered closed to domestic sheep use. The risk model indicates that zero percent of the total relative risk remains on the landscape for this alternative.

Alternative 7G designates 100 percent of both the Hells Canyon and the Salmon River GPRs, or 1,172,564 acres, as unsuitable for domestic sheep grazing. As such, 69 percent (260,431 acres) of summer source habitat and 71 percent (139,183 acres) of winter source habitat are considered unsuitable for domestic sheep grazing. Finally, trailing routes within the GPRs are not considered open to domestic sheep use. The risk model indicates that 20 percent of the total relative risk remains on the landscape for this alternative, and the alternative has a risk ratio of 3.92.

Similar to Alternative 7G, Alternative 7H considers 100 percent of both the Hells Canyon and the Salmon River GPRs (1,172,564 acres) as unsuitable for domestic sheep grazing; however, this alternative also designates the area within a 9-mile buffer surrounding both GPRs as unsuitable. Alternative 7H designates 2,039,586 acres as unsuitable for domestic sheep grazing. Finally, this alternative designates 92 percent of summer source habitat (87,132 more acres than Alternative 7G) and 93 percent of winter source habitat (42,485 more acres than Alternative 7G) as unsuitable for domestic sheep grazing. Trailing routes that fall within the GPRs or the 9-mile buffer are closed to domestic sheep use. The risk model indicates that 4 percent of the total relative risk remains on the landscape for this alternative, and this alternative has a risk ratio of 25.63.

Alternative 7J utilizes watershed boundaries to determine areas unsuitable for domestic sheep grazing compared to Alternative 7G. Alternative 7J determines 1,837,441 acres as unsuitable for domestic sheep grazing. Unlike Alternative 7G, Alternative 7J determines only 93 percent (1,087,933 acres) of both GPRs unsuitable for domestic sheep grazing—84,631fewer acres than Alternative 7G. Thus, 15 percent of the Hells Canyon GPR and 5 percent of the Salmon River GPR remain suitable for domestic sheep grazing. This alternative designates 87 percent of summer source habitat (70,079 more acres than Alternative 7G) and 90 percent of winter source habitat (37,832 more acres than Alternative 7G) as unsuitable for domestic sheep grazing. Finally, trailing routes within the areas determined unsuitable for domestic sheep grazing and the Salmon River Driveway are closed. The risk model indicates that 17 percent of the total relative risk remains on the landscape for this alternative, and this alternative has a risk ration of 4.92.

Compared to the Alternative 7G, Alternative 7K designates 122,231 acres as unsuitable for domestic sheep grazing. All but 33 acres considered unsuitable by this alternative are within current domestic sheep allotments. Alternative 7K designates 10 percent (122,231 acres) within both GPRs as unsuitable for domestic sheep grazing: 27 percent within the Hells Canyon GPR and 6 percent within the Salmon River GPR. Finally, this alternative considers 7 percent of summer source habitat (235,086 fewer acres than Alternative 7G) and 8 percent of winter source habitat (123,977 fewer acres than Alternative 7G) as unsuitable for domestic sheep grazing. All trailing routes that intersect with the unsuitable areas are closed to domestic sheep use, except for the Salmon River Driveway, which remains open to the junction with Hornet Creek Road. The risk model indicates that 72 percent of the total relative risk remains on the landscape for this alternative, and this alternative has a risk ratio of 0.39.

Table 2-19a. Percentage of Bighorn Sheep Habitat Remaining Outside of Each Alternative

Alternative	Hells Canyon GPR (%)	Salmon River GPR (%)	Summer Source Habitat (%)	Winter Source Habitat (%)
1B, 2, 5, and 7	100	100	100	100
3, 4, and 6	68	100	92	87
7E	0	0	0	0
7G	0	0	31	29
7H	0	0	8	7
7J	15	5	13	10
7K	73	94	93	92

Rangeland Resources

Issue Statement: Forest Plan management strategies may affect rangeland resources, including lands considered suitable for livestock grazing and the level of livestock grazing authorized under permit for the Forests.

Indicator 1: Estimated suitable rangeland acres by Forest.

The Alternatives vary by suitable rangeland acres (Table 2-44a).

Alternative 7 considers all areas as suitable for domestic sheep grazing. Alternative 7E considers no areas and no trailing routes within the boundaries of the Payette National Forest as open to domestic sheep; thus, 100,310 suitable acres—38,468 more than Alternative 7G—are removed from suitability under this alternative. The alternative that removes the second largest area of suitable acres from suitability is Alternative 7H. Alternative 7H considers 94,231 suitable acres—32,389 more than Alternative 7G—to be unsuitable for domestic sheep grazing. Alternatives 7G and 7J consider intermediate amounts of suitable acres as unsuitable. Alternative 7G designates 61,842 suitable acres as unsuitable for domestic sheep grazing. Alternative 7J considers 58,785 suitable acres—3,057 fewer acres than Alternative 7G—as unsuitable for domestic sheep grazing. The alternatives that remove the fewest suitable acres from suitability are Alternative 7K (24,981 acres—36,861 fewer acres than Alternative 7G) and Alternatives 3, 4, and 6 (6,113 acres—1,090,561 fewer acres than Alternative 7G).

Table 2-44a. Suitable Acres Determined Unsuitable by Alternative

Criteria	Alt. 7	Alt. 7E	Alt. 7G	Alt. 7H	Alt. 7J	Alt. 7K	Alts. 3, 4, 6
Capable Acres [1]	233,672	233,672	233,672	233,672	233,672	233,672	233,672
Bighorn Habitat Acres Deducted	0	100,310	61,842	94,231	58,785	24,981	6,113
Total Suitable Acres	**233,672**	**133,362**	**171,830**	**139,441**	**174,887**	**208,691**	**227,559**

[1] Includes all suitable rangeland, both for cattle and domestic sheep.

Tribal Rights and Interests

Issue Statement: Forest Plan management strategies may affect the availability of resources and the use of traditional places important to American Indian rights and interests.

Indicators: The indicators used to describe effects on the issue are: (2) the relationship of species viability to tribal harvest ability.

Effects to Harvest Ability: The risk of disease transmission is a concern that may affect harvest ability. Alternatives 3, 4, and 6 greatly reduce the harvest ability for tribal members since these alternatives continue to have a high risk for the potential risk of contact between bighorn and domestic sheep. Because Alternative 7E removes all risk for contact between bighorn and domestic sheep on the Payette National Forest, it may provide the greatest long-term ability to harvest bighorn sheep in all traditional locations influenced by the Payette National Forest. Alternative 7G considers no land within the GPRs as suitable for domestic sheep grazing, thus reducing contact between the two species and potentially providing for greater tribal harvest opportunity. However, this alternative still retains some risk. Alternative 7H greatly increases the potential area for tribal members to hunt in traditional areas since it has only a minimal potential for the risk of contact between bighorn and domestic sheep. Although Alternative 7J does consider all currently known occupied bighorn sheep habitat as unsuitable for domestic sheep habitat, the potential grazing of domestic sheep within the GPRs provides a greater risk of contact. Therefore, while this alternative provides for greater opportunity for tribal harvest, it does still retain some risk. Alternative 7K greatly reduces the harvest ability for tribal members since this alternative continues to have a high risk for the potential risk of contact between domestic and bighorn sheep.

Compliance with the Hells Canyon National Recreation Area Act (P.L. 94-199)

The HCNRA Act was signed into law on December 31, 1975. The following sections of the Act are applicable when considering whether or not to graze domestic livestock in the HCNRA:

Section 7. (3) Preservation, especially in the area generally known as Hells Canyon, of all features and peculiarities believed to be biologically unique including, but not limited to, rare and endemic plant species, rare combinations of aquatic, terrestrial, and atmospheric habitats, and the rare combinations of outstanding and diverse ecosystems and parts of ecosystems associated therewith;

(4) Protection and maintenance of fish and wildlife habitat;

(7) Such management, utilization, and disposal of natural resources on federally owned lands, including, but not limited to, timber harvesting by selective cutting, mining and grazing and the continuation of such existing uses and developments as are compatible with the provisions of this Act.

Section 13. Ranching, grazing, farming, timber harvesting, and the occupation of homes and lands associated therewith, as they exist on the date of enactment of this Act, are recognized as traditional and valid uses of the recreation area.

Further, regulations governing the use of public lands in the HCNRA were promulgated on July 19, 1994. HCNRA Public Lands Use Regulations at 36 CFR §292.48:

"The following standards and guidelines apply only to domestic livestock grazing activities on Other Lands, Wild and Scenic Rivers, and Wilderness Lands in the HCNRA:

(b) Where domestic livestock grazing is incompatible with the protection, restoration, or maintenance of fish and wildlife or their habitats; public outdoor recreation; conservation of scenic, wilderness, and scientific values; rare combinations of outstanding ecosystems, or the protection and enhancement of the values for which a wild and scenic river was designated, the livestock use shall be modified as necessary to eliminate or avoid the incompatibility. In the event in incompatibility persists after modification or modification is not feasible, livestock use shall be terminated."

HCNRA Comprehensive Management Plan

In addition to the above sections of the Act, the HCNRA is managed under the guiding direction of the HCNRA CMP. The Revised CMP was completed and signed in July 2003. It includes the following standard:

"Wld-S8: Prevent the spread of diseases from domestic sheep to wild sheep by maintaining separation of the two species. Vacant allotments will not be stocked with domestic sheep unless a vaccine or other technique is found that eliminates the incompatibility."

Compatibility with the Hells Canyon National Recreation Area Act

In consideration of the above information, the following determinations have been made regarding compatibility with the HCNRA Act and the HCNRA CMP for the action alternatives analyzed for the DSEIS.

Alternatives 7G, 7E, and 7H

All three of these alternatives eliminate domestic sheep grazing from the Payette National Forest system lands within the boundary of the HCNRA. They also eliminate domestic sheep grazing at least 6 air miles from the boundary of the HCNRA.

Elimination of domestic sheep grazing in HCNRA and surrounding area is compatible with the HCNRA Act and its implementing regulations by providing for the protection, restoration, and maintenance of bighorn sheep and their habitat. All three alternatives are in compliance with the HCNRA CMP by maintaining a separation between bighorn and

domestic sheep that is likely to keep the two species apart at the current population levels (Table 2-84).

Alternatives 7J and 7K

These alternatives eliminate domestic sheep grazing from the Payette National Forest system lands within the boundary of the HCNRA. However, both alternatives allow grazing within 3 air miles of the boundary of the HCNRA in the Lick Creek Lookout area. Mixing of the two species in this area is likely over a 5 year period, if bighorn sheep occupy habitats they have in the recent past. This represents at least a moderate risk to bighorn sheep. Consequently, alternative 7J and 7K are not in compliance with the compatibility requirements of the HCNRA Act beyond the immediate future (Table 2-84).

Alternatives 1B, 2, 3, 4, 5, 6, and 7

All of these alternatives allow domestic sheep grazing in the Payette National Forest system lands within the boundary of the HCNRA. Mixing of the two species in this area is very likely over a 5 year period. This represents at least a high risk to bighorn sheep, if bighorn sheep occupy habitats they have in the recent past. All of these alternatives are not in compliance with the compatibility requirements of the HCNRA Act (Table 2-84).

Table 2-84. Compatibility with the Hells Canyon National Recreation Area Act for each Alternative

Alternative	Compatible	Compatible Only in Immediate Future	Not Compatible
7G, 7E,7H	No grazing in HCNRA, or within 6 air miles of HCNRA		
7J, 7K		No grazing in HCNRA, or within 3 air miles of HCNRA, contact likely within 5 years	
1B, 2, 3, 4, 5, 6,7			Grazing in and adjacent to HCNRA, contact very likely within 5 years

Chapter 3
Affected Environment and Environmental Consequences

Terrestrial Wildlife Habitat and Species

Consistent with 36 CFR §219.20(a), the following pages will supplement the Species of Special Interest section, pages 3-286 through 3-287, of the Chapter 3 Terrestrial Wildlife Habitat and Species section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

CURRENT CONDITIONS

Species of Special Interest

Bighorn Sheep

History

Prior to the mid-1800s, bighorn sheep (*Ovis canadensis*) were abundant and widely distributed throughout the western United States. Numbers of bighorn sheep in North America were estimated to be about 1.5 to 2 million sheep (Buechner 1960; Queen et al. 1994). Large declines in both abundance and distribution of bighorn sheep occurred during the late 1800s and early 1900s as a result of overharvest, habitat loss, and competition for forage with and disease transmission from domestic livestock (Goodson 1982, Valdez and Krausman 1999). Although some estimate numbers are even lower—1 percent of what they were before human settlement (Martin et al. 1996)—most believe that in the United States, bighorn sheep occur at less than 10 percent of historic numbers. Current distribution is estimated at less than 33 percent of historic distribution, with most existing within relatively small and isolated populations, despite recurring efforts at recovery (Berger 1990, Singer et al. 2000b).

Prior to the 1850s, bighorn sheep were abundant in Idaho (Smith 1954, Toweill and Geist 1999). Abundant species included both California (*O. c. californiana*) and Rocky Mountain bighorn sheep (bighorn sheep) (*O. c. canadensis*). Bighorn sheep were abundant throughout the mountainous areas of central Idaho. Human settlement of Idaho in the mid-1800s increased harvest of bighorn sheep and introduced domestic sheep. Historic accounts of major die-offs of bighorn sheep in the Salmon River Mountains began in approximately 1870 (Smith 1954). In 1969, Idaho began reintroducing Rocky Mountain bighorn sheep, and increased their numbers to nearly 4,000 sheep by 1989. By 1998, that number had again decreased to 1,710, with population declines attributed to disease outbreaks (Toweill and Geist 1999).

Payette National Forest

Two Rocky Mountain bighorn sheep metapopulations currently occur on the Payette National Forest, one within the Hells Canyon of the Snake River and the other among the Salmon River Mountains (USDA Forest Service 2006a). More than 10,000 bighorn sheep may have once lived in the Hells Canyon and surrounding mountains, but they were

extirpated by the mid-1940s by competition for forage with domestic livestock, diseases, and unregulated hunting (Hells Canyon Bighorn Sheep Restoration Committee 2005). A reintroduction effort began in 1971 by transplanting 474 bighorn sheep into Hells Canyon between 1971 and 2004 (USDA Forest Service 2006a). In 2005, the Hells Canyon Bighorn Sheep Restoration Committee estimated 875 bighorn sheep were present within Hells Canyon (Hells Canyon Bighorn Sheep Restoration Committee 2005). This number represents a positive population growth since 1971, although seven bighorn sheep die-offs have been reported since 1971 (Hells Canyon Bighorn Sheep Restoration Committee 1997).

The Salmon River Mountains metapopulation was never extirpated (USDA Forest Service 2006a). Winter population surveys have detected 508 bighorn sheep spread amongst the various drainages of the Salmon River; in 2001 and 2003, an additional 137 bighorn sheep were surveyed in the South Fork Salmon River and main Salmon River (IDFG 2004, USDA Forest Service 2006a).

Habitat

Bighorn sheep occupy rugged canyons, foothills, and mountainous terrain at elevations ranging from 1,450 to 10,500 feet. Key habitat features include steep, rugged "escape" terrain, grasses and forbs for forage, and a limited amount of tall vegetation. Native bunchgrasses and forbs are important components of forage (IDFG 2005).

Source Habitats

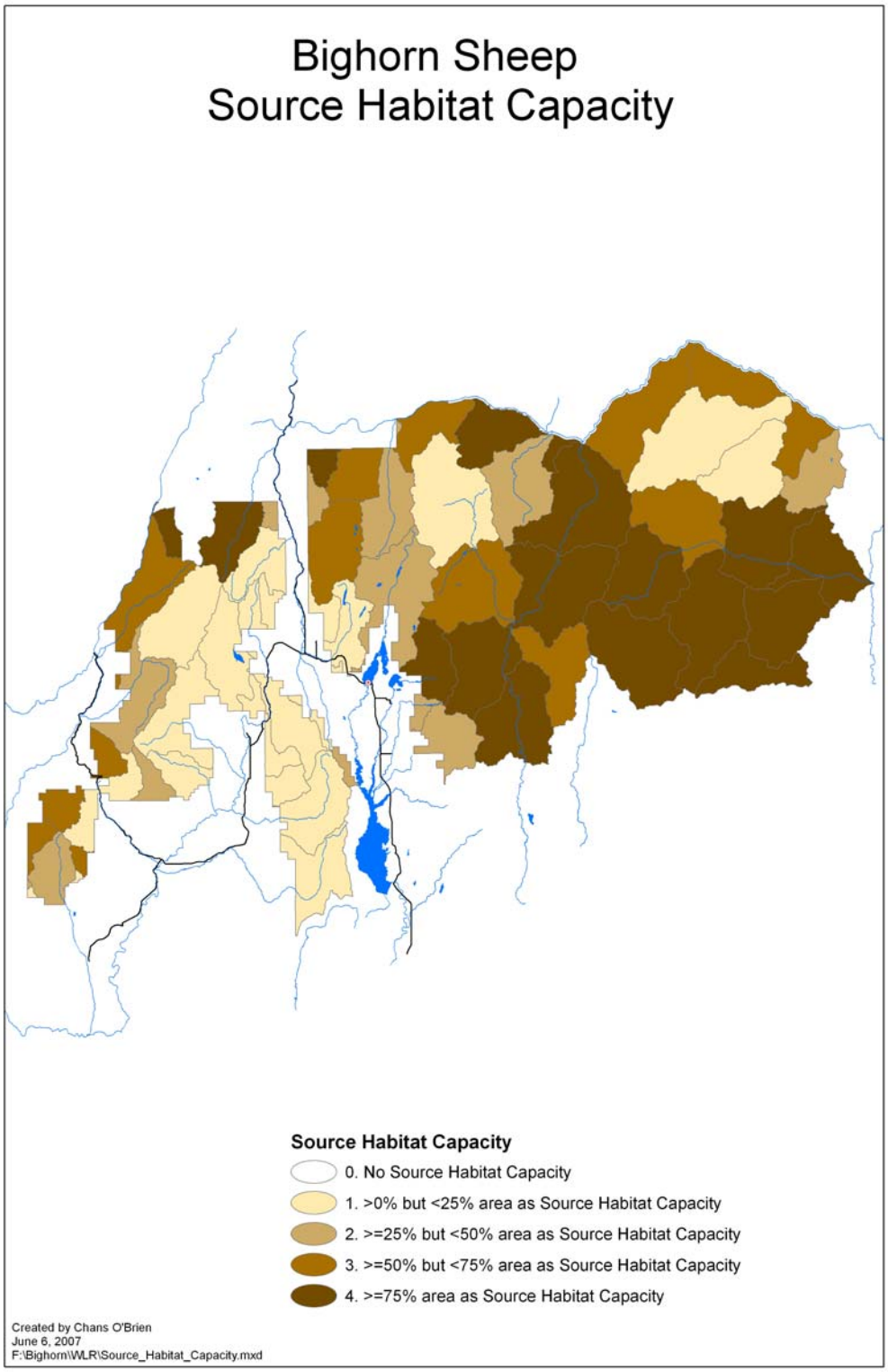
In 2003, an interagency memorandum of understanding (MOU) was signed to cooperatively implement "The Interior Columbia Basin Strategy" to guide the amendment and revision of forest plans. This MOU stated that "management plans shall address ways to maintain and secure terrestrial habitats that are comparable to those classified by the science findings as "source habitats." Therefore, this Draft Supplemental Environmental Impact Statement (DSEIS) uses source habitat to assess conditions for bighorn sheep. Source habitats are those characteristics of macrovegetation that contribute to positive population growth for a species in a specified area and time (Wisdom et al. 2000). Wisdom et al. (2000) describe source habitats for bighorn sheep in alpine, subalpine, upland shrubland, and upland herbland community groups. Alpine and subalpine community groups are primarily summer range and upland herbland and shrubland are used in both seasons, depending on elevation (Wisdom et al. 2000). Old-forest and stand initiation stage of whitebark pine and stand initiation stage of other forested cover types are other source habitat.

Visibility is an important habitat variable for bighorn sheep: vegetation height and structure are probably more important than plant species composition for predator detection (Risenhoover and Bailey 1985, Wakelyn 1987), and a negative correlation between forest cover and bighorn sheep occurrence has been observed (Bentz and Woodard 1988). Open habitat provides good visibility for detecting predators and communicating to other herd members (Risenhoover et al. 1988). Post-fire habitats can benefit bighorn sheep by improving forage quality (McWhirter et al. 1992) and increasing visibility (Bentz and Woodard 1988). Seasonal use of different slopes and aspects results in the use of a mosaic of plant communities and phenological patterns, which provides foraging and security opportunities for bighorn sheep (Valdez and Krausman 1999).

Source habitat capacity is defined as all acres with the potential to provide habitat for bighorn sheep, based only on their requirement for escape terrain. Escape terrain is so critical for ewes during lambing (Blood 1961, Kornet 1978, Hall 1981) that they will sacrifice access to high-quality forage for security (Festa-Bianchet 1989, Cook 1990, Bleich et al. 1997). Escape terrain habitat components consist of slopes between 31 degrees and 85 degrees, a buffer of 300 meters or land areas less than or equal to 1,000 meters wide bounded on two or more sides by escape terrain (500 meters), and a minimum area of 1.6 hectares (Hells Canyon Bighorn Sheep Restoration Committee 2004). The vegetation is not considered a component of source habitat capacity since vegetation will vary by successional and disturbance processes, but escape terrain remains constant. Therefore, while source habitat capacity is constant, source habitat will vary spatially and temporally across the landscape. Source habitat capacity by watersheds is displayed in Figure W-1a.

Source habitat capacity for bighorn sheep falls within suitable rangeland on the Payette National Forest. Suitable rangelands include lands suitable for grazing both cattle and sheep. Although impacts to habitat from historic livestock grazing have been substantially reduced under current practices, livestock grazing can still cause localized areas of damage, including changes in understory vegetation from livestock foraging, trampling of reproducing tree seedlings, soil erosion, and other habitat degradation. Damage can result in the subsequent introduction and spread of invasive weeds and other non-natives, disruption of ecological and physical processes, and changes in historic fire regimes. Bighorn sheep have been found to actively avoid habitats occupied by cattle (Wilson 1968, McQuivey 1978, Jones 1980, Dodd and Brady 1986, Steinkamp 1990). Overgrazing by domestic livestock reduces the overall carrying capacity of bighorn sheep range and may lead to more predation by increasing cover for predators. Succession of grassland to shrub communities may also increase competition with deer and increase cougar populations, the major predator of bighorn sheep (Beecham et al. 2007). Competition with domestic sheep and goats is considered even more serious than with cattle because of their similar preferences in forage and topography, and the higher potential for disease transmission between the species (Beecham et al. 2007).

Figure W-1a. Percentage of Area by Watersheds Identified as Bighorn Sheep Source Habitat Capacity on the Payette National Forest



Current Source Habitat

To assess the current source habitat available for bighorn sheep, the existing vegetation layer from the national LANDFIRE layer (The National Map LANDFIRE 2006) was used. This information was utilized since it goes beyond the boundaries of the Payette National Forest, and it is useful for analyzing wildlife habitat and corridors across landscapes. The vegetative cover types used by the Hells Canyon Restoration Committee (Hells Canyon Bighorn Sheep Restoration Committee 2004) and Wisdom et al. (2000) were crosswalked into the LANDFIRE ecological systems (NatureServe 2004) to identify summer and winter source habitat. Winter source habitat is a subset of summer source habitat in that it encompasses only those areas below 4,500 feet on southerly aspects.

Across the Payette National Forest, 379,609 acres of summer source habitat and 196,172 acres of winter source habitat exist, representing 16.5 percent and 8.5 percent, respectively of the Payette National Forest. Outside of wilderness areas, the percentages are 25 percent and 13 percent, respectively. Source habitat for bighorn sheep is spread across the Payette National Forest, and bighorn sheep habitat is considered contiguous throughout the Payette National Forest, although not all of it is currently known to be occupied.

This mid-scale habitat modeling may not represent smaller-scale conditions. For example, not all special habitat features may be delineated and invasions by exotic plants, forage quality, and human disturbance factors may not be detectible. Changes in the patch and pattern of range mosaics have changed since historical times as fire suppression has resulted in an increased density of trees in formerly open stands, with a resultant loss of foraging quantity, quality, and open habitat (Wisdom et al. 2000). Fire-suppressed stands have created barriers between historical winter and summer range, preventing occupancy of the total range, although each isolated range may be suitable (Wakelyn 1987). In other cases, fires have opened up forested areas and increased habitat. Mixed-lethal fire regimes may have followed historical patch and pattern, but the same may not be true for non-lethal fire regimes. Disruption of hydrological regimes from a variety of sources has also resulted in the loss of riparian vegetation in many foraging areas (Wisdom et al. 2000).

Table W-7a displays the numbers of watersheds that currently include summer and winter range source habitat for bighorn sheep. Figure W-1b displays the spatial extent of current summer source habitat and the percentages of area found in watersheds. Figure W-1c displays the spatial extent of current winter source habitat and the percentages of area by watershed with winter source habitat. This information has not been updated for the 2008 fire season, as classified imagery is not yet available.

Table W-7a. Percentage of Watersheds that Include Bighorn Sheep Source Habitat (Summer and Winter) for the Payette National Forest

		Percent of the Watershed Currently Classified as Source Habitat					
		0	>0–<25% Area	≥25-<50% Area	≥50-<75% Area	≥75-<100% Area	Total
Number of watersheds classified as bighorn sheep source habitat under current conditions	Summer	0	49	9	0	0	58
	Winter	0	56	2	0	0	58

Figure W-1b. Percentage of Bighorn Sheep Summer Source Habitat within each Watershed on the Payette National Forest

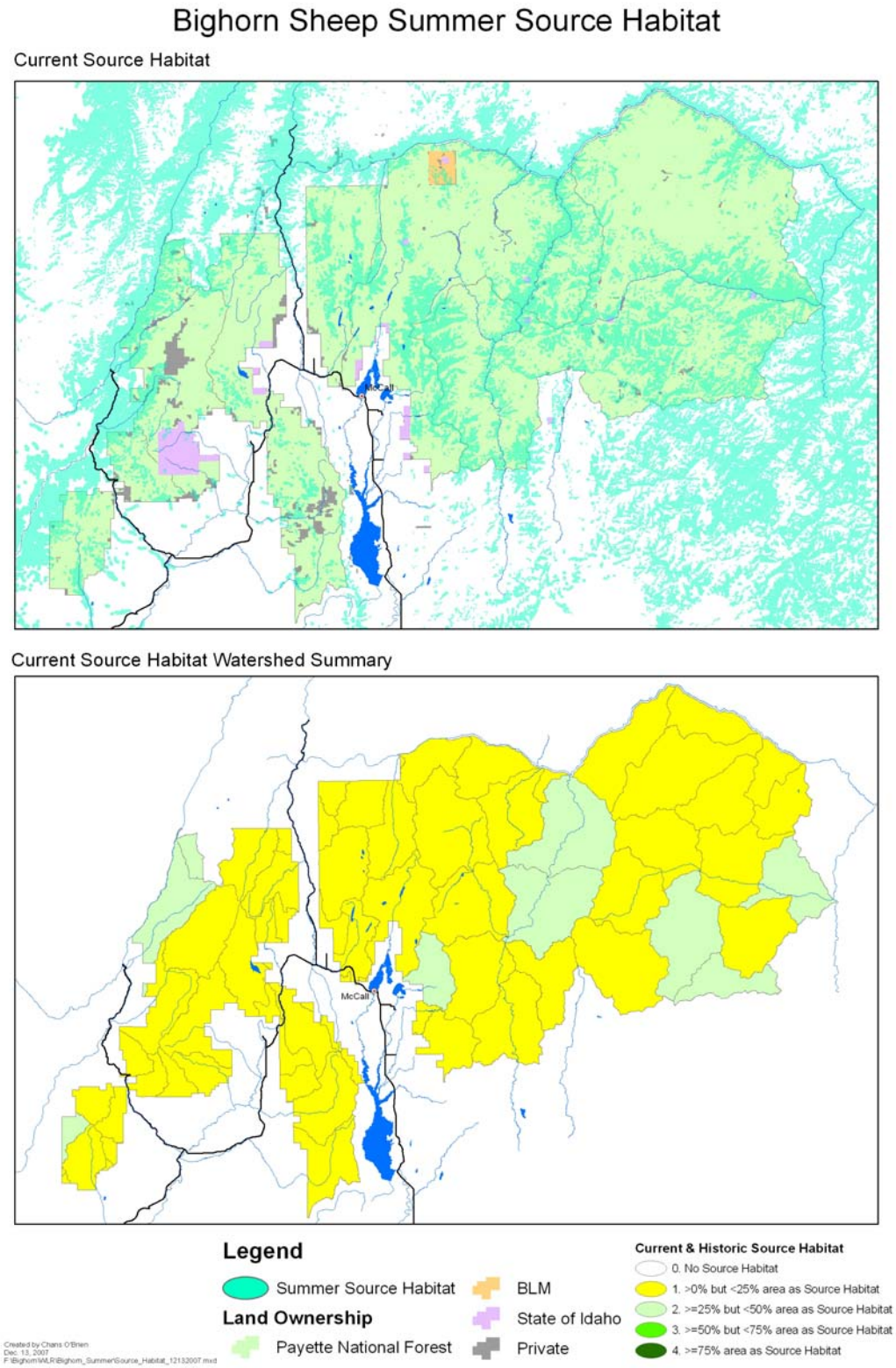
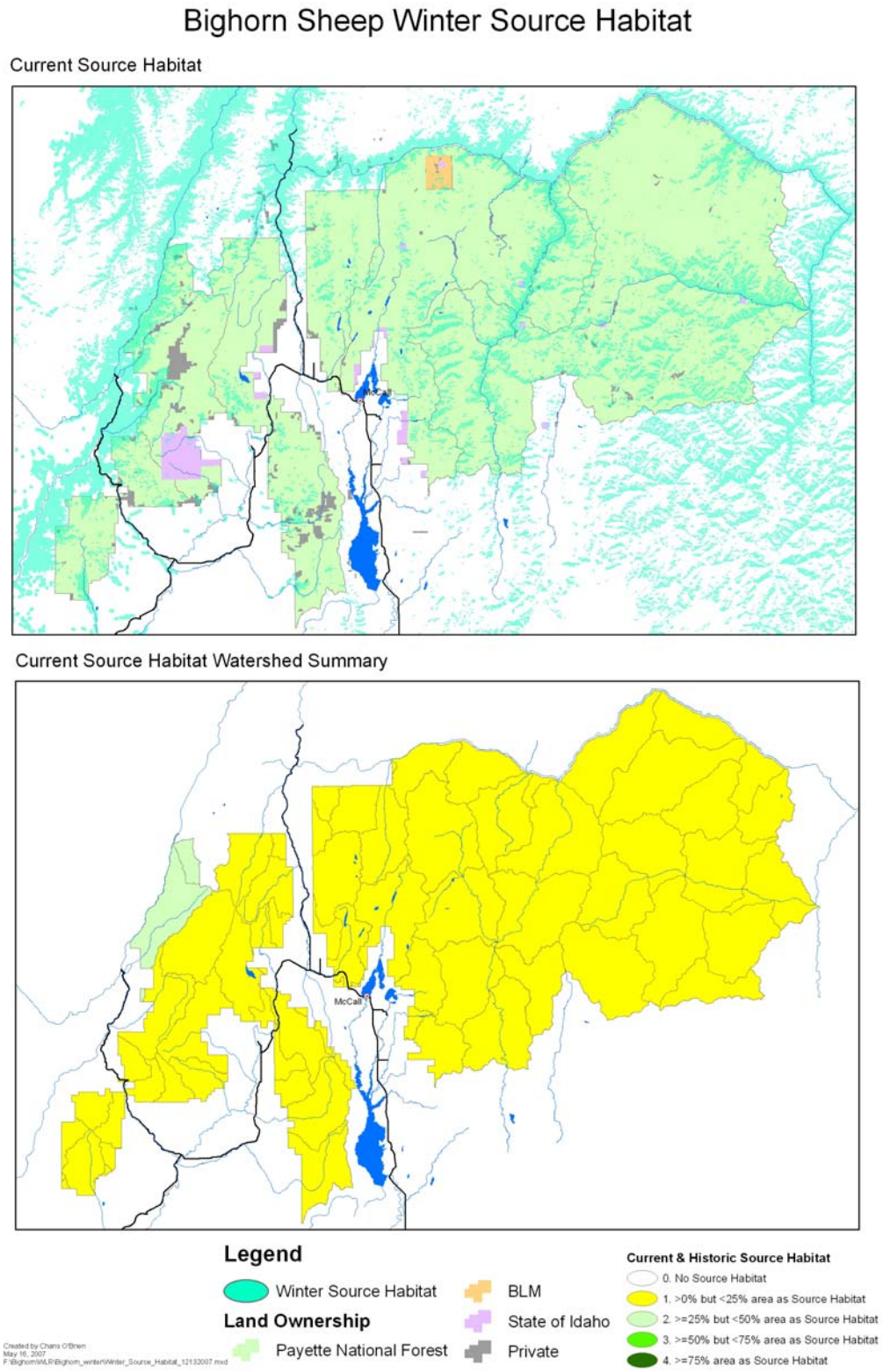


Figure W-1c. Percentage of Bighorn Sheep Winter Source Habitat within each Watershed on the Payette National Forest



Bighorn Sheep Habitat Use and Movement

Bighorn sheep are typically structured in metapopulations: each metapopulation is composed of discrete local populations that interact with each other as a result of limited movement between the local populations (Bleich et al. 1996, Singer et al. 2000a). The fragmented nature of sheep habitat and the relatively small size of most bighorn herds suggest that bighorns evolved with a metapopulation structure where small populations would not persist without movement and reproduction among herds (Gilpin and Hanski 1989, Berger 1990, Bleich et al. 1990). The term "population" is used loosely here, as a large amount of "mixing" can occur between bighorn sheep populations, and at the same time, coexist with other populations that are somewhat isolated or better defined as a subpopulation. For the purpose of this document, the term population will be used, recognizing that populations are not always clearly delineated with metapopulations of bighorn sheep.

Sheep with geographically separate winter ranges have been observed sharing summer ranges (Akenson and Akenson 1992). These interactions can have positive effects, such as population augmentation, colonization, and enhancement of genetic diversity; however, negative effects, such as disease transmission, can also occur. Bighorn sheep ewes can travel as far as 24.8 miles from winter ranges to lambing areas. On Bureau of Land Management (BLM) lands in Idaho, bighorn sheep were documented to have traveled up to nearly 50 miles, through towns and across major rivers (Coggins 2002). Telemetry data has shown that desert bighorn sheep regularly cross the broad valleys that separate the majority of desert mountain ranges (Ough and deVos 1984, Schwartz et al. 1986, Jaeger 1994). These complex spatial and temporal range use patterns occur among populations of sheep, with resulting effects on forage and vulnerability to disease and parasite transmission (Akenson and Akenson 1992). Bighorn sheep populations in both the Hells Canyon and Salmon River Mountains metapopulations generally move between lower-elevation winter ranges in the canyon bottoms to upper-elevation summer ranges, although considerable variation can exist among herds and individuals (USDA Forest Service 2006a). The presence of dispersal corridors between suitable patches of habitat, and the ability for sheep to move between patches, influences their ability to disperse into suitable, but unoccupied habitats (Noss 1987, Simberloff and Cox 1987, Hudson 1991, Douglas and Leslie 1999).

