# PROPOSED COTTONWOOD RESOURCE MANAGEMENT PLAN AMENDMENT
for
# DOMESTIC SHEEP GRAZING
and
# FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

**United States Department of the Interior**
**Bureau of Land Management**

**BLM Cottonwood Field Office**
1 Butte Drive
Cottonwood, Idaho 83522

**April 2016**

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# DRAFT COTTONWOOD RESOURCE MANAGEMENT PLAN AMENDMENT FOR DOMESTIC SHEEP GRAZING AND SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

**1. Responsible Agency:** United States Department of the Interior
Bureau of Land Management

**2. Type of Action:** Administrative

**3. Document Status:** Final

**4. Abstract:** The *Proposed Cottonwood Resource Management Plan (RMP) Amendment for Domestic Sheep Grazing and Final Supplemental Environmental Impact Statement (SEIS)* describes and analyzes six alternatives for the management of domestic sheep on 19,405 acres of public land in Idaho and Adams counties, Idaho, administered by the Bureau of Land Management, Cottonwood Field Office. The SEIS is a supplement to the analysis in the *Proposed Cottonwood Resource Management Plan and Final Environmental Impact Statement*, published by this office in 2008. The purpose of this RMP Amendment/SEIS is to address concerns regarding the potential transmission of disease from domestic to bighorn sheep. In addition, the SEIS presents the analysis of related impacts to the interests and rights of the Nez Perce Tribe, and to the local social and economic conditions.

**5. Protest Period:** The protest period for the Proposed RMP Amendment/Final SEIS is 30 calendar days, and begins when the Environmental Protection Agency publishes a Notice of Availability in the *Federal Register*.

**6. For Further Information Contact:**
BLM Cottonwood Field Office
1 Butte Drive
Cottonwood, ID 83522
Telephone: (208) 962-3245
Email: BLM_ID_SheepSEIS@blm.gov
Website: http://www.blm.gov/id/st/en/Districts-Idaho/CDA.html

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United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Cottonwood Field Office
1 Butte Drive
Cottonwood, Idaho 83522

In Reply Refer To:
1610 (IDC020)

Dear Reader:

Enclosed is the Proposed Cottonwood Resource Management Plan (RMP) Amendment for Domestic Sheep Grazing and Final Supplemental Environmental Impact Statement (SEIS). This Final SEIS supplements the Proposed Cottonwood Resource Management Plan and Final Environmental Impact Statement (Cottonwood PRMP/FEIS) published in 2008. The Final SEIS specifically focuses on domestic sheep grazing on four Bureau of Land Management (BLM) grazing allotments and the associated potential for transmission of disease from domestic sheep to bighorn sheep.

Pursuant to BLM's planning regulations at 43 CFR 1610.5-2, any person who participated in the planning process for this Proposed RMP Amendment/Final SEIS and has an interest which is or may be adversely affected by the proposed decisions may protest the proposed decisions within 30 days from date the Environmental Protection Agency (EPA) publishes the Notice of Availability of the Final SEIS in the *Federal Register*. BLM's planning regulations at 43 CFR 1610.5-2 provide more details regarding protest procedures.

All protests must be in writing and mailed to one of the following addresses:

Regular Mail: Director (210)
Attn: Protest Coordinator
P.O. Box 71383
Washington, D.C. 20024-1383

Overnight Delivery: Director (210)
Attn: Protest Coordinator
20 M Street SE, Room 2134LM
Washington, D.C. 20003

Emailed protests will not be accepted as valid protests unless the protesting party also provides the original letter by either regular mail or overnight delivery postmarked by the close of the protest period. Under these conditions, the BLM will consider the emailed protest as an advance copy and will afford it full consideration. If you wish to provide the BLM with such advance notification, please direct emailed protests to: protest@blm.gov.

Before including your address, phone number, email address, or other personal identifying information in your protest, be advised that your entire protest - including your personal identifying information- may be made publicly available at any time. While you can ask us in your protest to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

The BLM Director will make every attempt to promptly render a decision on each protest. The decision will be in writing and will be sent to the protesting party by certified mail, return receipt requested. The decision of the BLM Director on each protest shall be the final decision of the Department of the Interior. Responses to protest issues will be compiled and formalized in a Director's Protest Resolution Report made available following issuance of the decisions. Upon resolution of all protests, the BLM will issue an Approved RMP Amendment and Record of Decision.

Sincerely,

Richard White
Field Manager

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# ACRONYMS

| Acronym | Meaning |
|---|---|
| AMS | Analysis of the Management Situation |
| AUM | Animal Unit Month |
| BLM | Bureau of Land Management |
| BMP | Best Management Practice |
| CCD | Census County Division |
| CdA | Coeur d'Alene |
| CEQ | Council on Environmental Quality |
| CFO | Cottonwood Field Office |
| CFR | Code of Federal Regulations |
| CHHR | Core Herd Home Range |
| DSEIS | Draft Supplemental Environmental Impact Statement |
| EIS | Environmental Impact Statement |
| EPS-HDT | Economic Profile System Human Dimensions Toolkit |
| ESA | Endangered Species Act |
| FEIS | Final Environmental Impact Statement |
| FLPMA | Federal Land Policy and Management Act |
| FO | Field Office |
| FSEIS | Final Supplemental Environmental Impact Statement |
| GIS | Geographic Information System |
| GMU | Game Management Unit |
| GPS | Global Positioning System |
| HCBSRC | Hells Canyon Bighorn Sheep Restoration Committee |
| ID | Idaho |
| IDFG | Idaho Department of Fish and Game |
| IDIM | Idaho Instruction Memorandum |
| IHL | Interim Herd Level |
| ISDA | Idaho State Department of Agriculture |
| LANDFIRE | Landscape Fire and Resource Management Planning Tools |
| MFP | Management Framework Plan |
| NEPA | National Environmental Policy Act |

# ACRONYMS

| Acronym | Meaning |
|---|---|
| NVN | Nonviable Herd Number |
| ODFW | Oregon Department of Fish and Wildlife |
| PCPI | Per Capita Personal Income |
| PMU | Population Management Unit |
| PRMP | Proposed Resource Management Plan |
| RMP | Resource Management Plan |
| ROD | Record of Decision |
| SEIS | Supplemental Environmental Impact Statement |
| SRBSP | Salmon River Bighorn Sheep Project |
| SRMA | Special Recreation Management Area |
| SRP | Special Recreation Permit |
| TPI | Total Personal Income |
| TWS | The Wildlife Society |
| USDA | United States Department of Agriculture |
| USGS | United States Geological Survey |
| USFS | United States Department of Agriculture Forest Service |
| VHF | Very High Frequency |
| WAFWA | Western Association of Fish and Wildlife Agencies |
| WDFW | Washington Department of Fish and Wildlife |
| WOIM | Washington Office Instruction Memorandum |
| WSA | Wilderness Study Area |
| WWP | Western Watersheds Project |

# EXECUTIVE SUMMARY

The Bureau of Land Management (BLM) proposes to amend the *Record of Decision and Approved Cottonwood Resource Management Plan* (Cottonwood ROD/RMP) (BLM 2009a) by providing new direction for the management and allocation for livestock grazing on 19,405 acres of BLM land within four BLM allotments in Idaho and Adams counties, Idaho (see Map 2 in Appendix D). This is in response to protests to the *Proposed Cottonwood Resource Management Plan and Final Environmental Impact Statement* (Cottonwood PRMP/FEIS) (BLM 2008b), which were granted by the Director of the BLM.

## Purpose and Need

Disease transmission from domestic sheep to bighorn sheep has likely contributed to significant declines in bighorn sheep populations and, in some cases, extirpation. The proposed action is needed because domestic sheep and goat grazing on four BLM allotments (Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek) could result in disease transmission to bighorn sheep and contribute to downward trends of local bighorn populations. As identified in protests to the Cottonwood PRMP/FEIS, the BLM must consider this when developing RMP direction for livestock grazing on these four allotments.

The purpose of the proposed action is to provide RMP direction for the management and allocation of livestock grazing on four BLM allotments that avoids or effectively reduces domestic sheep contact with and potential disease transmission to bighorn sheep populations.

## Planning Issues

The BLM identified the following planning issues:

- Bighorn Sheep – Domestic sheep and goats may contact and potentially transmit diseases to bighorn sheep and subsequently result in respiratory disease outbreaks; a possible contributing factor to the downward trend in bighorn sheep populations.
- Native American Tribal Interests and Treaty Rights – Management of livestock grazing by the BLM, specifically domestic sheep and goats, may affect the availability of resources and uses (specifically related to bighorn sheep) that are important to the interests and rights of the Nez Perce Tribe.
- Livestock Grazing and Social and Economic Interests – Changes to management of livestock grazing by the BLM may affect the local economy.

## Descriptions of the Alternatives

The BLM developed five action alternatives to meet the purpose and need. In addition, for analysis purposes, the BLM included a No Action alternative. Because this amendment specifically focuses on addressing the impacts of potential disease transmission from domestic sheep and goats to bighorn sheep, none of the proposed alternatives would close the allotments to

other types of livestock grazing (e.g., cattle, horses, etc.). Under all alternatives, all four allotments and specified allocations of forage would be available for grazing by other types of livestock.

The BLM would also develop a separation response plan for bighorn sheep and domestic sheep for any of the four allotments where domestic sheep are allowed to graze. The response plan would define the process, protocols, and timelines for short-term or emergency management actions when intervention is needed to minimize the risk of association between domestic sheep and goats, and bighorn sheep. The response plan will allow for an adaptive management approach that includes reviewing, evaluating, and modifying grazing management to provide for long-term effective separation between domestic and bighorn sheep.

The BLM has identified Alternative B as the proposed RMP amendment. This alternative was identified as the preferred alternative in the draft SEIS. In making this identification, the BLM considered: (1) its multiple-use and sustained yield mandate, (2) BLM policy guidance for the coordination and management of domestic sheep and goats to sustain wild sheep on BLM managed lands (BLM 2016), (3) the purpose and need for this RMP Amendment/SEIS, (4) the planning issues, and (5) the results of the effects analysis (Chapter 4). The BLM found that Alternative B provides a means to allow for compatible multiple uses (in this case, domestic sheep grazing and bighorn sheep habitat) with low potential for adverse effects to bighorn sheep populations from inter-species disease transmission.

Tables ES-1, ES-2, and ES-3 illustrate the allotment, acreage, and animal unit month (AUM) availability for domestic sheep and goats by alternative.

**Table ES-1: Allotment Availability for Domestic Sheep and Goat Grazing by Alternative**

| Allotment | Alternative A | Alternative B (Proposed) | Alternative C | Alternative D | Alternative E | Alternative F |
|---|---|---|---|---|---|---|
| Partridge Creek | Yes | No | No | No | No | No |
| Marshal Mountain | Yes | No | No | Yes | Yes | No |
| Hard Creek | Yes | No | No | No | Yes | Yes |
| Big Creek | Yes | Yes | No | Yes | Yes | Yes |

**Table ES-2: Acres Available for Domestic Sheep and Goats by Alternative**

| Allotment | Alternative A | Alternative B (Proposed) | Alternative C | Alternative D | Alternative E | Alternative F |
|---|---|---|---|---|---|---|
| Partridge Creek | 9,544 | 0 | 0 | 0 | 0 | 0 |
| Marshal Mountain | 4,212 | 0 | 0 | 4,212 | 4,212 | 0 |
| Hard Creek | 5,210 | 0 | 0 | 0 | 5,210 | 5,210 |
| Big Creek | 439 | 439 | 0 | 439 | 439 | 439 |
| Total | 19,405 | 439 | 0 | 4,651 | 9,861 | 5,649 |

**Table ES-3: Animal Unit Months Available for Domestic Sheep and Goats by Alternative**

| Allotment | Alternative A | Alternative B (Proposed) | Alternative C | Alternative D | Alternative E | Alternative F |
|---|---|---|---|---|---|---|
| Partridge Creek | 431 | 0 | 0 | 0 | 0 | 0 |
| Marshal Mountain | 166 | 0 | 0 | 166 | 166 | 0 |

| Table ES-3: Animal Unit Months Available for Domestic Sheep and Goats by Alternative | | | | | | |
|---|---|---|---|---|---|---|
| Hard Creek | 218 | 0 | 0 | 0 | 218 | 218 |
| Big Creek | 81 | 81 | 0 | 81 | 81 | 81 |
| Total | 896 | 81 | 0 | 247 | 465 | 299 |

## Affected Environment

### Bighorn Sheep

Occupied bighorn sheep habitat in Idaho, Oregon, and Washington occurs in the Salmon River and Snake River drainages of the Columbia River Basin (WAFWA 2010). Bighorn sheep exist in both small isolated populations (herds) and interconnected metapopulations (IDFG 2010). This document addresses Rocky Mountain bighorn sheep, hereafter referred to simply as bighorn sheep, that occur within the analysis area. Two bighorn sheep metapopulations occur within the analysis area, one within the Hells Canyon section of the Snake River and the other within the Salmon River canyon and mountains. Historically, these populations were likely connected by suitable habitat between the two major drainages and may have functioned as one metapopulation.

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, disease, and unregulated hunting (Hells Canyon Bighorn Sheep Restoration Committee [HCBSRC] 2005). Reintroduction efforts in Hells Canyon began in 1971, with 474 bighorn sheep transplanted between 1971 and 2004 (HCBSRC 2005). In 2005, the HCBSRC estimated that 875 bighorn sheep were located within Hells Canyon, and the 2011 population estimate is 850 (includes Idaho, Oregon, and Washington). Overall, Hells Canyon modeled habitat could support more bighorn sheep than current population levels. The Idaho Department of Fish and Game (IDFG 2010) determined that the Hells Canyon Population Management Unit (PMU) can support between 1,555 and 2,802 bighorn sheep, well above current bighorn sheep numbers. Cassirer and Sinclair (2007) describe the effects of chronic, repeated pneumonia outbreaks on bighorn sheep populations in Hells Canyon, and their potential adverse effects on bighorn sheep population recovery and persistence.

The Salmon River metapopulation was never extirpated (Toweill and Geist 1999), although the population has experienced periodic die-offs. No reintroduction or augmentation has occurred in the Lower Salmon River Population Management Unit (PMU) (IDFG 2011). Low recruitment rates and an overall decline in sheep numbers over the years for this metapopulation may have been caused by disease and habitat conditions in this PMU (IDFG 2010). Population numbers have dwindled in the western portion of this PMU that is closest to active domestic sheep allotments, and disease has resulted in low lamb survival in adjacent herds along the Salmon River (IDFG 2010). According to Idaho Department of Fish and Game (IDFG 2010), the predicted population size within the Salmon River PMU is 942 to 1,504, which is above current bighorn sheep population levels. Within the Lower Salmon River PMU, Game Management Unit (GMU) 14 is the most western GMU, occurs the closest to domestic sheep grazing, and has low lamb survival. During the period of 2010 to 2012 the lamb to ewe ratio was 9.7 (lambs per 100 ewes) within GMU 14. During the same period, the GMUs within the Lower Salmon River PMU

that were further east and more distant from historic domestic sheep grazing areas ranged from 57 percent to over 200 percent higher for lamb to ewe ratios when compared to GMU 14 ratios.