Hells Canyon Metapopulation

The Hells Canyon metapopulation contains 16 populations. The Hells Canyon bighorn sheep restoration project covers 5,617,062 acres in the Snake River drainage in Washington, Oregon, and Idaho (Hells Canyon Bighorn Sheep Restoration Committee 2005, USDA Forest Service 2006a). Bighorn sheep populations located closest to the Payette National Forest are the McGraw, Sheep Mountain, and Upper Hells Canyon (both Idaho and Oregon) populations (USDA Forest Service 2006a). When the Hells Canyon bighorn sheep restoration project was established, it was believed that sheep would not cross from the Oregon side of Hells Canyon to the Idaho side; however, that has not been the case and bighorn sheep have been observed swimming across the reservoir and walking on Brownlee Dam (USDA Forest Service 2006a). Winter range is limited at the higher elevations of the Wallowa and Seven Devils mountains but is extensive within the Snake River portion of the project area (Hells Canyon Bighorn Sheep Restoration Committee 1997). Extent of habitat does not appear to currently limit the number of bighorn

sheep since they do not occupy much of the suitable habitat; however, habitat quality such as forage species composition and nutritional value may affect herd size, productivity, and distribution (Hells Canyon Bighorn Sheep Restoration Committee 1997).

Salmon River Metapopulation

Bighorn sheep were never extirpated from the Salmon River Mountains, making them important native genetic stock. The Salmon River metapopulation has several populations distributed along the South Fork of the Salmon River, main Salmon River Canyon, and Middle Fork of the Salmon River. Of these populations, the only ones known within the boundaries of the Payette National Forest occur in the South Fork Salmon River drainage and the Big Creek drainage (USDA Forest Service 2006a). Due to the nature of a metapopulation, sheep adjacent to the Payette National Forest may affect or be affected by management on the Payette National Forest. The main Salmon River populations may overlap the Payette National Forest, with the Middle Fork of the Salmon River populations just east and adjacent to the Payette National Forest.

Review of Disease Transmission and Bighorn Sheep

Bighorn sheep are a New World species and are closely related to domestic sheep, which are an Old World species. Domestication and intense artificial selection have probably helped domestic sheep develop a resistance to important diseases (Jessup 1985, USDA Forest Service 2006a). However, bighorn sheep can be highly susceptible to diseases carried by domestic sheep.

A long history of large-scale, sudden, all-age die-offs in bighorn sheep exists across Canada and the United States, many associated with domestic animal contact (Shackleton 1999). Although limited knowledge of transmission dynamics exists (Garde et al. 2005), extensive scientific literature supports the relationship between disease in bighorn sheep populations and contact with domestic sheep, including both circumstantial evidence linking bighorn die-offs in the wild to contact with domestic animals and controlled experiments where healthy bighorn sheep exposed to domestic sheep displayed subsequently high mortality rates (Foreyt 1989, 1990, 1992; Foreyt et al. 1994; Onderka et al. 1988; Onderka and Wishart 1988; Garde et al. 2005). While much of the evidence for competition between domestic sheep and bighorn sheep is circumstantial, it is sufficient to have prompted management decisions to eliminate shared use of ranges by bighorn and domestic sheep by federal land management agencies and state wildlife departments (Goodson 1982, WAFWA 2007).

Although various stressors and disease organisms are related in these disease complexes, deaths are most often caused by bacterial pneumonia, which is caused by *Pasteurella* spp.—an incredibly large and diverse group of bacteria that is continually undergoing reclassification (Garde et al. 2005)—and *Mannheimia haemolytica* (formerly *Pasteurella haemolytica*[2]) (Foreyt 1990, USDA Forest Service 2006a). In fact, these bacterial species have been reported as the number one cause for bighorn sheep population declines throughout North America (Garde et al. 2005).

[2] Future references to *Pasteurella* spp. include both *Pasteurella* spp. and *Mannheimia haemolytica.*

Additional stressors include overcrowding on limited range; loss of escape cover; harassment by dogs; encroachment by humans; heavy snowfall and other weather stressors (Bunch et al. 1999); parasitism; poor nutrition; predation; and other human disturbances such as roads, habitat degradation, noise, and high dust levels (Festa-Bianchet 1988, Jenkins et al. 2000, Jones and Worley 2004). These stressors reduce the ability of bighorn sheep to resist disease (Garde et al. 2005). Other factors that can potentially predispose a bighorn sheep to disease or exacerbate its risk of mortality when exposed to *Pasteurella* spp. include the presence of other bacteria, respiratory viruses, other microbial agents, lungworms, gastrointestinal and external parasites; genetics; capture and restraint techniques; breeding behavior; and the presence of other wildlife (Foreyt 1998).

Pasteurella spp. are common commensals on the mucous membranes of most animal species in all climatic zones (Biberstein 1979) and most ruminants are asymptomatic carriers. *Pasteurella* spp. are also common commensals of native North American ruminant species (Biberstein 1979, Thorne 1982, Jaworski et al. 1998). Only sporadic cases of pasteurellosis, usually associated with *Pasteurella multocida*, have been reported in bison, elk, moose, mountain goats, mule deer, and pronghorn (Thorne 1982). Bighorn sheep did not co-evolve with the same set of pathogens as domestic sheep (Dubay et al. 2002), and domestic animals have been selected for disease resistance and are subjected to regular treatment with vaccines and other preventative measures (Jessup 1985). Furthermore, *in vitro* studies have revealed a reduced capacity of bighorn sheep immune systems to kill bacteria compared with domestic sheep (Dubay et al. 2002). Bighorn sheep also display a lower tolerance to habitat destruction, competition, and other stressors compared with other wild North American ungulates (Martin et al. 1996, Schommer and Woolever 2001).

Beginning in 1937, multiple die-offs of bighorn sheep throughout North America were documented in literature and *Pasteurella* spp. were often cited as the cause (Potts 1937, Marsh 1938, Post 1962, Foreyt and Jessup 1982, Onderka and Wishart 1984, Spraker et al. 1984, Hobbs and Miller 1992, Ryder et al. 1992, McCarty and Miller 1998). Epidemics in bighorn sheep and other native North American wild ruminants generally followed the settlement and establishment of domestic livestock grazing and may have reflected an historical introduction of novel pathogens into native wildlife populations in the late 1800s (Grinnell 1928, Skinner 1928, Honess and Frost 1942, Miller 2001). Limited understanding and/or access to bacteriological techniques probably precluded diagnoses of pasteurellosis in many early field investigations, thus the role of *Pasteurella* spp. in bighorn sheep epidemics was probably underestimated in studies reported prior to 1980 (Frank et al. 2004.).

Many bighorn sheep die after direct contact with domestic sheep, while domestic sheep appear to be refractory to most wild sheep pathogens (Martin et al. 1996, Schommer and Woolever 2001). Furthermore, domestic sheep are often carriers of *Pasteurella* spp. but do not exhibit clinical signs. Foreyt (1989) raised six Rocky Mountain bighorn sheep in captivity, five from birth and one that was taken from the wild as a lamb. He kept all six in captivity for 1 year. Six clinically normal domestic sheep were then placed on the 2 hectares of pasture with the bighorn sheep. *Mannheimia haemolytica* (formerly *Pasteurella haemolytica*) was isolated from swab specimens from four of the six domestic sheep but none from the bighorn sheep. All six bighorn sheep died within 4 to 71 days exposure to the domestic sheep. *Mannheimia haemolytica* was isolated from the respiratory tract tissue of

the bighorn sheep at the time of death. None of the domestic sheep were clinically ill during the study, but three of the six were later euthanatized, and *Mannheimia haemolytica* was isolated from two of them. Routine isolation of *Pasteurella* and *Mannheimia* spp. does occur in bighorn sheep, although it is uncommon (Foreyt 1989).

In another experiment, two bighorn rams were raised in captivity and maintained in a room with concrete walls and a concrete floor. After 3 months of acclimation, two domestic Suffolk sheep were introduced into the room. At introduction, *Mannheimia haemolytica* was isolated from the domestic sheep (each domestic sheep had a different strain of *Mannheimia haemolytica*) but not from the bighorn sheep. All animals were asyptomatic at introduction. On day 13, both bighorn sheep developed respiratory disease; one died on day 14 and the other was euthanatized the same day. *Mannheimia haemolytica* was isolated from both bighorn sheep, post-mortem (Foreyt 1990). No other viruses or lungworms were present, and other parasite numbers were negligible. The domestic sheep were still asymptomatic on day 14. In another series of experiments, isolates of a particular strain of *Mannheimia haemolytica* from healthy domestic sheep were intratracheally inoculated into eight bighorn sheep and seven domestic sheep. Seven of the eight bighorn sheep died within 48 hours, whereas all seven domestic sheep remained asymptomatic (Foreyt et al. 1994).

Mannheimia haemolytica generally requires direct physical contact between animals for transmission (Foreyt et al. 1994). However, bighorn sheep and domestic sheep are attracted to each other, particularly during rut, increasing the potential for close contact and disease transmission (Onderka et al. 1988, Foreyt 1989, Ward et al. 1997, Dubay et al. 2002, USDA Forest Service 2006a).

After episodes of pneumonia in bighorn sheep populations, lambs are born healthy but will often subsequently die within several weeks. Researchers presume the lambs are initially protected via passive immunity from their mother's colostrum (Foreyt 1990). The impacts to recruitment can last for several years (Foreyt 1990, McCarty and Miller 1998, Miller et al. 2000, Cassirer et al. 2001, Miller 2001,). In fact, once *Pasteurella* spp. or *Mannheimia haemolytica* have been introduced to bighorn sheep populations, they may become endemic and continue cycling for decades (Miller et al. 1991, Hobbs and Miller 1992, Miller et al. 1995).

Although the exact mechanism for developing pneumonia in bighorn sheep following association with domestic sheep is unknown, experimental and field data indicate the two species are not compatible on the same range (Foreyt 1992, WAFWA 2007).

Phenotypic traits of *Pasteurella* spp. isolated from bighorn sheep are similar to those of isolates from domestic ruminants (Frank et al. 2004). Physiologically, the two species have different alveolar macrophage function and arachidonic acid metabolism, which may cause increased sensitivity of bighorn sheep to respiratory disease (Silflow et al. 1991). Silflow and Foreyt (1994) found that bighorn sheep neutrophils were more susceptible to cytotoxin damage than domestic sheep neutrophils. Divergences in host–parasite co-evolutionary paths may explain observed differences in pulmonary host defense mechanisms between bighorn and domestic sheep (Silflow et al.1989). The development of immunity to pasteurellosis in bighorn sheep is complex and poorly understood (Miller 2001); vaccines to protect bighorn sheep have been ineffective (Foreyt 1992, Foreyt 1998, Foreyt and Silflow 1996). However,

bighorns that recover from pasteurellosis remain healthy during subsequent epidemics (Miller et al. 1991).

Overall, bighorn sheep abundance appears to be limited by recurrent pasteurollosis epidemics (Hobbs and Miller 1992, Jorgenson et al. 1997, McCarty and Miller 1998). Significant mortality across all age classes and suppressed recruitment for the following 1 to 15 years impair population recovery and stability (Frank et al. 2004). A die-off in the Lostine herd of northeastern Oregon in 1986 to 1987 eliminated 66 percent of the herd, and poor lamb survival kept the herd at static levels for 3 years following the pneumonia episodes (Coggins and Matthews 1992). In a summary of risk to wild sheep from *Pasteurella* and *Mannheimia* spp., Garde et al. (2005) makes the following conclusions:

- These bacteria can cause pneumonia in bighorn sheep, but there are benign commensal strains in the upper respiratory tract
- Domestic sheep, goats, and llamas have been reported with these bacteria species
- Wild sheep and mountain goats have been reported with these bacteria species
- Transmission is by direct contact and aerosolization
- These bacteria species do not persist in the environment
- Acute-to-chronic die-offs in bighorn sheep can result in low to 100 percent mortality, although they can be present in healthy sheep
- These bacteria are considered opportunistic and can result in pneumonia outbreaks
- These bacteria can cause clinical disease in domestic sheep and goats but are rarely primary pathogens

Predisposing factors such as stress or a viral infection may cause the organism to shift from being a commensal to pathogenic (Srikumaran 2007).

Singer et al. (2001) found that the persistence of bighorn sheep populations was significantly correlated with the presence of domestic sheep: populations located closer to domestic sheep were smaller and had lower population growth rates than bighorn populations located farther from domestic sheep.

In summary, field observations suggest that bighorn sheep have a high probability of contracting fatal pneumonia following contact with domestic sheep, which has led to numerous independent experiments. The results of these experiments provided strong corroboration that bighorn sheep have a high probability of contracting fatal pneumonia following contact with domestic sheep; numerous opportunities to falsify that assertion under controlled conditions have existed, and none has done so (Wehausen et al., unpublished data).

The impact of disease on bighorn sheep conservation is likely to increase as habitat loss and fragmentation restrict their movement and concentrate them into smaller areas, increasing contact rates and the spread of disease (Scott 1988, Levins et al. 1994, Schrag and

Wiener 1995). Several agencies and experts have weighed in on the issue. U.S. Department of Agriculture (USDA) Forest Service Region 2 identified the following threats to the long-term viability of their bighorn sheep: the risk of disease outbreaks resulting from contact with domestic sheep and goats is identified as the most significant threat facing bighorns in both Region 2 and across their range, followed by lack of connectivity and/or loss of genetic fitness due to habitat fragmentation; habitat loss; human disturbance; competition with domestic livestock; and predation on small, isolated herds (Beecham et al. 2007). The Science Panel, convened by the Payette National Forest and comprised of wildlife and domestic ungulate health experts with experience in pasteurellosis in wild and domestic sheep, reviewed the available scientific information on bighorn–domestic sheep interactions and developed a list of principle statements, which have become known as the "Payette Principles" (USDA Forest Service 2006b). The Western Association of Fish and Wildlife Agencies (WAFWA) Wild Sheep Working Group concur with these principles, and used them to form the foundation for their recommendations (WAFWA 2007). Since the development of the consensus statements at the science panel held in November 2006, there have been four other scientific reviews on disease transmission between bighorn sheep and domestic sheep and goats: Davis, California (April 2007), Tucson, Arizona (September 2007), Salt Lake City, Utah (February 2008), and Boise, Idaho (March 2008). Results from all four of these reviews were similar to the science panel convened by the Payette National Forest.

History of Pneumonia Infections near the Payette National Forest

Hells Canyon Metapopulation

Seven population die-offs have been reported since reintroductions were initiated in Hells Canyon (Hells Canyon Bighorn Sheep Restoration Committee 1997). *Pasteurella multocida* was associated with a major die-off in Hells Canyon in 1995 to 1996 (Frank et al. 2004). During this time, over 300 bighorn sheep died of pasteurellosis in Hells Canyon, possibly caused by contact with one goat (Cassirer et al. 1996, Coggins 2002). During this period of die-off, bighorn sheep on the Idaho side of the river showed signs of respiratory disease, but no die-off occurred (Cassirer et al. 1996). Five die-offs within the Hells Canyon metapopulation have been circumstantially linked to domestic sheep (Coggins 1988).

Four bighorn sheep populations of the Hells Canyon metapopulation have occurred near domestic sheep allotments on the west side of the Payette National Forest since 2000. One of these, the McGraw population, is no longer considered extant (USDA Forest Service 2006a). The other populations have had pneumonia outbreaks, resulting in substantial mortality. Disease has reduced the population growth rate of the Hells Canyon metapopulation by at least 40 percent (Hells Canyon Bighorn Sheep Restoration Committee 1997).

Salmon River Metapopulation

Evidence exists that disease has affected the South Fork Salmon River population, main Salmon River population (Unit 19), and Big Creek populations of the Salmon River Mountains metapopulation on the east side of the Payette National Forest (IDFG 2004, 2006). The small numbers of bighorn sheep within the South Fork Salmon River population justify concern over the viability of this population (USDA Forest Service 2006a). From

1987 to 1991, a population on Big Creek experienced 5 years of low lamb-to-ewe ratios and an all-age die-off in 1990 (Akenson and Akenson 1992). Research conducted in April 2000 found a highly virulent strain of *Pasteurella* spp. in the Big Creek population (IDFG 2004, 2006).

Risks of Contact between Domestic Sheep and Bighorn Sheep on the Payette National Forest

An expert panel rated the risk of disease transmission for each domestic sheep allotment on the Payette National Forest[3] (*Risk Analysis of Disease Transmission between Bighorn Sheep on the Payette National Forest* [risk analysis]) (Table W-7b) (USDA Forest Service 2006a). The principal assumption for rating disease transmission risk was, "direct contact between domestic sheep and bighorn sheep results in a high likelihood of disease transmission to bighorn sheep and disease outbreak in local bighorn herds" (USDA Forest Service 2006a). Risk factors included distance between the sheep allotment and nearest bighorn sheep populations, amount of geographic information system-modeled bighorn sheep habitat within the sheep allotment and between the allotment and the nearest bighorn sheep herd, expert knowledge of the amount and quality of bighorn sheep habitat, presence of incidental bighorn sightings in or near allotments, expert knowledge about bighorn sheep distribution and movement near the allotments, and characteristics of each sheep allotment. The expert panel also considered existing sheep trailing routes and identified levels of risk with each trailing route. They identified the Salmon River Driveway to present a high risk of disease transmission because of its proximity to currently occupied bighorn sheep range in Hells Canyon (USDA Forest Service 2006a). The trailing routes along the main Salmon River, and between the main Salmon River and the sheep allotments on the east side of the Payette National Forest, present "considerable" risk of disease transmission to bighorn sheep (Figure RR-2 [see *Rangeland Resources* section]) (USDA Forest Service 2006a).

[3] The Surdam On/Off Allotment (158 acres) was not included in the expert panel risk assessment because the facilitator did not know of the existence of the allotment at the time of the December 14, 2005, assessment.

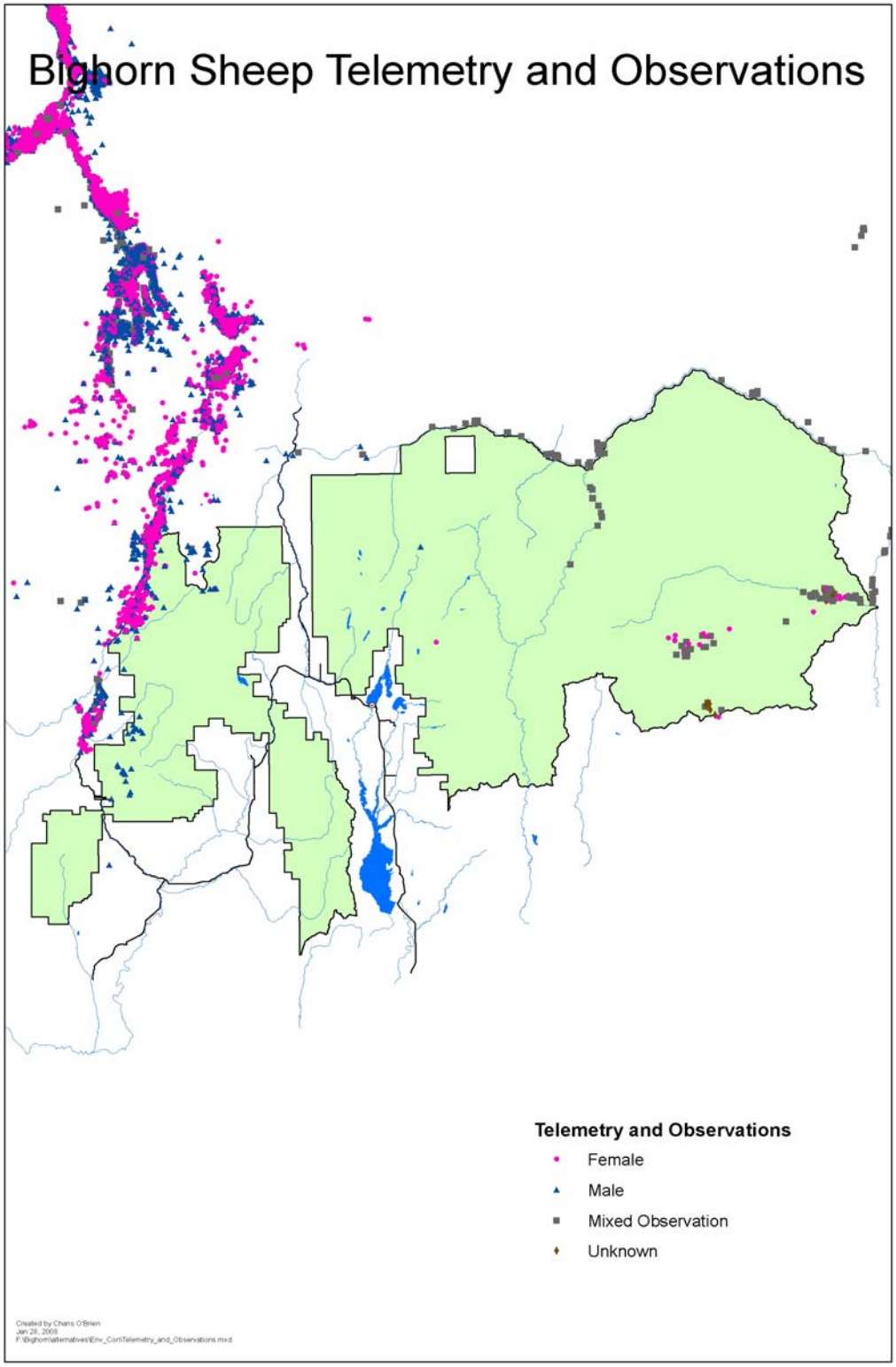
Table W-7b. Risk Analysis Sorted by Value of Weighted Mean Outcome (USDA Forest Service 2006a)

Allotment	Risk of Disease Transmission					Weighted Mean Outcome	S.D.[1]
	Very Low	Low	Moderate	High	Very High		
	1	2	3	4	5		
Smith Mountain	0.0	0.0	0.0	3.3	96.7	4.97	0.18
Marshall Mountain	0.0	0.0	16.7	40.0	43.3	4.27	0.73
Curren Hill	1.7	10.8	17.5	39.2	30.8	3.87	1.03
Bear Pete	3.3	16.7	21.7	25.0	33.3	3.68	1.19
French Creek	0.0	14.2	38.3	30.8	16.7	3.50	0.93
N. Fork Lick Creek	0.0	43.3	33.3	15.0	8.3	2.88	0.95
Shorts Bar	6.7	30.0	41.7	16.7	5.0	2.83	0.95
Victor-Loon	0.0	48.3	36.7	11.7	3.3	2.70	0.80
Lake Fork	8.3	46.7	28.3	13.3	3.3	2.57	0.94
Hershey-Lava	23.3	26.7	28.3	15.0	6.7	2.55	1.19
Jughandle	21.7	41.7	30.0	6.7	0.0	2.22	0.86
Josephine	39.2	33.3	12.5	6.7	8.3	2.12	1.23
Boulder Creek	48.3	33.3	10.0	5.0	3.3	1.82	1.03
Twenty Mile	50.0	40.8	7.5	1.7	0.0	1.61	0.70
Fall/Brush Creek	71.7	12.5	5.8	5.0	5.0	1.59	1.12
Little French Creek	56.7	33.3	10.8	0.0	0.0	1.53	0.67
Price Valley	78.3	10.0	6.7	3.3	1.7	1.40	0.88
Cougar Creek	66.7	28.3	5.0	0.0	0.0	1.38	0.58
Brundage	82.5	12.5	3.3	1.7	0.0	1.24	0.59
Bill Hunt	82.5	12.5	3.3	1.7	0.0	1.24	0.59
Vance Creek	80.0	18.3	1.7	0.0	0.0	1.22	0.45
Grassy Mountain	78.3	21.7	0.0	0.0	0.0	1.22	0.41
Slab Butte	78.3	21.7	0.0	0.0	0.0	1.22	0.41

[1] Standard deviation

Figure W-1d displays telemetry and observational data collected by the Idaho Department of Fish and Game (IDFG), University of Idaho, USDA Forest Service, and other federal personnel, overlapped with the Payette National Forest. Overall, these data include 50,000 telemetry points, representing approximately 400 individuals for the two metapopulations collected from March 1997 through December 2006, except for the University of Idaho data in the Frank Church River of No Return Wilderness, which was collected in 1989 to 1990.

Figure W-1d. Telemetry Data and Observations of Bighorn Sheep near the Payette National Forest.



Hells Canyon Metapopulation

The Hells Canyon telemetry data have been collected by IDFG, the Oregon Department of Fish and Wildlife, and the Forest Service. The telemetry data were used in modeling, which is described in the Environmental Consequences section on page 3-24. In any given year, approximately 150 animals have telemetry collars. Figure W-1e shows those known (from telemetry data) bighorn sheep that entered the Payette National Forest allotments. Between 1997 and 2004, radio-collared bighorn sheep were detected within the Smith Mountain Allotment on 319 occasions and within 1 to 4 miles of the Curren Hill Allotment on 22 occasions (USDA Forest Service 2006a). These telemetry data account for 22 individuals: 7 rams and 15 ewes. Of these 22 individuals, 18 (7 rams and 11 ewes) entered the allotments when domestic sheep were present (May–October), with a total of 163 telemetry points amongst those 18 individuals within that time period. All of these recorded individuals are now deceased. It is unknown how many bighorn sheep without telemetry collars entered the allotments when domestic sheep were present. The risk analysis concludes that continuing to graze domestic sheep on the highest risk portions of the Smith Mountain and Curren Hill allotments would continue to negatively affect bighorn sheep restoration efforts within the Hells Canyon project area and threaten the viability of populations located within the metapopulation's southern range (USDA Forest Service 2006a). Negatively affecting restoration efforts will likely continue to preclude establishing a viable bighorn sheep population on the west side of the Payette National Forest (USDA Forest Service 2006a).

A 6,567-acre area of the Smith Mountain allotment is within the boundaries of the Hells Canyon National Recreation Area (HCNRA) (Figure W-1f). The Curren Hill Allotment no longer exists within the HCNRA but is adjacent to it.

To determine the extent of overlap between domestic sheep and bighorn sheep a geographic population range (GPR) was developed using the combined herd home ranges that were created by using the Clifford et al. (2007) process. The GPR showed significant overlap with domestic sheep allotments on the west side of the Payette National Forest and the bighorn sheep metapopulation in Hells Canyon.

Figure W-1e. Telemetry Data of Bighorn Sheep that Entered Occupied Domestic Sheep Allotments on the West Zone Payette National Forest

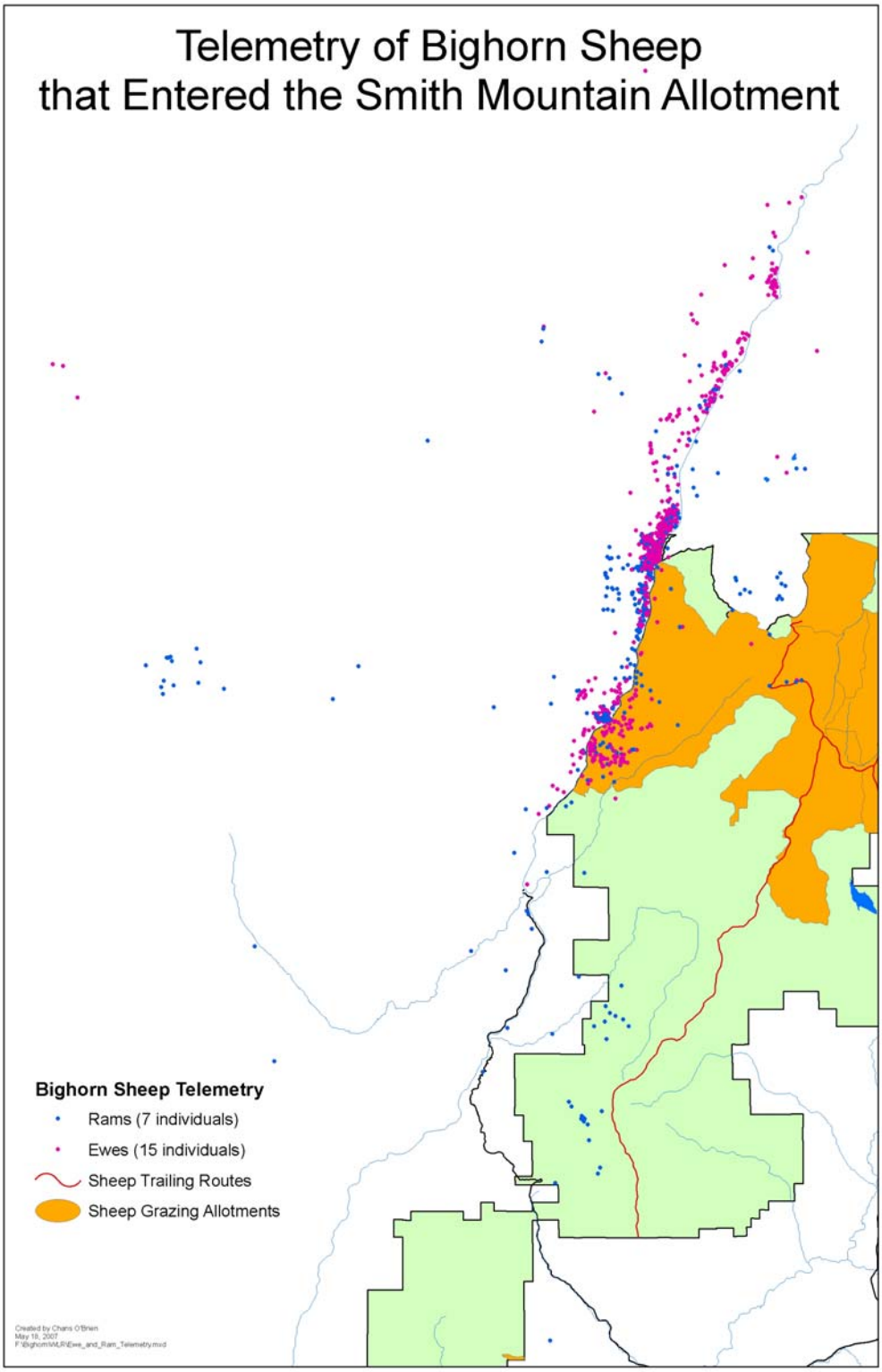
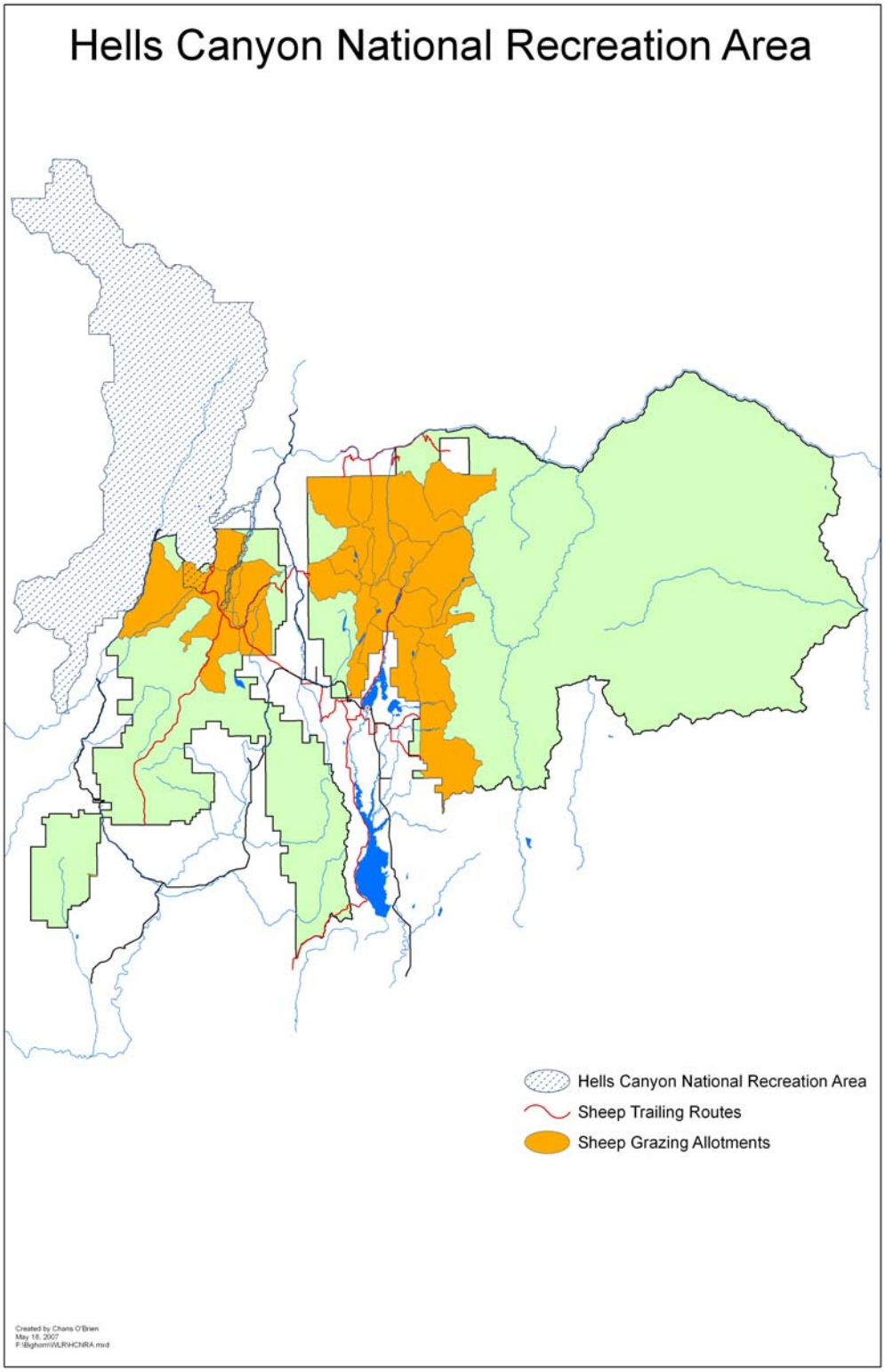


Figure W-1f. Domestic Sheep Allotments within Hells Canyon National Recreation Area



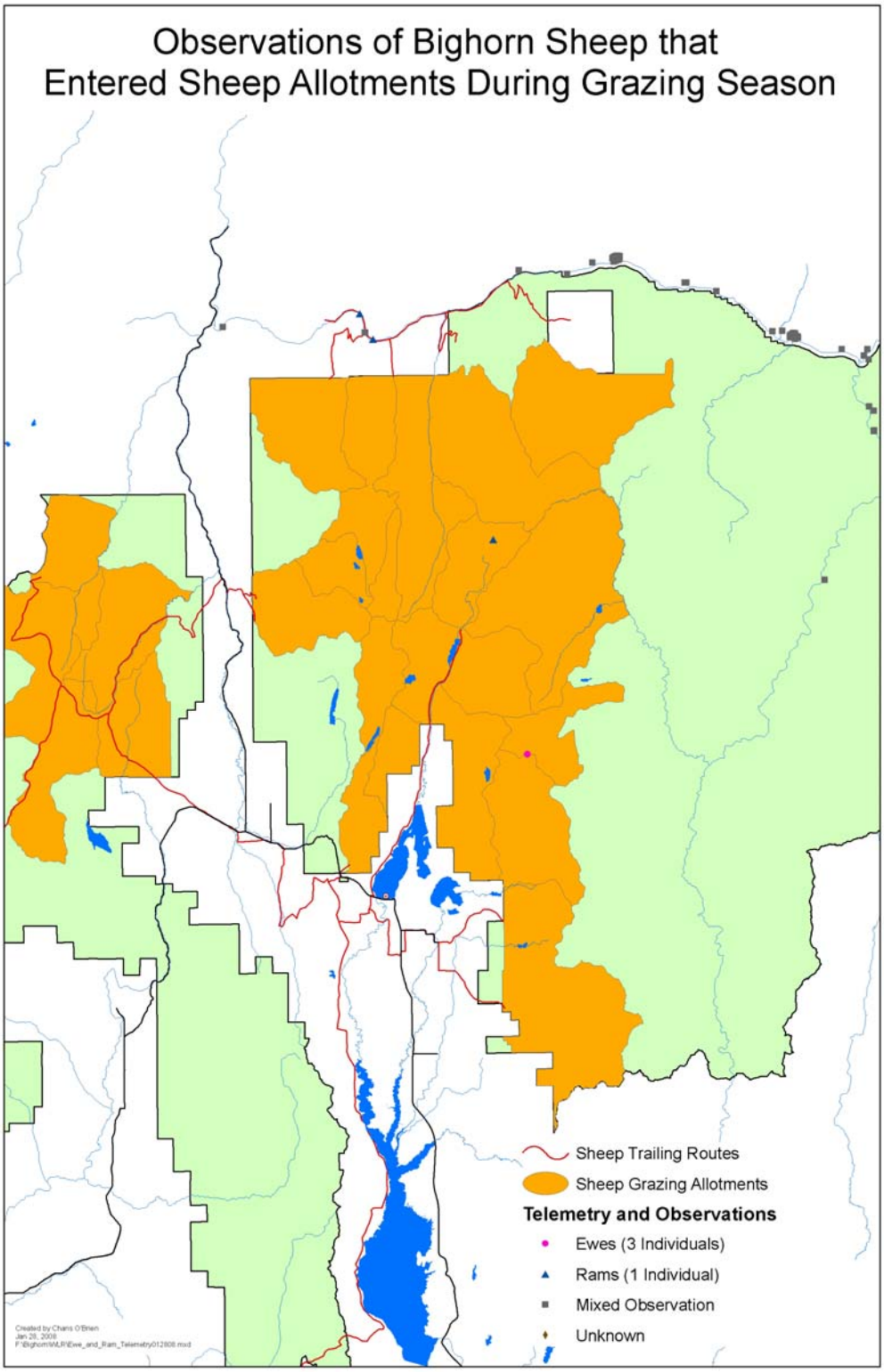
Salmon River Metapopulation

Little telemetry data for the Salmon River Mountains metapopulation provides a high degree of uncertainty for the risk of contact and potential subsequent disease transmission on the east side of the Payette National Forest. One observation of a bighorn sheep ram was noted within the Josephine Allotment, and three ewes were sighted within the North Fork Lick Creek Allotment, along the border with the Lake Fork Allotment. These individuals entered the allotments when domestic sheep were present (May–October) as displayed in Figure W-1g. The Payette National Forest, IDFG, and Nez Perce Tribe currently have a cooperative project that is placing Global Positioning System (GPS) collars on Salmon River Mountain bighorn sheep. Fifteen sheep were collared in fall 2007 and spring 2008. One of those collared sheep was lethally removed by IDFG in early 2008 due to contact with domestic goats. This information has provided additional data on bighorn sheep movement on the east side of the Payette National Forest. Forested area and large rivers, which bighorn sheep do not prefer for movement and which serve as partial barriers to bighorn sheep movement (Singer et al. 2000b, USDA Forest Service 2006a), are located between bighorn sheep habitat on the South Fork Salmon River and the east side allotments.

Furthermore, the effects of the 2007 fires within the Payette National Forest on bighorn sheep habitat and movement are unknown. However, bighorn sheep have been observed swimming large rivers and have been found in locales where their routes to arrive there were unknown (USDA Forest Service 2006a). Akenson and Akenson (1992) observed ewes from different parts of the winter range utilizing four different drainages for lambing, and they had three separate summer ranges, indicating a high degree of movement for this population. They also observed ewes traveling more than 50 miles in less than 3 days, and pregnant ewes swimming Big Creek during flood stage to begin spring migration. Ewes followed rock outcrops and broken open terrain, but the migration corridor also included forested ridges and a snow covered pass (Akenson and Akenson 1992). Big Creek bighorn sheep had separate winter ranges from the Middle Fork of the Salmon River bighorn sheep but did share some summer range, which would increase the risk of disease transmission between populations of the Salmon River Mountains metapopulation (Akenson and Akenson 1992). The risk analysis concludes that the allotments on the east side of the Payette National Forest would not likely threaten the viability of the overall Salmon River Mountain metapopulation. However, they acknowledge the high degree of uncertainty without strong knowledge of the current disease status and bighorn sheep movements on summer ranges of these populations (USDA Forest Service 2006a). A lack of telemetry data makes it impossible to know if other bighorn sheep have entered allotments. Unlike re-introduced sheep in Hells Canyon, these native sheep are considered migratory, and historical migration routes are important to their population dynamics. As native populations of bighorn sheep that have persisted since historic times, loss of the genetic diversity of these populations could affect bighorn sheep persistence and restoration at scales much larger than the Payette National Forest (USDA Forest Service 2006a).

To determine the extent of overlap between domestic sheep and bighorn sheep a GPR was developed using a map developed by IDFG field biologists and home range analysis using similar techniques as found in the Clifford et al. (2007) paper. The Salmon River GPR showed overlap with the majority of domestic sheep allotments on the east side of the Payette National Forest.

Figure W-1g. Observational Data of Bighorn Sheep that Entered Occupied Domestic Sheep Allotments on the East Zone of the Payette National Forest



Consistent with 36 CFR §219.20(a), these following pages will supplement the Direct and Indirect Effects by Alternative section, page 3-316, of the Chapter 3 Terrestrial Wildlife Habitat and Species section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects by Alternative

Species of Special Interest

Bighorn Sheep

Viability

This DSEIS is written in response to direction from the Forest Service Chief (Chief) to analyze bighorn sheep viability commensurate with the concerns and questions raised in the appeal decision related to the potential impacts of disease transmission from domestic sheep grazed on the Payette National Forest. However, the metapopulation structure of bighorn sheep is complicated by the fact that only small portions of two different metapopulations occur within the Payette National Forest boundaries (USDA Forest Service 2006a). Traditional population viability analyses are usually done within the context of isolated populations (Hanski 1998), and a viability analyses solely of bighorn sheep on the Payette National Forest is meaningless unless the dynamics of the metapopulation are also considered (USDA Forest Service 2006a). Therefore, viability discussions will need to go beyond the borders of the Payette National Forest, although the analysis of how domestic sheep use on the Payette National Forest affects the two metapopulations is relevant.

Evaluation Methods for the Potential for the Risk of Contact between Domestic and Bighorn Sheep

The consensus statements adopted by the Payette National Forest Science Panel and concurred to by the WAFWA wild sheep working group (WAFWA 2007) include the principle that "scientific observation and field studies demonstrate that contact between domestic sheep and bighorn sheep is possible under range conditions, and that this contact increases (or can increase) the risk of subsequent bighorn sheep mortality and reduced recruitment, primarily due to respiratory disease" (USDA Forest Service 2006b). The principles continue that "it is prudent to undertake management to prevent contact between these species" (USDA Forest Service 2006b). Given these statements and other literature cited in this DSEIS, the direct/indirect effects specific to each alternative will be evaluated based on the potential for the risk of contact between the two species.

A potential risk of contact model was developed that incorporated three risk components: 1) where bighorn sheep are expected to be found GPR, 2) where they may interact with domestic sheep (risk analysis) (USDA Forest Service 2006a), and 3) where habitat for bighorn sheep occurs (source habitat). Each of these components is described in further detail.

Geographic Population Range

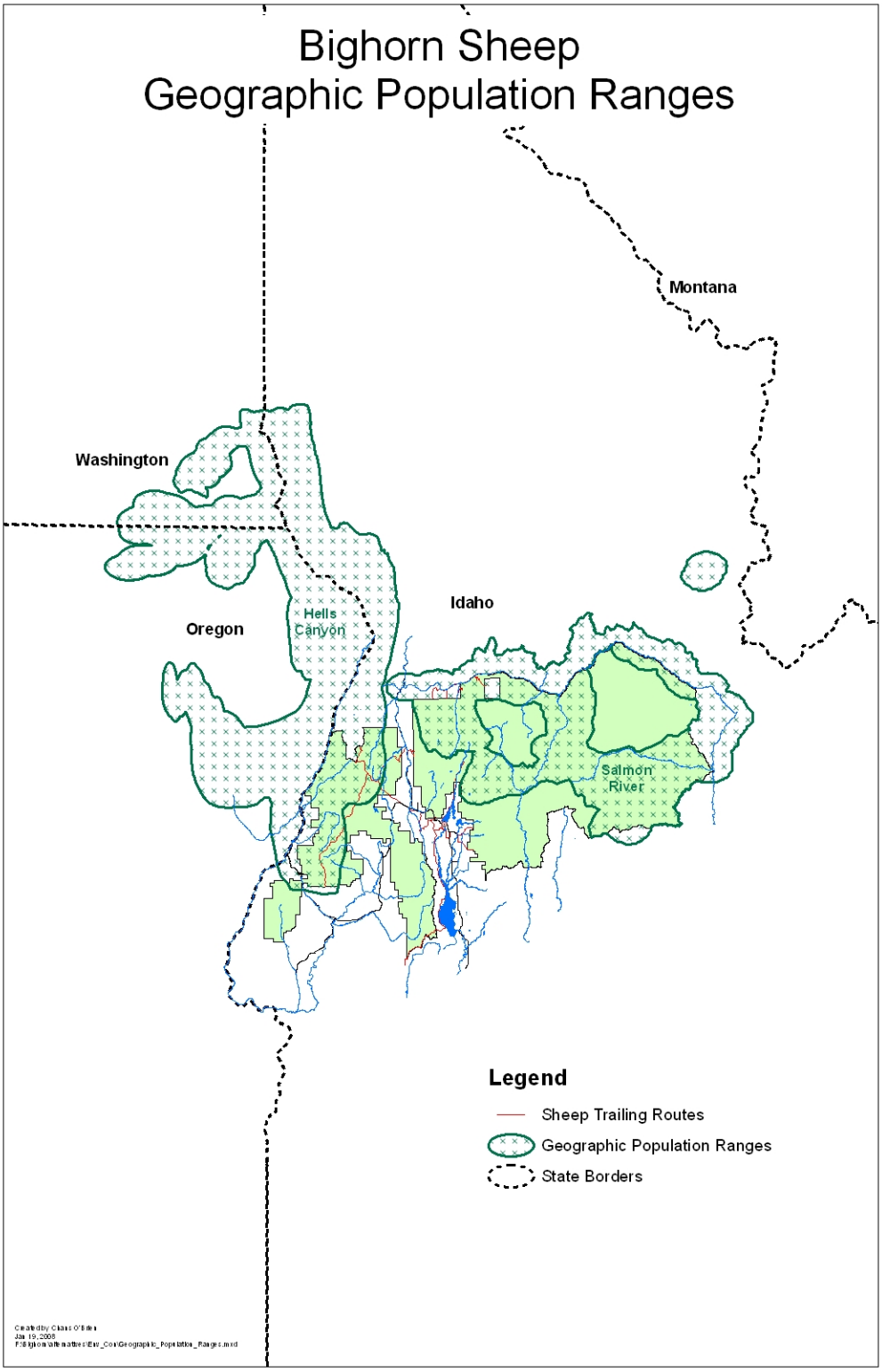
Available telemetry data of bighorn sheep movement were used to model the utility distributions of bighorn sheep populations with 50 to 100 percent (in 10 percent increments) fixed kernal estimators, following the methods of Clifford et al. (2007). Kernel estimators are based on probability "kernels," which are regions around each point location containing some likelihood of animal presence. The kernel represents a sampling of the current bighorn sheep population. Hence, the 50 percent volume contour line represents core habitat and the 100 percent volume contour was used to estimate the variability of ranging behavior for the entire population, known as the GPR. The objective here is to describe the areas that bighorn sheep would be utilizing and/or moving through, based on the actual occurrence data. The validity of these GPRs was verified by biologists from several organizations with expertise in bighorn sheep movement. Two separate GPRs were developed: one for the Hells Canyon metapopulation and one for the Salmon River metapopulation (Figure W-9a).

The Salmon River metapopulation has a scarcity of telemetry points available for modeling. Therefore, this GPR was modeled by adding the observational points with the telemetry data to increase the point density. However, it still contains substantially less point density than the data available for the Hells Canyon metapopulation. To reduce the variability in the Salmon River GPR, a different mathematical methodology was used in determining parameters (band width).

The volume contour lines that resulted from this modeling show the ranging behavior of current bighorn sheep and are the best approximation of occupied habitat at this time. However, as additional data are collected, or as a population expands, these volume contours could be modified. The current volume contours are based on populations that are considered "depressed," meaning population numbers are low and the range is not fully occupied.

As per Clifford et al. (2007), the overlap of modeled GPRs with domestic sheep allotments is a means of quantifying differential levels of the risk of contact between the species. The fixed kernal modeling results in volume contour lines that are exponentially related to each other, so our risk model treats them as such. These values are relative only to each other; they do not estimate actual risk of contact, only the levels of change between volume contours. However, what they do show is the probabilities of where bighorn sheep are expected to be, given their current ranging behavior.

Figure W-9a. Geographic Population Ranges of Bighorn Sheep that Overlap the Payette National Forest



Risk Analysis

Each allotment rated in the risk analysis (USDA Forest Service 2006a) is divided into a risk category based on the conclusions of the risk analysis as previously described in the *Current Conditions*. Therefore, each allotment is assigned to a very high, high, moderate, low, or very low risk rating. Each rating is then treated as varying exponentially from very low to very high, as a mathematical relationship that infers the increasing potential rates of contact and subsequent risk for disease transmission between those categories, which is consistent with the assumptions used in applying the risk analysis ratings.

Source Habitat

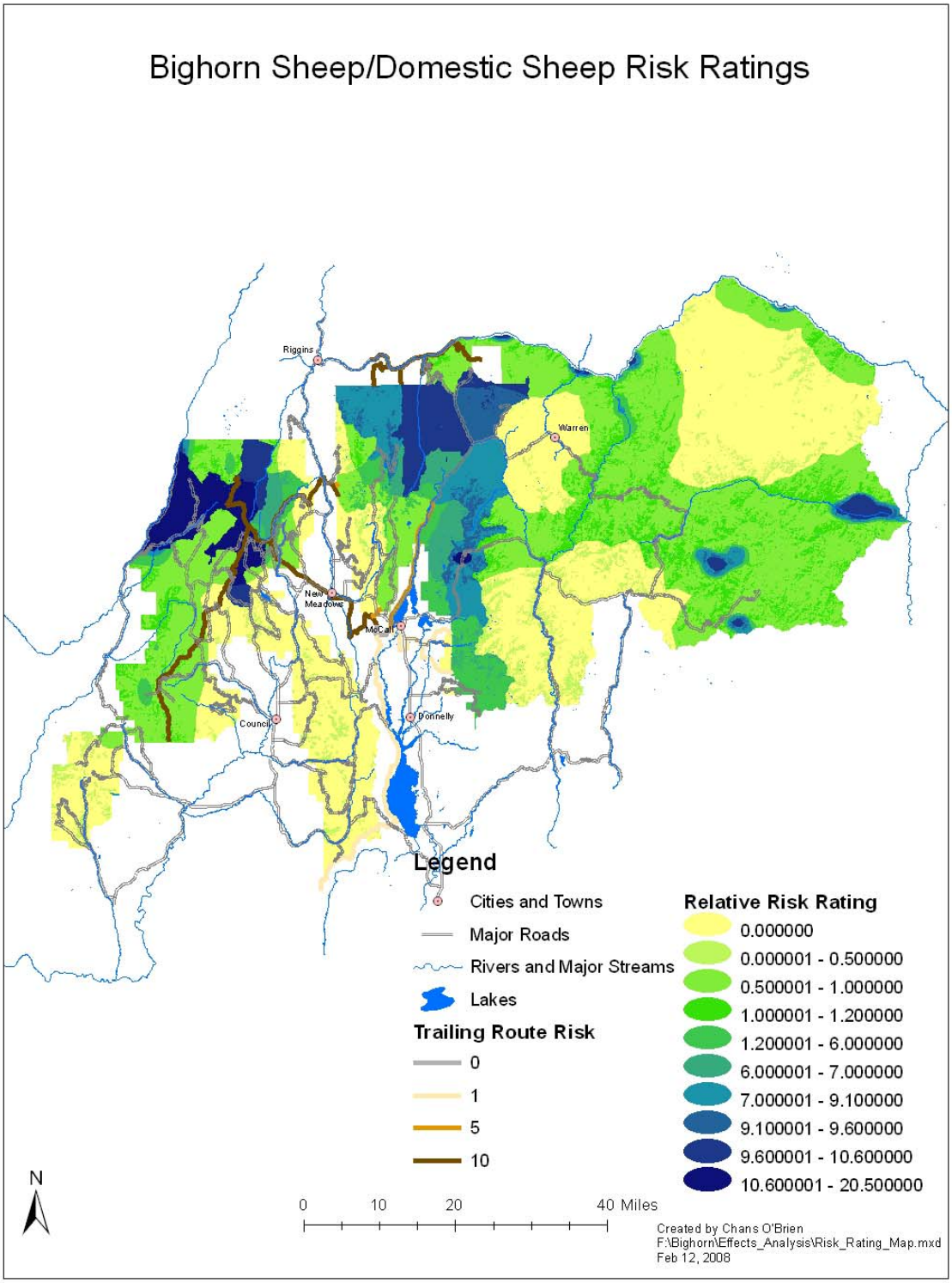
Bighorn sheep source habitat was modeled as previously described. In the risk of contact model, source habitat is applied as a Boolean factor, it is either present or absent. Figures W-1b and W-1c display source habitat used in the risk model.

Overall Risk Model

These three components were then "added" to each other to produce a map of the relative risks of contact across the Payette National Forest—the potential for the risk of contact is a function of where bighorn sheep are (the GPR), where they may interact with domestic sheep (risk analysis), and where habitat occurs (the presence or absence of source habitat). When these are added together, incremental relative risk ratings can be applied across the Payette National Forest. The components are added to evaluate the influence of all three of them together. Adding is just a simplified way of evaluating the three together; multiplying or some other function would not change the relative risks of each alternative, just the scale at which they are evaluated.

The final product is a risk rating map (Figure W-9b) representing the relative ratings for the potential risk of contact across the Payette National Forest, which can then be used for alternative comparison. For example, if an area is within the 50 percent volume contour line (core habitat) and within an allotment rated as very high, and if it contains source habitat, then this area is assigned the highest possible relative rank for risk of contact. An option with an intermediate rank is within the 100 percent volume contour line, within an allotment rated as moderate, and contains source habitat. Areas within GPR lines with habitat (although outside of an allotment) are ranked as having some risk of contact although no domestic sheep are present because of the higher probability that bighorn sheep could be found there. Areas outside of both the GPR and allotments, but with source habitat, have a lower relative ranking than the above examples but still have some risk assigned due to the presence of habitat. This system assigns some risk to areas with source habitat, where bighorn sheep could expand. Areas with no risk of contact are outside of the GPR, have no habitat, and have no domestic sheep allotments. Furthermore, as additional information or changed conditions become available, each one of the input components can be modified (i.e., new GPR volume contours, changes in source habitat, etc.) to re-evaluate the potential for the risk of contact as needed.

Figure W-9b. Relative Risk Ratings across the Payette National Forest[1]



[1] Ten Relative Risk Categories shown for display purposes. Actual analysis utilized each individual polygon of overlap.

This model then ranks the alternatives relative to each other regarding how much the potential risk of contact varies with each alternative. We do not have all of the available data to assign what the relative risk ratings of contact mean in terms of "how much contact" they represent, nor what level of disease transmission and population effects they represent. However, we can assume that the alternatives that reduce the risk of contact the most also provide for increased viability of bighorn sheep. Reducing the potential for the risk of contact does not equate to an equal reduction in the risk to population viability—even limited contact between bighorn and domestic sheep can result in a risk to bighorn sheep viability due to disease transmission and prolonged population die-offs (DSEIS IDT and Cooperators 2007, 2008; Gross et al. 2000).

Viability is composed of two components—how many and how long—which comprise population persistence through time. Population persistence is usually measured by 99 percent of the population persisting for 1,000 years or 95 percent over 100 years (Thompson 1991). Singer and Gudorf (1999) found no unequivocal minimum viable number for bighorn sheep but suggest a minimum population size of 100 individuals if disease is not a factor, and 300 individuals to buffer against the loss of genetic heterozygosity if severe or moderate epizootics are present. In a later paper, Singer et al. (2001) found a strong correlation of population persistence with larger habitat patch sizes, greater distances from domestic sheep, higher population growth rates, greater home-range sizes, larger population sizes, and migratory movements. Larger populations (> 250 animals) were more likely to recover following an epizootic, but habitat patch size is the primary correlate to both population performance and persistence (Singer et al. 2001).

Three items were considered when developing parameters for the impact of disease on populations: 1) rate of contact between bighorn sheep and domestic sheep, 2) probability that contact will result in transmission of disease, and 3) effect of disease on the bighorn sheep population. Using conservative estimates based on the literature, with one contact per year (2 per generation) and each contact with a 50 percent chance of disease development and 50 percent chance of population loss (literature often cites even higher population losses, e.g., Foreyt 1989, 1990; Coggins and Matthews 1992; Foreyt et al. 1994, Frank et al. 2004; Garde et al. 2005; Beecham et al. 2007), traditional population viability modeling results suggest there is not a level at which a bighorn populations can persist unless the frequency of contact is reduced far below one contact annually (DSEIS IDT and Cooperators 2007, 2008). Modeling completed by U.C. Davis (Clifford et al. 2007) also suggests that there is likely no, or an extremely minimal, level of contact at which a bighorn population can persist. They estimated through their modeling process, that a 2 percent risk of contact in their populations predicted a 50 percent probability of at least one respiratory disease outbreak causing greater than 40 percent bighorn sheep mortality during the next 70 years. No population of any species can repeatedly lose nearly half its numbers and remain viable.

Although we do not have all of the available data to make direct links between the risk of contact and viability, the risk of contact must be absent or extremely low to ensure bighorn sheep viability across the Payette National Forest. According to the appeal decision on the Payette National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service 2003), "the viability of bighorn sheep populations across the Payette National Forest appears to be threatened by allowing grazing of domestic sheep in or near occupied bighorn

sheep habitat". Given our lack of population modeling ability at this time, we propose to make the link to viability by assuming that the potential risk of contact must be approaching a zero percent probability. Although this analysis will be qualitative, it builds on the work by Clifford et al. (2007) by adding the components of rated risk for each allotment and the modeled source habitat.

Trailing Routes

Trailing routes are the stock trails that producers use to move domestic sheep onto and off of the Payette National Forest. Trailing routes are treated as linear features in the model and rated separately, depending on their relationship to the GPRs (where bighorn sheep are likely to be) and current domestic sheep allotments (where domestic sheep are likely to be). Those that intersect with a GPR are given a very high rating, those that intersect with allotments are rated as moderate, and everything else that crosses the Payette National Forest is rated as low to account for the naturally fragmented habitat of bighorn sheep. Trailing routes that do not intersect with Payette National Forest are rated as zero. A width of 0.25 mile was used for each trailing route, although the actual zone of influence of a trailing route can vary widely depending on terrain, temporal use, movement patterns of bighorn sheep in the area, and other factors. The trailing routes will be discussed separately from the overall risk of contact model.

Trends in Habitat Quantity/Quality and Distribution

Current source habitat does not appear to be limiting for bighorn sheep. Furthermore, much of this habitat appears to be unoccupied (Hells Canyon Bighorn Sheep Restoration Committee 1997). At scales below the Forest or watershed level, however, it is expected that the quality of habitat can have variances that cannot be detected at larger scales. No successional modeling has been completed for bighorn sheep habitat, as was done for forested potential vegetation groups or sagebrush cover types in the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement (FEIS). Comparable information was not available on grasslands, mountain mahogany, bitterbrush, and forest cover types of ≤ 10 percent canopy cover to complete successional modeling. Ecological information on how these communities change through time is sparse. The FEIS does, however, provide information on the trends of grassland vegetative response under each of the seven alternatives and ranks the alternatives (pages 3-572 through3-574). This discussion represents generalized grassland trends for the entire Ecogroup (Payette, Boise, and Sawtooth National Forests) and is not specific only to the Payette National Forest, although it did consider those management areas (i.e., Hells Canyon, Snake River, and Weiser River) that overlap the Hells Canyon bighorn sheep metapopulation and contain some of the higher risk domestic sheep allotments and trailing routes. Furthermore, these generalized trends represent more than bighorn sheep habitat but do not account for the escape terrain and other special habitat features important to bighorn sheep. Bighorn sheep habitat is a subset of these trends for grassland response.

The FEIS also discusses the generalized trends for deciduous riparian vegetation under the seven alternatives (pages 3-575 through 3-576), which Wisdom et al. (2000) identified as a special habitat feature. Again, bighorn sheep habitat is a subset of deciduous riparian

vegetation. Sagebrush cover types and their component grassland successional stages are discussed on pages 3-539 through 3-572 of the FEIS.

Other factors that affect bighorn sheep habitat include patch dynamics of nonforest and forested habitats, and their juxtapositions to each other. For example, suppressing wildfires for several decades has resulted in a reduced fire return interval and larger wildfires in some vegetative types. The effect on the landscape has been larger patch sizes of burned areas than expected under historical conditions, which has occurred to some extent, on the community types used by bighorn sheep. However, without specific information on the juxtaposition of needed patches on the landscape (size and arrangement) for this species, it is difficult to further compare trends with the species' needs. Patch dynamics, which vary historically, may affect dispersal between source habitat patches for bighorn sheep. Although bighorn sheep can use a diverse array of terrestrial and aquatic systems for movement across the landscape, altering historical vegetation dynamics can affect migratory routes. Large patch sizes of burned areas can open up forested and dense shrub areas to bighorn sheep. In some fire regimes, these large patch sizes would have been historically present. However, their location on the landscape shifts over time as a burned area successes back to denser vegetation and new areas experience periodic disturbances. Livestock grazing practices can affect the balance between shrub and herbaceous vegetation and contribute to changes in the floristic composition of grass and shrub communities, both of which can result in altered fire regimes. These changes can also contribute to altering historical patch sizes.

In addition to patch dynamics, habitat quality is an important predictor of whether a species may be present. Degradation of habitat quality through exotic weed invasions is a threat to habitat for this species. Depending on the type of exotic weed, food resources can be depleted and fire cycles disrupted, which can further alter species composition and structure. Livestock grazing can contribute to exotic weed invasions and damage to biological soil crusts, which can contribute to declines in source habitat quality.

Associated riparian areas within the ecosystem may also be affected by livestock grazing, with declines in habitat quality. Riparian systems can be particularly susceptible to livestock concentrations and grazing damage (Berry 1979). Defoliation; soil compaction; and floodplain water table subsidence, due to channel widening or downcutting, have resulted in the loss of densely rooted sedges and rushes and willows, cottonwoods, and other woody species (Berry 1979, Kovalchik and Elmore 1992). Natural recovery of native riparian vegetation once occurring along the margins of the riparian area may be extremely slow, even with reductions in livestock grazing because of deteriorating physical conditions of the stream during the last 150 years, dominance of exotic annuals within the riparian area, and loss of native seed sources (Clary et al. 1996). Livestock grazing can affect riparian vegetation by altering vegetation composition and seral stages. Excessive runoff from poor condition sagebrush and grasslands and direct damage to riparian vegetation and stream banks can result from livestock grazing and trampling, road construction, and recreational use (Blaisdell et al. 1982). Often, lowered water tables, resulting from heavy grazing pressure, have modified or destroyed normal riparian vegetation (Blaisdell et al. 1982), which has affected riparian ecosystem function. The ability of streams, associated vegetation, and wildlife populations to recover after reducing grazing stress appears to be

situation specific and related to site characteristics, degree of degradation, and availability of native plant materials (Shaw 1992, Krueper 1993).

Human activities are also primary sources of potential habitat degradation for bighorn sheep. Roads can be a source of direct mortality through vehicle strikes, and their presence can increase disturbance to bighorn sheep during critical periods throughout the year. Road construction can exacerbate effects from other risk factors, such as the spread of exotic species. Another human factor that can accelerate risks associated with roads and weeds is the dramatic increase of off-highway vehicle use, which can facilitate expansion of invasive species and adversely increase the potential for human disturbance and unlawful take. Roads and trails provide the primary access corridors for invasive plants, and some invasive species are able to out-compete native species, which can result in a substantial change in the overall biological diversity of the affected area and changes in historic fire regimes. The susceptibility of source habitat to weed establishment is important to investigate at finer scales in relation to ground-disturbing activities, such as prescribed fire, roads, livestock grazing, energy development/exploration, etc. Finally, winter recreation can also disturb bighorn sheep.

The DSEIS alternatives vary in the acres of rangelands located outside each alternative. The general effects listed above will also vary according to available rangelands, trailing routes, roads, and human disturbance associated with each alternative. This analysis can be an oversimplification as site specific ecological conditions and livestock grazing practices will have different effects on more localized areas. Although habitat is not limiting at a forest-wide scale on the Payette National Forest, these localized effects can limit habitat in some areas.

Forest Plan Alternatives

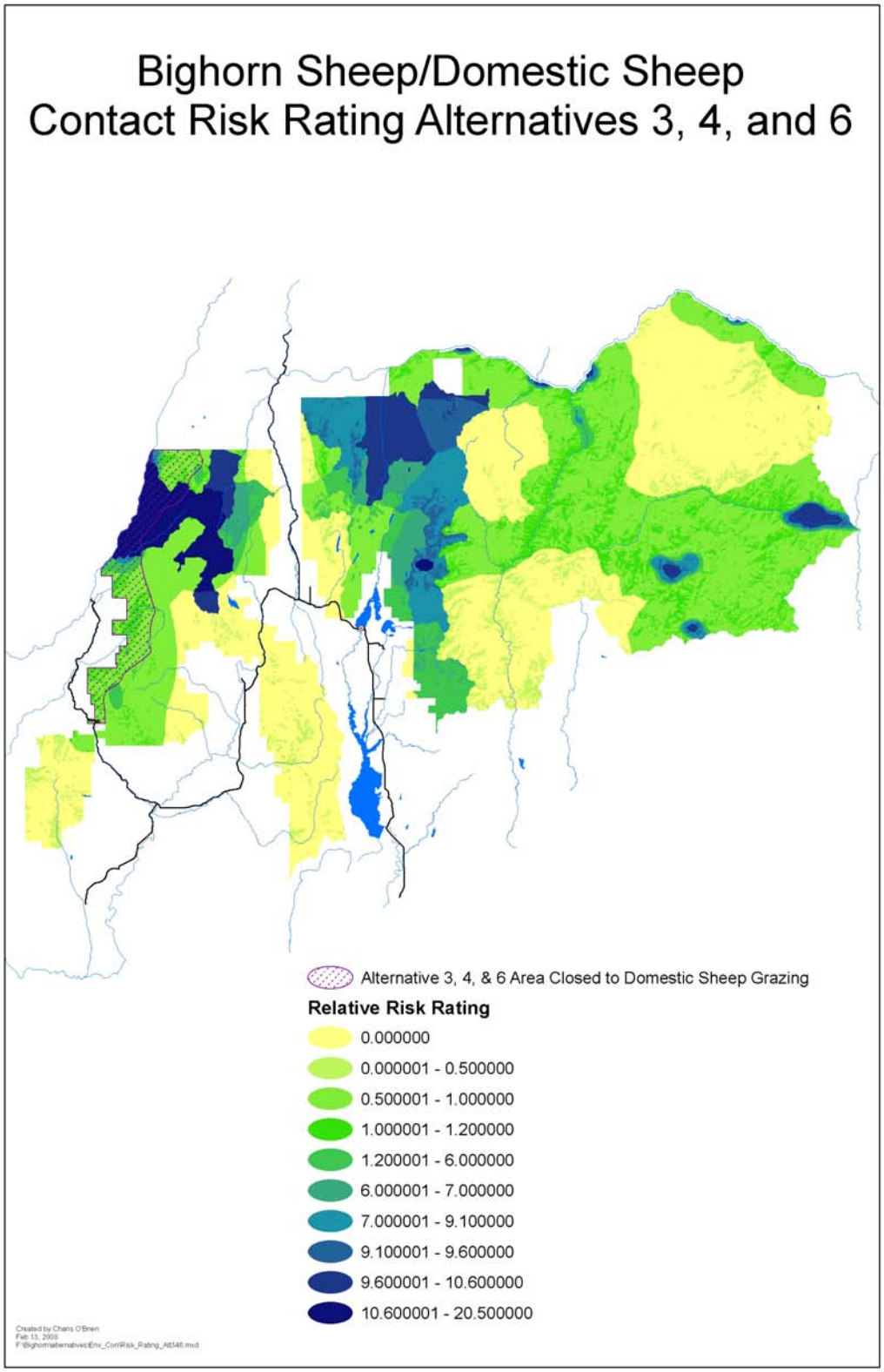
The seven alternatives evaluated in the FEIS for the Forest Plan (USDA Forest Service 2003) were combined into two categories based on their effect on the risk of contact between domestic and bighorn sheep. Alternatives 1B, 2, 5, and 7 had no reduction in suitable acres on the Payette National Forest available for grazing by domestic sheep. Alternatives 3, 4, and 6 reduced suitable acres available for grazing by domestic sheep by determining suitable rangeland portions of domestic sheep allotments that overlapped current bighorn sheep habitat as unsuitable (see page 3-678 of the FEIS). Adjacent areas that contained either unsuitable range or were not currently in domestic sheep allotments were also determined to be unsuitable to domestic sheep grazing. Table W-10 displays acreage information for each alternative on the Payette National Forest. All of the acres removed from suitability were within the Hells Canyon Management Area (MA) of the Payette National Forest; no other deductions in other portions of the Payette National Forest were considered. Total suitable acres include all suitable rangelands, both for cattle and domestic sheep. Bighorn habitat acres deducted included only acres from existing domestic sheep allotments that were determined to be unsuitable for domestic sheep grazing. Other suitable acres may be considered unsuitable for domestic sheep grazing but still suitable for cattle. Table W-10 contains differences in the numbers of acres than those shown in the FEIS, due to property adjustments and mapping refinement that have taken place since the Forest Plan (USDA Forest Service 2003) was released.

Table W-10. Payette National Forest Rangeland Suitability Acres by Alternative (Adapted from Table RR-9)

Criteria	Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Capable Acres	233,672	233,672	233,672	233,672	233,672	233,672	233,672
Bighorn Habitat Acres Deducted	0	0	6,113	6,113	0	6,113	0
Total Suitable Acres	**233,672**	**233,672**	**227,559**	**227,559**	**233,672**	**227,559**	**233,672**

Since the Forest Plan (USDA Forest Service 2003) alternatives contained only two effective alternatives, the effects to bighorn sheep from these alternatives will be analyzed in two groups: Alternatives 3, 4, and 6 and Alternatives 1B, 2, 5, and 7. Figure W-9c displays the spatial extent of the deduction in Alternatives 3, 4, and 6, overlain with the risk model and rated trailing routes.