Disease, primarily bacterial pneumonia, has played an important role in the dynamics of bighorn sheep populations and has been responsible for numerous population declines throughout North America (Cassirer and Sinclair 2007). A long history of large-scale, rapid, all-age die-offs in bighorn sheep has been documented across Canada and the United States, many of which are attributed to domestic animal contact (Shackleton 1999). Although there is limited knowledge of transmission dynamics (Garde et al. 2005), extensive scientific research supports a relationship between disease in bighorn sheep populations and contact with domestic sheep (Lawrence et al. 2010; Besser et al. 2014).

Three models were developed to better understand bighorn sheep habitat suitability and the potential for contact with domestic sheep. The models developed include (1) a bighorn sheep source habitat model; (2) a core herd home range model; and (3) a risk-of-contact model that utilizes a bighorn sheep source habitat and core herd home range (CHHR) analysis for the bighorn sheep foray analysis. Forest Service (2013a), O'Brien et al. (2014) and Carpenter et al. (2014) document methods and models primarily used for analysis purposes in this SEIS. Outputs from these models were used to describe current conditions on BLM domestic sheep allotments and the adjacent areas, and as a basis for alternative evaluation and comparison. The BLM also used the results from these models to make inferences regarding the potential for disease transmission between the species and outbreaks of disease within bighorn populations.

In response to bighorn sheep population viability concerns, the Payette National Forest developed a methodology for calculating the probability and rate of contact between bighorn sheep and active domestic sheep allotments (USFS 2010a). Subsequently in 2011, a team of Forest Service and BLM specialists initiated a process to develop a geospatial platform based on the concepts used in the Payette analyses for application on other National Forests or BLM Districts (USFS 2010a; USFS 2013a; O'Brien et al. 2014; Carpenter et al. 2014). The BLM domestic sheep allotments addressed in this SEIS are within the cumulative effects analysis area addressed in the Payette analysis (USFS 2010a); consequently, the analysis, methodology, and resulting Risk of Contact Tool was the chosen modeling method used by the BLM for this SEIS. The models used for this SEIS along with background information and the user's guide are included in the *Bighorn Sheep Risk of Contact Tool Users Guide* (USFS 2013a). Methods provided by the referenced Risk of Contact Tool provide land managers a framework for addressing and calculating the probability and rates of contact between bighorn sheep and domestic sheep allotments and potential for disease transmission; and subsequent development of bighorn sheep conservation measures (USFS 2013a).

Bighorn Sheep Source Habitat Model

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; Raphael et al. 2001). Source habitats contribute to source environments, which represent the composite of all environmental conditions that result in stationary or positive population growth in a specified area and within a specified time. Within the BLM's Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek domestic sheep allotments, there are 7,249 acres of summer source habitat

and 4,706 acres of winter source habitat. In addition to the source environments present within an allotment identification of source habitat was also dependent on the season of use during which domestic sheep have historically used the allotment (summer May - October; winter November - April). For example, if domestic sheep grazing was not historically occurring during the winter period, then no winter source habitat available for domestic sheep grazing would be identified for that allotment.

Core Herd Home Range Model

The core herd home range (CHHR) was mapped as a polygon containing 95 percent of all telemetry points from radio-collared (telemetry) or observed bighorn sheep (USFS 2013a; O'Brien et al. 2014). The four subject BLM allotments contain a total of 7,756 acres of summer and 7,533 acres of winter CHHR.

Risk-of-Contact Model

The risk-of-contact modeling estimates the probability of foraying bighorn sheep reaching a domestic sheep allotment (USFS 2013a; O'Brien et al. 2014; Carpenter et al. 2014). By definition, contact occurs where the CHHR overlaps an allotment; in this case, it is assumed that at least one potential contact per year may occur (USFS 2013a). The risk-of-contact model also includes parameters that characterize bighorn sheep movements, or forays, outside of the CHHR. These include the frequency and season during which foray movements occur, and the distance beyond the CHHR that bighorn sheep are likely to travel.

Together, the habitat, CHHR, and risk-of-contact models were used to estimate the probability that a ewe or ram in any of the herds would reach any of the domestic sheep allotments in a given year. Thus, the risk of contact is related to the distance between the CHHR and the allotments available for domestic sheep or goat grazing.

Interpreting Contact Rates Relative to the Probability of Bighorn Sheep Disease Outbreaks and Population Trends

A high degree of uncertainty exists regarding the probability that contact of a bighorn sheep with an allotment will lead to disease outbreak occurring within a herd (USFS 2010a, USFS 2013b; Carpenter et al. 2014; O'Brien et al. 2014). Quantification of disease transmission and outbreaks in bighorn sheep populations following contact with domestic sheep or goats, and the subsequent ability of a population to recover, are key to interpreting the results from the above models; however, the mechanisms of disease transmission and resulting disease outbreaks in bighorn sheep is not fully understood. We currently lack empirical data to accurately predict the frequency of outbreaks and the effects on population persistence for all scenarios.

In order to sustain populations of bighorn sheep within the Hells Canyon and Main Salmon/South Fork metapopulations in the long term, it will be necessary to reverse the significant declining trends in populations. Therefore, for this analysis, the BLM used the predicted number of disease outbreaks over a 50-year period that would result from contact with domestic sheep as an indicator of the effect on these bighorn sheep population trends.

The BLM recognizes the uncertainty regarding the relationship between the number of bighorn sheep contacts with a domestic sheep allotment and predictions for disease transmission and outbreaks. In this SEIS the analysis was conducted at a herd level for the various alternatives to predict disease outbreak attributed to BLM authorized domestic sheep grazing over a 50-year period. Due to the uncertainty in the amount of contacts between domestic sheep and bighorn sheep needed to result in disease transmission to bighorn sheep and subsequent disease outbreak, the BLM analyzed a range of probabilities. These ranged from 0.05 (1 in 20 contacts would result in a disease outbreak) to 1.00 (every contact would result in a disease outbreak). The specific probability values modeled were: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00. The BLM then used the range of probabilities of disease outbreak to predict the number of outbreaks that would occur over a 50-year period.

**Native American Tribal Uses**

Traditionally, socio-cultural values of the Nez Perce reflect a close relationship with natural resources, including big game animals. At times, spiritual values are attributed to animals. For instance, the taking of bighorn sheep is more than a subsistence activity. The Nez Perce believe that in sharing a successful hunt, family ties are strengthened and their connection to the local ecology is maintained, forming a link to the past that contributes to maintaining cultural continuity. As such, the act of hunting is reserved under Article 3 of the 1855 Treaty between the United States and the Nez Perce Tribe. Because hunting is a reserved right and is incorporated into the Tribe's socio-cultural system, any change in these Treaty-reserved opportunities has the potential to affect the socio-cultural system of the Nez Perce Tribe.

**Livestock Grazing and Social and Economic Conditions**

Wildlife and outdoor enthusiasts, hunters, photographers, and the general public value the opportunity to view and hunt bighorn sheep. Consumptive and non-consumptive wildlife activities are an important contributor to the economy in Idaho (IDFG 2010). In 2006 estimates for annual hunting and wildlife viewing in Idaho were 187,000 and 754,000 participants, respectively, which resulted in gross expenditures of $259.7 million and $265.4 million, respectively (USFWS 2007).

The price and sales of resident and non-resident bighorn sheep tags, including special auction and lottery tags, can be attributed directly to bighorn sheep hunting opportunities. Tag sales for the 2009 season included 85 controlled-hunt permits/tags, 1 auction tag, and 1 lottery tag. Eight non-resident and 77 resident tags were allocated that year. Resident tags sold for $166.75 and non-resident tags for $2,101.75. The auction tag sold for $120,000 in 2009, and has averaged $82,450 per year over the past 10 years (IDFG 2010).

Sheep grazing within the Cottonwood Field Office also plays an important social role, as area residents identify with the tradition, land use, and history of livestock operations. Of note is the intimate culture that surrounds the sheep industry, which is attributable to values such as hard work, tradition, and a love for the animals and the land. These values are emphasized and cultivated in area events such as county fairs, where 4-H and Future Farmers of America programs contribute to youth education and a sense of community identity. In *History of the*

*State of Idaho*, Cornelius Brosnan states that, "Idaho has become one of the greatest wool-producing States, but has long been noted for its mutton" (Brosnan 1918).

Table ES-4 outlines the current authorizations and status of the four subject grazing allotments.

**Table ES-4: Allotments with Sheep Grazing**

| Allotment Name | Partridge Creek | Marshall Mountain | Hard Creek | Big Creek |
|---|---|---|---|---|
| **BLM Acres** | 9,544 | 4,212 | 5,210 | 439 |
| Lessee Name | Carlson Livestock Company | Carlson Livestock Company | Soulen Livestock Company | Soulen Livestock Company |
| Lease Expiration Date | 2/28/2014 | 2/28/2016 | 2/28/2019 | 2/28/2019 |
| Season of Use | 4/11 to 7/15<br>10/15 to 11/30 | 07/5 to 08/04 | 6/15 to 7/15 | 6/1 to 10/30 |
| No. of Sheep | 833 | 815 | 1,050 | 8,000 |
| Permitted Sheep Use in AUMs | 431 | 166 | 218 | 81 |
| Current Status | District Court Temporary Restraining Order 10/14/2009 | Temporary Closure by BLM Decision 3/15/2011 | Lessee has voluntarily taken non-use | Lessee has voluntarily taken non-use |

## Environmental Consequences

Table ES-5 summarizes the estimated environmental consequences (impacts) from implementation of each of the alternatives. The following is a brief explanation of each key indicator as presented in the table. Chapter 4 of this document provides more detailed explanations of the indicators.

- *Bighorn Sheep Summer/Winter Source Habitat Available for Domestic Sheep Use* – Source habitat contains characteristics that contribute to positive population growth for bighorn sheep. Bighorn may, or may not actually occupy this habitat, and potential use varies by season (summer/winter). If source habitat is available for domestic sheep use, the potential for interspecies contact increases because of the occurrence of habitats preferred by bighorn sheep.
- *Bighorn Sheep Summer/Winter CHHR Available for Domestic Sheep Use* – The CHHR is the area within which most bighorn herd individuals spend at least 95 percent of their time. If the CHHR is available for domestic sheep use, the allotment has a predicted contact rate of one or more interspecies contacts per year, greatly increasing the potential for disease transmission and disease outbreaks. The higher the number of acres of CHHR that overlap with domestic sheep allotments, the greater the number of contacts that could occur annually.
- *Distance between BLM Land Available for Domestic Sheep Use and Nearest Bighorn Sheep CHHR* – The shorter the distance between allotments available for domestic sheep use and a bighorn CHHR, the greater the likelihood of contact between species.

- *Little Salmon Area of Concern Available for Domestic Sheep Use* – Over the past five years there have been several observations of bighorn sheep in the Little Salmon River drainage, which suggest a degree of habitat site fidelity or preference for the area. Areas in close proximity to these sightings and associated habitat preference have been identified as having an increased risk for interspecies contact. These areas (Little Salmon Area of Concern) that overlap with a domestic sheep allotment have an apparent greater risk for disease transmission. No documentation of an established bighorn sheep herd exists for the area; however, because of documented bighorn sheep fidelity for use of the area and the potential for increased risk for interspecies contact, effects will be assessed for the Little Salmon Area of Concern.
- *Distance between BLM Land Available for Domestic Sheep Use and Little Salmon Area of Concern Interest* – The shorter the distance between allotments available for domestic sheep use and this area of concern, the greater the likelihood of contact between species.
- *Probable Contacts per Year between Bighorn Sheep and Domestic Sheep Allotments* – This is the number of contacts per year predicted for a bighorn sheep intersecting a domestic sheep allotment, which is considered a primary factor contributing to potential for disease transmission, disease outbreaks, and indicates effects on population trends.
- *Ranking of Effects on Bighorn Sheep Population Trends* – This is the rank order of alternatives in regards to the estimated adverse effect on bighorn sheep population trends.
- *Ranking of Area Available for Bighorn Sheep and Native American Tribal Hunting* – The rank order of the adverse effects that each alternative would have on the opportunities for Native American Tribal members to hunt for bighorn sheep in traditional or culturally important areas.
- *Ranking of Availability of Bighorn Sheep for Native American Tribal Hunting* – This is the rank order of the effects that each alternative would have on the opportunities for Native American Tribal members to hunt bighorn sheep, based on effects to bighorn sheep population trends.
- *AUMs Available for Domestic Sheep Use* –AUMs are a measure of the forage that would be available for domestic sheep use under each alternative.
- *Contributed Jobs* – This is an estimate of the number of jobs that the grazing use on the four allotments would contribute to the local economy.
- *Ranking of Opportunities for Bighorn Sheep-related Recreation* – The rank order of the adverse effects on bighorn sheep-related recreation, such as hunting or wildlife viewing.

| Table ES-5: Comparative Summary of Impacts from the Alternatives | | | | | | |
|---|---|---|---|---|---|---|
| Indicator | Alternatives | | | | | |
| | A | B | C | D | E | F |
| Bighorn Sheep Summer/Winter Source Habitat Available for Domestic Sheep Use (acres) | 7,249/ 4,706 | 1/0 | 0/0 | 1,202 / 0 | 1,958/ 0 | 772/ 0 |
| Bighorn Sheep Summer/Winter CHHR Available for Domestic Sheep Use (acres) | 5,127 / 7,533 | 0/ 0 | 0/0 | 0/0 | 0/ 0 | 0/ 0 |
| Distance between BLM Land Available for Domestic Sheep Use and Nearest Bighorn Sheep CHHR (miles) | 0.0 | 26.15 | N/A | 1.25 | 1.25 | 10.25 |
| Little Salmon Area of Concern Available for Domestic Sheep Use (acres)[1] | 2,629 | 0 | 0 | 0 | 2,629 | 2,629 |
| Distance between BLM Land Available for Domestic Sheep Use and Little Salmon Area of Concern (miles)[1] | 0.0 | 12.96 | N/A | 12.96 | 0.0 | 0.0 |
| Probable Contacts per Year between Bighorn Sheep and Domestic Sheep Allotments | 1.1256+ | 0.00002 | 0.0000 | 0.06604 | 0.117312 | 0.051312 |
| Ranking of Adverse Effects on Bighorn Sheep Population Trends (1=least, 6=most) | 6 | 2 | 1 | 4 | 5 | 3 |
| Ranking of Area Available for Bighorn Sheep and Native American Tribal Hunting (1=most, 6=least) | 6 | 2 | 1 | 4 | 5 | 3 |
| Ranking of Availability of Bighorn Sheep for Native American Tribal Hunting (1=most, 6=least) | 6 | 2 | 1 | 4 | 5 | 3 |
| AUMs Available for Domestic Sheep Use | 896 | 81 | 0 | 247 | 465 | 299 |
| Contributed Jobs | 5.1 | 0.4 | 0.0 | 1.4 | 2.6 | 1.7 |
| Ranking of Opportunities for Bighorn Sheep-Related Recreation (1=most, 6=least) | 6 | 2 | 1 | 4 | 5 | 3 |

[1]Little Salmon Area of Concern has no established bighorn sheep herd and values were determined from bighorn sheep occasional use of the area (based on past incidental sightings) and associated habitats that have had fidelity for use. Predicted allotment contacts would potentially occur from bighorn sheep use of area and habitats in proximity to past sightings.