Figure W-9c. Alternatives 3, 4, and 6 Overlain with Risk Model and Rated Trailing Routes



Under Alternatives 3, 4, and 6, a total of 82,003 acres—25,988 of which are currently within domestic sheep allotments—are no longer considered suitable for domestic sheep grazing.

To calculate the potential risk of contact, the 82,003 acres were overlain with the risk model, and the total relative risk for each polygon was compiled for the entire changed area encompassed by Alternatives 3, 4, and 6. This risk is not the percent risk of contact; it is the percent of the total relative risk that remains outside of the alternative. A risk ratio of the amount of relative risk remaining on the landscape to relative risk removed from the landscape was developed. The higher the absolute value of the ratios, the less risk posed by an alternative. Table W-11 presents the results for the potential risk of contact in Alternatives 3, 4, and 6, as well as Alternatives 1B, 2, 5, and 7.

Table W-11. Relative Risk of Contact on the Payette National Forest for Alternatives 3, 4, and 6 and Alternatives 1B, 2, 5, and 7

Alternative	Risk Removed (%)	Risk Remaining[1] (%)	Risk Ratio
1B, 2, 5, and 7	0	100	0
3, 4, and 6	11	89	0.12

[1] Outside of the alternative.

To further elucidate information about the risk posed by the alternatives, each was further evaluated by the amount of risk in high, moderate, and low risk categories that remained outside of the alternative. The risk data from the model were grouped into three even categories to represent the three corresponding levels of risk. Table W-12 displays those categories for Alternatives 3, 4, and 6, as well as Alternatives 1B, 2, 5, and 7.

Table W-12. Relative Risk Remaining on the Payette National Forest Outside of the Alternative by Risk Category for Alternatives 3, 4, and 6 and Alternatives 1B, 2, 5, and 7

Alternative	High Risk (%)	Moderate Risk (%)	Low Risk (%)
1B, 2, 5, and 7	100	100	100
3, 4, and 6	13	96	95

Alternative 3, 4, and 6 have 89 percent of the total relative risk remaining on the landscape in areas that are outside of the alternative, compared with 100 percent in Alternatives 1B, 2, 5, and 7. The overall risk ratio improves from 0 to 0.12. For Alternatives 3, 4, and 6, the relative risk remaining in areas outside of the alternative is 13 percent in the high category, compared with 100 percent for Alternatives 1B, 2, 5, and 7. Most of the potential risk of contact removed in Alternatives 3, 4, and 6 is in the high risk areas. However, 13 percent in the high risk category still leaves high risk on the landscape. A substantial amount of moderate and low risk areas remain in this alternative, but the change between alternatives is minimal. A substantial potential for the risk of contact remains in Alternatives 3, 4, and 6 due to the total relative risk and risk ratios mentioned above and the small percentage of high risk areas and the majority of the moderate and low risk areas that remain outside of the alternative.

No trailing routes are closed to domestic sheep use in Alternatives 3, 4, and 6. Therefore, no changes to the potential risk of contact between bighorn sheep and domestic sheep on or near trailing routes would occur in these alternatives, relative to Alternatives 1B, 2, 5, and 7. Figures W-1e and W-1g display telemetry and observational points located near the trailing routes, all of which were rams. Figures RR-3 and RR-4 (see *Rangeland Resources* section) show bighorn sheep habitat located near trailing routes. Figure W-9c shows these alternatives overlain with the rated trailing routes. Trailing routes with high, moderate, and low risk all remain outside of these alternatives. As indicated in the risk analysis (USDA Forest Service 2006a), a risk of contact exists, particularly along the Salmon River Driveway and the trailing routes along the main Salmon River and those to and from the main Salmon River and the east side allotments. These trailing routes were rated as high on the risk ratings map (Figure W-9c). This risk is unchanged in Alternatives 3, 4, and 6 and shows no decrease in risk from the current condition.

To further breakdown the changes in Alternatives 3, 4, and 6, the components of GPRs and source habitat are reviewed.

Geographic Population Range—Figure W-9a demonstrates the GPRs for the two metapopulations. The GPRs cover 1,172,564 acres (51 percent) of the Payette National Forest: 254,020 acres (11 percent of the Payette National Forest) comprises the Hells Canyon GPR and 918,544 acres (40 percent of the Payette National Forest) comprises the Salmon River GPR. Alternatives 3, 4, and 6 determine 82,003 acres (7 percent) of the GPRs to be unsuitable for domestic sheep grazing (i.e., inside the alternative), all of which are within the Hells Canyon GPR. Approximately 93 percent of the GPRs fall outside of this alternative: 68 percent of the Hells Canyon GPR and 100 percent of the Salmon River GPR (Table W-13).

Table W-13. Percentage of Geographic Population Ranges (GPRs) Affected by Alternatives 1B, 2, 5, and 7 and Alternatives 3, 4, and 6 on the Payette National Forest

Alternatives	Area Outside of the Alternative			Area Inside of the Alternative		
	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)
1B, 2, 5, and 7	100	100	100	0	0	0
3, 4, and 6	93	68	100	7	32	0

All acres considered unsuitable for domestic sheep grazing overlap with the modeled GPRs, which would facilitate protection of sheep whose populations overlap this area. However, 93 percent of the GPRs remain outside of the alternative, which is most of the current estimated occupied habitat, and no changes are proposed regarding domestic sheep grazing near the Salmon River Mountain metapopulation. In fact, 100 percent of this GPR remains outside of the alternative. The greater the overlap between domestic sheep grazing and bighorn sheep habitat, the greater the potential risk of contact, which according to appeal direction, threatens viability by allowing continued grazing of domestic sheep in or near occupied bighorn sheep habitat. Furthermore, these GPRs are based on "depressed" populations and would be expected to expand with population recovery. As demonstrated by

the modeled GPRs, bighorn sheep will travel long distances between habitat patches where they could encounter domestic sheep. Managing 93 percent of the GPR outside of the alternative leaves a substantial potential for the risk of contact within estimated current occupied habitat.

Source Habitat—A total of 29,021 acres (35 percent of the area covered by the alternative) of summer source habitat for bighorn sheep occur within the area determined to be unsuitable for domestic sheep grazing. This alternative determines 8 percent of total bighorn sheep summer source habitat on the Payette National Forest as unsuitable for domestic sheep grazing (i.e., inside of the alternative). However, 92 percent of total summer source habitat (source habitat across the entire Payette National Forest) remains outside of the alternative. A total of 25,824 acres (32 percent) of winter source habitat for bighorn sheep occurs within the unsuitable area, amounting to 13 percent of total bighorn sheep winter source habitat (source habitat across the entire Payette National Forest). However, 87 percent of total winter source habitat remains outside Alternatives 3, 4, and 6. Table W-14 contrasts the information presented between the alternatives.

Table W-14. Bighorn Sheep Source Habitat on the Payette National Forest for Alternatives 1B, 2, 5, and 7 and Alternatives 3, 4, and 6

Alternatives	Summer Source Habitat Inside of the Alternative		Winter Source Habitat Inside of the Alternative		Summer Source Habitat Outside of the Alternative (%)	Winter Source Habitat Outside of the Alternative (%)
	Acres	Percent	Acres	Percent		
1B, 2, 5, and 7	0	0	0	0	100	100
3, 4, and 6	29,021	8	25,824	13	92	87

Determining source habitat to be unsuitable for domestic sheep grazing eliminates some risk of contact; however, risk of contact remains from any overlap between source habitat and domestic sheep grazing or the travel corridors that bighorn sheep traverse between their naturally fragmented source habitats and domestic sheep grazing. The high amount of source habitat outside of this alternative leaves a high potential risk of contact on the landscape.

Summary—The risk model indicates that 89 percent of the total relative risk remains across the area outside of Alternatives 3, 4, and 6, with a risk ratio of 0.12. Some of what remains is high risk areas (13 percent), and most of what remains is in the moderate (96 percent) and low (95 percent) risk areas. Additionally, 93 percent of the GPRs, 92 percent of summer source habitat, and 87 percent of winter source habitat are outside of the alternative. All trailing routes are considered open to domestic sheep use. These alternatives have the potential for a high risk of contact between bighorn sheep and domestic sheep, although it is less than Alternative 7.

Alternatives Proposed to Modify Alternative 7

Alternative 7 was chosen to be implemented with the Forest Plan (USDA Forest Service 2003). To meet the appeal requirements related to the potential impacts of disease transmission from domestic sheep on the Payette National Forest, modifications to Alternative 7 are analyzed in this DSEIS to determine how they minimize the potential for

risk of contact between bighorn and domestic sheep and potentially reduce the risk of disease transmission. Each alternative is discussed below. Table W-15 displays the suitable acres deducted from suitability for bighorn sheep habitat by each proposed alternative that modifies Alternative 7. Total acres include all suitable rangeland for cattle and domestic sheep.

Table W-15. Payette National Forest Rangeland Suitability Acres by Alternative (Adapted from Table RR-9)

Criteria	Alt. 7	Alt. 7E	Alt. 7G	Alt. 7H	Alt. 7J	Alt. 7K	Alts. 3, 4, 6
Capable Acres[1]	233,672	233,672	233,672	233,672	233,672	233,672	233,672
Bighorn Habitat Acres Deducted	0	100,310	61,842	94,231	58,785	24,981	6,113
Total Suitable Acres	**233,672**	**133,362**	**171,830**	**139,441**	**174,887**	**208,691**	**227,559**

[1] Includes all suitable rangeland, for cattle and domestic sheep.

Alternative 7E on the Payette National Forest

Alternative 7E determines no areas on the Payette National Forest to be suitable for domestic sheep grazing. Figure W-9d displays the spatial extent of Alternative 7E overlain with the risk model and rated trailing routes.

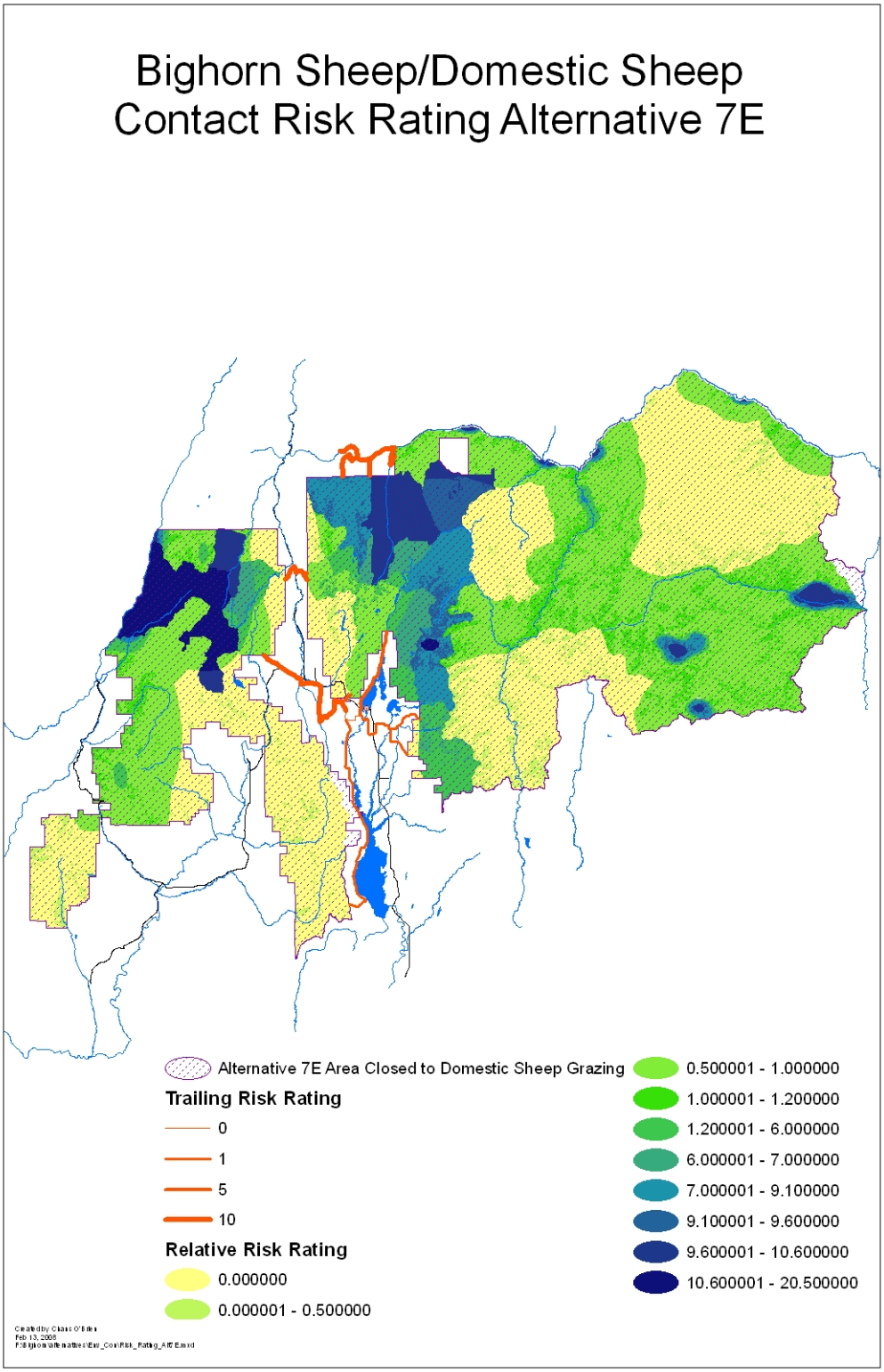
A total of 2,300,253 acres—490,476 currently within domestic sheep allotments—are no longer suitable for domestic sheep grazing. The 2,300,253 acres were overlain with the risk model, and the total relative risk for each polygon was compiled for the entire changed area encompassed by Alternative 7E. This risk is not the percent risk of contact; it is the percent of the total relative risk that remains outside of the alternative. Similar to the Forest Plan (USDA Forest Service 2003) alternatives analyzed above, a risk ratio of the amount of relative risk remaining on the landscape to relative risk removed from the landscape was developed (Table W-16). The higher the absolute value of the ratios, the less risk posed by an alternative.

Table W-16. Relative Risk of Contact on the Payette National Forest for Alternatives 7 and 7E

Alternative	Risk Removed (%)	Risk Remaining[1] (%)	Risk Ratio
7	0	100	0
7E	100	0	∞

[1] Outside of the alternative.

Figure W-9d. Alternative 7E Overlain with the Risk Model and Rated Trailing Routes



To further elucidate information about the risk posed by the alternatives, they were each evaluated according to the amount of risk remaining in the high, moderate, and low risk categories. The risk data from the model were grouped into three even categories to represent the three corresponding levels of risk (Table W-17).

Table W-17. Relative Risk Remaining on the Payette National Forest Outside of the Alternative by Risk Category for Alternatives 7 and 7E

Alternative	High Risk (%)	Moderate Risk (%)	Low Risk (%)
7	100	100	100
7E[1]	0	0	0

[1] Additional risk outside the boundaries of the Payette National Forest may still exist.

Alternative 7E retains zero percent of the total relative risk on the landscape, compared with 100 percent in Alternative 7. The overall risk ratio improves from zero to approaching infinity (∞). For Alternative 7E, the relative risk remaining is zero in all categories. The potential risk of contact between domestic and bighorn sheep, and subsequent potential for disease transmission, has been removed from Alternative 7E. However, this reduction in risk is only for the risk of contact within the boundaries of the Payette National Forest; additional risk that will be discussed in the cumulative effects can still exist.

All trailing routes across the Payette National Forest are closed to domestic sheep use in Alternative 7E. Therefore, the potential risk of contact between bighorn sheep and domestic sheep on or near trailing routes on the Payette National Forest is eliminated in this alternative. Trailing routes adjacent to the Payette National Forest pose a risk for potential contact, particularly those routes to and along the main Salmon River. Figures W-1e and W-1g display telemetry and observational points located near the trailing routes; all were rams. Figures RR-3 and RR-4 (see *Rangeland Resources* section) show the habitat located near trailing routes. Figure W-9d shows the alternative overlain with the rated trailing routes.

To further breakdown the changes proposed in Alternative 7E, the components of the GPRs and source habitat are reviewed.

Geographic Population Range—Figure W-9a demonstrates the GPRs for the two metapopulations. The GPRs cover 1,172,564 acres (51 percent) of the Payette National Forest: 254,020 acres (11 percent of the Payette National Forest) comprise the Hells Canyon GPR and 918,544 acres (40 percent of the Payette National Forest) comprise the Salmon River GPR. Alternative 7E determines 1,172,564 acres of land within the GPRs to be unsuitable for domestic sheep grazing (i.e., inside of the alternative), which comprises 100 percent of both GPRs. Thus, zero percent of the GPRs fall outside of this alternative: zero percent of the Hells Canyon GPR and zero percent of the Salmon River GPR (Table W-18).

Table W-18. Percentage of Geographic Population Ranges (GPRs) Affected by Alternatives 7 and 7E on the Payette National Forest

Alternatives	Area Outside of the Alternative			Area Inside of the Alternative		
	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)
7	100	100	100	0	0	0
7E	0	0	0	100	100	100

In Alternative 7E, the entire Payette National Forest is determined unsuitable for domestic sheep grazing, including the areas that overlap with modeled GPRs; therefore, this alternative protects sheep whose populations overlap this area and protects areas outside their current range. As previously demonstrated, bighorn sheep travel long distances between habitat patches and could encounter domestic sheep if these areas are within active domestic sheep allotments. This alternative decreases, to the highest extent possible, the potential risk of contact.

Source Habitat—A total of 379,609 acres (16.5 percent of the area covered by this alternative) of summer source habitat for bighorn sheep overlaps with the area inside of the alternative. This alternative determines 100 percent of total summer source habitat on the Payette National Forest as unsuitable for domestic sheep grazing (i.e., inside of the alternative) (Table W-19). A total of 196,172 acres (8.5 percent of the area covered by the alternative) of winter source habitat for bighorn sheep occurs within the area inside of the alternative, which accounts for 100 percent of total winter source habitat (Table W-19).

Table W-19. Bighorn Sheep Source Habitat on the Payette National Forest for Alternatives 7 and 7E

Alternatives	Summer Source Habitat Inside of the Alternative		Winter Source Habitat Inside of the Alternative		Summer Source Habitat Outside of the Alternative (%)	Winter Source Habitat Outside of the Alternative (%)
	Acres	Percent	Acres	Percent		
7	0	0	0	0	100	100
7E	379,609	100	196,172	100	0	0

Under this alternative, all source habitat and the travel corridors that bighorn sheep use to traverse between their naturally fragmented source habitats are inside of the alternative, thus eliminating all risk of contact on the Payette National Forest.

Summary—The risk model displays that zero percent of the total relative risk remains across the area outside of Alternative 7E, with a risk ratio approaching infinity (∞). No trailing routes are open and no risk remains on Payette National Forest lands in this alternative: zero percent on the GPRs, zero percent within summer source habitat, and zero percent within winter source habitat. This alternative eliminates, to the highest degree possible, the potential risk of contact between bighorn sheep and domestic sheep on the Payette National

Forest; it does not contain areas outside of the alternative within current occupied habitat and protects areas outside their current range.

Alternative 7G on the Payette National Forest

Alternative 7G utilizes the GPRs as boundaries and designates all land within the Hells Canyon and Salmon River GPRs as unsuitable for domestic sheep grazing. Figure W-9e displays the spatial extent of the deduction in Alternative 7G overlain with the risk model and the rated trailing routes.

A total of 1,172,564 acres—298,378 currently within domestic sheep allotments—is considered unsuitable (i.e., inside of the alternative) for domestic sheep grazing. These 1,172,565 acres were overlain with the risk model, and the total relative risk for each polygon was compiled for the entire changed area encompassed by Alternative 7G. This risk is not the percent risk of contact; it is the percent of the total relative risk that remains outside of the alternative. A risk ratio of the amount of relative risk remaining on the landscape to the amount removed from the landscape was developed (Table W-20). The higher the absolute value of the ratios, the less risk posed by an alternative.

Table W-20. Relative Risk of Contact on the Payette National Forest for Alternatives 7 and 7G

Alternative	Risk Removed (%)	Risk Remaining[1] (%)	Risk Ratio
7	0	100	0
7G	80	20	3.92

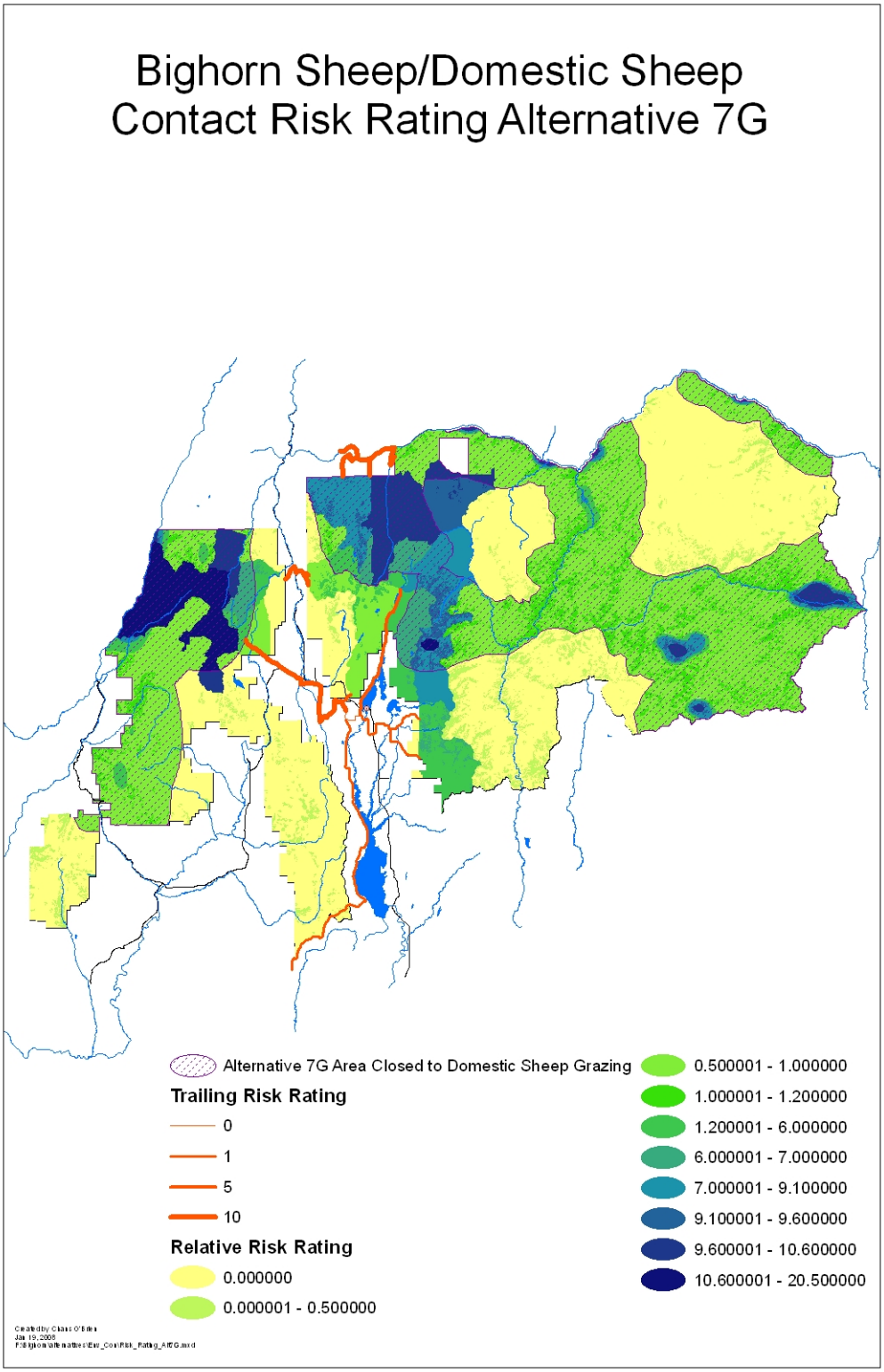
[1] Outside of the alternative.

To further elucidate information about the risk posed by the alternatives, each was further evaluated according to the amount of risk remaining in the high, moderate, and low risk categories. The risk data from the model were grouped into three even categories to represent the three corresponding levels of risk (Table W-21).

Table W-21. Relative Risk Remaining on the Payette National Forest Outside of the Alternative by Risk Category for Alternatives 7 and 7G

Alternative	High Risk (%)	Moderate Risk (%)	Low Risk (%)
7	100	100	100
7G	0	18	30

Figure W-9e. Alternative 7G Overlain with Risk Model and Rated Trailing Routes



Alternative 7G retains 20 percent of the total relative risk on the landscape in areas that are outside of the alternative, compared with 100 percent in Alternative 7. The overall risk ratio improves from 0 to 3.92. For Alternative 7G, the relative risk remaining in areas outside of the alternative is zero percent in the high category, compared to 100 percent in Alternative 7, indicating that all high risk areas are removed in Alternative 7G. However, 18 percent of moderate and 30 percent of low risk areas remain outside of the alternative, although much less than Alternative 7. The total relative risk and risk rations noted above and the small areas of low and moderate risk that remains outside of the alternative leave a risk of contact in Alternative 7G.

All trailing routes within the GPRs are closed to domestic sheep use in Alternative 7G. The entire Salmon River Driveway is also closed, regardless of grazing suitability areas. The potential risk of contact between bighorn sheep and domestic sheep on or near these trailing routes is eliminated in this alternative. Trailing routes rated as high, moderate, and low that cross the Payette National Forest remain open. The high-risk rated trailing routes adjacent to the Payette National Forest and the main Salmon River and along the main Salmon River remain open to domestic sheep use. Figures W-1e and W-1g display telemetry and observational points located near the trailing routes; these points were all rams. Figures RR-3 and RR-4 (see *Rangeland Resources* section) show bighorn sheep habitat located near trailing routes. Figure W-9e shows the alternative overlain with the rated trailing routes. Although the risk from trailing routes has decreased from Alternative 7, a considerable risk of contact potential remains because of trailing routes on and adjacent to the Payette National Forest that do remain open to domestic sheep.

To further breakdown the changes proposed in Alternative 7G, the components of the GPRs and source habitat are reviewed.

Geographic Population Range—Figure W-9a demonstrates the GPRs for the two metapopulations. The GPRs cover 1,172,564 acres (51 percent) of the Payette National Forest: 254,020 acres (11 percent of the Payette National Forest) comprise the Hells Canyon GPR and 918,544 acres (40 percent of the Payette National Forest) comprise the Salmon River GPR. Alternative 7G determines 1,172,564 acres to be unsuitable for domestic sheep grazing (i.e., inside of the alternative), which comprises 100 percent of both GPRs. The total percentage of bighorn sheep GPR that falls outside of this alternative is zero percent: zero percent of the Hells Canyon GPR and zero percent of the Salmon River GPR (Table W-22).

Table W-22. Percentage of Geographic Population Ranges (GPRs) Affected by Alternatives 7 and 7G on the Payette National Forest

Alternatives	Area Outside of the Alternative			Area Inside of the Alternative		
	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)
7	100	100	100	0	0	0
7G	0	0	0	100	100	100

Under Alternative 7G, 1,172,565 acres on the Payette National Forest are determined unsuitable for domestic sheep grazing; all of which are within the modeled GPRs. This alternative protects those sheep whose populations overlap this area. However, these GPRs are based on "depressed" populations and would be expected to expand with population recovery. As previously demonstrated, bighorn sheep will travel long distances between habitat patches where they could encounter domestic sheep if these areas were within active domestic sheep allotments. This alternative decreases the potential risk of contact, compared to Alternative 7.

Source Habitat—A total of 260,431 acres (22 percent of the area of the alternative) of summer source habitat for bighorn sheep overlaps with the area inside of the alternative. This alternative determines 69 percent of total summer source habitat on the Payette National Forest to be unsuitable for domestic sheep grazing (Table W-23). A total of 139,183 acres (12 percent of the area of the alternative) of winter source habitat for bighorn sheep overlaps with the area inside of the alternative, which amounts to 71 percent of total bighorn sheep winter source habitat (Table W-23).

Table W-23. Bighorn Sheep Source Habitat on the Payette National Forest for Alternatives 7 and 7G

Alternatives	Summer Source Habitat Inside of the Alternative		Winter Source Habitat Inside of the Alternative		Summer Source Habitat Outside of the Alternative (%)	Winter Source Habitat Outside of the Alternative (%)
	Acres	Percent	Acres	Percent		
7	0	0	0	0	100	100
7G	260,431	69	139,183	71	31	29

Determining nearly 70 percent of source habitat as unsuitable for domestic sheep grazing removes a significant portion of risk of contact. However, risk of contact remains from any overlap between source habitat and domestic sheep grazing or any overlap of travel corridors that bighorn sheep use to traverse between their naturally fragmented source habitats and domestic sheep grazing. The acres of source habitat outside of the alternative leave a risk of contact on the landscape for this alternative; but, risk is greatly reduced compared to Alternative 7.

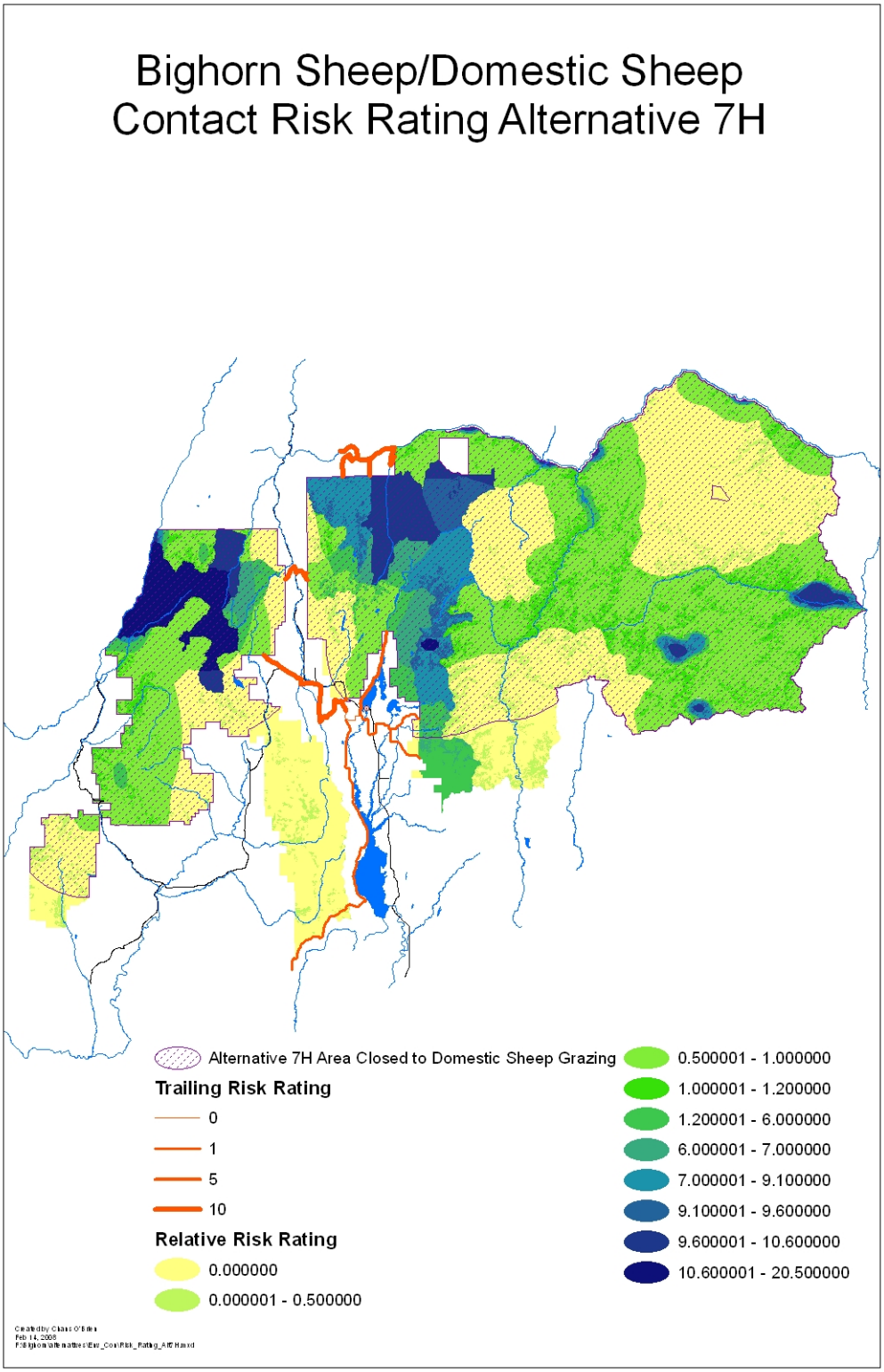
Summary—The risk model indicates that 20 percent of the total relative risk remains across the area outside of Alternative 7G, with an overall risk ratio of 3.92. None of what remains is in the high risk category, but 18 percent and 30 percent remain in the moderate and low risk categories, respectively. Additionally, zero percent of the GPRs, 31 percent of summer source habitat, and 29 percent of winter source habitat are outside of the alternative. Some trailing routes that pose a considerable potential for risk of contact remain open across the Payette National Forest. This alternative eliminates some of the highest possible potential for risk of contact between bighorn and domestic sheep on the Payette National Forest, but some level of risk remains. The amount of moderate risk and the remaining trailing routes is of particular concern. Eighteen percent of the risk that remains is in the moderate risk category, and high, moderate, and low risk trailing routes remain open to domestic sheep use. This alternative still retains a risk of contact between bighorn and domestic sheep, although the

risk is less than Alternative 7, and this alternative does not contain areas suitable for domestic sheep grazing within current occupied habitat.

Alternative 7H on the Payette National Forest

Alternative 7H utilizes the GPRs plus a 9 mile buffer as boundaries to determine areas unsuitable for domestic sheep grazing: no areas within the GPR or 9 mile buffer are considered suitable for potential domestic sheep grazing. Figure W-9f displays the spatial extent of Alternative 7H overlain with the risk model and the rated trailing routes.

Figure W-9f. Alternative 7H Overlain with Risk Model and Rated Trailing Routes



A total of 2,039,586 acres—459,644 currently within domestic sheep allotments—is no longer suitable domestic sheep grazing (i.e., inside of the alternative). The 2,039,586 acres were overlain with the risk model, and the total relative risk for each polygon was compiled for the entire changed area encompassed by Alternative 7H. This risk is not the percent risk of contact; it is the percent of the total relative risk that remains outside of the alternative. A risk ratio of the amount of relative risk remaining on the landscape to relative risk removed from the landscape was developed (Table W-24). The higher the absolute value of the ratios, the less risk posed by an alternative.

Table W-24. Relative Risk of Contact on the Payette National Forest for Alternatives 7 and 7H

Alternative	Risk Removed (%)	Risk Remaining[1] (%)	Risk Ratio
7	0	100	0
7H	96	4	25.63

[1] Outside of the alternative.