## Cumulative Effects

The USFS recently closed seven domestic sheep allotments that are adjacent to and in proximity of the BLM allotments, which eliminated the majority of areas available for domestic sheep grazing that overlap with CHHRs or in close proximity. However, a substantial number of domestic sheep and goats are still grazed on state and private lands in and around the BLM lands at issue. The implications of additional contacts, particularly from state and private lands, are substantial; primarily for the Main Salmon/South Fork and Little Salmon area of concern. Applying the same inference regarding disease transmission and population trends used in the analysis of the BLM's alternatives, to domestic sheep and goat grazing on combined BLM and non-BLM lands results in predicted disease outbreak(s) that would adversely impact desired sustainable population levels and trends for the Main Salmon/South Fork local population regardless of the BLM alternative considered. Thus, the largest bighorn sheep population (Main Salmon/South Fork), even under the most favorable alternative (C), would likely continue a

downward trend under this cumulative effects scenario. Compared to current management (Alternative A), alternatives B, D, E, and F would reduce at varying levels the potential that domestic sheep grazing on BLM land would contribute to cumulative effects that adversely impact bighorn sheep population levels and trends, while Alternative C would eliminate it.

# CHAPTER 1 – INTRODUCTION

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# CHAPTER 1 – INTRODUCTION

## 1.1 PROPOSED ACTION

The Bureau of Land Management (BLM) proposes to amend the *Record of Decision and Approved Cottonwood Resources Management Plan* (Cottonwood ROD/RMP) (BLM 2009a) by providing new direction for the management and allocations for livestock grazing on 19,405 acres of BLM land within four BLM allotments in Idaho and Adams counties, Idaho (see Map 2 in Appendix D).

## 1.2 BACKGROUND

In August 2008, the BLM published the *Proposed Cottonwood Resource Management Plan and Final Environmental Impact Statement* (Cottonwood PRMP/FEIS) (BLM 2008b); subsequently receiving a number of protests on the proposed decision. In accordance with federal regulations (43 Code of Federal Regulations [CFR] 1610.5-2), the BLM Director renders a decision on any valid protest to a proposed RMP. In this case, the single protest point granted by the Director pertained to the adequacy of the range of alternatives for the management of domestic sheep grazing on four BLM allotments within bighorn sheep (*Orvis canadensis*) habitat. In the *Protest Resolution Report* (BLM 2009b), the Director found that the Cottonwood PRMP/FEIS did not provide an adequate range of alternatives to address potential disease transmission from domestic sheep and goats to bighorn sheep. As such, this portion of the PRMP/FEIS was remanded to the BLM Idaho State Director, requiring that a supplemental EIS (SEIS) be completed that includes a reasonable range of alternatives. The Director further specified that the SEIS would be for the express purpose of analyzing the impacts of domestic sheep and goat grazing within the previously mentioned allotments (Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek allotments).

As a result of the Director's decision regarding this protest point, the Cottonwood ROD/RMP did not provide direction for grazing management on the four subject allotments. Therefore, the grazing decisions from the previous plan - Chief Joseph Management Framework Plan (MFP) (BLM 1981) and the North Idaho Grazing EIS/ROD (BLM 1982) - remained in effect. Although the MFP allowed domestic sheep grazing on these allotments, none is currently occurring. In late 2009, the United States District Court issued a temporary restraining order that closed domestic sheep use of the Partridge Creek Allotment[1]. On March 15, 2011, the Cottonwood Field Manager closed the Marshall Mountain Allotment (BLM 2011a) in accordance with grazing administration regulations found at 43 CFR Part 4100. The grazing lessee for Hard Creek and Big Creek has voluntarily chosen non-use for these two allotments.

## 1.3 PURPOSE AND NEED

Disease transmission from domestic sheep to bighorn sheep has potentially contributed to significant declines in bighorn populations and, in some cases, extirpation. The proposed action

[1] U.S. District Court for the District of Idaho, Civ. No. 09-0507-E-BLW, Decision and Order, October 14, 2009.

is needed because domestic sheep and goat grazing on four BLM allotments (Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek) could result in disease transmission to bighorn sheep and contribute to downward trends of local bighorn populations. As identified in protests to the Cottonwood PRMP/FEIS, the BLM must consider this when developing RMP direction for livestock grazing on these four allotments.

Hence, the purpose of the proposed action is to provide RMP direction for the management and allocation of livestock grazing on four BLM allotments that avoids or effectively reduces domestic sheep contact with, and potential disease transmission to bighorn sheep populations.

## 1.4 DECISIONS TO BE MADE

The BLM Idaho State Director will decide, through an amendment to the Cottonwood ROD/RMP, which areas of BLM land will be available and how much forage will be allocated for livestock grazing, as well as what other management direction is necessary to address potential contact between bighorn sheep, and domestic sheep and goats, and related potential disease transmission to bighorn sheep populations, in the vicinity of or within the Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek allotments. These decisions will be based on direction in the following federal regulations and BLM policy:

- 43 CFR 4100.0-8 states that "the authorized officer shall manage livestock grazing on public lands under the principle of multiple use and sustained yield, and in accordance with applicable land use plans. Land use plans shall establish allowable resource uses (either singly or in combination), related levels of production or use to be maintained, areas of use, and resource condition goals and objectives to be obtained. The plans also set forth program constraints and general management practices needed to achieve management objectives. Livestock grazing activities and management actions approved by the authorized officer shall be in conformance with the land use plan as defined at 43 CFR 1601.0-5(b)."

- The BLM Land Use Planning Handbook (BLM 2005) specifies that land use plan decisions will "identify lands available or not available for livestock grazing…" and "for lands available for livestock grazing, identify on an area-wide basis both the amount of existing forage available for livestock (expressed in animal unit months) and the future anticipated amount of forage available for livestock with full implementation of the land use plan…"

- While land use plan/RMP decisions allocate areas and forage for livestock use, they do not authorize use. Authorized use will not be decided by this RMP amendment. As specified in federal regulations (43 CFR 4130.2(a)), "grazing permits and leases authorize use on the public lands and other BLM-administered lands that are designated in land use plans as available for livestock grazing."

- The FLPMA specifically identifies wildlife as one of the resources for which the public lands will be managed. The bighorn sheep in Idaho is a designated BLM sensitive species. Consequently, to comply with existing laws, including the BLM multiple use mission as specified by FLPMA, the BLM shall implement measures to conserve these

species and their habitats, to promote their conservation and reduce the likelihood and need for such species to be listed pursuant to the Endangered Species Act (ESA). Even though adjacent land management actions may not promote conservation measures for a species, BLM authorized actions would support conservation of a wildlife species and specifically a designated sensitive species.

## 1.5 PLANNING CRITERIA

Planning criteria guide the development of a plan. These criteria help define the decision space (or the "sideboards" that define the scope of the planning effort), which is generally based on applicable laws, Director and State Director guidance, and the results of public and governmental participation (43 CFR 1610.4-2). For this RMP amendment process and SEIS the BLM Director and the BLM Idaho State Director provided specific direction in the *Protest Resolution Report* (BLM 2009b) and the Cottonwood ROD/RMP (BLM 2009a), respectively that will be used as planning criteria. In accordance with this direction:

- This RMP amendment process and SEIS will only address the management of livestock grazing on the four BLM allotments as it relates to potential disease transmission to bighorn sheep populations. The four allotments are Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek. This amendment process and SEIS will not address or modify any other decisions in the 2009 *ROD and Approved Cottonwood RMP* (BLM 2009).

In addition, the following planning criteria from the Cottonwood PRMP and FEIS (BLM 2008b) also apply to this plan amendment process and SEIS:

- This RMP amendment process and SEIS will comply with all applicable laws, regulations, and current policies. This includes local, state, Tribal, and federal air quality standards, as well as water quality standards from the Idaho Nonpoint Source Management Program Plans.
- The RMP planning effort will be collaborative and multijurisdictional in nature. The BLM will strive to ensure that its management decisions are complementary to other planning jurisdictions and adjoining properties, within the boundaries described by law and federal regulations.
- The RMP will recognize all valid existing rights.

## 1.6 DESCRIPTION OF THE PLANNING AREA

The planning area for this amendment process is limited to the Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek grazing allotments in Idaho and Adams counties, Idaho (see Map 2 in Appendix D). These allotments contain 19,405 acres of BLM-administered land.

## 1.7 PLANNING PROCESS

This RMP Amendment/SEIS process will follow the standard steps for preparing an RMP, as outlined in the BLM Land Use Planning Handbook and as depicted on Figure 1-1 which appears on page 1-6. However, since this is a supplemental EIS, public scoping and publication of a scoping report and analysis of the management situation (AMS) was not necessary. This is indicated by an "X" over each of these items in Figure 1-1. The BLM considered public comments from the Draft Cottonwood RMP/EIS and protests to the Cottonwood PRMP/FEIS to identify planning issues (see Section 1.8 below). All supplemental information and analysis are documented in this SEIS, which would make a new AMS redundant.

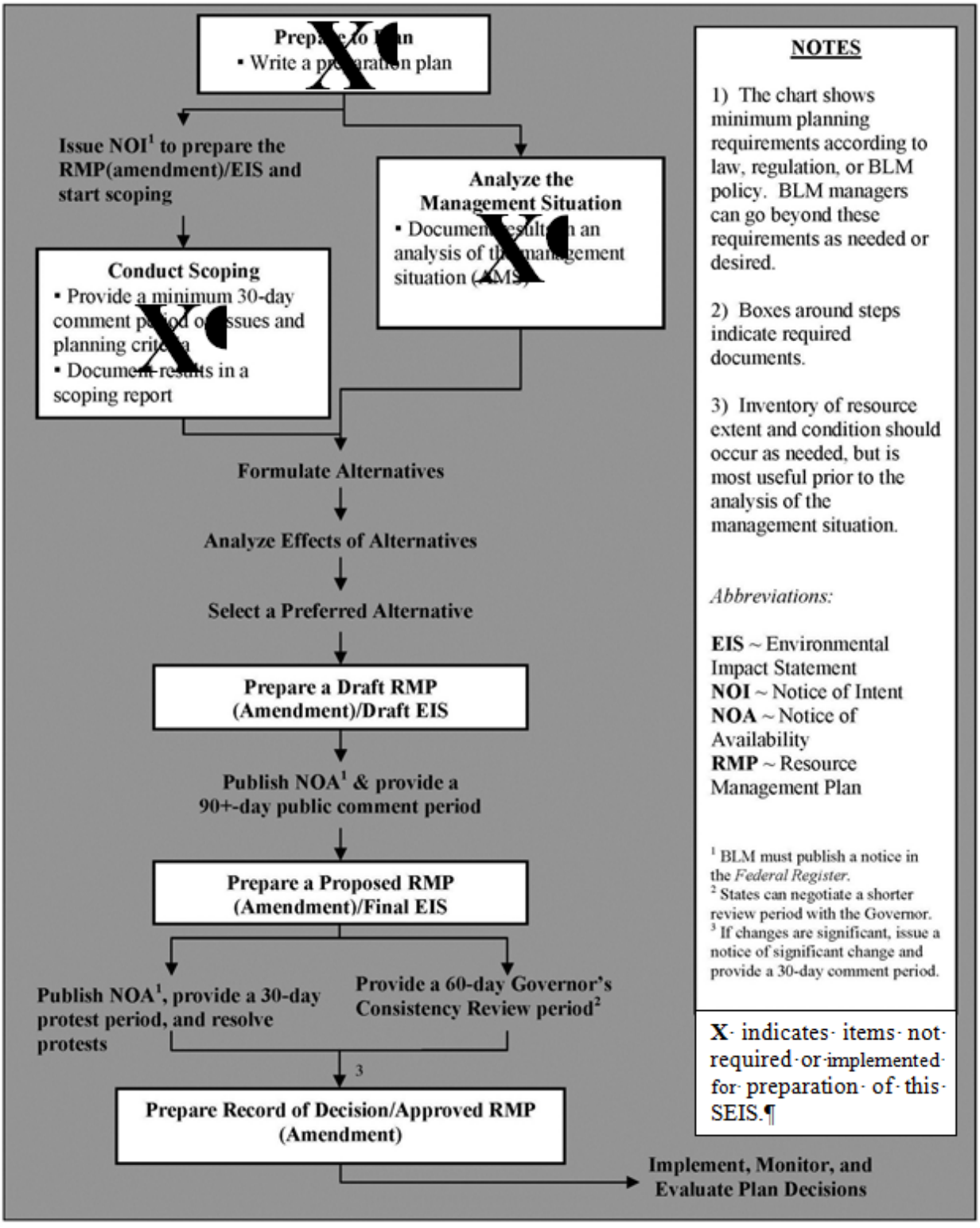


**Figure 1-1: Steps for the Preparation of an RMP**

## 1.8 PLANNING ISSUES

Considering the concerns addressed in protests to the 2008 Proposed Cottonwood RMP, as well as input from cooperating agencies the BLM identified the following planning issues:

- Bighorn Sheep – Domestic sheep and goats may contact and transmit diseases to bighorn sheep, which contributes to the downward trend in bighorn sheep populations.
- Native American Tribal Interests and Treaty Rights – Management of livestock grazing by the BLM, specifically domestic sheep and goats, may affect the availability of resources and uses specifically related to bighorn sheep and that are important to the interests and rights of the Nez Perce Tribe.
- Livestock Grazing and Social and Economic Interests – Changes to management of livestock grazing by the BLM may affect the local economy.

## 1.9 COLLABORATION

Section 202(c)(9) of the Federal Land Policy and Management Act of 1976 (FLPMA) requires the BLM, to the extent consistent with applicable federal laws, to coordinate its planning and management actions with similar planning and management actions of other federal, state, and local agencies and Tribal governments. In July 2010, the Payette National Forest and Nez Perce Tribe accepted invitations to participate in preparation of this SEIS as cooperating agencies. In March 2012, the BLM, Nez Perce Tribe, and Payette National Forest signed a formal cooperating agency agreement.

Section 202(c)(9) of the FLPMA further requires the BLM to ensure that consideration is given to those state, local, and Tribal plans that are germane to the development of land use plans for public lands and that assist in resolving, to the extent practical, any inconsistencies between federal and non-federal government plans.

Consistent with FLPMA, the BLM has coordinated with the Nez Perce Tribe, taking into consideration the Tribe's policies regarding management of bighorn sheep. Specifically, the BLM considered the Tribe's policy as described in their letter of protest for the 2008 Cottonwood PRMP/FEIS, including:

- *Adopt a recovery goal for bighorn sheep, of healthy, self-sustaining numbers, well-distributed across historic habitats in Hells Canyon and the Salmon River to ensure long-term conservation and support treaty harvest across age and sex classes.*
- *Establish a Tribal standard of no contact between bighorn sheep and domestic sheep and encourage the federal land managers to adopt standard that would prohibit domestic sheep grazing within or adjacent to occupied bighorn sheep habitat.*
- *Establish Tribal standard of using buffers to create space between occupied bighorn sheep habitat and domestic sheep grazing and encourage federal land managers to do the same.*

- *Adopt a Tribal standard of promoting bighorn sheep restoration and expansion across historic habitats within Hells Canyon and the Salmon River.*

The above administrative actions "provide a Tribal policy framework for promoting healthy, harvestable population recovery goals for bighorn sheep, and encourages federal land managers to adopt these policies in accordance with the United States' treaty and trust responsibilities to the Nez Perce Tribe" (Nez Perce Tribe 2008).

The BLM also coordinated with the Payette National Forest and Idaho Department of Fish and Game (IDFG) regarding the following non-BLM plans:

- *Record of Decision for the Final SEIS, and Forest Plan Amendment Identifying Suitable Rangeland for Domestic Sheep and Goat Grazing to Maintain Habitat for Viable Bighorn Sheep Populations* (USFS 2010b)
- *Idaho Bighorn Sheep Management Plan* (IDFG 2010)

In June 2010, recognizing the jurisdiction and expertise of Idaho State agencies, the BLM invited the IDFG and IDL to become cooperating agencies in preparation of the SEIS. However, neither agency accepted the invitation. Although lacking a formal cooperating agency agreement, the BLM continued to coordinate with IDFG in preparation of this SEIS, specifically in regard to management and data for bighorn sheep populations. In addition to the above requirements and compliance measures, this PRMP/FEIS will be subject to a Governor's Consistency Review (pursuant to 43 CFR 1610.3-2).

In addition, in 2007, the Governor of Idaho asked federal and state agencies to work with sheep producers to come up with a strategy to reduce the potential for contact between domestic and bighorn sheep (IDFG ISDA 2007). In response the BLM, Carlson Livestock Company, IDFG, IDL, and Idaho State Department of Agriculture developed a "Strategy for Reducing Risk of Contact between Bighorn Sheep and Domestic Sheep in the Salmon River Area" (ISDA 2009) which applied to the Partridge Creek and Marshall Mountain Allotments. For more details about this strategy, see Section 3.4.2.1.

The BLM is also a partner in the Salmon River Bighorn Sheep Project, an interagency research effort established for the purpose of gaining a better ecological understanding of bighorn sheep in the Salmon River Canyon, which is specific to the Main Salmon/South Fork herd. Additional partners include the Nez Perce Tribe, IDFG, Payette National Forest, and Nez Perce National Forest. The project area includes a 75-mile portion of the Salmon River drainage in Idaho from the town of Riggins, east upriver to the confluence of Big Mallard Creek. Major tributaries within the project area include the lower portions of the Little Salmon and South Fork Salmon rivers.

The BLM also participates in the Hells Canyon Initiative, a state, federal, and private partnership established in 1995 to restore Rocky Mountain bighorn sheep in the Hells Canyon area of Oregon, Idaho, and Washington. The concept was formalized in 1997 with the completion of an interagency memorandum of agreement and restoration plan. Additional partners include IDFG, Oregon Department of Fish and Wildlife (ODFW), Washington Department of Fish and Wildlife (WDFW), and the Wild Sheep Foundation.

The BLM also collaborated with other stakeholders through the Wild Sheep Working Group of the Western Association of Fish and Wildlife Agencies (WAFWA) in developing *Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat* (WAFWA 2012). For the state of Idaho, the Wild Sheep Working Group guidelines are included in the *Interim Strategy for Managing Separation between Bighorn Sheep and Domestic Sheep in Idaho* (IDFG 2007) and the *Idaho Bighorn Sheep Management Plan* (IDFG 2010). Although the BLM took these guidelines into consideration in developing the alternatives in this SEIS, the BLM has not formally adopted them.

## 1.10 PUBLIC REVIEW AND COMMENTS

The BLM and the U.S. Environmental Protection Agency (EPA) published Notices of Availability for the Draft RMP Amendment/SEIS on May 9, 2014. This initiated a 90-day public review and comment period which ended August 7, 2014. During this period the BLM conducted 3 public meetings to share information about the draft document and answer questions. By the end of the comment period interested parties had submitted 11,933 letters and emails. The BLM analyzed these submissions and the comments they contained. Appendix E provides a detailed description of the analysis process, issues raised, and the BLM's responses.

## 1.11 CHANGES FROM THE DRAFT RMP AMENDMENT/SEIS

The Proposed RMP/Final SEIS contains numerous changes from the Draft, which resulted from analysis of comments received during the review period, as well as internal review of the Draft RMP Amendment/SEIS. These changes include minor corrections and clarifications, as well as the following substantial changes:

- Eliminated the analytical assumption that identified a threshold in regards to contact resulting in disease outbreak. Because the probability that contact of a bighorn sheep with a domestic sheep in an allotment will lead to disease outbreak within a bighorn sheep population is uncertain, modelers evaluated a range of probabilities for disease outbreak within a 50 year period.

- Removed discussions of bighorn sheep "population persistence" from the effects analysis. Instead, the findings now, more accurately, discuss effects on population "trends" and "sustainability."

- Considered two additional alternatives that were subsequently eliminated from detailed analysis (see Section 2.4).

- Updated modeling to reflect more current population data, probability of contact data, and source habitat data.

- Cited additional and current scientific literature to support analysis findings.

- Clarified and updated FSEIS regarding how the Little Salmon Area of Concern was considered in the analysis and included additional characterization and analysis for this area.

- Updated information and analysis regarding the recent designation of bighorn sheep as a BLM Idaho sensitive species (BLM, Idaho State Office Instruction Memorandum No. ID-2015-009, January 13, 2015).

- Incorporated new information and established policy identified in recent release of BLM manual: BLM Manual 1730 – Management of Domestic Sheep and Goats to Sustain Wild Sheep, release date March 2, 2016.

## 1.12 POLICY

The RMP amendment must be consistent with the following policies:

- Land Use Planning Handbook (BLM 2005) – Outlines requirements and procedures for developing and amending RMPs.
- National Environmental Policy Act Handbook (BLM 2008a) – Outlines requirements and procedures for compliance with the NEPA and CEQ Regulations.
- Manual 6500, Wildlife and Fisheries Management (BLM 1988) – Outlines BLM policy for the wildlife and fisheries program, as well as identifies a general goal to "ensure optimum population and a natural abundance and diversity of wildlife resources on public lands by restoring, maintaining, and enhancing habitat conditions through management plans and action integrated with other uses of public lands, through coordination with other programs, the States, by management initiatives, and through direct habitat improvement projects." It also identifies a specific goal for big game/upland game habitat management "to ensure that big game/upland game species on the public lands are provided habitat of sufficient quantity and quality to sustain identifiable economic and/or social contributions to the American people."
- Manual 6840 – Special Status Species Management (BLM 2008) – This manual establishes policy for management of species listed or proposed for listing pursuant to the Endangered Species Act and Bureau sensitive species which are found on BLM-administered lands. BLM sensitive species will be managed consisted with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA.
- Manual 8120, Tribal Consultation under Cultural Resource Authorities – Outlines policy for BLM Tribal consultation. One of the objectives is to "ensure that Tribal issues and concerns are given legally adequate consideration during decision making."
- BLM Idaho Instruction Memorandum 2011-004 (BLM 2011b), Separation Response Plans for Bighorn Sheep and Domestic Sheep and Goats – Requires BLM offices in Idaho to complete and implement separation response plans for all grazing allotments that authorize domestic sheep or goat use, and other areas where bighorn sheep could come into contact with domestic sheep and goats on BLM public lands.
- BLM Manual 1730 (BLM 2016) – Management of Domestic Sheep and Goats to Sustain Wild Sheep (Release Date March 2, 2016). This manual establishes policy for the management of domestic sheep and goats to sustain wild sheep on public lands

administered by the BLM. This manual acknowledges wild sheep habitat as a resource that may require special management considerations in the context of BLM authorized domestic sheep or goat grazing, trailing, or other (e.g., recreational) use within and adjacent to wild sheep habitat.

- 43 CFR 4100 – Code of Federal Regulations – Range Management. The objectives of these regulations are to promote healthy sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions; to promote the orderly use, improvement and development of the public lands; to establish efficient and effective administration of grazing of public rangelands; and to provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands. These objectives shall be realized in a manner that is consistent with land use plans, multiple use, sustained yield, environmental values, economic and other objectives stated in applicable law.

# CHAPTER 2 – ALTERNATIVES

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# CHAPTER 2 – ALTERNATIVES

## 2.1 INTRODUCTION

Chapter 2 describes the reasonable range of alternatives for amending the *Approved Cottonwood RMP* (BLM 2009) designed specifically to address potential disease transmission to bighorn sheep populations that could result from domestic sheep and goat grazing in the Big Creek, Hard Creek, Partridge Creek, and Marshall Mountain allotments. As stated in Section 1.5, this amendment process does not address or modify any other decisions in the 2009 Cottonwood ROD/RMP.

## 2.2 DECISIONS FROM THE APPROVED COTTONWOOD ROD/RMP WITH BEARING ON THE ALTERNATIVES

The following decisions from the 2009 Cottonwood ROD/RMP, while not subject to modification, have bearing on or are related to the alternatives for the amendment:

**Wildlife Goal WS-1**: Manage habitat to contribute to the conservation of special status species habitats and maintain biological diversity of wildlife.

- **Objective WS-1.6—**Manage rangeland and forest vegetation to provide for diversity, cover, structure, forage, and security to contribute to healthy populations of rangeland and forest dependent species and other wildlife.
- **Objective WS-1.10—**Maintain or restore Rocky Mountain bighorn sheep *(Ovis canadensis canadensis)* habitat.
    - **Action WS-1.10.2—**Coordinate with the State of Idaho, including the Department of Fish and Game and other appropriate state agencies, the Nez Perce Tribe, U.S. Forest Service (USFS), and other appropriate federal agencies, grazing lessees, and partners on population and habitat management of bighorn sheep.
    - **Action WS-1.10.3—**No existing allotments authorized for cattle and/or horse use within the Salmon River and/or Snake River drainages will be converted to sheep or goats, when such use would result in potential risk for disease transmission to bighorn sheep populations or affect the potential for bighorn sheep expansion into suitable habitats.
    - **Action WS-1.10.4—**Goat grazing for weed control is prohibited in Hells Canyon (Snake River drainage), downriver from Maloney Creek (Salmon River drainage), and upriver from Little Salmon River (Salmon River drainage). In other areas, goat grazing for weed control will only be authorized when such use will result in no or very low risk for transmission of disease to bighorn sheep.
    - **Action WS-1.10.5—**Support cooperative bighorn sheep studies and research within the Snake and Salmon River drainages that provide improved or updated habitat, distribution, and management information. Cooperate with survey and monitoring projects that document bighorn sheep observations, telemetry locations, and

population ranges within the Snake and Salmon River canyons, tributary drainages, and associated uplands.

**Livestock Grazing Goal LS-1**: Provide opportunities for livestock grazing while meeting rangeland health standards.

- **Objective LG-1.1**—Identify lands available for livestock grazing.

**Native American Tribal Uses Goal NA-1**: Manage natural and cultural resources consistent with treaty and trust responsibilities to Native American tribes.

- **Objective LG-1.1**—Maintain and, where possible, improve natural and cultural resource conditions to enhance opportunities to exercise Native American traditional uses.
  - **Action NA-1.1.1**—Consult with Native American tribes to identify culturally significant plants, animals, fish, and important habitats.

## 2.3 DESCRIPTIONS OF THE ALTERNATIVES

The BLM developed five action alternatives to meet the purpose and need. In addition, for analysis purposes, the BLM included a No Action alternative. These alternatives are described below.

### 2.3.1 Common to All Alternatives

*Grazing Allocations*:

This amendment specifically focuses on addressing the impacts of potential disease transmission from domestic sheep and goats to bighorn sheep. This amendment does not foreclose potential grazing by cattle, horses or burros on the four allotments. Under all Alternatives, all four allotments and forage allocations would be available for grazing by cattle, horses and burros. These allocations are not authorizations. As stated in Section 1.4, this RMP amendment does not authorize livestock grazing. Actual area, season of use, and animal unit months (AUM) authorized for use will be determined through site-specific analysis for grazing leases for these allotments, which must be consistent with the management direction in the RMP as amended when a decision is signed for this planning effort.

Table 2-1 presents these allocations by allotment.

**Table 2-1: Livestock Grazing Allocations Common to All Alternatives**

| Allotment Name | Acres Allocated | Forage Allocated (AUMs) |
|---|---|---|
| Partridge Creek | 9,544 | 431 |
| Marshall Mountain | 4,212 | 166 |
| Hard Creek | 5,210 | 218 |
| Big Creek | 439 | 81 |
| **Total Allocation** | **19,405** | **896** |

*Separation Response Plan and Adaptive Management*:

For any of the four allotments where domestic sheep are allowed to grazed, the BLM would develop a separation response plan for bighorn sheep and domestic sheep that will become additional terms and conditions of the leases. The response plan would define the process, protocols, and timelines for short-term or emergency management actions when specific actions are needed to minimize risk of co-mingling and contact between bighorn sheep and domestic sheep. Interspecies separation actions would be needed if separation has failed, bighorn sheep and domestic sheep observed in close proximity (e.g., within allotment boundary or within one-mile of allotment), or bighorn sheep distribution and herd CHHR has changed. In such cases, a re-assessment of the risk of contact and evaluation of the separation response plan will be conducted for the specific allotment. As needed, allotment specific adaptive management would be implemented to insure that risk of contact is discountable or at acceptable very low risk levels. Risk evaluations and adaptive management strategies would primary be dependent on updated population surveys and monitoring data which define CHHRs and risk of contact assessments with domestic sheep allotments.

The BLM would develop a strategy to monitor or survey for bighorn sheep in proximity to domestic sheep allotments, to be included in the separation response plan. Monitoring and survey intensity would be dependent on proximity to core herd home ranges and source habitats occurring within and adjacent to allotment. Monitoring and surveys may be conducted by state or other federal agencies, tribes, or other partnerships. The resulting survey and monitoring data would provide updated bighorn sheep distribution and population information, provide for adaptive management needs for conservation of bighorn sheep, and minimizing potential for contact with domestic sheep and goats.

### 2.3.2 Alternative A – No Action Alternative

Under this alternative, the BLM would take no action. Since the Cottonwood ROD/RMP did not address livestock grazing on these four allotments, the grazing decisions from the Chief Joseph Management Framework Plan (MFP) (BLM 1981) and the North Idaho Grazing EIS/ROD (BLM 1982) would remain in effect. The area and forage allocations shown in Table 2-1 would be available for domestic sheep (see Map 5 in Appendix D). The MFP did not address domestic goat grazing.

Council on Environmental Quality (CEQ) regulations direct that an EIS describe the No Action alternative (40 CFR 1502.14(d)), which is the only alternative that must be analyzed that does not respond to a proposed project's purpose and need. The No Action alternative provides a baseline for comparison of environmental effects and demonstrates the consequences of not meeting the purpose and need for the action.

### 2.3.3 Alternative B – Proposed Amendment

Alternative B, the BLM's proposed RMP amendment, emphasizes reducing the potential for transmission of disease to bighorn sheep while providing some opportunity for grazing of domestic sheep, based on consideration of the proximity of the allotments to CHHRs and risk of contact between domestic sheep and goats and bighorn sheep (see Map 5 in Appendix D). The

proposed amendment would prohibit domestic sheep and goat grazing on all allotments except Big Creek (Table 2-2). The terms and conditions in Appendix C would be added to the grazing lease for the Big Creek Allotment to reduce the potential for straying of domestic sheep and emergency response actions that would be implemented regarding any potential contact between domestic sheep or goats and bighorn sheep; or, at the time of lease renewal, the BLM will explain why specific terms and conditions would not be applied and/or why other terms and conditions to reduce potential for contact, not listed in Appendix C, would be required.

**Table 2-2: Alternative B Allocations Available for Domestic Sheep Grazing**

| Allotment Name | Acres Available | Forage Available (AUMs) |
|---|---|---|
| Partridge Creek | 0 | 0 |
| Marshall Mountain | 0 | 0 |
| Hard Creek | 0 | 0 |
| Big Creek | 439 | 81 |
| **Total** | **439** | **81** |

### 2.3.4 Alternative C – Eliminate Domestic Sheep and Goat Grazing

Alternative C would eliminate contact between domestic sheep or goats and bighorn sheep and the associated potential for disease transmission, by prohibiting domestic sheep and goat grazing on all of the four allotments (see Map 5 in Appendix D).