To further elucidate information about the risk posed by the alternatives, each alternative was evaluated according to the amount of risk remaining in the high, moderate, and low risk categories. The risk data from the model were grouped into three even categories to represent the three corresponding levels of risk (Table W-25).

Table W-25. Relative Risk Remaining on the Payette National Forest Outside of the Alternative by Risk Category for Alternatives 7 and 7H

Alternative	High Risk (%)	Moderate Risk (%)	Low Risk (%)
7	100	100	100
7H	0	0	12

Alternative 7H retains 4 percent of the total relative risk on the landscape in areas outside of the alternative, compared with 100 percent in Alternative 7, and the overall risk ratio improves from 0 to 25.63 (Table W-24). For Alternative 7H, the relative risk remaining in areas outside of the alternative is zero percent in the high and moderate categories, compared with Alternative 7, which is 100 percent in both of those categories. All of the potential risk of contact in the high and moderate risk categories is removed in Alternative 7H, along with the subsequent potential for disease transmission (Table W-25). However, the total relative risk mentioned above and the small amount of low risk areas (12 percent) that remain outside of the alternative retain a low potential for risk of contact.

In Alternative 7H, all trailing routes within the GPR and 9 mile buffer are closed to domestic sheep grazing, which closes the high- and moderate-rated trailing routes that cross the Payette National Forest. The potential risk of contact between bighorn sheep and domestic sheep on or near these trailing routes is eliminated in this alternative, relative to Alternative 7. However, trailing routes rated as low risk remain open to domestic sheep use on the Payette National Forest and the trailing route adjacent to the Payette National Forest and the main Salmon River and along the main Salmon River rated as high risk also remains

open. Figures W-1e and W-1g display telemetry and observational points located near the trailing routes; all were rams. Figures RR-3 and RR-4 (see *Rangeland Resources* section) show the habitat located near trailing routes. Figure W-9f shows this alternative overlain with the rated trailing routes. Although risk from trailing routes has greatly decreased from Alternative 7, a small potential risk of contact remains because of trailing routes on and adjacent to the Payette National Forest that do remain open.

To further breakdown the changes proposed in Alternative 7H, the components of GPRs and source habitat are reviewed.

Geographic Population Range—Figure W-9a demonstrates the GPRs for the two metapopulations. The GPRs cover a combined 1,172,564 acres (51 percent) of the Payette National Forest: 254,020 acres (11 percent of the Payette National Forest) comprise the Hells Canyon GPR and 918,544 acres (40 percent of the Payette National Forest) comprise the Salmon River GPR. Alternative 7H determines 1,172,564 acres of area within the GPRs as unsuitable for domestic sheep grazing (i.e., inside of the alternative), which comprises 100 percent of both GPRs. The total percentage of bighorn sheep GPR that falls outside this alternative is zero percent: zero percent of the Hells Canyon GPR and zero percent of the Salmon River GPR (Table W-26).

Table W-26. Percentage of Geographic Population Ranges (GPRs) Affected by Alternatives 7 and 7H on the Payette National Forest

Alternatives	Area Outside of the Alternative			Area Inside of the Alternative		
	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)
7	100	100	100	0	0	0
7H	0	0	0	100	100	100

Under Alternative 7H, 2,039,586 acres on the Payette National Forest are considered unsuitable for domestic sheep grazing (i.e., inside of the alternative)—all of the area within the GPRs. This alternative protects those sheep whose populations overlap this area. However, these GPRs are based on "depressed" populations and would be expected to expand with population recovery. This alternative also provides a buffer that determines the 9 miles around each GPR as unsuitable for domestic sheep grazing and further decreases the risk around the GPR. As previously demonstrated, bighorn sheep will travel long distances between habitat patches where they could encounter domestic sheep if these areas are within active domestic sheep allotments. This alternative represents a substantial decrease in the potential risk of contact, compared to Alternative 7.

Source Habitat—A total of 347,563 acres (17 percent of the area covered by the alternative) of summer source habitat for bighorn sheep overlaps with the area inside of the alternative. This alternative will remove 92 percent of total bighorn sheep summer source habitat on the Payette National Forest from suitability (Table W-27). A total of 181,668 acres (9 percent of the area covered by the alternative) of winter source habitat for bighorn sheep overlaps with

the area inside of the alternative, which amounts to 93 percent of total bighorn sheep winter source habitat (Table W-27).

Table W-27. Bighorn Sheep Source Habitat on the Payette National Forest for Alternatives 7 and 7H

Alternatives	Summer Source Habitat Inside of the Alternative		Winter Source Habitat Inside of the Alternative		Summer Source Habitat Outside of the Alternative (%)	Winter Source Habitat Outside of the Alternative (%)
	Acres	Percent	Acres	Percent		
7	0	0	0	0	100	100
7H	347,563	92	181,668	93	8	7

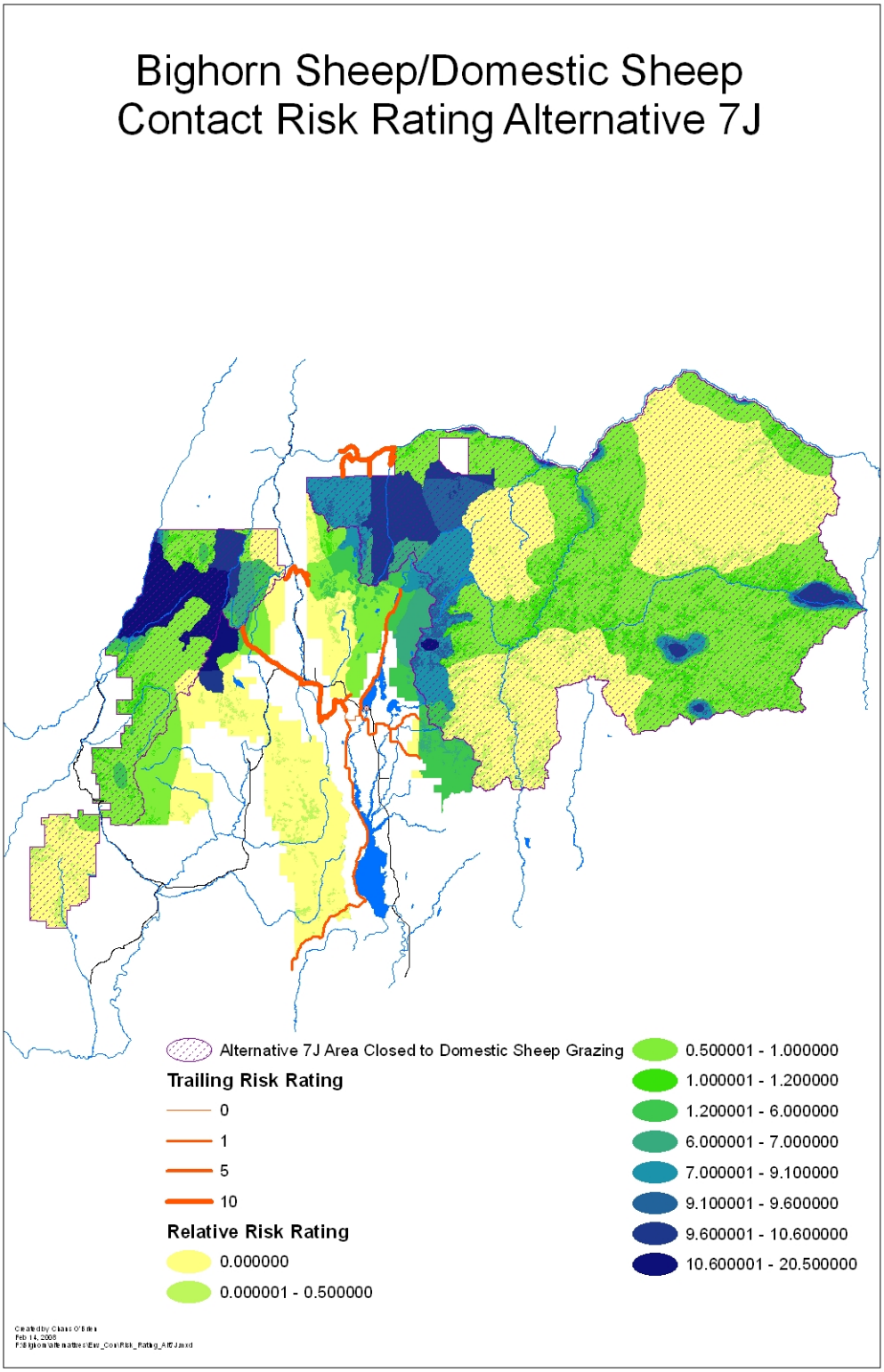
Most of the risk of contact on the Payette National Forest is eliminated in this alternative by considering most of the source habitat as unsuitable for domestic sheep grazing. A risk of contact results from any overlap between source habitat and domestic sheep grazing and any overlap between the travel corridors that bighorn sheep traverse between their naturally fragmented source habitats and domestic sheep grazing. The small amount of source habitat within areas outside this alternative leaves a relatively small risk of contact on the landscape, but risk is substantially reduced compared with Alternative 7.

Summary—The risk model indicates that 4 percent of the total relative risk remains across the area outside of Alternative 7H, with an overall risk ratio of 25.63. None of the remaining risk is in the high or moderate risk category, but 12 percent of the low risk category remains. Additionally, zero percent of the GPRs, 8 percent of summer source habitat, and 7 percent of winter source habitat are outside of the alternative. Low risk trailing routes remain open to domestic sheep use on the Payette National Forest. This alternative eliminates most of the highest possible potential for risk of contact between bighorn and domestic sheep on the Payette National Forest, but a small level of risk still remains. The small level of remaining risk is in the low risk category and the remaining trailing routes. This alternative has a minimal potential for risk of contact between bighorn and domestic sheep that is greatly decreased from Alternative 7. This alternative does not consider areas within current occupied habitat to be suitable for domestic sheep grazing, and it provides a 9 mile buffer to that habitat.

Alternative 7J on the Payette National Forest

Alternative 7J utilizes watershed divides to determine areas unsuitable for domestic sheep grazing: no areas within those boundaries are considered suitable for domestic sheep grazing. Figure W-9g displays the spatial extent of the reduction in Alternative 7J overlain with the risk model and the rated trailing routes.

Figure W-9g. Alternative 7J Overlain with Risk Model and Rated Trailing Routes



A total of 1,837,441 acres—311,428 currently within domestic sheep allotments—are no longer suitable for domestic sheep grazing (i.e., inside of the alternative). The 1,837,441 acres were overlain with the risk model, and the total relative risk for each polygon was compiled for the entire changed area encompassed by Alternative 7J. This risk is not the percent risk of contact; it is the percent of the total relative risk that remains outside of the alternative. A risk ratio of the amount of relative risk remaining on the landscape to relative risk removed from the landscape was developed (Table W-28). The higher the absolute value of the ratios, the less risk posed by an alternative.

Table W-28. Relative Risk of Contact on the Payette National Forest for Alternatives 7 and 7J

Alternative	Risk Removed (%)	Risk Remaining[1] (%)	Risk Ratio
7	0	100	0
7J	83	17	4.92

[1] Outside of the alternative.

To further elucidate information about the risk posed by the alternatives, each was further evaluated according to the amount of risk remaining in the high, moderate, and low risk categories. The risk data from the model were grouped into three even categories to represent the three corresponding levels of risk (Table W-29).

Table W-29. Relative Risk Remaining on the Payette National Forest Outside of the Alternative by Risk Category for Alternatives 7 and 7J

Alternative	High Risk (%)	Moderate Risk (%)	Low Risk (%)
7	100	100	100
7J	0	9	35

Alternative 7J retains 17 percent of the total relative risk on the landscape outside of the alternative, compared with 100 percent in Alternative 7. The overall risk ratio improves from 0 to 4.92. For Alternative 7J, the relative risk remaining in the area outside of the alternative is zero percent in the high category, compared to 100 percent in Alternative 7. However, a small amount of moderate (9 percent) and somewhat higher amount of low risk (35 percent) areas remains outside of the alternative, although a large portion of both moderate and low risk has been removed, compared to Alternative 7. A potential for risk of contact remains in Alternative 7J due to the total relative risk and risk ratio noted above and the small percentage of moderate and low risk areas that remain outside of this alternative.

All trailing routes within the areas determined unsuitable for domestic sheep grazing are closed in Alternative 7J. The entire Salmon River Driveway is also closed, regardless of grazing suitability. The potential risk of contact between bighorn and domestic sheep on or near these trailing routes is eliminated, relative to Alternative 7. Trailing routes crossing the Payette National Forest remain open to domestic sheep use; some routes rated as high, moderate, and low.

The trailing routes rated as high risk adjacent to the Payette National Forest and the main Salmon River and along the main Salmon River also remain open to domestic sheep use. Figures W-1e and W-1g display telemetry and observational points located near the trailing routes; all were rams. Figures RR-3 and RR-4 (see *Rangeland Resources* section) show the habitat located near trailing routes. Figure W-9g shows Alternative 7J overlain with the rated trailing routes. Although risk from trailing routes is greatly decreased from Alternative 7, a small potential risk of contact remains because of trailing routes on and adjacent to the Payette National Forest that remain open to domestic sheep use.

To further breakdown the changes proposed in Alternative 7J, the components of GPRs and source habitat are reviewed.

Geographic Population Range—Figure W-9a demonstrates the GPRs for the two metapopulations. The GPRs cover a combined 1,172,564 acres (51 percent) of the Payette National Forest: 254,020 acres (11 percent of the Payette National Forest) comprise the Hells Canyon GPR and 918,544 acres (40 percent of the Payette National Forest) comprise the Salmon River GPR. Alternative 7J determines 1,087,933 acres—93 percent of both GPRs—as unsuitable for domestic sheep grazing (i.e., inside of the alternative). The percentage of total bighorn sheep GPR that falls outside this alternative is 7 percent: 15 percent of the Hells Canyon GPR and 5 percent of the Salmon River GPR (Table W-30).

Table W-30. Percentage of Geographic Population Ranges (GPRs) Affected by Alternatives 7 and 7J on the Payette National Forest

Alternatives	Area Outside of the Alternative			Area Inside of the Alternative		
	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)
7	100	100	100	0	0	0
7J	7	15	5	93	85	95

Under Alternative 7J, 1,837,441 acres on the Payette National Forest are considered unsuitable for domestic sheep grazing (i.e., inside of the alternative), including a large portion of the areas that overlap with modeled GPRs. This alternative protects those bighorn sheep whose populations overlap this portion of the area. Overall, 7 percent of bighorn sheep GPRs still overlap with areas outside of this alternative, which is current estimated occupied habitat. The greater this overlap, the greater the potential for risk of contact, which according to appeal direction, threatens bighorn sheep viability by allowing continued grazing of domestic sheep in or near occupied bighorn sheep habitat. Furthermore, these GPRs are based on “depressed” populations and would be expected to expand with population recovery. As previously demonstrated, bighorn sheep will travel long distances between habitat patches where they could encounter domestic sheep. Managing 7 percent of the GPR as outside of the alternative leaves a portion of the risk of contact within estimated occupied habitat.

Source Habitat—A total of 330,510 acres (18 percent of the area covered by the alternative) of summer source habitat for bighorn sheep overlaps with the area inside of the alternative. This alternative will remove suitability from 87 percent of total bighorn sheep summer source habitat on the Payette National Forest (Table W-31). A total of 177,015 acres (10 percent of the area covered by the alternative) of winter source habitat for bighorn sheep overlaps with the area inside of the alternative, which amounts to 90 percent of total bighorn sheep winter source habitat (Table W-31).

Table W-31. Bighorn Sheep Source Habitat on the Payette National Forest for Alternatives 7 and 7J

Alternatives	Summer Source Habitat Inside of the Alternative		Winter Source Habitat Inside of the Alternative		Summer Source Habitat Outside of the Alternative (%)	Winter Source Habitat Outside of the Alternative (%)
	Acres	Percent	Acres	Percent		
7	0	0	0	0	100	100
7J	330,510	87	177,015	90	13	10

A large portion of the risk of contact is eliminated in this alternative by determining close to 90 percent of the source habitat as unsuitable for domestic sheep grazing. However, a risk of contact results from any overlap between source habitat and domestic sheep grazing or from any overlap of the travel corridors that bighorn sheep traverse between their naturally fragmented source habitats and domestic sheep grazing. The small amount of source habitat within areas outside this alternative leaves a relatively small risk of contact on the landscape; the risk is greatly reduced compared to Alternative 7.

Summary—The risk model indicates that 17 percent of the total relative risk remains across the area outside Alternative 7J, with an overall risk ratio of 4.92. None of what remains is in the high risk category, but 9 percent and 35 percent remain in the moderate and low risk categories, respectively. Additionally, 7 percent of the GPRs, 13 percent of summer source habitat, and 10 percent of winter source habitat remain outside of the alternative. Some trailing routes are closed, but others across the Payette National Forest remain open, which poses a considerable potential for risk of contact. This alternative eliminates some of the highest possible potential for risk of contact between bighorn and domestic sheep on the Payette National Forest, but some level of risk remains. Of particular concern are the portions of GPRs that remain outside of the alternative (15 percent and 5 percent for the Hells Canyon GPR and Salmon River GPR, respectively), the amount of moderate risk and low risk areas that remain on the landscape, and the trailing routes that remain open to domestic sheep use—9 percent of the risk that remains is in the moderate risk area, and trailing routes rated as high, moderate, and low risk remain suitable for domestic sheep use. This alternative has the potential for risk of contact between bighorn and domestic sheep and contains areas open to domestic sheep within current occupied habitat, although the level of risk is less than Alternative 7.

Alternative 7K on the Payette National Forest

Alternative 7K implements recent court settlements to determine areas that are unsuitable for domestic sheep grazing and closely reflect grazing practices on the Payette National Forest for 2007 and 2008. Figure W-9h displays the spatial extent of the deduction in Alternative 7K overlain with the risk model and the rated trailing routes.

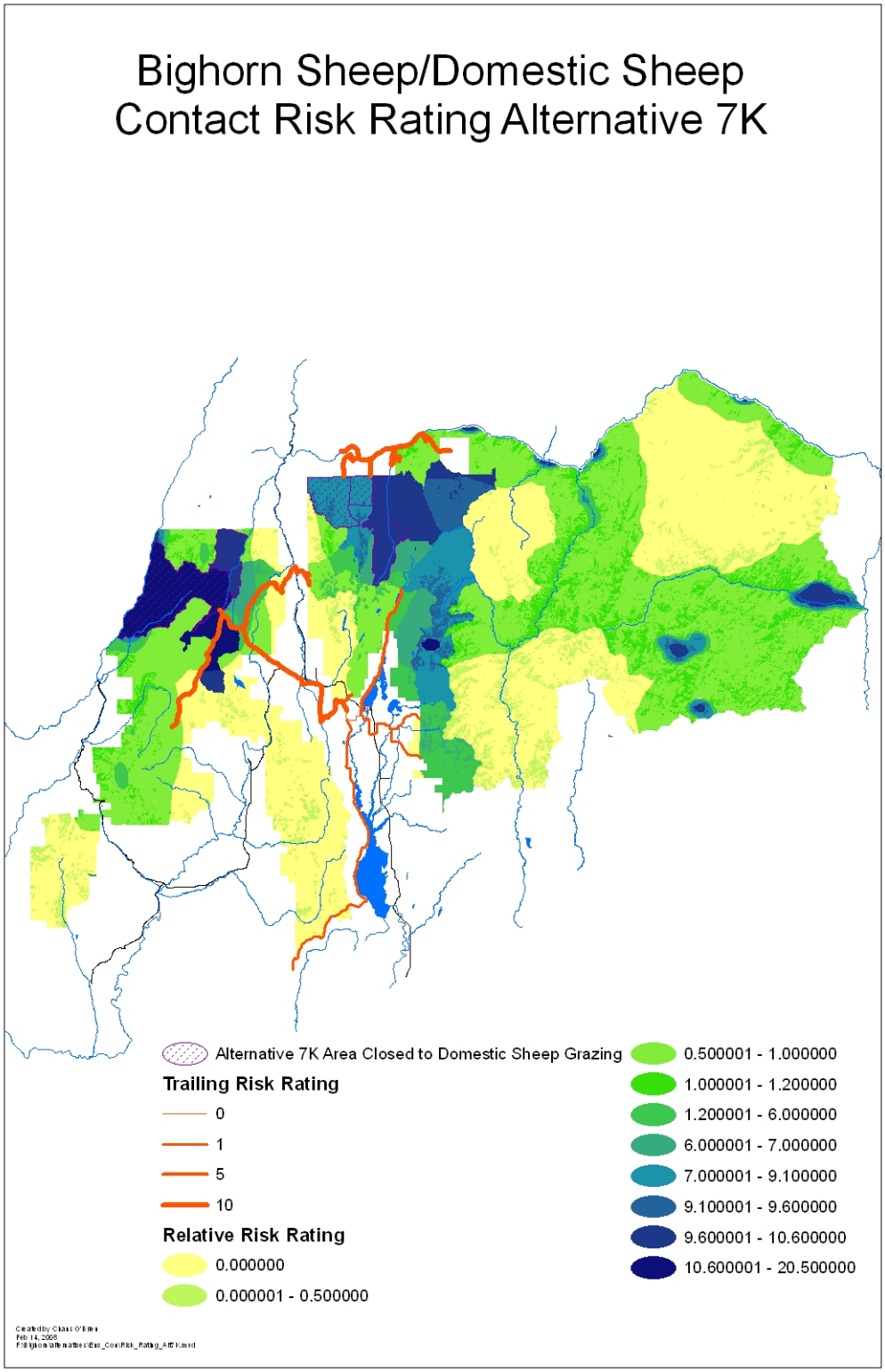
A total of 122,231 acres—122,198 currently within domestic sheep allotments—are no longer suitable for domestic sheep grazing (i.e., inside of the alternative). The 122,231 acres were overlain with the risk model and the total relative risk for each polygon was compiled for the entire changed area encompassed by Alternative 7K. This risk is not the percent risk of contact; it is the percent of the total relative risk that remains outside of the alternative. A risk ratio of the amount of relative risk remaining on the landscape to the amount of relative risk remaining on the landscape was developed (Table W-32). The higher the absolute value of the ratios, the less risk posed by an alternative.

Table W-32. Relative Risk of Contact on the Payette National Forest for Alternatives 7 and 7K

Alternative	Risk Removed (%)	Risk Remaining[1] (%)	Risk Ratio
7	0	100	0
7K	28	72	0.39

[1] Outside of the alternative.

Figure W-9h. Alternative 7K Overlain with Risk Model and Rated Trailing Routes



To further elucidate information about the risk posed by the alternatives, each was further evaluated according to the amount of risk remaining in the high, moderate, and low risk categories. The risk data from the model were grouped into three even categories to represent the three corresponding levels of risk for Alternative 7K (Table W-33).

Table W-33. Relative Risk Remaining on the Payette National Forest Outside of the Alternative by Risk Category for Alternatives 7 and 7K

Alternative	High Risk (%)	Moderate Risk (%)	Low Risk (%)
7	100	100	100
7K	5	65	100

Alternative 7K retains 72 percent of the total relative risk on the landscape in areas outside of the alternative, compared with 100 percent in Alternative 7. The overall risk ratio improves from 0 to 0.39. For Alternative 7K, 5 percent of the area outside of the alternative remains in the high risk category, compared with Alternative 7, which is 100 percent. Most of the potential risk of contact removed in Alternative 7K is in the high risk areas. However, 5 percent in the high risk category still leaves a high risk on the landscape. A substantial amount of moderate (65 percent) and low (100 percent) risk areas remain in this alternative. A substantial potential for the risk of contact in Alternative 7K remains, due to the total relative risk and risk ratios noted above and the small percentage of high, moderate, and low risk areas that remain.

All trailing routes that intersect with areas considered unsuitable for domestic sheep grazing are closed to domestic sheep use in Alternative 7K, except for the Salmon River Driveway, which remains open to the junction with Hornet Creek Road (see Figure W-9h). The high risk portion of the Salmon River Driveway in the Cuddy Mountain area is closed, reducing the risk in this area. The potential risk of contact between bighorn and domestic sheep on or near these trailing routes is eliminated in this alternative, relative to Alternative 7. However, trailing routes rated as high, medium, and low risk still cross the Payette National Forest. The high risk trailing routes adjacent to the Payette National Forest that lead to the main Salmon River and routes along the main Salmon River remain open. Figures W-1e and W-1g display telemetry and observational points located near the trailing routes; all were rams. Figures RR-3 and RR-4 (see *Rangeland Resources* section) show the habitat located near trailing routes. Figure W-9h shows this alternative overlain with the rated trailing routes. Although risk decreases from the removal of trailing routes when compared with Alternative 7, a substantial potential risk of contact is still present. The risk of contact results from the trailing routes on and adjacent to the Payette National Forest that remain outside this alternative.

To further breakdown the proposed changes in Alternative 7K, the components of GPRs and source habitat are reviewed.

Geographic Population Range—Figure W-9a demonstrates the GPRs for the two metapopulations. The GPRs cover a combined 1,172,564 acres (51 percent) of the Payette National Forest: 254,020 acres (11 percent of the Payette National Forest) comprise the

Hells Canyon GPR and 918,544 acres (40 percent of the Payette National Forest) comprise the Salmon River GPR. Alternative 7K determines 122,231 acres—10 percent of both GPRs—as unsuitable for domestic sheep grazing (i.e., inside of the alternative). The total percentage of bighorn sheep GPR that falls outside this alternative is 90 percent: 73 percent of the Hells Canyon GPR and 94 percent of the Salmon River GPR (Table W-34).

Table W-34. Percentage of Geographic Population Ranges (GPRs) Affected by Alternatives 7 and 7K on the Payette National Forest

Alternatives	Area Outside of the Alternative			Area Inside of the Alternative		
	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)
7	100	100	100	0	0	0
7K	90	73	94	10	27	6

Under Alternative 7K, 122,231 acres on the Payette National Forest is considered unsuitable for domestic sheep grazing, including a portion of the area that overlaps with modeled GPRs. This alternative protects sheep whose populations overlap this portion of the area. However, 90 percent of bighorn sheep GPRs still overlap with areas outside this alternative, which accounts for most of the current estimated occupied habitat. The greater this overlap, the greater the potential for the risk of contact, which according to appeal direction threatens bighorn sheep viability by allowing continued grazing of domestic sheep in or near occupied bighorn sheep habitat. Furthermore, these GPRs are based on "depressed" populations and would be expected to expand with population recovery. As previously demonstrated, bighorn sheep will travel long distances between habitat patches where they could encounter domestic sheep. Managing 90 percent of the GPR outside this alternative leaves a substantial portion of the potential risk of contact within estimated current occupied habitat.

Source Habitat—A total of 25,345 acres (21 percent of the area covered by the alternative) of summer source habitat for bighorn sheep overlaps with the area inside of the alternative. This alternative determines 7 percent of total bighorn sheep summer source habitat on the Payette National Forest as unsuitable for domestic sheep grazing (Table W-35). A total of 15,206 acres (12 percent of the area covered by the alternative) of winter source habitat for bighorn sheep overlaps with the area inside of the alternative, which amounts to 8 percent of the total bighorn sheep winter source habitat (Table W-35).

Table W-35. Bighorn Sheep Source Habitat on the Payette National Forest for Alternatives 7 and 7K

Alternatives	Summer Source Habitat Inside of the Alternative		Winter Source Habitat Inside of the Alternative		Summer Source Habitat Outside of the Alternative (%)	Winter Source Habitat Outside of the Alternative (%)
	Acres	Percent	Acres	Percent		
7	0	0	0	0	100	100
7K	25,345	7	15,206	8	93	92

Some portion of the risk of contact on the Payette National Forest is eliminated in this alternative by determining source habitat to be unsuitable for domestic sheep grazing. However, a risk of contact results from any overlap between source habitat and domestic sheep grazing or from any overlap of travel corridors that bighorn sheep traverse between their naturally fragmented source habitats and domestic sheep grazing. The high amount of source habitat outside this alternative leaves a high potential for risk of contact on the landscape.

Summary—The risk model indicates that 72 percent of the total relative risk remains across the area outside of Alternative 7K, with a risk ratio of 0.39. Some of what remains is in the high risk category (5 percent), although most of what remains is in the moderate (65 percent) and low (100 percent) risk categories. Additionally, 90 percent of the GPRs, 93 percent of summer source habitat, and 92 percent of winter source habitat remain outside of the alternative. Trailing routes that pose a considerable potential for the risk of contact remain open to domestic sheep use across the Payette National Forest. This alternative eliminates some of the potential for risk of contact between bighorn and domestic sheep on the Payette National Forest, but a high level of risk remains. The amount of high, moderate, and low risk areas that remains on the landscape and the trailing routes that remain open to domestic sheep use is of particular concern. This alternative has the potential for a high risk of contact between bighorn and domestic sheep, although the risk is less than Alternative 7.

Comparison of the Alternatives

Ranking of the Alternatives

The following tables compare and contrast the information presented above for all of the alternatives. Table W-36 displays the changes by alternative to suitability and allotments that remain outside of the alternatives.

Table W-36. Areas Determined Unsuitable for Domestic Sheep Grazing (Inside of the Alternative) on the Payette National Forest

Alternative	Unsuitable for Domestic Sheep Grazing			Current Allotments Remaining Open (%)	Rank for Effects to Domestic Sheep Grazing[1]
	Total Acres	Acres Within Current Domestic Sheep Allotments	Suitable Acres		
1B, 2, 5, and 7	0	5,288	0	100	1
3, 4, and 6	82,002	25,988	6,113	95	2
7E	2,300,253	490,476	100,310	0	7
7G	1,172,565	298,378	61,842	39	4
7H	2,039,586	459,644	94,231	6	6
7J	1,837,441	311,428	58,785	37	5
7K	122,231	122,198	24,981	75	3

[1] Ranked 1 through 7, with 1 having the least effect and 7 having the greatest effect.

Alternatives 3, 4, and 6 and Alternative 7K (of the modified Alternative 7 alternatives) have the least effect on acres available to domestic sheep grazing. Alternative 7E and 7H have the greatest effect. Other alternatives have an intermediate effect.

Frank Church River of No Return Wilderness

The alternatives vary in how they treat the area of the Frank Church River of No Return Wilderness area that is administered by the Payette National Forest. In some alternatives, the wilderness is considered unsuitable for domestic sheep grazing (i.e., inside of the alternative); in others, the wilderness is outside or partially outside of the alternative. However, after alternative development was complete, it was discovered that, although the Wilderness Act of 1964 does not prohibit range suitability for domestic animal grazing, Forest Service policy regarding the area administered by the Payette National Forest is that as commercial livestock allotments are closed, the area would be removed from future range suitability. Therefore, the entire Payette National Forest portion of the Frank Church River of No Return Wilderness area has been removed from suitability for commercial livestock grazing, although pack animals are permitted. The overall ranking of alternatives does not change from including the wilderness area as suitable for domestic sheep grazing, but the actual amount of total risk for bighorn sheep may differ (Table W-37).

Table W-37. Relative Risk of Contact on the Payette National Forest and Outside the Frank Church Wilderness Area for all Alternatives

Alternative	Total Risk Removed (%)	Risk Remaining on Landscape (%)	Risk Ratio for All Acres	Risk Ratio for All Acres Outside of the Frank Church Wilderness	Rank for Minimizing Potential of Contact[1]
1B, 2, 5, and 7	0	100	0	0	7
3, 4, and 6	11	89	0.12	0.15	6
7E	100	0	∞	∞	1
7G	80	20	3.92	3.20	4
7H	96	4	25.63	21.63	2
7J	83	17	4.92	4.03	3
7K	28	72	0.39	0.50	5

[1] Ranked 1 through 7, with 1 minimizing the potential for contact the most and 7 minimizing the potential for contact the least.

Alternative 7E reduces the potential risk of contact between domestic and bighorn sheep the most, since all areas and trailing routes within the Payette National Forest boundaries are closed to domestic sheep use. Alternative 7H is the next alternative that reduces risk the most, with a risk ratio of 25.63 and only 4 percent of the total risk remaining on areas outside of the alternative. Alternatives 7J and 7G are intermediate choices for reducing the potential risk of contact. Note that eliminating the wilderness as suitable acres for domestic sheep in all alternatives does not change the rankings; however, it does narrow the gap in risk ratios between some alternatives, primarily 7J and 7G, and widen the gap between 7K and Alternatives 3, 4, and 6. Alternatives 7K and 3, 4, and 6 have the lowest risk ratios and leave the highest amount of risk on the landscape.

Alternative 7E minimizes the potential risk of contact to the highest degree by leaving no areas on the Payette National Forest suitable for domestic sheep grazing. Alternative 7H leaves 4 percent of the total relative risk outside the alternative. Alternatives 7G and 7J are intermediate in their potential risk of contact: Alternative 7G has more risk due to the higher amount of moderate risk that remains on the landscape while 7J leaves some moderate risk, but more of the risk that remains is distributed to the low risk category. Alternatives 7K and 3, 4, and 6 pose the highest risk by leaving a high potential for risk of contact, large amounts of moderate risk areas, and even larger amounts of low risk areas. Each alternative can be ranked according to the percentage of high, moderate, and low risk areas that remain (Table W-38).

Table W-38. Relative Risk Remaining on the Payette National Forest Outside of the Alternative by Risk Category for all Alternatives

Alternative	Percentage Remaining Outside of the Alternative			Risk According to Percentage Remaining Outside of the Alternative		
	High Risk (%)	Moderate Risk (%)	Low Risk (%)	High Risk Remaining	Moderate Risk Remaining	Low Risk Remaining
1B, 2, 5, and 7	100	100	100	4	6	6
3, 4, and 6	13	96	95	3	5	5
7E	0	0	0	1	1	1
7G	0	18	30	1	3	3
7H	0	0	12	1	1	2
7J	0	9	35	1	2	4
7K	5	65	100	2	4	6

[1] Alternatives ranked with a 1 have the least amount of risk remaining.

According to appeal direction, viability is threatened by allowing continued grazing of domestic sheep in or near occupied bighorn sheep habitat and the alternatives vary by the amount of occupied habitat they consider unsuitable for domestic sheep grazing (Table W-39). Only Alternatives 7E, 7G, and 7H determine occupied habitat, as defined by the GPRs, as unsuitable for domestic sheep grazing. Alternatives 7E and 7H also buffer the GPRs adjacent to current occupied habitat, further minimizing the potential risk of contact from either stray domestic sheep or bighorn sheep that may not conform to modeled occupied habitat. Alternative 7J allows some areas within the GPRs to be outside of the alternative, with a higher area of the Hells Canyon GPR outside of the alternative. Alternatives 7K and 3, 4, and 6 both leave a large amount of the GPRs outside of the alternatives.

Table W-39. Geographic Population Ranges (GPR) Outside of Each Alternative on the Payette National Forest

Alternative	Outside of Alternative			Rank According to Percentage Outside of Each Alternative		
	Total GPR (%)	Hells Canyon GPR (%)	Salmon River GPR (%)	Total GPR	Hells Canyon GPR	Salmon River GPR
1B, 2, 5, and 7	100	100	100	5	5	4
3, 4, and 6	93	68	100	4	3	3
7E	0	0	0	1	1	1
7G	0	0	0	1	1	1
7H	0	0	0	1	1	1
7J	7	15	5	2	2	2
7K	90	73	94	3	4	3

The last comparison is of source habitat that each alternative leaves outside of the alternative (Table W-40). Alternative 7E leaves no source habitat outside of the alternative, and Alternative 7H leaves 8 percent and 7 percent of summer and winter source habitat, respectively, outside of the alternative. Alternative 7J leaves slightly more source habitat outside of the alternative and Alternative 7G leaves even more. Alternatives 7K and 3, 4, and 6 both leave a large amount of source habitat outside of the alternatives.