### 2.3.5 Alternative D – Restrict Grazing on Partridge Creek and Hard Creek

Alternative D was developed to reduce the potential for contact and disease transmission in the Main Salmon/South Fork CHHR (Partridge Creek Allotment) and Little Salmon area of concern (Hard Creek Allotment). Domestic sheep and goat grazing would be prohibited on the Partridge Creek and Hard Creek allotments (see Map 5 in Appendix D; Table 2-3).

**Table 2-3: Alternative D Allocations Available for Domestic Sheep Grazing**

| Allotment Name | Acres Available | Forage Available (AUMs) |
|---|---|---|
| Partridge Creek | 0 | 0 |
| Marshall Mountain | 4,212 | 166 |
| Hard Creek | 0 | 0 |
| Big Creek | 439 | 81 |
| **Total** | **4,651** | **247** |

### 2.3.6 Alternative E – Restrict Grazing on Partridge Creek Only

Alternative E was developed to eliminate the highest risk of contact by prohibiting domestic sheep and goat grazing on the Partridge Creek Allotment (see Map 5 in Appendix D; Table 2-4). The Partridge Creek Allotment is the only allotment that overlaps with the Main Salmon/South Fork CHHR.

| Table 2-4: Alternative E Allocations Available for Domestic Sheep Grazing | | |
|---|---|---|
| **Allotment Name** | **Acres Available** | **Forage Available (AUMs)** |
| Partridge Creek | 0 | 0 |
| Marshall Mountain | 4,212 | 166 |
| Hard Creek | 5,210 | 218 |
| Big Creek | 439 | 81 |
| **Total** | **9,861** | **465** |

### 2.3.7 Alternative F – Restrict Grazing on Partridge Creek and Marshall Mountain

Alternative F emphasizes the elimination of potential contact in the Main Salmon/South Fork bighorn herd (see Map 5 in Appendix D) by prohibiting the grazing of domestic sheep or goats on the Partridge Creek and Marshall Mountain allotments; however, domestic sheep grazing could continue at its current levels on the Hard Creek and Big Creek allotments which occur in the Little Salmon River drainage (Table 2-5).

| Table 2-5: Alternative F Allocations Available for Domestic Sheep Grazing | | |
|---|---|---|
| **Allotment Name** | **Acres Available** | **Forage Available (AUMs)** |
| Partridge Creek | 0 | 0 |
| Marshall Mountain | 0 | 0 |
| Hard Creek | 5,210 | 218 |
| Big Creek | 439 | 81 |
| **Total** | **5,649** | **299** |

### 2.3.8 Summary of Alternatives

Table 2-6 and Table 2-7 summarize the livestock grazing allocations available for domestic sheep for all six alternatives.

| Table 2-6: Acres Available for Domestic Sheep by Alternative | | | | | | |
|---|---|---|---|---|---|---|
| **Allotment** | **Alternative A** | **Alternative B** | **Alternative C** | **Alternative D** | **Alternative E** | **Alternative F** |
| Partridge Creek | 9,544 | 0 | 0 | 0 | 0 | 0 |
| Marshal Mountain | 4,212 | 0 | 0 | 4,212 | 4,212 | 0 |
| Hard Creek | 5,210 | 0 | 0 | 0 | 5,210 | 5,210 |
| Big Creek | 439 | 439 | 0 | 439 | 439 | 439 |
| **Total** | **19,405** | **439** | **0** | **4,651** | **9,861** | **5,649** |

| Table 2-7: Animal Unit Months Available for Domestic Sheep by Alternative | | | | | | |
|---|---|---|---|---|---|---|
| **Allotment** | **Alternative A** | **Alternative B** | **Alternative C** | **Alternative D** | **Alternative E** | **Alternative F** |
| Partridge Creek | 431 | 0 | 0 | 0 | 0 | 0 |
| Marshal Mountain | 166 | 0 | 0 | 166 | 166 | 0 |
| Hard Creek | 218 | 0 | 0 | 0 | 218 | 218 |

| Table 2-7: Animal Unit Months Available for Domestic Sheep by Alternative | | | | | | |
|---|---|---|---|---|---|---|
| **Allotment** | **Alternative A** | **Alternative B** | **Alternative C** | **Alternative D** | **Alternative E** | **Alternative F** |
| Big Creek | 81 | 81 | 0 | 81 | 81 | 81 |
| **Total** | **896** | **81** | **0** | **247** | **465** | **299** |

## 2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

The BLM considered other alternatives based on public comments and scoping with cooperators, but eliminated them from further analysis. Following is a description of these alternatives and the reasons for their elimination.

### 2.4.1 Alternative G – 9-mile Buffer

To reduce a potential for contact, the BLM considered establishing a 9-mile buffer between areas available for domestic sheep or goat grazing and for bighorn sheep herds, but eliminated it from detailed analysis because it is essentially the same as Alternative B, the proposed RMP amendment. In a past policy (BLM 1998) the BLM recommended a minimum 9-mile buffer between herds or populations of bighorn sheep and domestic sheep allotments to ensure effective separation. Although this is no longer BLM policy, it is a method worthy of consideration. However, of the four allotments, domestic sheep grazing would only be allowed in the Big Creek Allotment because it is the only one that is more than 9 miles from any herd home range. Partridge Creek, Marshal Mountain, and Hard Creek allotments are within 9 miles of CHHR, and therefore, domestic sheep and goat grazing would be prohibited on all of these allotments under a 9-mile buffer alternative. Thus, Alternative G is essentially the same as Alternative B, which prohibits domestic sheep and goat grazing on Partridge Creek, Marshall Mountain, and Hard Creek allotments.

### 2.4.2 Alternative H – 1-mile Source Habitat Buffer

To reduce a potential for contact near bighorn summer and winter source habitats (see maps 6 and 7 in Appendix D), the BLM considered prohibiting domestic sheep or goat grazing within 1 mile of these habitats (buffer based on distance from source habitats, not herd home ranges as in Alternative G). Alternative H was eliminated from detailed study because it is also the same as Alternative B, the proposed RMP amendment. Implementing this 1-mile buffer would prohibit domestic sheep and goat grazing on the Partridge Creek, Marshal Mountain, and Hard Creek allotments. However, domestic sheep and goat grazing would be permitted on most of the Big Creek Allotment. Alternative H is essentially the same as Alternative B, which prohibits domestic sheep and goat grazing on the same allotments.

### 2.4.3 Alternative I – 20-mile Buffer

The BLM considered establishing a 20-mile buffer between areas available for domestic sheep or goat grazing and for bighorn sheep CHHRs. Alternative I was eliminated from detailed analysis because it is the same as Alternative C. Under Alternative I, domestic sheep and goat grazing would be prohibited on all 4 of the allotments, because all are within the 20-mile buffer,

essentially making Alternative I the same as Alternative C, which prohibits domestic sheep and goat grazing on all four allotments.

### 2.4.4 Alternative J – Geographic Boundaries

The BLM developed Alternative J to determine if geographic boundaries (e.g., watersheds) could be used to separate domestic sheep or goats from bighorn sheep to reduce contact, but this was eliminated from detailed analysis. Under this alternative, the lessee would need to use topographic and landscape features as barriers to prevent or minimize potential contact. Because the BLM determined that there are no geographic features that could effectively serve this purpose, Alternative J was deemed to be not practical or feasible to implement.

### 2.4.5 Alternative K – Designate Bighorn as a BLM Sensitive Species

The Nez Perce Tribe requested that the BLM designate bighorn sheep a sensitive species in Idaho. However this type of decision is outside the scope of an RMP amendment, thereby eliminating Alternative K from detailed analysis in the FSEIS. However, through a separate process, the BLM-Idaho State Office collaborated with the IDFG regarding this request and added bighorn sheep to the sensitive species list (January 2015). While this designation is noted throughout the FSEIS, it did not result in changes to the alternatives already analyzed or the need to consider a new alternative.

### 2.4.6 Alternative L – Allow Domestic Sheep and Goat Grazing on All Allotments with Leasing Terms and Conditions to Reduce Potential Interspecies Contact

The BLM considered an alternative that would make all four allotments available for domestic sheep and goat grazing with application of the leasing terms and conditions identified in Appendix C to reduce the potential for contact with bighorn sheep. These terms and conditions have previously been identified, recommended, or implemented by the USFS and the BLM as best management practices (BMPs). However, when bighorn sheep CHHR occur in or adjacent to a domestic sheep allotment, and especially when the allotment is within bighorn herd home range, development and implementation of effective separation measures is difficult; and contact between the species will most likely still occur. In other words, special terms and conditions to avoid contact between bighorn and domestic sheep that are known to be in close proximity are generally ineffective to ensure separation of the species. Furthermore, even with these extra measures, control of domestic sheep, or monitoring and locating bighorn sheep in forested/ dense vegetation or steep/rocky/rugged terrain is very difficult. Accordingly, without a large buffer between domestic and wild bighorn sheep, extra measures are not likely to result in a significant reduction in the risk of contact (Schommer 2009). No known studies, research, or peer reviewed literature has documented the effectiveness of BMPs preventing contact and disease transmission when domestic sheep or goats grazed within or adjacent to occupied bighorn sheep habitats. Appendix C contains a more detailed review of the effectiveness of BMPs.

The Partridge Creek allotment overlaps with bighorn sheep CHHR and the Marshall Mountain Allotment is in close proximity to CHHR. The Hard Creek allotment overlaps with the Little Salmon area of concern. The terrain on all three of these allotments is interspersed with dense

vegetation and forested areas, with additional areas that are steep, rocky, and rugged. Therefore, application of the specified terms and conditions on these allotments would likely be ineffective at significantly reducing the potential for contact between bighorn sheep and domestic sheep. Hence, for the Partridge Creek, Hard Creek, and Marshall Mountain Allotments, this alternative would be effectively the same as Alternative A under which all four allotments would be available for domestic sheep grazing but without specified terms and conditions. Differing from the other three allotments, the Big Creek Allotment is not in or near bighorn sheep CHHR or the Little Salmon area of concern and has more open and moderately sloped rangeland. However, for this allotment, this alternative would be essentially the same as Alternatives B, which also makes Big Creek available for domestic sheep or goat grazing with application of the terms and conditions. Therefore this alternative was not analyzed in detail.

### 2.4.7 Alternative M - No Net Loss of Domestic Sheep Grazing AUMs.

The BLM considered an alternative that would allocate allotments and AUMs for domestic sheep grazing in other areas that would have no risk or very low risk for contact with bighorn sheep in order to replace allotments and AUMs for displaced lessees. However, this alternative is not feasible and was eliminated from detailed analysis because suitable replacement allotments are not available within the CFO, and allocation of BLM allotments and AUMs outside of the planning area is beyond the scope of the Cottonwood RMP. The Cottonwood RMP already prohibits conversion of allotments to domestic sheep within the Salmon River and Snake River drainages. There are currently 12 vacant allotments within the CFO that are outside of these drainages and available for consideration. All of these are small in size (39 to 800 acres), widely scattered in the Clearwater River drainage, and surrounded by private land. In total they include 2,946 acres of BLM lands with a forage allocation of 179 AUMs and could only replace a small portion of the 431-896 domestic sheep AUMs eliminated by the action alternatives. Use of these allotments would require the lessee to split their flock among many available small allotments and get permission to access these from the private landowners whose properties surround the small, mostly unfenced BLM lands.

### 2.4.8 Alternative N – Zoning

The BLM considered an alternative that would identify zones where domestic sheep and goat grazing would be allowed and zones where it would not. This RMP Amendment/SEIS is only specific to allocating grazing that would occur on the BLM Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek Allotments. Zoning would only be effective if private, Forest Service, and State lands were included. This would require a regional or state-wide management plan and coordinated management strategy which is outside of the scope of this RMP Amendment/SEIS. Therefore the BLM eliminated this alternative from further study.

### 2.4.9 Alternative O – Close All Four Allotments to All Types of Livestock Grazing.

Based on comments received during the public review of the Draft RMP/SEIS, the BLM considered an alternative that would close all four allotments to any type of livestock grazing. However, this alternative was eliminated from detailed analysis because it would have essentially the same effect as Alternative C, which would prohibit grazing by domestic sheep and

goats on all four allotments. As specified in the Directors Protest Resolution Report, this SEIS focuses on the potential for disease transmission from domestic sheep and goats to bighorn sheep. Grazing of other types of livestock on allotments where domestic sheep and goat grazing is prohibited would not affect this potential. Also, effects from grazing by other types of livestock were not part of the original protest point.

## 2.5 SUMMARY COMPARISON OF IMPACTS

The following is a brief explanation of each of the key indicators of impacts that the BLM analyzed as described in Chapter 4. Table 2-8summarizes the results of this analysis (see Chapter 4 for more detailed explanations regarding methods and results of analysis):

- *Bighorn Sheep Summer/Winter Source Habitat Available for Domestic Sheep Use* – Source habitat contains characteristics that contribute to positive population growth for bighorn sheep, which may or may not actually occupy this habitat. Potential use varies by season (summer/winter). The potential for contact increases should this habitat be available for domestic sheep use because it provides preferred suitable habitat for bighorn sheep use.
- *Bighorn Sheep Summer/Winter CHHR Available for Domestic Sheep Use* – The CHHR is the area within which most bighorn herd individuals spend at least 95 percent of their time. Should a CHHR be available for domestic sheep use, the allotment has a predicted contact rate of one or more (1+) interspecies contacts per year, thus contributing to potential disease transmission and disease outbreaks. The more acres of CHHR that overlap with domestic sheep allotments, the greater the number of contacts that would be expected to occur annually.
- *Distance between BLM Lands Available for Domestic Sheep Use and Nearest Bighorn Sheep CHHR* – This is the distance between lands within BLM allotments that would be available for domestic sheep grazing and the nearest CHHR. The shorter the distance, the greater the likelihood of contact between species.
- *Little Salmon Area of Concern Available for Domestic Sheep Use* – Over the past five years there have been several observations of bighorn sheep in the Little Salmon River drainage, which suggest a degree of habitat site fidelity or preference for the area. Areas in close proximity to these sightings and associated habitat preference have been identified as having an increased risk for interspecies contact. These areas (Little Salmon Area of Concern) that overlap with a domestic sheep allotment have an apparent greater risk for disease transmission. No documentation of an established bighorn sheep herd exists for the area, however, because of documented bighorn sheep fidelity for use of the area and the potential for increased risk for interspecies contact effects will be assessed for the Little Salmon Area of Concern.
- *Distance between BLM Land Available for Domestic Sheep Use and Little Salmon Area of Concern* – The shorter the distance between allotments available for domestic sheep use and this area of concern, the greater the likelihood of contact between species.
- *Probable Contacts per Year between bighorn sheep and domestic sheep allotments* – This is the number of contacts per year predicted for a bighorn sheep coming in contact with a

domestic sheep allotment, which would increase the potential for interspecies contact and is considered a primary factor contributing to potential disease transmission, disease outbreaks, and indicates the effects on population trends.