Table W-40. Bighorn Sheep Source Habitat on the Payette National Forest for all Alternatives

Alternative	Remaining Outside of the Alternative				Rank for Source Habitat Left Outside of the Alternative	
	Summer Source Habitat (%)	Summer Source Habitat (Acres)	Winter Source Habitat (%)	Winter Source Habitat (Acres)	Summer Source Habitat	Winter Source Habitat
1B, 2, 5, and 7	100	0	100	0	7	7
3, 4, and 6	92	29,021	87	25,021	5	5
7E	0	379,609	0	196,172	1	1
7G	31	260,431	29	139,183	4	4
7H	8	347,563	7	181,668	2	2
7J	13	330,510	10	177,015	3	3
7K	93	25,345	92	15,206	6	6

The trailing routes that remain open in each alternative also differed. Alternative 7E left no trailing routes open to domestic sheep use, thus eliminating the risk of contact from trailing routes on the Payette National Forest. Alternative 7H determined all high and moderate risk rated trailing routes to be closed to domestic sheep use, but some low risk trailing routes remained open. Alternatives 7G and 7J determined some of the high risk trailing routes to be closed to domestic sheep use; but other high, moderate, and low risk trailing routes remained

open, with their subsequent risk of contact. Alternative 7K also considers some high risk trailing routes as closed but leaves more high, moderate, and low risk trailing routes open to domestic sheep use than Alternatives 7G or 7J. The risk of contact in Alternative 7K from trailing routes is somewhat higher than for Alternatives 7G or 7J. Alternatives 3, 4, and 6 and Alternative 7 (and 1B, 2, and 5) leave all trailing routes open to domestic sheep use.

Compliance with the Hells Canyon National Recreation Area Act

The Forest Plan (USDA Forest Service 2003) had an appeal issue related to the consistency between language in the HCNRA Act and its implementing regulations (36 CFR 292.48) and maintaining domestic sheep grazing because of the risk of disease transmission (USDA Forest Service 2006a).

The following determinations have been made regarding compatibility with the HCNRA Act and the HCNRA Comprehensive Management Plan (CMP) for the action alternatives analyzed for this DSEIS.

Alternatives 7G, 7E, and 7H

All three of these alternatives eliminate domestic sheep grazing from the Payette National Forest system lands within the boundary of the HCNRA. They also eliminate domestic sheep grazing at least six 6 air miles from the boundary of the HCNRA.

Eliminating domestic sheep grazing in the HCNRA and surrounding area is compatible with the HCNRA Act and its implementing regulations by providing for the protection, restoration, and maintenance of bighorn sheep and their habitat. All three alternatives are in compliance with the HCNRA CMP by maintaining a separation between bighorn and domestic sheep that is likely to keep the two species apart at the current population levels.

Alternatives 7J and 7K

These alternatives eliminate domestic sheep grazing from the Payette National Forest system lands within the boundary of the HCNRA. However, both alternatives allow grazing within 3 air miles of the boundary of the HCNRA in the Lick Creek Lookout area. Mixing of the two species in this area is likely over a 5-year period, if bighorn sheep occupy habitats they have in the recent past. This represents at least a moderate risk to bighorn sheep. Consequently, alternative 7J and 7K are not in compliance with the compatibility requirements of the HCNRA Act beyond the immediate future.

Alternatives 1B, 2, 3, 4, 5, 6, and 7

All of these alternatives allow domestic sheep grazing in the Payette National Forest system lands within the boundary of the HCNRA. Mixing of the two species in this area is likely over a 5-year period. This represents at least a high risk to bighorn sheep, if bighorn sheep occupy habitats they have in the recent past. All of these alternatives are not in compliance with the compatibility requirements of the HCNRA Act.

Synthesis

From these results, it is apparent that Alternative 7E, followed by Alternative 7H, reduces the potential risk of contact between bighorn and domestic sheep to the greatest extent. They also have the largest effect on livestock allotments. Alternatives 7G and 7J are the next best alternatives for minimizing the potential risk of contact, with intermediate effects to the livestock allotments. However, some differences exist between Alternatives 7G and 7J. Alternative 7G does not considered the modeled occupied habitat (GPR) to be suitable for domestic sheep grazing. However, it does leave slightly more moderate risk on the landscape outside of the alternative. The risk ratio for Alternatives 7J and 7G reflecting the overall risk are very close, with Alternative 7J having the higher ratio. Alternative 7J, however, leaves occupied habitat outside of the alternative, as much as 15 percent of the Hells Canyon GPR and 5 percent of the Salmon River GPR. Grazing in the GPR poses a potential risk not reflected by the other numbers for this alternative (such as total risk, risk ratio, category risk, and source habitat). Neither Alternatives 7G nor 7J buffer the occupied habitat. Alternative 7K and then Alternatives 3, 4, and 6 are ranked next for minimizing risk, although they both leave a substantial amount of risk on the landscape but have much smaller effects to livestock allotments.

Consistent with 36 CFR §219.20(a), the following pages will supplement the Cumulative Effects section, page 3-328, of the Chapter 3 Terrestrial Wildlife Habitat and Species section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

Cumulative Effects

Species of Special Interest

Bighorn Sheep

Activities and disturbances that take place on National Forest System lands can affect larger-scale functions beyond National Forest borders, and conversely, the management of lands outside of the National Forest may influence National Forest ecosystems. Management on other adjacent ownerships, including private, state, and other federal lands, may or may not consider the broad needs of ecosystem integrity or the more specific components, including wildlife populations. Therefore, National Forest System lands must provide for these attributes to contribute to functioning ecosystems and viable populations, regardless of ownerships. Adjacent lands under varied ownerships and interspersed ownerships may have different management direction regarding wildlife populations than the National Forests. Therefore, any Forest Service management activities affecting the specific components, particularly those components that are scarce outside of National Forest System lands, would affect the overall ecology and habitat properties these components provide for the entire region. How the Payette National Forest manages habitat can have far-reaching impacts on other ownerships and throughout the region, such as the dispersal of wildlife, and in this specific case, the impacts of disease. National Forest System lands can also be influenced in similar ways by the habitat management on other ownerships. Understanding the interactions that generate processes in wildlife populations and how they change with

management actions through space and time is crucial to providing for well-distributed habitat across the Planning Unit.

Each one of the alternatives discussed above would have effects both off and on National Forest System lands. Figure W-9i displays the extent of the two metapopulations with other landownerships. Those alternatives that eliminate all or most of the potential risk of contact between domestic and bighorn sheep on the Payette National Forest (Alternatives 7E and 7H) are hoped to also provide a large benefit to the broad metapopulations by reducing the probability of disease transmission between the species and subsequent spread across the metapopulation. The alternative that reduces the risk so that all of the current occupied bighorn sheep habitat on the Payette National Forest is considered unsuitable for domestic sheep grazing (Alternative 7G) should also reduce the probability of disease in the metapopulations, although perhaps not completely since sheep can have contact at the boundaries of the occupied habitat or expanding populations may increase the extent of occupied habitat. Those areas of potential moderate risk and some of the low risk contribute to this effect at the boundaries. Those Alternatives (7J; 7K; and 3, 4, and 6) that reduce areas suitable for domestic sheep grazing on the Payette National Forest but include some areas of occupied habitat, may also reduce the incidence of disease in the populations. However, disease may still cycle in the metapopulations since the potential for the risk of contact may be greater by retaining current occupied habitat outside of the alternative. As discussed above, those alternatives with higher potential risks of contact are expected to have potential effects of disease beyond the boundaries of the Payette National Forest within the larger metapopulations.

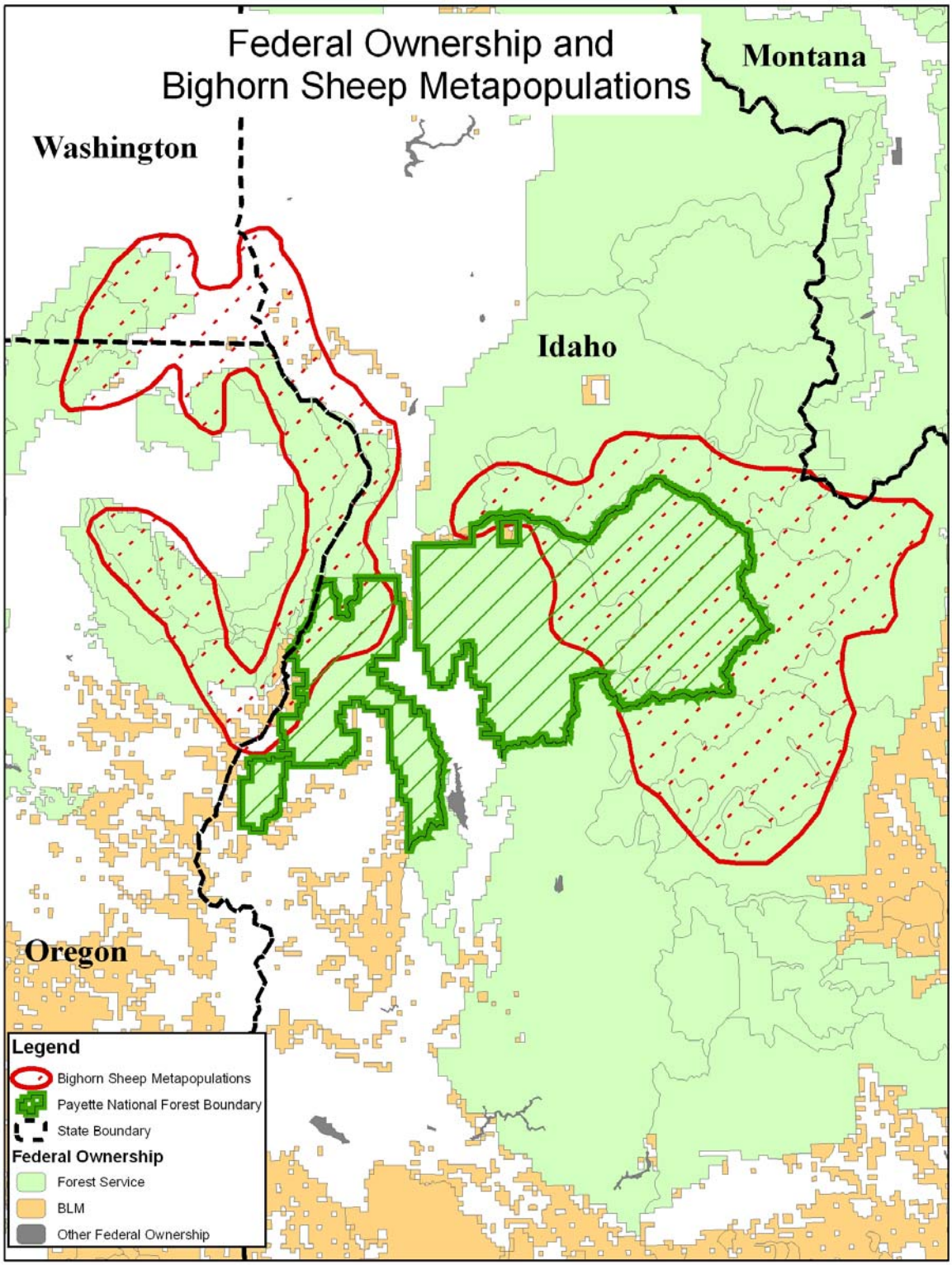
Other ownerships can also be affected by changes in National Forest domestic sheep allotments. Other federal and state agencies that issue domestic sheep permits can see changes in their capacity to issue permits if some of the biological and physical infrastructure needed to continue domestic sheep grazing is lost on the Payette National Forest. A similar trend could also extend to private lands. While reducing the infrastructure could have effects on the economics associated with domestic sheep grazing, it could also reduce additional risks to bighorn sheep by reducing potential risks of contact from other ownerships.

Figure W-9i displays the ownerships that can affect the potential risk of contact to bighorn sheep on the Payette National Forest. Even if the Payette National Forest eliminated all domestic sheep grazing (Alternative 7E), a potential risk of contact could exist from the adjoining ownerships that graze domestic sheep, particularly given the overlap of the GPRs and metapopulations onto adjacent ownerships. Domestic sheep are currently grazed on adjacent National Forests, the BLM, and private farm flocks. Therefore, disease could still be a factor for bighorn sheep populations on the Payette National Forest, regardless of how much domestic sheep grazing remains outside of the alternatives. The effects to the two metapopulations are unknown, since the potential risk of contact from lands other than the Payette National Forest is unknown.

Furthermore, given the continuous bighorn sheep source habitat that exists in the region (Figure W-9j), across state boundaries, and throughout Idaho, the effects of the potential risk of contact from the Payette National Forest can extend beyond the boundaries of the known GPRs. It is unknown how many bighorn sheep intermingle between populations, although given their metapopulation structure, intermingling throughout the region can be assumed.

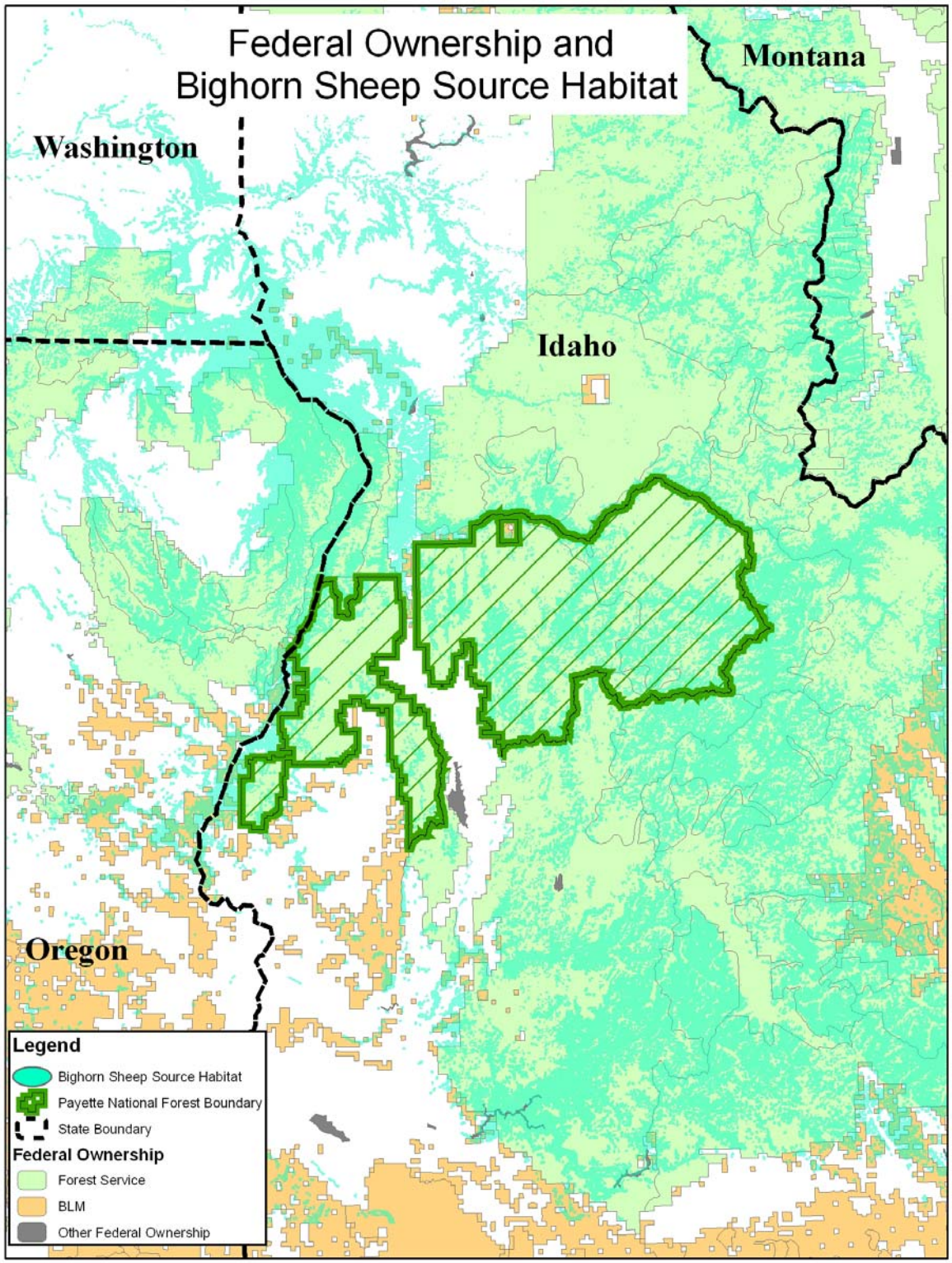
Radiotelemetry data from the Hells Canyon metapopulation shows that subpopulations are interconnected, which increases the risk of disease transmission moving throughout the metapopulations. Conversely, other ownerships that graze domestic sheep can be a potential source of disease to populations of bighorn sheep on the Payette National Forest, regardless of the alternative implemented by the Payette National Forest. GPRs were only modeled from the data available to the Payette National Forest. Data from other ownerships may exist that were not used in the modeling, particularly for the Salmon River GPR. The GPR could extend beyond the boundaries of the Payette National Forest, particularly to the east and south, given the continuous habitat.

Figure W-9i. Regional Metapopulations and Landownerships[1]



[1] Metapopulation boundaries have not incorporated more recent GPR modeling.

Figure W-9j. Ownerships and Continuous Habitat for Bighorn Sheep across Central Idaho and Adjacent States



The extent of connectivity between the Hells Canyon metapopulation and the Salmon River metapopulation is unknown, since both populations are at depressed levels. The connectivity corridors, which are the routes bighorn sheep move between areas, are also unknown.

From the visual perspective of Figure W-9j, the patterns of influence across a landscape that could exist between populations of bighorn sheep are apparent. A disease outbreak affecting one population may readily spread to another, given the continuous habitat, known modeled GPRs, and the potential for individuals of separate populations to come into contact. Shared summer ranges may also contribute to disease spread; therefore, if one population is at a higher risk of contracting disease, it increases the risk to other populations within the metapopulation, above and beyond just the immediate risk of proximity to domestic sheep and goats. This information can be used to infer that for habitat and population connectivity risks between the Payette National Forest and other ownerships do occur. This DSEIS only considers risks from the Payette National Forest commercial livestock allotments. Pack animals and other potential disease sources are not considered. Furthermore, Singer and Gudorf (1999) found grazing domestic cattle was negatively correlated with success of bighorn sheep populations (based on forage competition), although the effect on success was not as large as grazing domestic sheep. This effect would also occur across ownerships.

Conclusion

Models have shown that reducing the impact of disease on bighorn sheep has greater effects to population persistence than increasing areas of suitable habitat and/or corridors (Gross et al. 2000). Empirical data found that persistence of bighorn sheep populations was negatively correlated with the presence of domestic sheep, and that larger patch size, larger home-range size, greater migratory tendency, and the absence of domestic sheep are the most critical factors for population persistence in bighorn sheep (Singer et al. 2001). Habitat is not currently limiting to bighorn sheep on the Payette National Forest, but access to that habitat is limited when domestic sheep are present. Competition for the same habitat and the species' inherent attraction to each other increases the risk of contact whenever the species are in close enough proximity. Given the wide-ranging behavior of bighorn sheep, close proximity can encompass fairly large areas. Modeling done by Gross et al. (2000) found that mild disease events tended to have more persistent effects on population growth than severe infections, due to the dispersal of bighorn sheep from populations with mild disease. More severe events resulting in rapid, large die-offs tend to prevent dispersal. If the social structure is destroyed at the time of the event, regardless of the disease severity, population dispersal and dynamics can be affected (V. L. Coggins, Oregon Department of Fish and Game, pers. comm.). Larger population sizes with higher rates of dispersal had higher rates of persistence in the absence of disease; increased rates of movement facilitated disease transmission but also buffered the effects of disease by contributing to a spatially structured population and overall larger population size (Gross et al. 2000). Genetic exchange between populations is crucial for healthy metapopulations to function (Bleich et al. 1996). Careful attention to substructuring within and between populations is critical to management plans (Bleich et al. 1996). Furthermore, small populations and small patches of suitable habitat should not be undervalued, as these can be critical in a larger colonization process (Krausman and Leopold 1986). Unoccupied habitat patches represent an important aspect of bighorn sheep metapopulation dynamics because these areas may be the sites of future

populations and critical for long-term persistence (Nunney and Campbell 1993, Hanski 1998).

The bighorn sheep is a species that needs the large areas to create the spatially structured population required for their persistence. Small, isolated populations are not optimal for this species. Therefore, the need to minimize contact with domestic sheep within the large areas needed by bighorn sheep is crucial for strong, healthy populations of bighorn sheep. Keeping an adequate spatial buffer between bighorn sheep and domestic sheep is the most reliable method of preventing contact between these species (Desert Bighorn Council Technical Staff 1990, Schommer and Woolever 2001, Singer et al. 2001, WAFWA 2007), but spatial buffers are not always adequate given the distances bighorn sheep rams will travel (Wehausen et al., unpublished data) Clifford et al. (2007) recommended that if eliminating the risk of interspecies contact (thereby eliminating the probability of respiratory disease transmission to bighorn sheep from domestic sheep) is a management goal, at a minimum, domestic sheep grazing should not occur within the known population utility distribution of the bighorn sheep. Husbandry practices such as removing domestic sheep well before the onset of rut, following vigilant herd management to reduce strays, and responding to wandering bighorn sheep, are other methods to separate the species and reduce risk, but extensive monitoring efforts are required and are not always effective (DSEIS IDT and Cooperators 2007, 2008).

In large portions of habitat found in Alaska and Canada where domestic sheep are not grazed, the distribution of native sheep remains essentially unchanged from historical distribution (Valdez and Krausman 1999). Singer and Gudorf (1999) also reported that bighorn sheep were more successful if they were located further from domestic sheep. Similar effects have also been observed in Hells Canyon.

As bighorn sheep numbers increase and populations expand their geographic range, probabilities of domestic sheep contact could increase (Clifford et al. 2007). The models and expert opinions used in this analysis are based on current population levels; future movement of bighorn sheep can change during population growth or exploration by rams seeking mates (Clifford et al. 2007). Habitat is based on current habitat, which may also change due to succession, disturbance, and management. Changes in habitat could alter quantity and/or location on the landscape. Continued monitoring is essential to understanding the management implications of bighorn sheep movement, population growth, changing habitat, and changes in livestock grazing practices. Adjustments to the selected alternative may be needed, based on this monitoring.

Rangeland Resources

Consistent with 36 CFR §219.20(a), the following pages will supplement the Rangeland Capability section, page 3-669, of the Chapter 3 Rangeland Resources section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

CURRENT CONDITIONS

Rangeland Capability

Domestic Sheep Grazing On the Payette National Forest

Similar to many areas throughout the West, large numbers of domestic sheep (*Ovis aries*) were grazed on Payette National Forest lands during the late nineteenth and early twentieth centuries. This practice significantly changed vegetation structure and composition and soil resources (Hockaday 1968, Jones 1989). Sheep were historically grazed across the entire Payette National Forest, including areas now classified as the Frank Church River of No Return Wilderness (Jones 1989). In 1915, 174,445 sheep were permitted on the Payette National Forest. This number declined throughout the twentieth century to 19,112 in 2005 (Hockaday 1968, USDA Forest Service 2006a).

Currently, domestic sheep are seasonally grazed on 24 sheep allotments on the Payette National Forest (Table RR-1a). Grazing on these allotments is distributed among four permittees, and comprises a total of 490,476 acres of the Payette National Forest. This acreage comprises 21 percent of the total acreage of the Payette National Forest and 32 percent of the nonwilderness acres.

Figure RR-1 displays the spatial location of the sheep allotments on the west zone of the Payette National Forest, and Figure RR-2 displays the sheep allotments on the east zone. Twenty-two percent of summer source habitat and 16 percent of winter source habitat for bighorn sheep is within domestic sheep allotments and trailing routes across source habitat (Figures RR-3 and RR-4). This habitat is essentially unavailable to bighorn sheep when domestic sheep are on the allotments. A risk of contact results from any overlap between source habitat and domestic sheep allotments and the travel corridors that bighorn sheep traverse between their naturally fragmented source habitats.

Like bighorn sheep, domestic sheep are known to travel long distances. A stray ewe traveled a minimum of 48 kilometers from private land to bighorn range, through very rugged terrain and heavy timber, and across at least one river (Coggins 2002).

Table RR-1a. Permit Information for Payette National Forest Sheep Allotments (USDA Forest Service 2006a)

Allotment	Class	Permitted Number	Season On	Season Off	Headmonths
Smith Mountain	Ewe/lambs	1200	5/16	8/10	3432
	Dry ewes	1200	8/17	10/15	2367
	Ewe/lambs	1900	6/18	8/10	3373
	Dry ewes	1900	8/17	10/15	3748
Curren Hill	Dry ewes	1925	9/1	9/30	1899
Boulder Creek	Ewe/lambs	1000	6/16	8/31	2532
Price Valley	Ewe/lambs	895	6/16	8/31	2266
Surdam	Ewe/lambs	1900	4/1	6/30	284
Shorts Bar	Dry ewes	1600	9/20	10/7	907
Hershey-Lava	Ewe/lambs	1333	7/10	9/15	2980
French Creek	Ewe/lambs	833	7/7	10/7	2547
Bear Pete	Ewe/lambs	833	7/7	10/7	2547
Marshall Mountain	Ewe/lambs	834	7/7	10/7	2550
Vance Creek	Dry ewes	2666	9/15	10/15	2717
Little French Creek	Dry ewes	1333	7/10	7/20	444
Josephine	Ewe/lambs	1333	7/10	9/15	2980
Victor-Loon	Dry ewes	1500	8/26	10/10	2268
Grassy Mountain	Ewe/lambs	1333	7/10	9/15	2980
Slab Butte	Ewe/lambs	1333	7/10	9/15	2980
Cougar Creek	Ewe/lambs	1333	7/10	9/15	2980
Twenty Mile	Ewe/lambs	1333	7/10	9/15	2980
Brundage	Dry ewes	2666	9/15	10/15	2717
Bill Hunt	Dry ewes	2666	9/15	10/15	2717
Fall/Brush Creek	Ewe/lambs	800	7/1	8/25	1473
North Fork Lick Creek	Dry ewes	1500	8/25	8/25	50
Lake Fork	Ewe/lambs	817	7/1	8/25	1504
Jughandle	Dry ewes	2000	7/10	10/15	6444

Figure RR-1. Domestic Sheep Allotments and Trailing Routes for the West Zone of the Payette National Forest

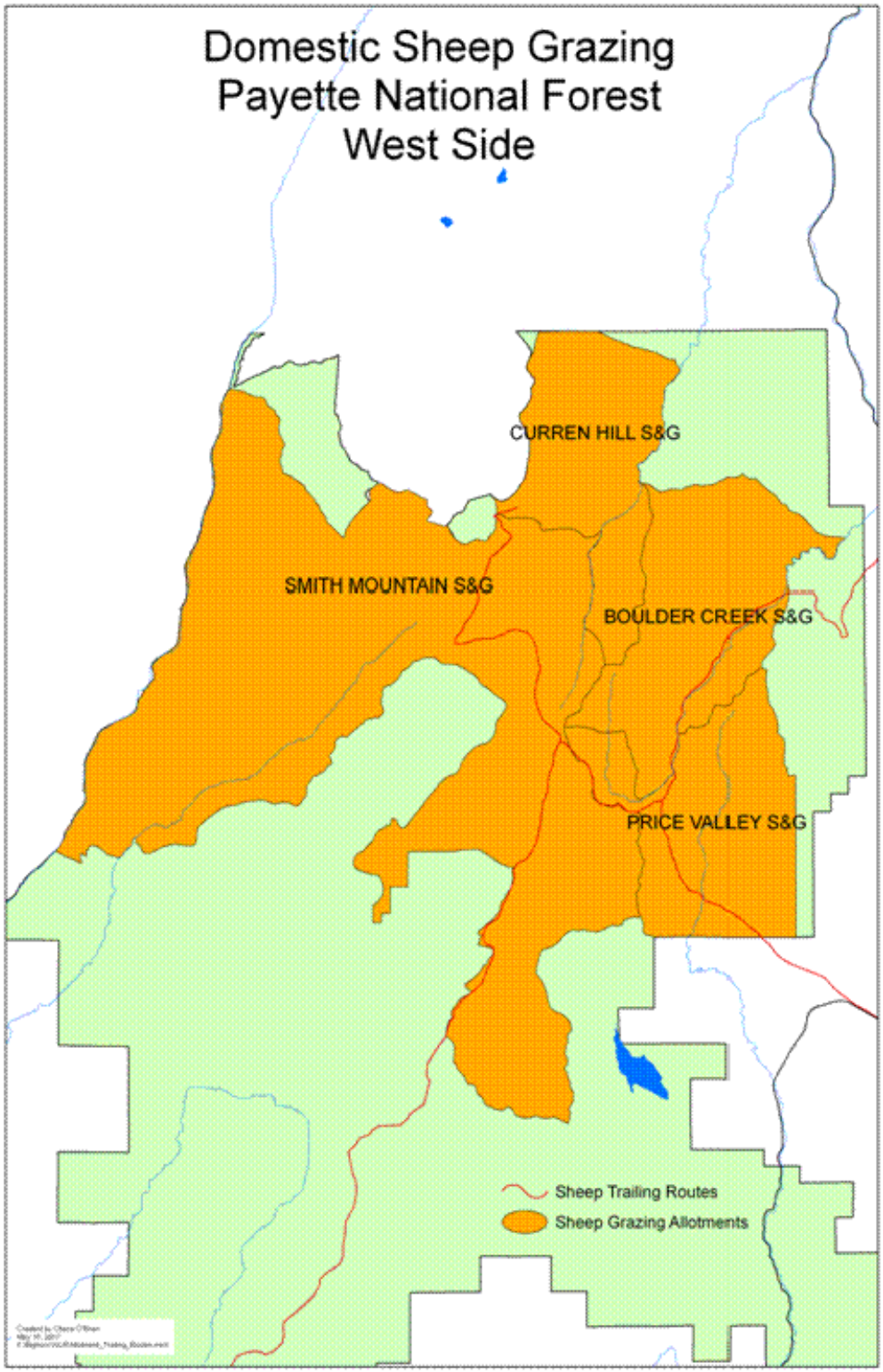


Figure RR-2. Domestic Sheep Allotments and Trailing Routes for the East Zone of the Payette National Forest

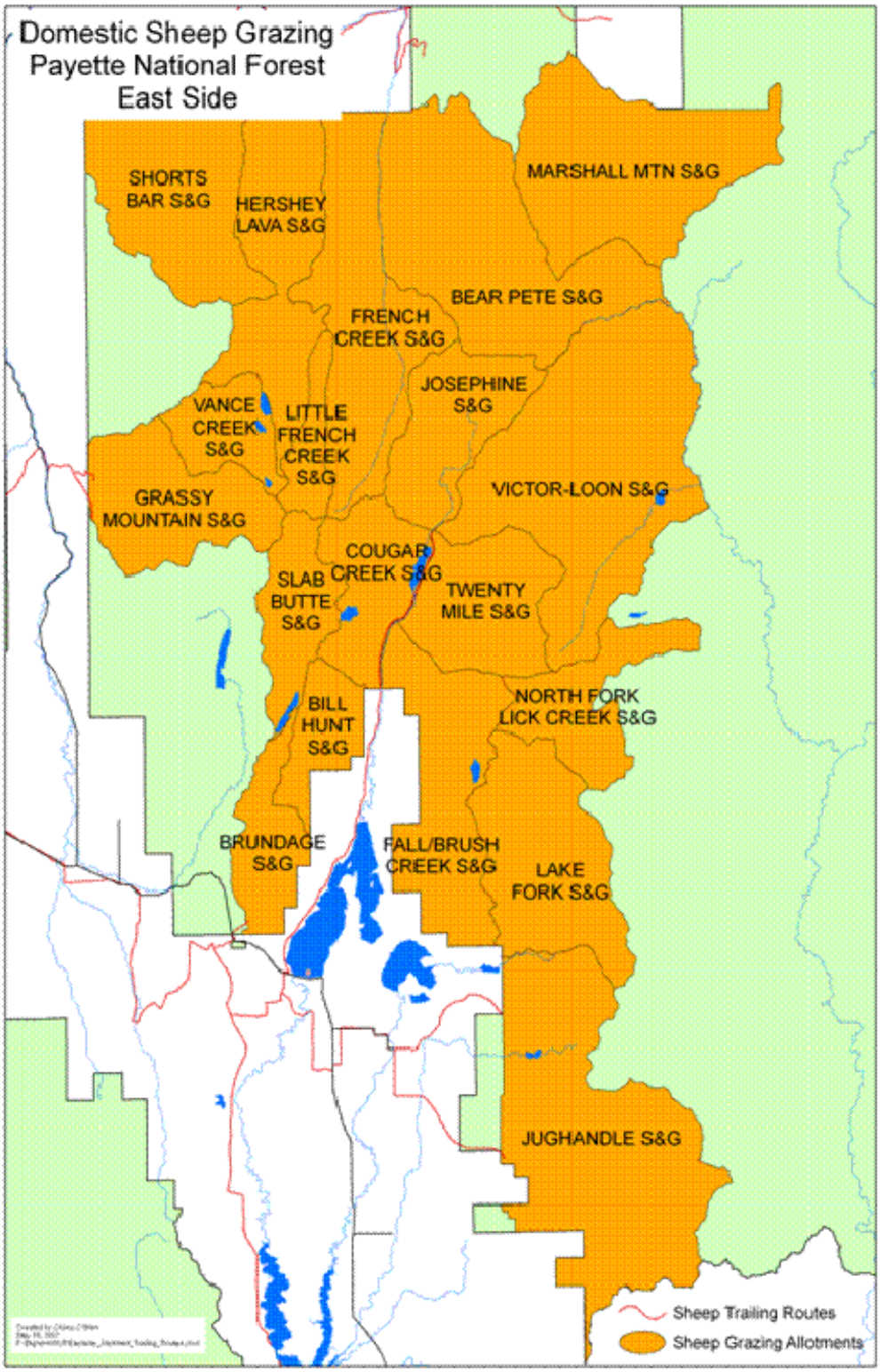


Figure RR-3. Domestic Sheep Allotments and Current Summer Source Habitat on the Payette National Forest