- *Ranking of Effects on Bighorn Sheep Populations* – This is the rank order of the estimated adverse effects on bighorn sheep population trends for analysis area herds.
- *Ranking of Area Available for Bighorn Sheep and Native American Tribal Hunting* – This is the rank order of the estimated adverse effects that each alternative would have on the opportunities for Native American Tribal members to hunt for bighorn sheep in traditional or culturally important areas.
- *Ranking of Availability of Bighorn Sheep for Native American Tribal Hunting* – This is the rank order of the adverse effects that each alternative would have on the opportunities for Native American Tribal members to hunt bighorn sheep, based on effects to bighorn sheep population trends.
- *AUMs Available for Domestic Sheep Use* – AUMs are a measure of the forage that would be available for domestic sheep use under each alternative.
- *Contributed Jobs* – This is an estimate of the number of jobs that the grazing use permitted under each alternative would contribute to the local economy.
- *Ranking of Opportunities for Bighorn Sheep-related Recreation* – This is the rank order of the adverse effects of each alternative on bighorn sheep related recreation, such as hunting or wildlife viewing.

| Table 2-8: Comparative Summary of Impacts from the Alternatives | | | | | | |
|---|---|---|---|---|---|---|
| | Alternatives | | | | | |
| Indicator | A | B | C | D | E | F |
| Bighorn Sheep Summer/Winter Source Habitat Available for Domestic Sheep Use (acres) | 7,249/ 4,706 | 1/0 | 0/0 | 1,202/0 | 1,958/0 | 772/0 |
| Bighorn Sheep Summer/Winter CHHR Available for Domestic Sheep Use (acres) | 5,127/ 7,533 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 |
| Little Salmon Area of Concern Available for Domestic Sheep Use (acres)[1] | 2,629 | 0 | 0 | 0 | 2,629 | 2,629 |
| Distance between BLM Land Available for Domestic Sheep Use and Nearest Bighorn Sheep CHHR | 0.0 | 26.15 | N/A | 1.25 | 1.25 | 10.25 |
| Distance between BLM Land Available for Domestic Sheep Use and Little Salmon Area of Concern[1] | 0.0 | 12.96 | N/A | 12.96 | 0.0 | 0.0 |
| Probable Contacts per Year between Bighorn Sheep and Domestic Sheep Allotments | 1.1256+ | 0.00002 | 0.0000 | 0.06604 | 0.117312 | 0.051312 |
| Ranking of Adverse Effects on Bighorn Sheep Population Trends (1=least, 6=most) | 6 | 2 | 1 | 4 | 5 | 3 |
| Ranking of Area Available for Bighorn Sheep and Native American Tribal Hunting (1=most, 6=least) | 6 | 2 | 1 | 4 | 5 | 3 |
| Ranking of Availability of Bighorn Sheep for Native American Tribal Hunting (1=most, 6=least) | 6 | 2 | 1 | 4 | 5 | 3 |
| AUMs Available for Domestic Sheep Use | 896 | 81 | 0 | 247 | 465 | 299 |
| Contributed Jobs | 5.1 | 0.4 | 0.0 | 1.4 | 2.6 | 1.7 |
| Ranking of Opportunities for Bighorn Sheep-Related Recreation (1=most, 6=least) | 6 | 2 | 1 | 4 | 5 | 3 |

[1]Little Salmon Area of Concern has no established bighorn sheep herd and such was determined from bighorn sheep use of the area (based on past incidental sightings) and associated habitats that have had fidelity for use. Predicted allotment contacts would potentially occur from bighorn sheep use of this area and habitats in proximity to past sightings.

## 2.6 RATIONALE FOR THE IDENTIFICATION OF THE PROPOSED RMP AMENDMENT

The BLM has identified Alternative B as the proposed RMP amendment. This alternative was previously identified as the preferred alternative in the Draft SEIS. In making this identification, the BLM considered the multiple-use and sustained yield mandate, pertinent BLM policies, the purpose and need for this RMP Amendment/SEIS, the planning issues, and the results of the effects analysis as described in Chapter 4. The BLM preliminarily found that Alternative B provides a means to allow compatible multiple uses to occur (domestic sheep grazing and bighorn sheep habitat) with low potential for adverse effects to bighorn sheep populations resulting from inter-species contact and disease transmission - essentially the same potential as Alternative C which would prohibit grazing by domestic sheep and goats on all four of the subject allotments.

The bighorn sheep is a BLM Idaho designated sensitive species and the selection of this alternative is consistent with BLM sensitive species management policy to implement measures to conserve these species and their habitats and to promote their conservation and reduce the likelihood and need for such species to be listed pursuant to the Endangered Species Act (ESA). Selection of this alternative is consistent with BLM Manual 1730 – Management of Domestic Sheep and Goats to Sustain Wild Sheep (BLM 2016); which provides policy guidance for the coordination and management of domestic sheep and goats and wild sheep and habitat on lands administered and managed by the BLM.

BLM Planning Regulations (43 CFR 1610.4-7) require identification of the preferred alternative in a draft EIS for an RMP; or in this case, for the draft SEIS for an RMP Amendment. The preferred alternative was identified in the draft SEIS to inform the public of the agency's orientation; it did not constitute a commitment or decision in principle, and there was no requirement to select the preferred alternative in the ROD. The selection of Alternative B as the proposed RMP amendment is BLM's proposed decision. The BLM will document its final decision in a Record of Decision and Approved RMP Amendment.

# CHAPTER 3 – AFFECTED ENVIRONMENT

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# CHAPTER 3 – AFFECTED ENVIRONMENT

## 3.1 INTRODUCTION

This chapter supplements Chapter 3 of the Cottonwood PRMP/FEIS (BLM 2008b) and focuses on the affected environment as it relates to the specific planning issues previously described in Section 1.8 of this SEIS. These issue topics are:

- Bighorn Sheep
- Native American Tribal Interests and Treaty Rights
- Livestock Grazing and Social and Economic Interests

## 3.2 BIGHORN SHEEP

This section supplements Section 3.2.9 of the 2008 PRMP/FEIS and focuses on the following issue: *Domestic sheep and goats may contact and transmit diseases to bighorn sheep, which may be a contributing factor to the downward trend in populations.*

### 3.2.1 Background

The FLPMA specifically identifies wildlife as one of the resources for which the public lands will be managed. The BLM manages wildlife habitat, as it relates to this SEIS, in coordination with the State of Idaho and the Nez Perce Tribe. The components of habitat management by the BLM include space, food, shelter, and water. The space component is particularly critical in this case because the preponderance of current scientific literature establishes that bighorn sheep and domestic sheep or goats should not share the same space at the same time due to potential for disease transmission.

BLM Manual 1730 – Management of Domestic Sheep and Goats to Sustain Wild Sheep (BLM 2016) establishes policy for the management of domestic sheep and goats and wild sheep and habitat on public lands administered by the BLM. Specifically, this manual sets forth policy for the management of BLM lands where the potential for disease transmission exists by interaction between wild sheep and permitted, authorized (e.g., leased), or recreational use of sheep and goats. The BLM's policy (BLM 2016) is to (1) achieve effective separation of BLM authorized domestic sheep or goats from wild sheep on BLM lands, and (2) to minimize the risk of contact between the species. Effective separation is defined as the spatial or temporal separation between wild sheep and domestic sheep or goats, resulting in minimal risk of contact and subsequent transmission of respiratory disease between animal groups. Currently, physical separation of domestic sheep or goats from wild sheep is the only effective means to reduce the potential for pneumonia-type disease transmission. Domestic sheep and goat authorizations and other uses will be implemented to ensure that effective separation results in a high degree of confidence that there will be a low to no risk of contact with wild sheep (BLM 2016).

Bighorn sheep are a BLM Idaho designated sensitive species (BLM 2015). In accord with BLM Manual 6840 – Special Status Species (BLM 2008); the BLM will undertake conservation actions to improve the status of such species before listing is warranted. In compliance with

existing laws, including the BLM multiple use mission as specified by FLPMA, the BLM shall designate Bureau sensitive species and implement measures to conserve these species and their habitats, to promote their conservation and reduce the likelihood and need for such species to be listed pursuant to ESA.

The planning area occurs in close proximity to the Payette National Forest, for which a Final Supplemental EIS (Payette FSEIS) (USFS 2010a) was completed to address grazing of domestic sheep within or near the range of bighorn sheep. Portions of this section of BLM's SEIS were derived from and/or summarize information from the Payette FSEIS.

### 3.2.2 Existing Conditions

Bighorn sheep tend to occur in groups of interacting local populations or herds (the terms herd and population are interchangeable in this SEIS). Interacting populations are often referred to as metapopulations (IDFG 2010). 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 sheep herds suggest that bighorn sheep evolved with a metapopulation structure in which small, local populations would not persist without movement and reproduction among herds (Gilpin and Hanski 1989; Berger 1990; Bleich et al. 1990). A large amount of contact and exchange of individuals may occur between some of the local herds identified in this document, while others are fairly isolated.

Due to the nature of metapopulations and the high dispersal and roaming characteristics of this species, bighorn sheep in proximity or adjacent to BLM domestic sheep allotments may be affected by BLM grazing management actions. The metapopulation structure of bighorn sheep and the long-distance periodic movements among populations (i.e., forays) are well documented. For example, 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 BLM land in Idaho, bighorn sheep rams were documented to have traveled as far as 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). The presence of dispersal corridors between suitable patches of habitat, and the ability of 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).

#### 3.2.2.1 Analysis Area

For management purposes, the IDFG has divided bighorn sheep populations and metapopulations into 22 Population Management Units (PMUs), including 6 PMUs for

California bighorn sheep and 16 PMUs for Rocky Mountain bighorn sheep (IDFG 2010). IDFG identifies separate management strategies for Rocky Mountain and California bighorn sheep; and identifies that Rocky Mountain bighorn sheep occur north of Interstate 84 (which crosses the southwestern portion of the state) and California bighorn sheep occur south of Interstate 84 (IDFG 2010). This document addresses only Rocky Mountain bighorn sheep, hereafter referred to simply as bighorn sheep.

The analysis area for direct and indirect effects to bighorn sheep in this SEIS includes the Hells Canyon and Salmon River metapopulations, and focuses on six herds and one area of concern (Little Salmon) within these metapopulations that occur in proximity (within 35 air-miles) to the four domestic sheep allotments (planning area). The cumulative effects analysis area includes the Upper Hells Canyon, Myers, Muir, Big Canyon, and Sheep Mountain herds in Hells Canyon; Main Salmon/South Fork herd; Little Salmon area of concern; and the four domestic sheep allotments. The herd cumulative effects analysis area includes the specific CHHR and foray analysis area. The cumulative effects analysis area is primarily based on: 1) the probability that foraying bighorn sheep may come in contact with domestic sheep or goat grazing areas, 2) interspecies contact results in disease transmission, 3) infected bighorn sheep return to local population CHHRs, and 4) some disease outbreak may potentially occur. As shown on Map 1 in Appendix C, occupied bighorn sheep habitat in Idaho, Oregon, and Washington occurs in the Salmon River and Snake River drainages of the Columbia River Basin (WAFWA 2010). Map 1 provides a large scale portrayal of bighorn sheep occupied and suitable habitats and metapopulations occurring within the analysis area. Within the analysis area more specific population and herd maps and suitable habitat maps (summer and winter source habitats) are presented in Appendix C, Maps 3, 4, 6, and 7. Bighorn sheep exist in both small isolated populations and interconnected metapopulations (IDFG 2010). Two bighorn sheep metapopulations occur within the analysis area; one within the Hells Canyon section of the Snake River and the other within the Salmon River canyon and mountains (see Map 1 in Appendix D). Historically, these populations were likely connected by suitable habitats between the two major drainages and may have functioned as one metapopulation. Today, re-introduced herds of the Hells Canyon population have been established along the Snake River. The indigenous (i.e., not reintroduced) population of the Main Salmon/South Fork local population of Rocky Mountain bighorn sheep occupy the Salmon River, from the Middle Fork Salmon River downstream.

*Hells Canyon Metapopulation*

The Hells Canyon metapopulation contains 15 local populations, largely defined by reintroduced cohorts (i.e., bighorn sheep groups/herds) that were established in specific areas within Hells Canyon and adjacent areas (see Map 3 in Appendix D). The Hells Canyon bighorn sheep restoration project covers more than 5.6 million acres in the Snake River drainage in Washington, Oregon, and Idaho (HCBSRC 2005). 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 (HCBSRC 1997). The amount 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 (HCBSRC 1997). The *Idaho Bighorn Sheep Management Plan* (IDFG 2010) identifies that the current objective for the Hells Canyon PMU is

to maintain or increase bighorn sheep populations, which is supported by the objectives and actions identified for bighorn sheep habitat in the Cottonwood RMP (BLM 2009a).

The specific local populations that will be addressed in this document due to proximity to BLM domestic sheep allotments include Upper Hells Canyon, Myers Creek, Muir Creek, Big Canyon, and Sheep Mountain. Population monitoring (e.g., telemetry) of bighorn sheep movements and distribution has revealed overlap and connectivity between herds within the Hells Canyon metapopulation. Telemetry monitoring of collared bighorn sheep has documented varying levels of connectivity between the Upper Hells Canyon, Myers Creek, Muir Creek, and Big Canyon local populations; the current estimated population for these local populations is 110 bighorn sheep (Frances Cassirer, IDFG, personal communication 2013). The Upper Hells Canyon local population includes the combined Upper Hells Canyon Oregon, Upper Hells Canyon Idaho, and Saddle Creek herds. The Sheep Mountain population is more isolated and occurs south of the other four local populations in Hells Canyon discussed above, and has an estimated population of 9 bighorn sheep.

*Salmon River Metapopulation*

Native populations of bighorn sheep were never extirpated from the Salmon River canyons and mountains, making them important native genetic stock. Loss of the genetic diversity of these populations could affect bighorn sheep persistence and restoration efforts within central Idaho. The Salmon River metapopulation has several populations distributed along the South Fork Salmon River, Main Salmon River Canyon, and Middle Fork Salmon River. Several social groups of bighorn sheep occur within the Main Salmon/South Fork population. Distribution overlaps and connectivity occurs between these groups. Borg (2014) found that social groups of bighorn sheep along the lower Salmon River were well connected. Risk of disease spread is related to the level of connectivity in bighorn sheep populations. While males were the primary source of connectivity between social groups, ewes also transitioned into other social groups but to a lesser degree. Rams had a three times higher probability of moving during the winter associated with the rut than during the summer (Borg 2014). The primary populations that potentially overlap or occur in proximity to BLM domestic sheep allotments include the Main Salmon River and South Fork Salmon River Herds (Main Salmon/South Fork Herd). The *Idaho Bighorn Sheep Management Plan* (IDFG 2010) identifies that the current objective for the Lower Salmon River PMU is to maintain or increase bighorn sheep populations. The objectives and actions identified for bighorn sheep habitat in the Cottonwood RMP (BLM 2009a) is consistent with this plan.

The BLM is a partner in the Salmon River Bighorn Sheep Project, an interagency research effort established for the purpose of gaining a better ecological understanding of the Main Salmon/South Fork bighorn sheep local population in the Salmon River canyon (local population that occurs within the Salmon River metapopulation). The project area includes a 75-mile portion of the Salmon River drainage in Idaho from the town of Riggins, Idaho, east upriver to the confluence of Big Mallard Creek, and the lower portions of the Little Salmon and South Fork Salmon rivers. The current estimate for the Main Salmon/South Fork local bighorn sheep population is 350 (Frances Cassirer, IDFG, personal communication 2013).