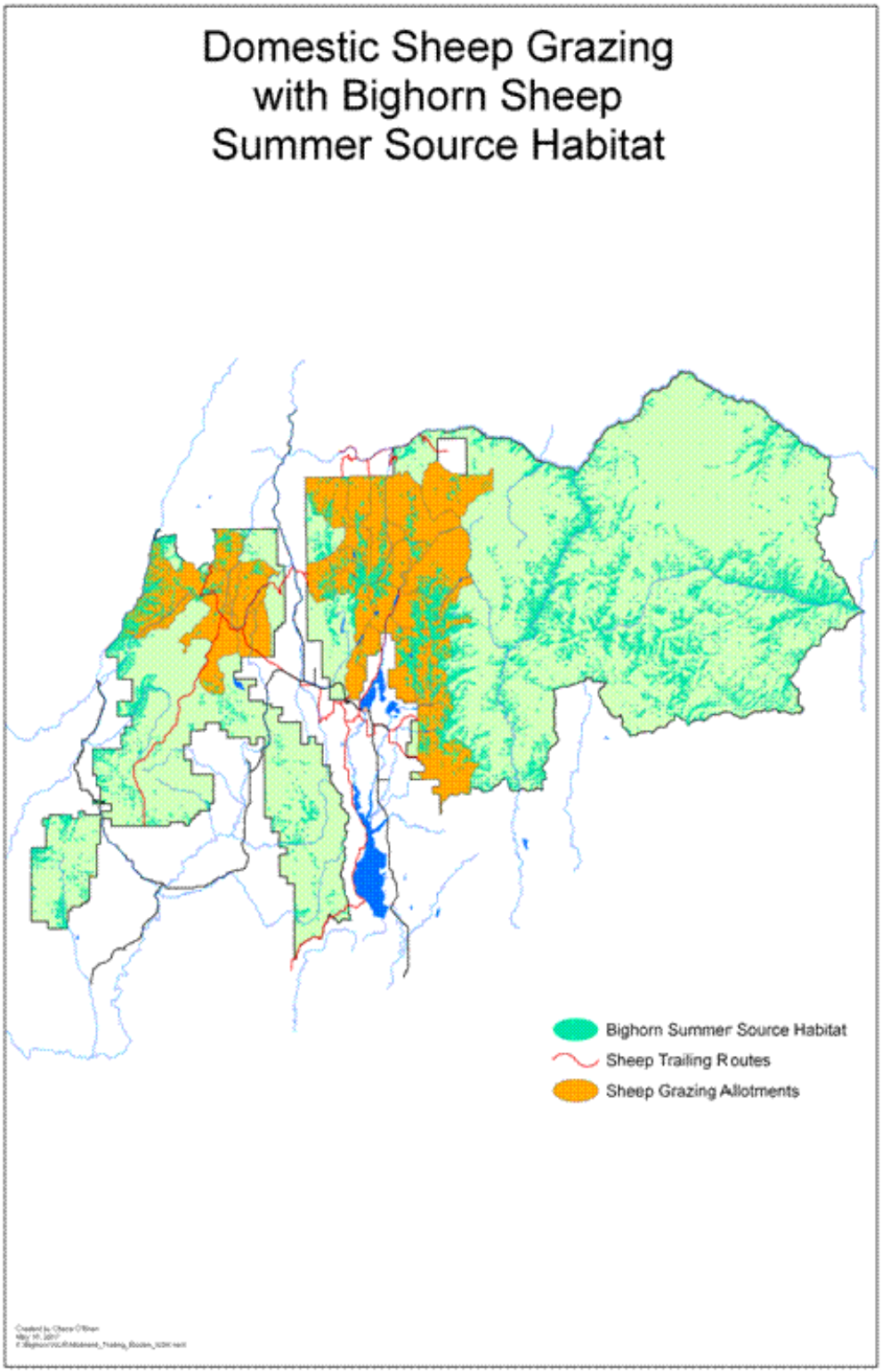
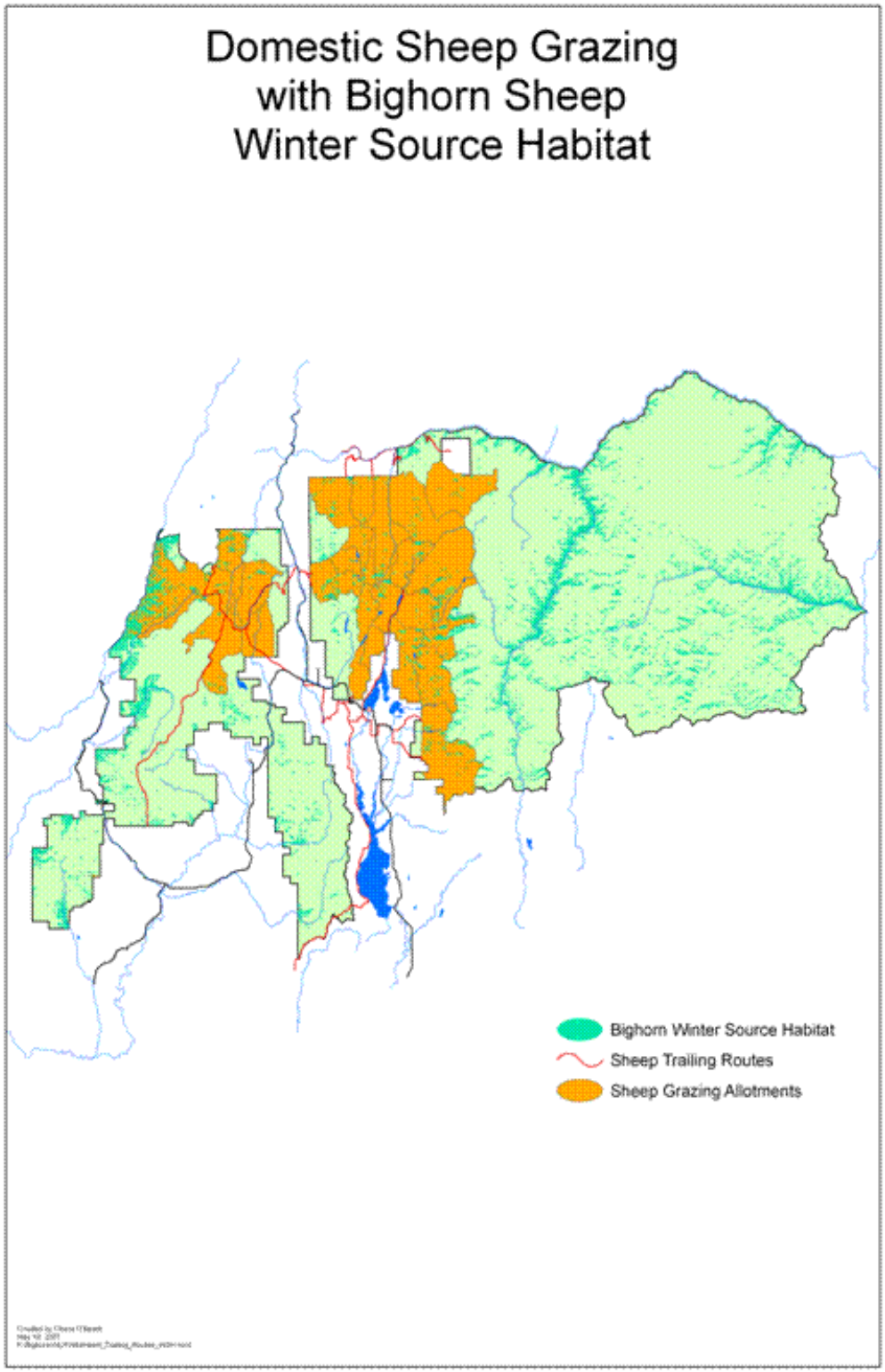


Figure RR-4. Domestic Sheep Allotments and Current Winter Source Habitat on the Payette National Forest



Consistent with 36 CFR §219.20(a), the following paragraph will replace paragraph one of the Current Conditions, Vacant Allotments section and Table RR-6 will replace the existing Table RR-6 of the Vacant Allotment section, page 3-671, of the Chapter 3Rangeland Resources section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

Vacant Allotments

There are eight vacant allotments on the Boise National Forest containing 32,041 acres capable of supporting livestock, and one vacant allotment on the Payette National Forest containing 2,413 acres capable of supporting livestock. Most of these allotments have been vacant since the 1980s. An analysis was conducted to determine which of these allotments or portions of the allotments have value from a livestock grazing standpoint and should be retained, and which ones have little to no value and should be closed. See Technical Report No. 3 for information related to allotment analysis. Table RR-6 displays a summary of the vacant allotments considered in determining rangeland suitability.

Table RR-6. Existing Vacant Allotments

National Forest	Allotment Name	Adjacent to Active Allotments	Livestock Type Best Suited for Use	Other Resource Considerations
Boise	Anderson Creek	Yes	Sheep	Yes
Boise	Bull Trout	Yes	Sheep	Yes
Boise	Deadwood East	Yes	Sheep	Yes
Boise	Eight Mile	No	Sheep	Yes
Boise	Five Mile	No	Sheep	Yes
Boise	Fir Creek	Yes	Sheep	Yes
Boise	Sheep Creek	Yes	Sheep	Yes
Boise	Whitehawk	Yes	Sheep	Yes
Payette	Shorts Bar	Yes	Sheep	Yes

Consistent with 36 CFR §219.20(a), these paragraphs and Table RR-9 will replace the corresponding paragraphs and table of the Direct and Indirect Effects by Alternative, Rangeland Suitability section, page 3-676 through 3-678, of the Chapter 3 Rangeland Resources section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement. Tables RR-8 and RR-10 are unchanged and can be found in the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

Direct and Indirect Effects by Alternative

Rangeland Suitability

The Boise, Payette, and Sawtooth National Forests capable rangelands were analyzed for grazing suitability by alternative. This analysis considered other uses or values of the area and also identified areas where grazing may not be appropriate. See Rangeland Resources

Technical Report No. 3 for detailed information. Tables RR-8 through RR-10 display the acres of suitable rangelands by Forest and the deductions used to determine suitability, by category, for each alternative. Overall, Alternatives 4 and 6 generally have the least amount of suitable rangelands. For the Payette National Forest, Table RR-9 indicates Alternatives 7E, 7G, 7H, 7J, and 7K retain the least amount of capable rangelands as suitable for domestic livestock grazing. Alternatives 7, 3, 4, and 6 retain the most acres of capable rangelands as suitable for domestic livestock grazing. The following paragraphs identify the other resource considerations and their effects on the rangeland environment.

Acres Deducted Due to Closing Vacant Allotments—Closing vacant allotments eliminates the use of these areas for domestic livestock production in the future. Most of the allotments considered under this category are on the Boise National Forest; one, Shorts Bar, is on the Payette National Forest. Areas capable of supporting livestock would be removed from the suitable grazing land base. Closures could have positive effects on other resources but could also have negative effects on livestock management, depending on site-specific conditions. Vegetative composition and vigor would be expected to improve with these deductions, due to the limited amounts of arid or semiarid vegetation cover types. Some southern exposures may not see significant long-term vegetative recovery due to the potential spread of non-native plants and the semiarid conditions. Big-game winter and summer range would follow a similar pattern. Groundcover would continue to increase on more mesic sites, providing for improved soil stability, thereby reducing potential sedimentation to bull trout and other fish habitat. Vegetation management options with livestock would not necessarily be precluded with the closing of allotments. Permits could still be issued for other purposes (FSM 2234, Livestock Use Permits), such as vegetation management, research, and livestock transportation or crossing access. Closing the vacant allotments would not automatically reduce headmonths currently permitted. However, closures could potentially reduce future management flexibility by eliminating the possibility of using the allotments to resolve future conflicts between livestock grazing and other resources on active allotments, or to provide alternative forage in drought years. This reduction could indirectly affect the management and use of private lands surrounding the Payette National Forest, based on the likelihood that livestock would have to leave the Payette National Forest early and return to privately owned or leased lands.

Table RR-6 provides the complete list of vacant allotments considered in this suitability deduction, and Tables RR-8 (Boise National Forest) and RR-9 (Payette National Forest) provide the capable acres associated with the allotments removed as suitable rangeland by alternative. Alternatives 2, 3, 4, 6, and 7 would remove 32,041 acres from the suitable rangelands, based on the closure of eight vacant allotments on the Boise National Forest. Alternatives 1B and 5 would not remove any acres from the Boise National Forest. For the Payette National Forest, Alternatives 7E, 7G, 7H, 7J, and 7K would remove 2,413 acres from the suitable rangelands, based on the closure of one vacant allotment that is within bighorn sheep habitat.

Acres Deducted Due to Bighorn Sheep Habitat—Discontinuing domestic sheep grazing in overlapping areas used by domestic sheep and bighorn sheep would reduce the risk of disease transmitted to bighorn sheep. For the Sawtooth National Forest, domestic sheep grazing would be discontinued by phasing out, on an opportunity basis, suitable rangeland portions of

domestic sheep allotments that overlap current bighorn sheep habitat, or by converting use to cattle, where feasible. This action may help existing bighorn sheep populations stabilize or increase in these areas. See the *Terrestrial Habitat and Species* section for more information. Areas deducted from the suitable rangelands for sheep may have a long-term effect on overall headmonths for domestic sheep with the Ecogroup area. However, the potential effect on existing sheep operators will be minimal, as this will occur on an opportunity basis only, and in relatively small areas. The areas on the Sawtooth National Forest where this situation exists occur in MA 11 (Rock Creek), MA 12 (Cottonwood Creek), and MA 13 (Trapper Creek/Goose Creek) (66,506 acres). Alternatives 3, 4, 6, and 7 include these deductions; Alternatives 1B, 2, and 5 have no deductions (Table RR-10).

Capable rangeland acres within domestic sheep allotments that overlap bighorn sheep habitat occur broadly across the Payette National Forest. Domestic sheep grazing would be discontinued within these areas to reduce the potential risk of contact with bighorn sheep and would result in a long-term effect on the overall headmonths for domestic sheep grazing on the Payette National Forest. The MA's on the Payette National Forest with capable rangeland within domestic sheep allotments that overlap bighorn sheep habitat and would be deducted from domestic grazing include: MA 1 (Hells Canyon), MA 2 (Snake River), MA 3 (Weiser River), MA 4 (Rapid River), MA 5 (Middle Little Salmon River), MA 6 (Goose Creek/Hazard Creek), MA 7 (Payette Lakes), MA 8 (Kennally Creek), MA 9 (Lake Creek/French Creek), MA 10 (Fall Creek/Warren Creek), MA 11 (Upper Secesh River), and MA 12 (South Fork Salmon River). The amount of capable rangeland deducted from domestic sheep allotments varies by alternative. The total amount of suitable rangeland remaining for domestic sheep and cattle grazing is displayed by alternative in Table RR-9.

Table RR-9. Payette National Forest Rangeland Suitability Acres by Alternative

Criteria	Alt. 7	Alt. 7E	Alt. 7G	Alt. 7H	Alt. 7J	Alt. 7K	Alts. 3, 4, and 6
Capable Acres[1]	233,672	233,672	233,672	233,672	233,672	233,672	233,672
Vacant Allotment Acres Deducted[2]	0	2,413	2,413	2,413	2,413	2,413	0
Bighorn Habitat Acres Deducted	0	100,310	61,842	94,231	58,785	24,981	6,113
Total Deductions	0	100,310	61,842	94,231	58,785	24,981	6,113
Total Suitable Acres[3]	**233,672**	**133,362**	**171,830**	**139,441**	**174,887**	**208,691**	**227,559**

[1] Includes all capable rangeland for both cattle and sheep allotments.
[2] The vacant allotment acres deducted are within the area deducted for bighorn habitat and to avoid double counting these acres are therefore not added into the total deductions.
[3] Includes all capable rangeland that remains suitable for livestock grazing for both cattle and sheep allotments.

Tribal Rights and Interests

TRIBAL RIGHTS AND INTERESTS INTRODUCTION

The *Tribal Rights and Interest* section of the FEIS included an analysis of the effects Forest Service management would have on the ability of the agencies to meet general federal trust duties and treaty specific statutory obligations. Availability of traditional and/or culturally important terrestrial and aquatic plant and animal species in sufficient and desirable quantities to satisfy off-reservation reserved rights is of particular interest. Tribal interests and uses are protected through various federal statutes, laws, policies and regulations (Appendix H in the Forest Plan [USDA Forest Service 2003]). The federal trust doctrine requires federal agencies to manage the lands under their stewardship with full consideration for all valid tribal rights and interests.

Availability of economically and culturally important species, in particular bighorn sheep, depends on the persistence of the species over time. Species viability depends on the distribution of quantity and quality habitat (CFR §219.19) that is available to the bighorn sheep. The FEIS included an analysis of species in the *Terrestrial Wildlife Habitat and Species* section, which was used in determining effects to tribal rights and interests. A more thorough analysis for bighorn sheep is now complete and is provided in Chapter 3 of this DSEIS. The federal tribal statutory duties are also being reassessed to determine the effects on the availability of bighorn sheep for Tribal harvest and on the use of traditional cultural properties.

Consistent with 36 CFR §219.20(a), this analysis will supplement the *Tribal Rights and Interests* section of the FEIS to 1) identify other affected tribes; 2) identify specifically the effects on the availability of bighorn sheep; and 3) disclose the effects on the associated use of traditional cultural properties important to American Indian rights and interests.

Consistent with 36 CFR §219.20(a), the following paragraphs will replace paragraphs one, two, and three of the Governmental Interests in the Boise, Payette, and Sawtooth National Forests section, page 3-800, of the Chapter 3 Tribal Rights and Interests section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

INTRODUCTION

Governmental Interests in the Boise, Payette, and Sawtooth National Forests

The Nez Perce, Shoshone-Bannock, Shoshone-Paiute, and the Confederated Tribes of the Umatilla Indian Reservation interests goes beyond that of spiritual, cultural, and economic to the unique legal relationship that the United States government has with American Indian tribal governments. Federally recognized tribes are sovereign nations who work with the federal government and its agencies through the process of government-to-government consultation. The federal trust relationship with each tribe was recognized by, and has been addressed through, the Constitution of the United States, treaties, executive orders, statutes,

and court decisions. In general, these mandates protect and enhance interests and uses on the three Forests (see *Resource Protection Methods* below and Appendix H in the Forest Plan [USDA Forest Service 2003]). The federal trust doctrine requires federal agencies to manage the lands under their stewardship with full consideration of tribal rights and interests. In addition, the Forest Service must ensure that the statutory reserved rights of Tribes on National Forest Service lands are provided.

The ancestors of the modern day Nez Perce, Shoshone-Bannock, Shoshone-Paiute, and the Confederated Tribes of the Umatilla Indian Reservation were present in the Ecogroup area long before the establishment of the Boise, Payette, and Sawtooth National Forests. Many of the treaties and executive orders signed by the United States government in the mid-1800s reserved homeland for the tribes. Additionally, the treaties with the Nez Perce, Shoshone-Bannock, and Confederated Tribes of the Umatilla Indian Reservation reserved certain rights outside of established reservations, including fishing, hunting, gathering, and grazing rights.

The following excerpts from the treaties with the Nez Perce, the Shoshone-Bannock, the Confederated Tribes of the Umatilla Indian Reservation, and the Executive Order with the Shoshone-Paiute are provided as examples of the rights that the tribes have, and where they can exercise these rights.

Consistent with 36 CFR §219.20(a), the following paragraph will supplement the Governmental Interests in the Boise, Payette, and Sawtooth National Forests section, pages 3-800 through 3-801, of the Chapter 3 Tribal Rights and Interests section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

Treaty Between The Cayuse, Umatilla, and Walla Walla Tribes Acting In Confederation of 1855: Article I in this treaty states:

That the exclusive right of taking fish in the streams running through and bordering said reservation is hereby secured to said Indians, and at all other usual and accustomed stations in common with citizens of the United States, and of erecting suitable buildings for curing the same; the privilege of hunting, gathering roots and berries and pasturing their stock on unclaimed lands in common with citizens, is also secured to them.

Consistent with 36 CFR §219.20(a), the following table and paragraph will replace Table TR-1 and paragraph three of the Cultural Interests in the Boise, Payette, and Sawtooth National Forests section, page 3-802, of the Chapter 3 Tribal Rights and Interests section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

CURRENT CONDITIONS

Cultural Interests in the Boise, Payette, and Sawtooth National Forests

Table TR-1. Federally Recognized Tribes within the Ecogroup Area

Federally Recognized Tribe	Culture Area	Name of Bands within Tribe
Nez Perce Tribe	Plateau	Nez Perce (Ni mii puu)
Shoshone-Bannock Tribes (Fort Hall Reservation	Great Basin	Eastern Shoshone (Sosoni) (including Lemhi), Bannock
Shoshone-Paiute Tribes (Duck Valley Reservation)	Great Basin	Western Shoshone, Northern Shoshone, Northern Paiute
Confederated Tribes of the Umatilla Indian Reservation	Plateau	Cayuse, Umatilla, and Walla Walla

The gathering of these and other natural resources is still a significant part of the individual cultures of the Nez Perce, Shoshone-Bannock, Shoshone Paiute, and the Confederated Tribes of the Umatilla Indian Reservation. The tribes see the continuation of gathering as an important link to their past as well as an essential ingredient to their continuing culture. Because of their concern with the continuation of this aspect of their cultures, the tribes are taking an increasingly active role in protecting and restoring various species of plants, animals, and fish. Where these treaty-guaranteed resources exist within the tribes aboriginal use areas on the Payette we have a statutory duty to protect and enhance them for the benefit of the Tribe.

Consistent with 36 CFR §219.20(a), the following paragraph will supplement the Cultural Interests in the Boise, Payette, and Sawtooth National Forests section, page 3-803, of the Chapter 3 Tribal Rights and Interests section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

Factors Affecting Tribal Rights and Interests

The analysis on the effects to tribal rights and interests related to bighorn sheep is tied directly to the following factors: 1) the continued persistence of the species over time in harvestable numbers; 2) the historical number of animals as it relates to present and future habitat carrying capacity; 3) the tribes annual harvest need; 4) the number harvested by non-tribal members; and 5) the historical locations the tribal members wish to utilize for their hunts. The effects are directly related to 1) the analysis discussions found in the *Terrestrial Wildlife Habitat and Species* section of this supplemental analysis; 2) the amount of source habitat available for bighorn sheep; and 3) the distribution of the bighorn sheep source habitat. The *Terrestrial Wildlife Habitat and Species* section provides detailed description of

source habitat, the current GPR of the species on the Payette National Forest, and of modeling methods used to estimate the potential relative risk of contact between bighorn sheep and domestic sheep with the subsequent implications for reasonable numbers of harvestable animals for the Tribes.

Consistent with 36 CFR §219.20(a), the following paragraphs will replace corresponding paragraphs of the Effects Common To All Alternatives section, page 3-803, of the Chapter 3 Tribal Rights and Interests section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives

Resource Protection Methods

Forest Plan Direction—Management direction for other resource programs—such as vegetation, soils, water, riparian, aquatic, and wildlife—is designed to provide for habitat and watershed conditions that contribute to species populations at sustainable and harvestable levels (see revised Forest Plan, Chapter 3, Forest-wide Management Direction [USDA Forest Service 2003]). Direction has also been provided at the MA level to address special areas of concern to the tribes, such as the South Fork Salmon River, Bear Valley Creek, Hells Canyon, and the main Salmon River Canyon.

General Effects

Species Viability—Under the Endangered Species Act (ESA), the Forest Service must comply with direction to protect threatened and endangered species, including Chinook salmon and steelhead trout, which are of great interest to the tribes. The latest direction from biological opinions and conservation strategies for these species has been incorporated into the Forest Plan (USDA Forest Service 2003), and this direction would be followed under all alternatives. Similar direction exists for a wide range of Region 4 sensitive fish, wildlife, and plant species, and the overall objective is to manage conditions so that these species do not have to be listed under the ESA. Although bighorn sheep have no status under the ESA, the U.S. Fish and Wildlife Service is concerned about their population status and threats to their local viability. Prevention of disease transmission between domestic and wild sheep is an important management concern [36 CFR 219.20(b)].

Many of the species found on the Ecogroup Forests, including salmon, steelhead, and bighorn sheep, are wide-ranging, anadromous, or migratory, only spending part of their lives here. Thus, the primary influence that Forest Service management activities have on these species is related to changes in the habitats they use while they are here or whether or not the habitat is available without the risk of contact between wild and domestic sheep. These changes can be positive or negative, temporary to long term, and they can influence the amount of habitat available, the condition of that habitat, and vulnerability to disturbance or mortality within that habitat. These changes can also occur from natural events, and Forest Service management can indirectly affect the likelihood, size, and timing of such events through activities such as vegetation manipulation, fire suppression, and fire use.

Potential habitat and disturbance effects from Forest Service management activities and natural events are described for species in the following sections of Chapter 3: *Soil, Water, Riparian, and Aquatic Resources, Terrestrial Wildlife Habitat and Species, Botanical Resources,* and *Range Resources.* In addition, potential effects to vegetation habitat components from management activities and natural events are presented in the *Vegetation Diversity, Vegetation Hazard,* and *Fire Management* sections. Although effects differ by alternative in these analyses, no alternative would result in significant negative effects to species viability. For listed species, threats are reduced by management direction and the aquatic conservation strategy, which minimize or avoid negative effects on these species. Over the long term, the recovery strategy would contribute to species viability and improvement of watershed conditions. For Chinook salmon and steelhead trout, habitat restoration and protection under all alternatives would contribute positive effects to species viability over the short and long term, although the cumulative off-forest effects from activities such as commercial harvest, or facilities such as hydroelectric dams would still pose serious threats. Short-term or temporary effects from restoration activities would be mitigated by Forest Plan direction, best management practices, and other resource protection methods.

Consistent with 36 CFR §219.20(a), the following paragraphs will supplement the Effects Common To All Alternatives section, page 3-803 through 3-805, of the Chapter 3 Tribal Rights and Interests section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

The alternatives added for this supplemental analysis contain a range of the effects for the potential risk of contact between bighorn sheep and domestic sheep, with subsequent implications for persistence of bighorn sheep populations over time and their potential distribution across the Payette National Forest, as discussed in the wildlife resources section.

Briefly, Alternative 7E, followed by Alternative 7H, reduce to the greatest extent the potential relative risk of contact between bighorn sheep and domestic sheep. Alternative 7G and Alternative 7J would minimize the potential relative risk of contact, but less so than Alternatives 7E and 7H. However, they do have some differences between them. Alternative 7G does not allow domestic sheep grazing in the bighorn sheep GPR. Alternative 7J, however, allows domestic sheep grazing within the GPR, as much as 15 percent of the Hells Canyon GPR and 5 percent of the Salmon River GPR. This poses a potential risk not reflected by the other numbers for this alternative (such as total risk, risk ratio, category risk, and source habitat). Neither Alternative 7G nor 7J add additional protection around the GPR. Alternative 7K and then Alternatives 3, 4, and 6 would be ranked next for minimizing relative risk, although they both leave a substantial amount of relative risk on the landscape due to the amount open to permitted domestic sheep grazing.

For the reasons listed above related to bighorn sheep, there could be significant direct, indirect, or cumulative negative effects expected to the viability of treaty resources or traditional and cultural species of interest to American Indians as a result of National Forest activities. In this case, the negative impacts are tied to domestic sheep grazing in the current bighorn sheep GPR on the Payette National Forest.

Harvest Ability—Some alternatives could have considerable negative effects on species viability and thus harvest ability. Ample source habitat is well distributed across the Payette National Forest. However, the habitat is not available to bighorn sheep if domestic sheep are present in or nearby the habitat. Current numbers of bighorn sheep are well below historical levels, which also impacts tribal ability to harvest the animal. Current uses of the habitat by domestic sheep, adjacent to known populations of bighorn sheep, impact the ability of the depressed populations to pioneer, explore, expand, or co-mingle with other isolated groups as needed to increase their numbers. The result is a reduced area from which the tribes can hunt that may or may not overlay with areas that were historically and/or traditionally important. The wildlife resources section contains an in-depth discussion of the effects to the potential relative risk of contact and subsequent implications for viability.

Alternatives 1B, 2, 3, 4, 5, 6, 7, and 7K greatly reduce the harvest ability for tribal members. These alternatives continue to have a high risk of the potential relative risk of contact between bighorn sheep and domestic sheep as allotments continue to be grazed within and around the bighorn sheep GPR. Because of the proximity to domestic sheep, bighorn sheep are not afforded the opportunity to pioneer, explore, or expand into adjacent source habitat and thus increase the opportunity for tribes to hunt in traditional areas and at greater harvest levels. These alternatives may have a considerable effect on the harvest ability of bighorn sheep for tribes.

Alternative 7J provides for a greater opportunity for tribal harvest. However, domestic sheep grazing is still permitted within the GPR in some locations, which increases the likelihood of contact between the two sheep species.

Alternative 7G may provide for greater opportunity for tribal harvest. With no domestic sheep grazing permitted within the GPR, contact between the two species is reduced. However, this alternative has the potential for a relative risk of contact between bighorn sheep and domestic sheep due to other factors discussed in the *Terrestrial Wildlife Habitat and Species* section.

Alternative 7H has a minimal potential for the relative risk for contact between the two sheep species and greatly increases the potential area for tribal members to hunt in traditional areas. With domestic sheep grazing not permitted within 9 miles of the GPR, bighorn sheep have a large opportunity to explore and expand into source habitat. However, it is difficult to predict how rapid the exploration and expansion into these areas will be, or if it will ever occur. Once, or if bighorn sheep expand, contact may occur, but the short-term likelihood is minimal.

Alternative 7E removes all relative risk of contact between bighorn and domestic sheep as no domestic sheep grazing is permitted on the Payette National Forest. In the long term, it may provide the greatest ability to harvest bighorn sheep in all traditional locations influenced by the Payette National Forest. However, it is impossible to predict if expansion will occur and if so, how long it could take.

Cumulative Effects—Other federal, state, and private lands in and around the Payette National Forest permit livestock grazing or contain small farm flocks. It is important to be aware of this fact for even if all permitted domestic sheep grazing is removed from the

Payette National Forest, the relative risk of contact may still continue. This in turn affects the continued viability and persistence over time of the bighorn sheep species. This DSEIS and subsequent decision and amendment to the Forest Plan (USDA Forest Service 2003) affect only the Payette National Forest lands. Even so, any increase in the amount of available bighorn source habitat reduces the relative risk of contact with domestic sheep. This allows the species to explore, pioneer, and interact with other members of the population and thus expand and restore to higher numbers over time.

It is important to note, that the gregarious nature of bighorn sheep and their ability to travel great distances in a short period of time, does lead to the potential for spread of disease to be far reaching. The impacts to tribal hunting opportunities are not confined within the boundary of the Payette National Forest. Disease spread that originates within the confines of the Forest has the ability to affect tribal treaty resources off Forest. As infected bighorn sheep move across the landscape, the potential for disease transmission stair-steps from one herd to another as their home ranges overlap one another.

For the reasons described above and in conjunction with those outlined previously, there are varying degrees of direct, indirect, and cumulative effects to the ability of tribal members to harvest bighorn sheep on the Payette National Forest for social, cultural, and subsistence purposes.

Socio-Economic Environment

SOCIO-ECONOMIC ENVIRONMENT INTRODUCTION

Economic Modeling Specialists, Incorporated (EMSI) conducted a socio-economic analysis for the Payette National Forest for the alternatives described in this DSEIS, which included the job and earnings impact of various alternatives provided by the Payette National Forest. Specifically, the analysis had four primary goals:

1. Provide updated economic profiles of the communities of Riggins, Idaho and Weiser, Idaho.
2. Develop an economic profile for Wilder, Idaho.
3. Calculate the direct employment effects of several alternative range management scenarios.
4. Calculate the economic impacts of the alternative range management scenarios on the communities of Riggins, Idaho; Weiser, Idaho; and Wilder, Idaho.

Consistent with 36 CFR §219.20(a), the following paragraphs will supplement the National and International section, pages 3-910 through 3-939, of the Chapter 3 Socio-Economic Environment section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

CURRENT CONDITIONS

National and International

Communities

Introduction—The economic impacts of the sheep allotments on the Payette National Forest under considerations occur in three communities: Riggins, Idaho; Weiser, Idaho; and Wilder Idaho. An economic profile for each community was constructed for this analysis.

Community Profiles—The community profiles of Riggins and Weiser have been updated from those reported in the earlier FEIS. The Wilder profile is a new addition. Several important changes have occurred in both information technology and the government data processes since the FEIS profiles were constructed. First, the United States government switched from the Standard Industrial Classification to the North American Industrial Classification System. This fundamentally altered the way that industry data are calculated and aggregated. It also makes some comparisons difficult before and after the change. Secondly, the prior profiles were based on pre-2000 census data. The 2000 census has provided more accurate baseline data for the community models. Finally, EMSI has adopted new and dynamic innovations in constructing community models. Governmental databases for rural regions extend only to the county level for most data series. EMSI processes take it to the community level.

Riggins

Table SO-oa illustrates the 2006 economic profile of Riggins, Idaho.

Table SO-oa. 2006 Economic Profile of Riggins

Aggregated Industrial Category	Total Jobs Per Industry	Jobs Per Industry (%)	Earnings ($1,000)	Earnings Per Industry (%)	Total Sales Per Industry ($1,000)	Sales Per Industry (%)	Earnings Per Worker ($1,000)
Ag., forestry, fishing, and hunting	127	18.2	1,444	10.0	6,169	11.9	11
Mining	13	1.9	707	4.9	2,526	4.9	56
Utilities	<10	N/A	60	0.4	230	0.4	130
Construction	45	6.4	1,016	7.0	2,312	4.4	22
Manufacturing	<10	N/A	88	0.6	376	0.7	39
Wholesale trade	<10	N/A	78	0.5	198	0.4	15
Retail trade	68	9.7	1,086	7.5	2,321	4.5	16
Transportation / warehousing	13	1.9	379	2.6	937	1.8	28
Information	<10	N/A	18	0.1	53	0.1	23
Finance and insurance	<10	N/A	168	1.2	572	1.1	38
Real estate and rental and leasing	56	8.0	905	6.3	5,201	10.0	16
Professional and technical services	<10	N/A	71	0.5	133	0.3	8
Company management	0	0.0	0	0.0	0	0.0	0
Administrative and waste services	<10	N/A	71	0.5	133	0.3	8
Educational services	12	1.7	246	1.7	444	0.9	21
Health care and social assistance	48	6.9	1,126	7.8	2,000	3.8	23
Arts, entertainment, and recreation	15	2.1	145	1.0	414	0.8	9
Accommodation and food services	82	11.7	831	5.8	2,386	4.6	10
Other services	17	2.4	203	1.4	361	0.7	12
Government	175	25.1	5,707	39.5	25,176	48.4	54
Total	**698**	**100.0**	**14,440**	**100.0**	**52,043**	**100.0**	**18**

The largest industry is government, providing the community with 175 jobs, $5.7 million in earnings, and $25.1 million in sales. The second largest industry is the agriculture, forestry, fishing, and hunting category, providing the community with 127 jobs, $1.4 million in earnings, and $6.2 million in sales. Of these jobs, 103 (81 percent) are in production agriculture. The third biggest industry in terms of employment is accommodation and food service (15.2 percent) followed by retail trade (12.6 percent). Riggins has a diverse economy

with strong tourist and agriculture sectors. In total, there are 698 jobs, $14.4 million in earnings, and $52 million in sales in Riggins.

Weiser

For Weiser (Table SO-qa), the largest industry is also the agriculture, forestry, fishing, and hunting category that provides the community with 1,185 jobs, $17.5 million in earnings and $51.6 million in sales. Of these jobs, 428 (36 percent) are in production agriculture and 756 (64 percent) are in agriculture and forestry support services. The second biggest industry in terms of employment is federal, state, and local government, which supplies 638 jobs. The third largest industry is manufacturing (13.2 percent), with 580 jobs. Weiser has a diverse economy that has strong wood products and agriculture sectors. In total, there are 4,398 jobs, $106.6 million in earnings, and $406 million in sales in Weiser.