The project participants have been conducting bighorn sheep capture, radio-collaring, and monitoring of movements, distribution, and habitat use since 2008. A total of 68 bighorn sheep (28 rams and 40 ewes) have been captured and radio-collared. The actual number of radio-collared sheep will vary during the duration of the study as a result of the capture and radio-collaring of new bighorn sheep, bighorn sheep mortality, and collar malfunction or battery life. As of January 2015, 30 bighorn sheep are being monitored with active radio-collars.

Within the Main Salmon/South Fork herd area bighorn sheep are grouped in a number of different local populations. Distinct ram and ewe social groups occur within the Salmon River Bighorn Sheep Project area. Distribution of social groups, extensive movement rates, and maintenance of large use areas by both rams and ewes result in a high degree of population connectivity within the project area. This could foster the spread of disease within and among social groups. Ram groups, although isolated from other ram and ewe groups during most of the year, interacted with multiple ewe groups and members of neighboring ram groups during the rut (Mack 2011). Radio collared rams in the project area were capable of extensive daily movements (7 to 15 km/day) and traveled over large distances (11 to 49 km; mean = 33 km) between rut and non-rut areas (Mack 2011).

*Little Salmon Area of Concern*

Over the past 5 years, there have been several observations of bighorn sheep in the Little Salmon River drainage, the origin of which is unknown. This could be a midpoint of a migration, the end point of a foray, or an undocumented population that is resident in the Little Salmon River drainage. The most likely origin of these bighorn sheep is Hells Canyon or Salmon River. Migration corridors to the Little Salmon may include several habitat corridors, such as up from the mouth of the Little Salmon River or down the Rapid River drainage, or they may have resulted from random forays. These observations suggest a degree of habitat site fidelity or preference for this area; however, neither telemetry data nor enough observations exist to determine if an established herd is in this area. The most recent sighting in the Little Salmon drainage is of one bighorn sheep ewe during the spring of 2013. Due to the uncertainty of bighorn sheep status and the documentation of an established local population in the Little Salmon River drainage, the area of incidental sightings that have occurred over the past 5 years will be referred to as an area of concern (i.e., the Little Salmon area of concern). The population size is estimated to be four animals, as this is the number that has been reported in the area (USFS 2010a). Several of these Little Salmon River incidental sightings have been in close proximity to the Hard Creek allotment. The Hard Creek allotment occurs outside the identified bighorn sheep distribution polygon (IDFG 2010). The Hard Creek allotment has relatively limited amounts of summer source habitats, however, concentrated source habitats occur in the lower portion of the Little Salmon Drainage (downriver from Pinehurst) and mid- to upper-portions of the Hazard Creek drainage.

As noted above, no documentation of an established herd exists for the Little Salmon. The specific likelihood of bighorn sheep dispersal or foray movements within the Little Salmon area is unknown. The Little Salmon area is a potential dispersal corridor for bighorn sheep based on bighorn sheep sightings and available habitat and it is reasonable to assume that such movements are generally rare and infrequent. Consequently, based on incidental bighorn sheep sightings over the past 5 years and fidelity for the area in proximity to the Hard Creek allotment, these

incidental sightings warrant further analysis regarding potential for bighorn sheep contact with the Hard Creek allotment and domestic sheep.

As identified above, because several observations of bighorn sheep have occurred over multiple years in the Little Salmon drainage this has led to analyzing this area as an area of concern. However, the population estimate will be limited to four bighorn sheep because this is the number reported in the area during the past. The BLM assessed the Little Salmon area of concern utilizing past sightings and then analyzed it similar to a herd, utilizing assessment data summarized by the Payette National Forest (USFS 2010a).

#### 3.2.2.2 Historical Context

Prior to the mid-1800s, bighorn sheep were abundant and widely distributed throughout the western United States. A large proportion of native bighorn south of Canada went extinct beginning in the second half of the nineteenth century (Wehausen et al. 2011). Large declines in both bighorn sheep abundance and distribution occurred during the late 1800s and early 1900s due to overharvest, habitat loss, and competition for forage and disease transmission from domestic livestock (Goodson 1982; Valdez and Krausman 1999; IDFG 2010). The large region where bighorn sheep extirpations have been so widespread coincides spatially with where domestic sheep have been grazing in North America, and temporally with the beginning of that grazing (Wehausen et al. 2011). Bighorn sheep in North America were estimated to number approximately 1.5 to 2 million (Buechner 1960; Queen et al. 1994). A large decline in the bighorn sheep population in North America, from an estimated 2 million at the beginning of the nineteenth century to fewer than 70,000 in 2009 (Lawrence et al. 2010; Buechner 1960; Valdez and Krausman 1999), has been attributed in part to disease, particularly pneumonia caused by bacteria of the genera *Mannheimia*, *Bibersteinia*, and *Pasteurella* (Coggins 1988; Miller 2001). Recently *Mycoplasma ovipneumoniae* has been identified in contributing to pneumonia related deaths in eight bighorn sheep populations from 2008-2010 (Besser et al. 2012a).

Archaeological evidence and reports by early explorers indicate that bighorn sheep were widely distributed and abundant in Idaho until the late 1800s (IDFG 2010; Smith 1954; Toweill and Geist 1999), and included both California bighorn sheep (*O. c. californiana*) in the southwest portion of the state and Rocky Mountain bighorn sheep (*O. c. canadensis*) northeast of the Snake River Plains. By 1920 the Idaho bighorn sheep population declined to an estimated 1,000 animals (IDFG 2010). In 1969, Idaho began reintroducing Rocky Mountain bighorn sheep into historic habitats. As a result of these efforts, and strict hunting regulations, habitat protection, and translocation of bighorn sheep to historically occupied habitat, the Idaho population increased to approximately 5,000 by 1990 (IDFG 2010). Unfortunately, that number then decreased to 1,710 by 1998, with population declines attributed to disease outbreaks (Toweill and Geist 1999). More recent statewide estimates for bighorn sheep are 2,900 (IDFG 2010).

Buchner (1960) prepared maps depicting the estimated ranges of bighorn sheep over time in the lower 48 states for 1850 and in 1955. The 1850 map identified wide distribution of bighorn sheep in Hells Canyon and the entire Salmon River Canyon, while the 1955 map depicted Hells Canyon as primarily extirpated and bighorn sheep range reduction in the Salmon River canyon of west-central and central Idaho.

Rocky Mountain bighorn sheep were native to Hells Canyon and were thought to be very abundant (Bailey 1936). Archaeological investigations indicate bighorn sheep bones were the most abundant ungulate bones recovered at Native American campsites in Hells Canyon (Randolph and Dahlstrom 1977). More than 10,000 bighorn sheep may have once lived in the Hells Canyon and surrounding mountains, but were extirpated by the mid-1940s by competition for forage with domestic livestock, disease, and unregulated hunting; reintroduction efforts in Hells Canyon began in 1971, and 474 bighorn sheep were transplanted into Hells Canyon between 1971 and 2004 (HCBSRC 2005). In 2005, the Hells Canyon Bighorn Sheep Restoration Committee estimated 875 bighorn sheep were located within Hells Canyon, and the 2011 population estimate is 850 (includes Idaho, Oregon, and Washington). Overall, Hells Canyon modeled habitat could support more bighorn sheep than current population levels. The Hells Canyon PMU (Idaho) predicted bighorn sheep supportable by habitat within the distribution area of bighorn sheep is 1,555 to 2,802 (IDFG 2010). Cassirer and Sinclair (2007) describe the effects of chronic, repeated pneumonia outbreaks on bighorn sheep populations in Hells Canyon and their potential adverse effects on bighorn sheep population recovery and persistence.

The Salmon River drainage and canyonlands and mountains had a much larger bighorn sheep distribution prior to European settlement as shown by mapping prepared by Buchner (1960). Historically bighorn sheep in the Salmon River drainage were an important food source for the Nez Perce Tribe and the Sheepeater Indians which used upriver and adjacent areas. The Salmon River metapopulation was never extirpated (Toweill and Geist 1999), although the population has experienced periodic die-offs. No reintroduction or augmentation has occurred in the Lower Salmon River PMU (IDFG 2011). Low recruitment rates and overall declines in sheep numbers over the years for this metapopulation may have been caused by disease and habitat conditions in the Lower Salmon River PMU (IDFG 2010). Population numbers have dwindled in the western portion of this PMU that is closest to active domestic sheep allotments. Disease has resulted in low lamb survival in adjacent herds along the Salmon River, the most significant of which is respiratory disease, which results in negative effects on population dynamics through increased adult and lamb mortality (IDFG 2010, 2011). Overall, Lower Salmon River PMU modeled habitat could support more bighorn sheep than current population levels. Salmon River PMU predicted populations supportable by habitat within the distribution area of bighorn sheep is 942 to 1,504 (IDFG 2010). Within the Lower Salmon River PMU, Game Management Unit (GMU) 14 is the most western GMU and occurs the closest to domestic sheep grazing and has low lamb survival. During the period of 2010 to 2012, the lamb to ewe ratio was 9.7 (lambs per 100 ewes) within GMU 14. During the same period, the GMUs within the Lower Salmon River PMU that were farther east and more distant from historic domestic sheep grazing areas ranged from 57 percent to over 200 percent higher for lamb to ewe ratios when compared to GMU 14 ratios.

#### 3.2.2.3 Disease Transmission

Disease was a significant factor in the historic decline of bighorn sheep and is a key factor limiting recovery (Besser et al. 2012a; WAFWA 2012; Wehausen et al. 2011; Lawrence et al. 2010; IDFG 2010). Widespread bighorn sheep extirpations in North America have occurred in regions where historically large numbers of domestic sheep grazed (Wehausen et al. 2011). Present-day recovery of bighorn sheep populations is in large part limited by periodic outbreaks of respiratory disease, which can be transmitted to bighorn sheep via contact with domestic

sheep grazing in their vicinity (Carpenter et al. 2014). Although respiratory disease resulting in pneumonia is the most serious disease limiting bighorn sheep recovery, other diseases and parasites, including but not limited to scabies, anaplasma, babesia, ovine parapox (contagious ecthyma), and infectious keratoconjunctivitis (pink eye), may be communicable (Jessup and Boyce 1993).

Free-ranging bighorn sheep are susceptible to many diseases, but pneumonia has the greatest impact on populations (Singer et al. 2000; Monello et al. 2001; George et al. 2008; Cahn et al. 2011; TWS 2014). Bighorn sheep are vulnerable to organisms carried by healthy domestic sheep and goats, and there is no effective treatment once these organisms are transmitted (IDFG 2010). The most important of these diseases is bronchopneumonia, which is usually associated with bacteria in the genera *Pasteurella* and *Mannheimia* (Bunch et al. 1999; Miller 2001). Pneumonia caused by these bacteria has produced partial to complete die-offs of herds across the species' range, with the frequency of die-offs being particularly high in the northwestern United States (Monello et al. 2001). The current abundance and distribution of the species appears to be largely limited by recurrent pasteurellosis epidemics (Hobbs and Miller 1992; Jorgenson et al. 1997; McCarty and Miller 1998).

A history of large-scale, rapid, all-age die-offs in bighorn sheep has been documented across Canada and the United States, many presumed to be associated with domestic animal contact (Shackleton 1999). Although there is limited knowledge of transmission dynamics (Garde et al. 2005), extensive scientific research supports a relationship between disease in bighorn sheep populations and contact with domestic sheep. The literature includes circumstantial evidence linking bighorn die-offs in the wild to contact with domestic animals, as well as controlled experiments where healthy bighorn sheep exposed to domestic sheep displayed subsequently high mortality rates (Wehausen et al. 2011; Lawrence 2010; Foreyt 1989, 1990, 1992a, b; Foreyt et al. 1994; Onderka et al. 1988; Onderka and Wishart 1988; Garde et al. 2005: Drew et al. 2014). Several disease-caused mortality events have been recorded in wild populations immediately after contact with domestic sheep in northeastern Oregon, central Colorado, Washington, California, Nevada, and other locations (George et al. 2008; Foreyt 1994; Foreyt and Jessup 1982; Coggins 1988). No known published and peer reviewed research could be found that documents fenced or free-ranging bighorn sheep remaining healthy when living directly with domestic sheep herds.

Pneumonia in bighorn sheep populations usually results in an initial all-age die-off, continued chronic low level of adult mortality, and annual or sporadic high rates of mortality of lambs (generally from 1-3 months of age) (Festa-Bianchet 1988, Akenson and Akenson 1992, Singer et al. 2000b, Monello et al. 2001, Cassirer and Sinclair 2007, Cassirer et al. 2013). Increased mortality rates of lambs may continue for one to >20 years (Rush 1927, Jorgenson et al. 1997, Aune et al. 1998, Enk et al. 2001, Hnilicka et al, 2002, and Cassirer et al. 2013). While much of the evidence for disease transmission from domestic sheep to free-ranging bighorn sheep is circumstantial, a large literature base has emerged that documents bighorn sheep die-offs near domestic sheep. These die-offs 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 2012; TWS 2014). Transmission of *Mannheimia haemolytica* from domestic sheep to bighorn sheep was irrefutably demonstrated by Lawrence et al. (2010; WAFWA 2012).

Bighorn sheep commonly occur in spatially structured, demographically independent, interconnected populations in steep, rugged terrain (Cassirer et al. 2013), which is typical of the Hells Canyon and Salmon River metapopulations. Males and females pursue different life-history strategies (Bleich et al. 1996; Rubin et al. 2002) and interactions between the sexes are concentrated around the breeding season which is relatively short in northern latitudes and high altitudes (Bunnell 1982; Thompson and Turner 1982; Bleich et al. 1997; Valdez and Krausman 1999). Outside the breeding season, mature males and females generally occur in male-only, female-only, or female-offspring associations (Cassirer et al. 2013). Males are more mobile and more likely than females to contact conspecific hosts in adjacent populations, or potential disease reservoirs such as domestic sheep (Bleich et al. 1997; Rubin et al. 1998; DeCesare and Pletscher 2006). Initially, infection probably originates in domestic sheep, but once the disease has spread into bighorn sheep population it is most likely maintained in the population and spread by bighorn sheep (Cassirer et al. 2013). Consequently, once disease transmission has occurred between domestic sheep/goats and bighorn sheep, the interconnected populations within Hells Canyon and Salmon River metapopulations are at continued risk from spread of disease by infected bighorn sheep contacting other bighorn sheep. See Appendix A for a more detailed discussion and review of the research regarding bighorn sheep disease and transmission.

*Disease History of Hells Canyon Metapopulation*

Bighorn sheep were extirpated from Hells Canyon and the surrounding area by 1945 (Smith 1954; Johnson 1980; ODFW 1992). Wild sheep were totally extirpated from Hells Canyon in Oregon, Idaho, and Washington by the mid-1940s and disease contracted from domestic sheep was believed to have been the major cause of the extinction of Hells Canyon bighorn sheep (Coggins 1980). From 1971 to 2002, 492 additional bighorn sheep from 11 source populations (not from Hells Canyon population), and 124 bighorn sheep (from within the Hells Canyon population) were relocated within the Hells Canyon area. At least six pneumonia epizootics (population die-offs) occurred between 1972 and 1996 within the Hells Canyon metapopulation (HCBSRC 2004). In 2012, a population all-age die-off occurred in the northern most population of the Hells Canyon population in Washington state (Francis Cassirer, 2013, personal communication). *Pasteurella multocida* was associated with a major die-off in Hells Canyon in 1995–1996 (Frank et al. 2004). During this time, more than 300 bighorn sheep died of pneumonia in Hells Canyon, possibly caused by contact with one goat (Cassirer et al. 1996; Coggins 2002). During this period, bighorn sheep on the Idaho side of the river showed signs of respiratory disease, but no die-off was documented (Cassirer et al. 1996). Five die-offs within the Hells Canyon metapopulation have been circumstantially linked to domestic sheep (Coggins 1988). Cassirer and Sinclair (2007) describe the effects of chronic, repeated pneumonia outbreaks on bighorn sheep populations in Hells Canyon, and their potential adverse effects on bighorn sheep population recovery and persistence. Cassirer and others identified that in some cases, even in the absence of a large-scale die-off, chronic or sporadic pneumonia-caused mortality can be the primary factor limiting population growth, especially in juvenile age classes (Cassirer et al. 2013).