Table SO-qa. 2006 Economic Profile of Weiser

Industry	Jobs	Jobs Per Industry (%)	Earnings ($1,000)	Earnings Per Industry (%)	Sales ($1,000)	Sales Per Industry (%)	Earnings per Worker ($1,000)
Ag., forestry, fishing, and hunting	1,185	26.9	17,485	16.4	51,578	12.7	15
Mining	<10	N/A	45	0.0	153	0.0	15
Utilities	<10	N/A	275	0.3	1,891	0.5	253
Construction	209	4.8	5,306	5.0	12,071	3.0	25
Manufacturing	580	13.2	21,983	20.6	101,333	25.0	38
Wholesale trade	100	2.3	3,380	3.2	8,606	2.1	34
Retail trade	348	7.9	7,203	6.8	15,388	3.8	21
Transportation / warehousing	193	4.4	7,274	6.8	16,291	4.0	38
Information	22	0.5	635	0.6	2,174	0.5	29
Finance and insurance	60	1.4	2,345	2.2	8,379	2.1	39
Real estate and rental and leasing	176	4.0	2,564	2.4	15,730	3.9	15
Professional and technical services	162	3.7	3,763	3.5	7,893	1.9	23
Company management	<10	N/A	52	0.0	84	0.0	36
Administrative and waste services	61	1.4	847	0.8	2,084	0.5	14
Educational services	<10	N/A	41	0.0	83	0.0	27
Health care and social assistance	296	6.7	6,121	5.7	10,744	2.6	21
Arts, entertainment, and recreation	48	1.1	933	0.9	2,169	0.5	19
Accommodation and food services	209	4.8	1,740	1.6	5,203	1.3	8
Other services	103	2.3	1,573	1.5	3,174	0.8	15
Government	638	14.5	23,001	21.6	140,882	34.7	36
Total	**4398**	**100.0**	**106,568**	**100.0**	**405,910**	**100.0**	**24**

Wilder

For Wilder (Table SO-r), the largest industry is the agriculture, forestry, fishing, and hunting category that provides the community with 800 jobs, $18.6 million in earnings, and $76.8 million in sales. Of these jobs, 704 (88 percent) are in production agriculture. The second biggest industry in terms of employment is manufacturing, with 519 jobs (25.3 percent). The third largest industry is government, which supplies 214 jobs (10.4 percent). Wilder has a

diverse economy that has strong food processing and agriculture sectors. In total, there are 2,048 jobs, $59.6 million in earnings, and $281.5 million in sales in Wilder.

Table SO-r. 2006 Economic Profile of Wilder

Industry	Jobs	Jobs Per Industry (%)	Earnings ($1,000)	Earnings Per Industry (%)	Sales ($1,000)	Sales Per Industry (%)	Earnings Per Worker ($1,000)
Ag., forestry, fishing, and hunting	800	39.1	18,587	31.2	76,802	27.3	23
Mining	<10	N/A	9	0.0	23	0.0	39
Utilities	0	0.0	0	0.0	0	0.0	0
Construction	111	5.4	3,012	5.1	6,853	2.4	27
Manufacturing	519	25.3	20,313	34.1	120,672	42.9	39
Wholesale trade	63	3.1	2,931	4.9	7,463	2.7	46
Retail trade	36	1.8	705	1.2	1,507	0.5	20
Transportation / warehousing	40	2.0	1,365	2.3	3,445	1.2	34
Information	<10	N/A	13	0.0	40	0.0	36
Finance and insurance	<10	N/A	344	0.6	1,367	0.5	45
Real estate and rental and leasing	37	1.8	558	0.9	3,594	1.3	15
Professional and technical services	18	0.9	307	0.5	580	0.2	17
Company management	0	0.0	0	0.0	0	0.0	0
Administrative and waste services	13	0.6	299	0.5	539	0.2	23
Educational services	<10	N/A	1	0.0	2	0.0	8
Health care and social assistance	105	5.1	626	1.1	1,149	0.4	6
Arts, entertainment, and recreation	14	0.7	224	0.4	694	0.2	16
Accommodation and food services	21	1.0	278	0.5	832	0.3	13
Other services	49	2.4	1,376	2.3	3,293	1.2	28
Government	214	10.4	8,606	14.5	52,645	18.7	40
Total	**2048**	**100.0**	**59,555**	**100.0**	**281,500**	**100.0**	**29**

Consistent with 36 CFR §219.20(a), the following paragraphs, tables, and Figure SO-2 will supplement the Employment and Income section, pages 3-950 through 3-958, of the Chapter 3 Socio-Economic Environment section of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

Employment and Income

The Impact of Forest Service Range Management on Local Economies

Management Scenarios

Seven management scenarios were provide by the Forest Service when considering jobs, earnings, and sales impacts on respective local Idaho communities. Sheep headmonths (sheep AUMS) were provided by management region for each scenario. These can be found in Figure SO-2. The analysis assumed approximately 3 months of summer grazing. Thus, the tota1 headmonths were reduced proportionally to account for the portion of the year when the sheep were not grazing on federal lands. As in the previous study, this analysis assumes National Forest summer range is limitational to herd maintenance, meaning no substitute for National Forest summer range, so a loss of range will result in a corresponding reduction in herd size. Forest-dependent herd size is converted to forest-dependent jobs in the livestock sector according to the following labor requirements: 1 worker per 900 head of sheep.

Alternative 7 had the most headmonths at 64,385. The remaining alternatives had the following headmonths: Alternative 7C had 62,738; Alternative 7A had 47,928; Alternative 7B had 47,755; Alternative 7D had 28,444; Alternative 7F had 7,364; Alternative 7E had zero; Alternative 7G had 27, 534; Alternative 7H had 3,801; Alternative 7J had 34,266; and Alternative 7K had 51,434.

Figure SO-2. Headmonths by Alternative

Current Condition
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	336
Fall Creek/Warren Creek	1160
Goose Creek/Hazard Creek	9823
Hells Canyon	2328
Hells Canyon Wilderness	1373
Kennally Creek	4520
Lake Creek/French Creek	8294
Middle Little Salmon River	1744
Payette Lakes	15427
Rapid River	3787
Snake River	4675
South Fork Salmon River	1797
Upper Secesh River	3526
Weiser River	5595
Grand Total	64385

Alt 7A
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	0
Fall Creek/Warren Creek	0
Goose Creek/Hazard Creek	9823
Hells Canyon	0
Hells Canyon Wilderness	0
Kennally Creek	4520
Lake Creek/French Creek	4152
Middle Little Salmon River	1744
Payette Lakes	15427
Rapid River	1698
Snake River	1507
South Fork Salmon River	1797
Upper Secesh River	1665
Weiser River	5595
Grand Total	47928

Alt 7B
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	0
Fall Creek/Warren Creek	0
Goose Creek/Hazard Creek	9823
Hells Canyon	0
Hells Canyon Wilderness	0
Kennally Creek	4520
Lake Creek/French Creek	4152
Middle Little Salmon River	1744
Payette Lakes	15427
Rapid River	1525
Snake River	1507
South Fork Salmon River	1797
Upper Secesh River	1665
Weiser River	5595
Grand Total	47755

Alt 7D
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	0
Fall Creek/Warren Creek	621
Goose Creek/Hazard Creek	6006
Hells Canyon	0
Hells Canyon Wilderness	0
Kennally Creek	4520
Lake Creek/French Creek	39
Middle Little Salmon River	853
Payette Lakes	11110
Rapid River	957
Snake River	2
South Fork Salmon River	52
Upper Secesh River	1632
Weiser River	2653
Grand Total	28444

Alt 7E
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	0
Fall Creek/Warren Creek	0
Goose Creek/Hazard Creek	0
Hells Canyon	0
Hells Canyon Wilderness	0
Kennally Creek	0
Lake Creek/French Creek	0
Middle Little Salmon River	0
Payette Lakes	0
Rapid River	0
Snake River	0
South Fork Salmon River	0
Upper Secesh River	0
Weiser River	0
Grand Total	0

Alt 7F
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	0
Fall Creek/Warren Creek	506
Goose Creek/Hazard Creek	535
Hells Canyon	0
Hells Canyon Wilderness	0
Kennally Creek	4520
Lake Creek/French Creek	0
Middle Little Salmon River	0
Payette Lakes	1108
Rapid River	0
Snake River	0
South Fork Salmon River	25
Upper Secesh River	671
Weiser River	0
Grand Total	7364

Alt 7C
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	336
Fall Creek/Warren Creek	1160
Goose Creek/Hazard Creek	9823
Hells Canyon	2328
Hells Canyon Wilderness	10
Kennally Creek	4520
Lake Creek/French Creek	8294
Middle Little Salmon River	1744
Payette Lakes	15427
Rapid River	3514
Snake River	4665
South Fork Salmon River	1797
Upper Secesh River	3526
Weiser River	5595
Grand Total	62738

Alt 7G
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	0
Fall Creek/Warren Creek	621
Goose Creek/Hazard Creek	6006
Hells Canyon	0
Hells Canyon Wilderness	1
Kennally Creek	4520
Lake Creek/French Creek	38
Middle Little Salmon River	853
Payette Lakes	10655
Rapid River	957
Snake River	2
South Fork Salmon River	52
Upper Secesh River	1177
Weiser River	2653
Grand Total	27534

Alt 7H
by MA

Sum of Head Months	
Management Area	**Total Head Months**
Fall Creek/Warren Creek	0
Goose Creek/Hazard Creek	0
Hells Canyon	0
Hells Canyon Wilderness	1
Kennally Creek	3800
Lake Creek/French Creek	0
Middle Little Salmon River	0
Payette Lakes	0
Rapid River	0
Snake River	0
South Fork Salmon River	0
Upper Secesh River	0
Weiser River	0
(blank)	
Grand Total	3801

Alt 7J
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	0
Fall Creek/Warren Creek	0
Goose Creek/Hazard Creek	9817
Hells Canyon	0
Hells Canyon Wilderness	1
Kennally Creek	4516
Lake Creek/French Creek	37
Middle Little Salmon River	691
Payette Lakes	13629
Rapid River	0
Snake River	6
South Fork Salmon River	4
Upper Secesh River	2
Weiser River	5563
Grand Total	34266

Alt 7K
by MA

Sum of Head Months	
Management Area	**Total Head Months**
BLM	336
Fall Creek/Warren Creek	1160
Goose Creek/Hazard Creek	9823
Hells Canyon	0
Hells Canyon Wilderness	1
Kennally Creek	4520
Lake Creek/French Creek	4471
Middle Little Salmon River	1744
Payette Lakes	15427
Rapid River	1527
Snake River	1507
South Fork Salmon River	1797
Upper Secesh River	3526
Weiser River	5595
Grand Total	51434

Community Mapping

Based on geographic proximity and the home address of allotment owners, the employment effects of the management scenarios were mapped to the individual communities of Riggins, Weiser, and Wilder (Tables S0-17a and S0-17b).

For the Current Conditions Alternative, Weiser had 60 percent of the total headmonths, Wilder had 27.2 percent, and 12.8 percent to Riggins.

Table SO-17a. Employment Effects of the Management Scenarios for Riggins, Weiser, and Wilder: Headmonths Sheep

City	Current	Alt 7A	Alt 7B	Alt 7C	Alt 7D	Alt 7E	Alt 7F	Alt 7G	Alt 7H	Alt 7J	Alt 7K
Riggins	8235.5	3323.6	3323.6	8235.5	1459.9	0.0	841.6	1231.9	0.1	23.0	5942.1
Weiser	38650.0	30123.9	30123.9	37276.1	18801.4	0.0	5719.3	18528.8	3800.6	25870.3	30252.1
Wilder	17499.4	14480.2	14307.5	17226.2	8183.0	0.0	803.2	7773.4	0.3	8372.6	15240.0
Total	64385.0	47927.6	47754.9	62737.8	28444.3	0.0	7364.2	27534.0	3800.9	34265.9	51434.1

Table SO-17b. Employment Effects of the Management Scenarios for Riggins, Weiser, and Wilder: Headmonths Sheep Percentage

City	Current (%)	Alt 7A (%)	Alt 7B (%)	Alt 7C (%)	Alt 7D (%)	Alt 7E (%)	Alt 7F (%)	Alt 7G (%)	Alt 7H (%)	Alt 7J (%)	Alt 7K (%)
Riggins	12.8	6.9	7.0	13.1	5.1	0.0	11.5	4.5	0.0	0.1	11.6
Weiser	60.0	62.9	63.1	59.4	66.1	0.0	77.7	67.3	100.0	75.5	58.8
Wilder	27.2	30.2	30.0	27.5	28.8	0.0	10.9	28.2	0.0	24.4	29.6
Total	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0

Employment and Earnings Income Impacts

The direct jobs dependent on the sheep allotment alternatives are presented in Table SO-17c. Direct jobs are defined as the actual number of jobs in the sheep production industry dependent on grazing allotments (per defined alternative). Under the Current Alternative, 21.5 jobs are directly employed in the sheep production industry. The remaining alternatives had the following jobs directly employed in the sheep production industry: Alternative 7C had 20.9 jobs; Alternative 7A had 16; Alternative 7B had 15.9; Alternative 7D had 9.5; Alternative 7F had 2.5; Alternative 7E had zero; Alternative 7G had 9.2; Alternative 7H had 1.3; Alternative 7J had 11.4; and Alternative 7K had 17.1.

Table SO-17c. Direct Jobs per Scenario

City	Current	Alt 7A	Alt 7B	Alt 7C	Alt 7D	Alt 7E	Alt 7F	Alt 7G	Alt 7H	Alt 7J	Alt 7K
Riggins	2.7	1.1	1.1	2.7	0.5	0.0	0.3	0.4	0.0	0.0	2.0
Weiser	12.9	10.0	10.0	12.4	6.3	0.0	1.9	6.2	1.3	8.6	10.1
Wilder	5.8	4.8	4.8	5.7	2.7	0.0	0.3	2.6	0.0	2.8	5.1
Total	21.5	16.0	15.9	20.9	9.5	0.0	2.5	9.2	1.3	11.4	17.1

The direct jobs derived from the sheep allotments were used as inputs to community economic input-output models of Riggins, Weiser, and Wilder that were produced using EMSI software. The foundation of these models is economic base theory, which bifurcates local economies into their basic and nonbasic sectors. All economic activity is allocated and attributed to the basic sectors. They are defined in the broadest sense as any economic activity that brings money into the community, including (but not limited to) agriculture industries, timber, manufacturing, and federal and state governmental operations. Government operations include transfer payments such as social security.

Nonbasic sectors are economic activities that support the basic sectors. Nonbase industries depend on base industries for income and could not exist without them. Nonbase industries support base industries, local businesses, and local households to the extent that they supply goods and services and keep money in the community that might have gone elsewhere. Nonbase industries generally include most of the retail trade and service sectors. The expenditures made at a grocery store, for example, that supply local consumers and businesses would be considered nonbasic. Some businesses have both basic and nonbasic components. If a grocery store has customers from outside the region these expenditures would be considered basic to the community.

The outputs of the community economic models include sales, earnings, and jobs. Sales are defined as the total transactions in dollars from direct and indirect economic activity. Earnings are defined as the wage and salary payments (direct and indirect) for labor income to individuals. Jobs represent the total of both direct and indirect employment of workers. Indirect effects are defined as the downstream economic effects on sales, earnings, and jobs in the regional economy from direct spending. These effects are part of the multiplier effects of direct spending. Induced effects are sometimes included in the indirect effects or identified separately. They are defined as the downstream effects of employee-related consumer spending in the economy. They are also part of the multiplier effects.

The models assess the multiplier effects from basic export activity. Two major factors determine the size and magnitude of export or basic activity: 1) the magnitude in dollars of exports in an industrial sector (e.g., sales outside the region) and 2) magnitude of the multiplier. The multiplier identifies the backward linkages of each industrial sector into the economy, along with the impacts of employee spending. The greater the backward linkages (ceteris paribus), the greater is the size of the multiplier.

Tables SO-17d and SO-17e identify the total jobs and total earnings per scenario, respectively. These include the multiplier effects. Alternative 7 produces 37.2 jobs and

$672,635 in earnings. Alternative 7C had 36.2 jobs and $653,922 in earnings. Alternative 7A produces 27.9 jobs and $518,085 in earnings. Alternative 7B produces 27.8 jobs and $516,225 in earnings. Alternative 7D produces 16.7 jobs and $311,126 in earnings. Alternative 7F produces 4.5 jobs and $78, 435 in earnings. Alternative 7E produces zero jobs and zero dollars in earnings. Alternative 7G produces 16.2 jobs and $302,462 earnings. Alternative 7H produces 2.4 jobs and $43,623 earnings. Alternative 7J produces 20.7 jobs and $387,229 earnings. Alternative 7K produces 29.6 jobs and $540,625 earnings.

Table SO-17d. Total Jobs per Scenario (includes the Direct, Indirect, and Induced Impacts, i.e. Multiplier Effects)

City	Current	Alt 7A	Alt 7B	Alt 7C	Alt 7D	Alt 7E	Alt 7F	Alt 7G	Alt 7H	Alt 7J	Alt 7K
Riggins	3.95	1.60	1.60	3.95	0.70	0.00	0.40	0.59	0.00	0.01	2.85
Weiser	24.86	19.38	19.38	23.98	12.10	0.00	3.68	11.92	2.45	16.64	19.46
Wilder	8.40	6.95	6.87	8.27	3.93	0.00	0.39	3.73	0.00	4.02	7.32
Total	37.2	27.9	27.8	36.2	16.7	0.00	4.5	16.2	2.4	20.7	29.6

Table SO-17e. Total Earnings per Scenario (includes the Direct, Indirect, and Induced Impacts, i.e. Multiplier Effects)

City	Current ($)	Alt 7A ($)	Alt 7B ($)	Alt 7C ($)	Alt 7D ($)	Alt 7E ($)	Alt 7F ($)	Alt 7G ($)	Alt 7H ($)	Alt 7J ($)	Alt 7K ($)
Riggins	40,519	16,352	16,352	40,519	7,183	-	4,141	6,061	0	113	29,235
Weiser	443,589	345,733	345,733	427,820	215,785	-	65,641	212,656	43,619	296,915	347,205
Wilder	188,527	156,000	154,139	185,584	88,158	-	8,653	83,745	3	90,201	164,185
Total	672,635	518,085	516,225	653,922	311,126	-	78,435	302,462	43,623	387,229	540,625

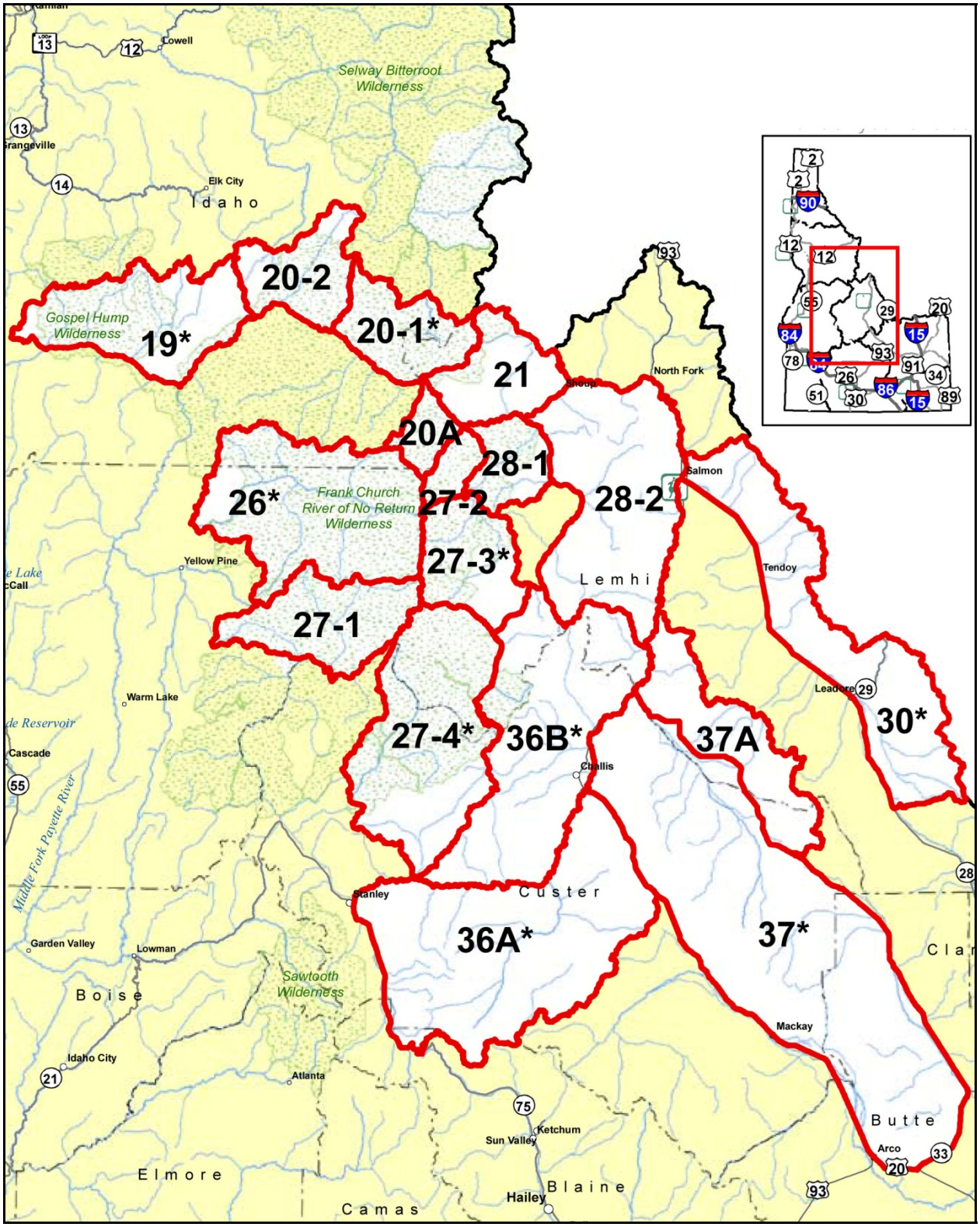
The Impact of National Forest Recreation on Local Economies

Change in bighorn sheep hunting opportunities—Some communities analyzed, such as Riggins, have realized the influx of visitors into their communities due to a large increase in the amount of available salmon and steelhead fishing opportunities. It is assumed that a similar affect could be realized as bighorn sheep populations recover and restore and hunting and viewing opportunities increase. Restored bighorn sheep populations could lead to an increase in available hunting permits, the need for additional outfitter and guide services, and an increase in watchable wildlife visitors. Each of these uses lead to more expenditures within the area of the Payette National Forest as users travel through and stay in the communities. The level of influx is difficult to determine, but wildlife hunting and viewing is a more than $100 million dollar industry in the state of Idaho. The trend is expected to continue into the foreseeable future.

Current Conditions—In Idaho, hunting bighorn sheep on and adjacent to the Payette National Forest is relatively limited, but it still provides a source of jobs and revenue. Bighorn sheep hunt areas on and adjacent to the Payette National Forest include units 11, 19, 20A, 20-1, 20-2, 21, 26, 26L, 27-1, 27-2, 27-3, and 27L (Figures SO-3 and SO-4). In these

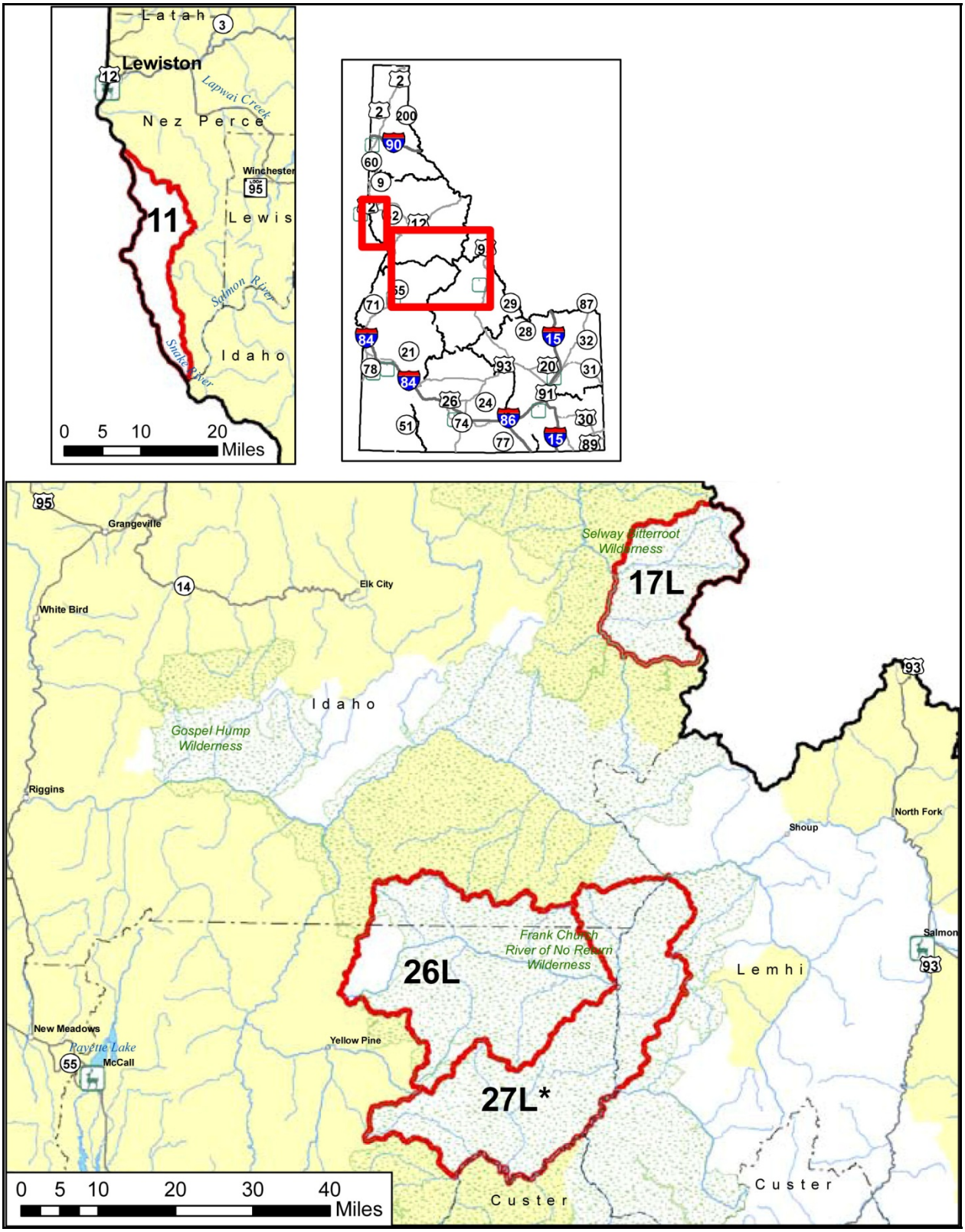
areas, an average of 44 bighorn sheep permits has been issued over the past 6 to 7 years (Table SO-20a). In addition, based on the number of hunters that apply for permits, this number could increase substantially if bighorn sheep populations increased in size and distribution.

Figure SO-3. 2007–2008 Rocky Mountain Bighorn Sheep Hunt Units



(Source: IDFG 2008)

Figure SO-4. 2007-2008 Rocky Mountain Bighorn Sheep Late Hunt Units



(IDF 2008)

Table SO-20a. Idaho Bighorn Sheep Hunting Areas on and adjacent to the Payette National Forest[1]

Hunt Area	General Location	Average No. of Permits Past Years of Record	Average No. Days Hunted per Permit (Years of Record)	Percent Successful Hunts Guided (Years of Record)
11	Northwest of Payette National Forest in Hells Canyon	2	1.7	50
19	North of the Main Salmon River	6	10.5	10
20-1	Northeast of Payette National Forest across Middle Fork Salmon River	2	12.5	0
20-2	Northeast of Payette National Forest across Middle Fork Salmon River	2	12.5	0
20A	Northeast portion of Payette National Forest in Wilderness (south of Main Salmon River)	2	12	50
26	Big Creek area, Payette National Forest	3	8.2	26
26L	In the Frank Church Wilderness Area	2	8	50
27-1	Southeast of #26 (on and off Payette National Forest)	13	7	33
27-2	Northeast of #26 (on and off Payette National Forest)	7	7	33
27-3	East of Payette National Forest	3	8.5	29
27L	South of Payette National Forest	2	10	28
		Average total permits year = 44	Average no. of days hunted/year = 9	Average percent guided = 28

[1] Information obtained from Idaho Fish and Game website from hunt statistics from 2000–2007.

Hells Canyon Populations—Hunting bighorn sheep in the Hells Canyon area is limited. The IDFG currently issues only two controlled hunting permits annually. These permits are awarded through a drawing process; 374 hunters applied for the Hells Canyon Hunt Area 11 in 2008. One other bighorn sheep hunting permit for Hells Canyon Hunt Area 11 is auctioned off at an annual benefit auction each season.

The actual dollar cost of these three permits varies greatly. The record amount paid for an auctioned bighorn sheep permit was $180,000 in 2005. In 2008, the cost for the standard resident permit is $194.75 and for a nonresident is $1,779.75. These permits allow a hunter

to legally hunt and take one bighorn ram in this area in their lifetime, making this a truly once in a lifetime hunt.

Due to the limited amount of hunting permits issued for the Hells Canyon Area 11 and the difficulty of accessing the area, most bighorn sheep hunters hire local guides. The exact number of hunters that hire a guide is not tracked. The hunting outfitters licensed in Hells Canyon offer only full-service or all-inclusive hunts for bighorn sheep. The amount charged by these outfitters ranges from $6,100 to $8,600 per hunter. With only three permits issued annually in the Hells Canyon area, any other associated costs for hunting bighorn sheep, such as gas, food, and ammunition, would be limited.

Salmon River and Big Creek Populations—The hunt areas and number of permits associated with the Salmon River and Bog Creek populations are displayed in Table SO-20a. Costs for resident and nonresident permits are the same as discussed above. We assume that outfitter and guide charges would also be similar to those above.

Direct Jobs—Comparing these data with the economic analysis of the direct jobs dependent on the sheep allotment alternatives (Table SO-17c) requires an assumption of the number of jobs associated with these bighorn sheep hunts.

Direct jobs associated with sheep production were defined as the actual number of jobs in the sheep production industry dependent on grazing allotments. Forest-dependent herd size was converted to forest-dependent jobs in the livestock sector according to the following labor requirements: 1 worker per 900 head of sheep. Under current conditions of 64,385 headmonths, this resulted in 21.5 jobs directly created by the sheep production industry.

Table SO-20a shows, on average, that 28 percent of the successful hunts were guided. We assumed that a similar number of unsuccessful hunts were gathered. We also assumed that these outfitters and guides were locally operated, thereby returning revenues to the local communities. Based on IDFG statistics (Table SO-20a), the average hunt lasted 9 days; we estimated each hunt resulted in 12 guided work days requiring 2 workers for a total of 24 days per hunt. During the past 6 to 7 years, an average of 44 permits have been issued per year on and adjacent to the Payette National Forest, resulting in 1,056 days or 4 jobs per year (about 264 working days per year) of employment.

Based on these estimates, under current conditions, the outfitting and guiding of bighorn sheep on and adjacent to the Payette National Forest equates to 4 jobs per year.

Environmental Effects—The change in the hunting revenues (to IDFG and to outfitters and guides) and change in economics (via "direct jobs") associated with each alternative was assumed to correspond with the change in the potential risk of contact between bighorn and domestic sheep (see analysis under *Terrestrial Wildlife Habitat and Species* above). Those alternatives that provided the greatest reduction in potential risk of contact between bighorn and domestic are assumed to provide the greatest increase in revenues and direct jobs associated with bighorn sheep hunting.

Alternative 7E provided the greatest reduction in potential risk of contact. Alternative 7H reduced the potential contact slightly less than Alternative 7E. Alternatives 7G and 7J reduced potential risk of contact to a moderate degree; neither Alternative 7G nor 7J buffer

the occupied habitat. Alternative 7K and then Alternatives 3, 4, and 6 are ranked next for minimizing risk, although they both leave a substantial amount of risk on the landscape, with much smaller expected benefits to outfitter and guided hunting opportunities and revenues.

Over time, it is expected that bighorn sheep populations would increase substantially in size and distribution under those alternatives that reduce the potential risk of contact to the greatest degrees (Alternatives 7E and 7H). As populations increase and expand, permit revenues and direct jobs are also expected to increase, perhaps substantially.

For those alternatives that reduce risk of contact by moderate amounts (Alternatives 7G and 7J), changes in permits and associated revenues are less clear, but some benefits via population increases and increased hunting opportunities are likely.

Alternatives that "leave a substantial amount of risk" (Alternative 7K and Alternatives 3, 4, and 6) may not result in any increase in bighorn sheep numbers and, in fact, may reduce jobs and revenues if bighorn sheep populations actually decline due to contact and subsequent disease.

Consistent with 36 CFR §219.20(a), the following paragraph will supplement the Cumulative Effects section, page 3-970, of the Chapter 3 Socio-Economic Environment of the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement.

Cumulative Effects

Employment

The number of jobs linked to bighorn sheep restoration is tied directly to the potential for the population to recover and persist over time or the amount of relative risk for contact between bighorn sheep and domestic sheep or goat left on the landscape. With Alternatives 1B, 2, 5, and 7 retaining 100 percent of the risk, the assumption is that no more opportunities for employment or income will occur, and the likelihood is that they will decrease as the bighorn sheep populations decline and/or disappear. The change from Alternatives 1B, 2, 5, 7, and 7K is minimal when considering Alternatives 3, 4, and 6. Alternative 7G and 7J provide more opportunity for recovery of the species and thus input into the communities as both employment and income. Alternatives 7H and 7E provide the most opportunity for economic enhancement as no, or nearly no, risk for contact is left on the Payette National Forest. That is not to say, however, that all risk is gone from the landscape as small farm flocks of domestic sheep and goats may still exist on private property or other state and federal lands.

Chapter 4
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Glossary

Fixed Kernel Analysis—A method to mapping the range of a herd on the landscape using a method derived from the calculation of the standard bivariate normal (i.e., Gaussian) kernel density estimator (i.e., utilization distribution). Polygons are calculated from the volumes of the curve under different portions of the utilization distribution. Polygons are also calculated using a fixed kernel approach that assumes the width of the standard bivariate normal kernel placed at each observation is the same throughout the plane of the utilization distribution.

Geographic Population Range (GPR)—A range that a group larger than a herd but smaller than a metapopulation occupies or has occupied in the last 50 years.

Herd—A group of bighorn sheep that remain together as a loose group with a tighter group of breeding ewes as the core.

Herd Home Range—Home range modeling utilizing all telemetry locations together to generate the range, as opposed to modeling each individual separately and aggregating the results.

Source Environment—The composite of all environmental conditions occurring in a specified area and time that result in stationary or positive population growth.

Source Habitat—Those characteristics of macrovegetation that contribute to positive population growth for a species in a specified area and time. Distinguished from habitats associated with species occurrence: such habitat may or may not contribute to long-term population persistence. Source habitats contribute to source environments.

Source Habitat Capacity—All acres with the potential to provide habitat for bighorn sheep, based only on their requirement for escape terrain.

Volume Contour—A component of a Fixed Kernel Analysis that depicts the level of activity (i.e., 50 percent contour means that half of the herd activity falls within that contour).

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