Six bighorn sheep local populations of the Hells Canyon metapopulation occur within 30 air miles from BLM domestic sheep allotments, including: Upper Hells Canyon, Myers, Muir Creek, McGraw, Big Canyon, and Sheep Mountain. The other populations have had periodic pneumonia outbreaks that have resulted in substantial mortality, as indicated by bighorn sheep

downward population trends in Hells Canyon (Figure 3-1). Disease has reduced the population growth rate of the Hells Canyon metapopulation by at least 40 percent (HCBSRC 1997).

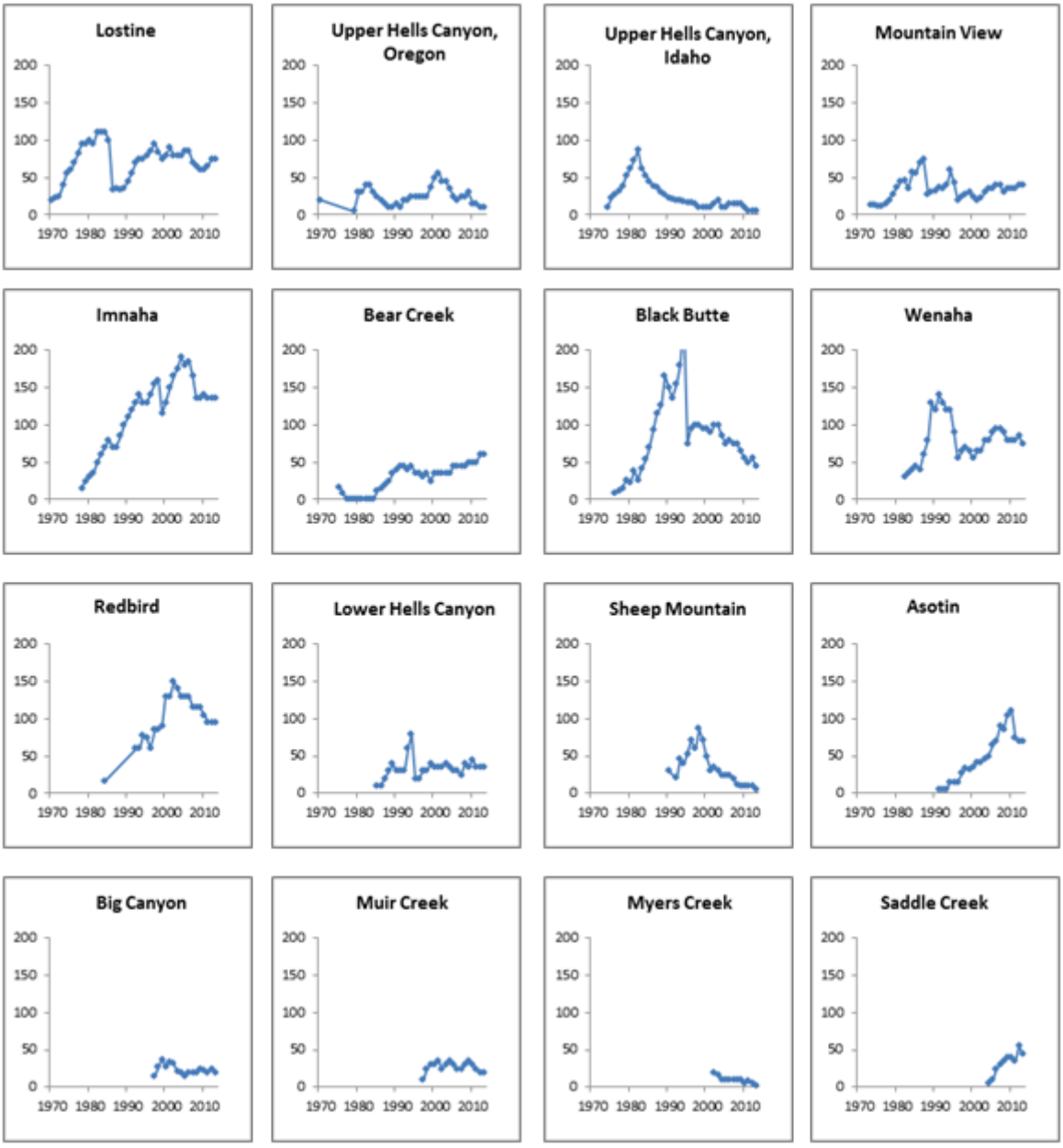


**Figure 3-1: Population Trends for Bighorn Sheep by Herd in Hells Canyon (Source: WDFW, ODFW, and IDFG bighorn sheep population census data; 1970 - 2012)**

*Disease History of Salmon River Metapopulation*

For the Salmon River metapopulation, the IDFG collects census data by game management unit (GMU; see Map 3 in Appendix D). As shown in Figure 3-1, the census data collected by the IDFG suggests significant bighorn sheep declines in several of these GMUs. Helicopter surveys during 2010, 2011, 2012, and 2013 were conducted specifically for bighorn sheep, while earlier

surveys for bighorn sheep were incidental sightings during surveys for elk (IDFG 2010). Consequently, population numbers and upward trends cannot be concluded from the higher population counts (e.g., GMU 19) when compared to earlier survey years.

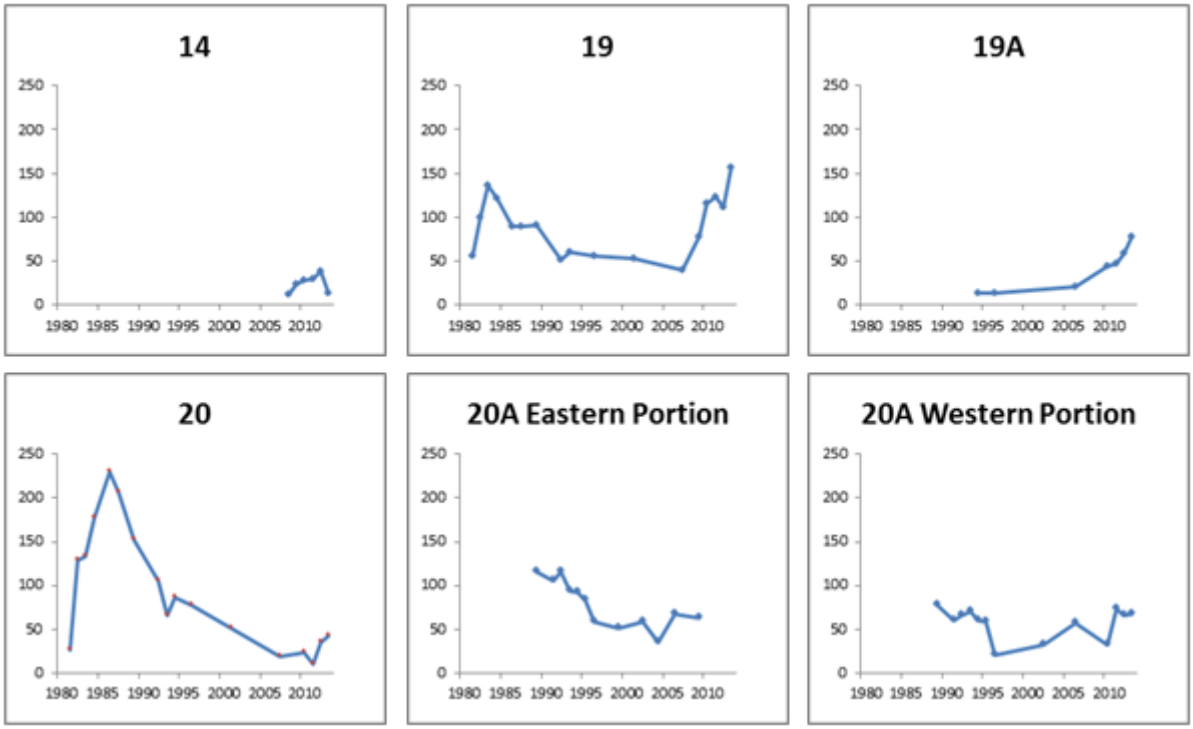


**Figure 3-2:** **Population Trends for Bighorn Sheep in Idaho Big Game Management Units that Overlap the Main Salmon/South Local Population Analysis Area** (Source: IDFG bighorn sheep population census data; 1981 - 2013)

The Main Salmon/South Fork population occurs within the Lower Salmon River PMU. Evidence suggests that disease has had severe implications on this population, which occurs within the Salmon River metapopulation (IDFG 2004a, 2006, 2010). The IDFG (2010) identified that low recruitment rates and overall declines in bighorn sheep have occurred in the Lower Salmon River PMU and specific GMUs and may have been caused by disease and habitat conditions. IDFG (2010) also identified that population numbers have dwindled in the western portion of the Lower Salmon PMU (GMU 14), which is closest to active domestic sheep allotments. Disease has resulted in low lamb survival in adjacent herds along the Salmon River.

From 1987 to 1991, a population on Big Creek within GMU 27 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 2004a, 2006).

A seven-year old radio-collared bighorn sheep ram was reported to have been observed on a sheep rancher's private land on May 18, 2009, on the north side of the Salmon River near Allison Creek and occurred within the Main Salmon/South Fork herd CHHR. The bighorn sheep ram was reported to have been within 50 to 75 yards from domestic sheep. The ram eluded Idaho

Department of Fish and Game officials for several weeks before they killed it on June 10, 2009 to prevent it from co-mingling with other bighorn sheep and potentially spreading disease. Prior to being killed the ram was observed to be coughing and sneezing. Blood and nasal samples were taken from the ram and were tested at the University of Idaho's Caine Veterinary Teaching Center in Boise. This ram had previously been captured within the Main Salmon/South Fork herd CHHR, radio-collared, tested for disease, and released in 2008. The lab results from the 2008 testing were compared to the samples collected in 2009. The comparison revealed that the ram had significantly decreased numbers of lungworms and indicated recent exposure and/or infection with a parainfluenza virus (pneumonia), although it was not certain whether the transmission occurred from the domestic sheep that it was observed in proximity to. The causal effects attributed to the coughing and sneezing were likely due to the parainfluenza virus and changes in the lungs. Lab analysis indicated that this animal did not have terminal pneumonia. However, this bighorn sheep almost certainly would have co-mingled with and transmitted disease to other bighorn sheep within the Salmon River metapopulation if it had not been lethally removed. This incident provides an unequivocal example that comingling has occurred immediately adjacent to the analysis area, and that a real potential for disease transmission exists.

#### 3.2.2.4 Vaccines and Range Applications

There are a number of pathogens that have been implicated in bighorn sheep that cause pneumonia and death that are common to domestic sheep and cause little or no symptoms in domestic sheep or goats. Two of the most lethal pathogens to bighorn sheep, *Mannheimia haemolytica* (leukotixin positive) and *Mycoplasma ovipneumoniae*, have been studied by researchers at Washington State University. Both researchers have indicated that development of specific vaccines to each of these bacteria may take 5 to 10 years. In addition to development of these vaccines, development of delivery systems to wild sheep are problematic and to date have not proved effective for wildlife with other diseases. A recent publication by Besser et al. (2013) and correspondence by Dr. Subramaniam Srikumaran, Washington State University, to the Payette National Forest Supervisor in 2010 discusses issues with both vaccines and delivery systems. Although vaccines may provide a long-term solution to disease transmission, there is no evidence that they will be effective in the near future. Therefore, vaccines do not provide solutions for this SEIS and current planning document. In other words, at this time and based on existing capabilities, it is not reasonable for the BLM to attempt to vaccinate wild bighorn sheep to protect them from domestic sheep.

#### 3.2.2.5 Model Analysis

Three models were used to better understand bighorn sheep habitat suitability and the potential for contact between bighorn sheep and domestic sheep: (1) a bighorn sheep source habitat model; (2) a CHHR model; and (3) a risk-of-contact model, which utilizes a bighorn sheep source habitat and CHHR analysis for the bighorn sheep foray analysis. Outputs from these models were used to describe current conditions on BLM domestic sheep allotments and adjacent areas and as a basis for alternative comparison. The BLM used the results from these models to make inferences regarding disease transmission between the species and potential outbreaks of disease within bighorn populations. Following is a summary of these models and results (see Appendix B for more information about the models and data used). A detailed description of these models

can also be found in *Bighorn Sheep Risk of Contact Tool Users Guide* (USFS 2013a) and Appendix L of the Payette FSEIS (USFS 2010a).

*Source Habitat Model*

Source habitats are those characteristics of macrovegetation that contribute to positive population growth for a species in a specified area and time; they contribute to source environments, which represent the composite of all environmental conditions that result in stationary or positive population growth in a specified area and within a specified time (Wisdom et al. 2000; Raphael et al. 2001). Source habitats have been described for bighorn sheep in alpine, subalpine, upland shrubland, and upland herbland community groups; alpine and subalpine community groups are primarily summer range, while upland herbland and shrubland are used in both seasons, depending on elevation (Wisdom et al. 2000). Bighorn sheep have habitat preferences and select habitat based on factors such as proximity of steep slope escape terrain, forage availability, and horizontal visibility (USFS 2013a; O'Brien et al. 2014; HCBSRC 1997).

Within the four BLM domestic sheep allotments, 7,249 acres of summer source habitat and 4,706 acres of winter source habitat exist, representing 37 percent (summer source habitat) and 24 percent (winter source habitat) of the total acreage of overlap within BLM domestic sheep allotments. Source habitat for bighorn sheep is distributed within the Salmon and Snake River canyon lands and adjacent landscape, which includes the BLM domestic sheep allotments (see maps 6 and 7 in Appendix D). Allotment-specific bighorn sheep source habitat and BLM land leased for domestic sheep grazing are summarized in Table 3-1.

**Table 3-1: Allotment Summary of Bighorn Sheep Source Habitats and BLM Lands Leased for Domestic Sheep Grazing Season of Use Overlap of Source Habitats**

| Allotment Name | Summer Source Habitat (Acres) | Winter Source Habitat (Acres)[1] | BLM Leased Lands (Acres) |
|---|---|---|---|
| Partridge Creek | 5,276 | 4,706 | 9,544 |
| Marshall Mountain | 1,201 | 0 | 4,212 |
| Hard Creek | 771 | 0 | 5,210 |
| Big Creek | 1 | 0 | 439 |
| **Total** | **7,249** | **4,706** | **19,405** |

[1]The Partridge Creek allotment is the only allotment that has a historic grazing season that overlaps with bighorn sheep summer period (May – October) and winter period (November – April), consequently bighorn sheep source habitat acreage is identified for both use periods. Marshall Mountain, Hard Creek, and Big Creek allotments have winter source habitat, however, because domestic sheep grazing has not occurred during this period the overlap with winter source habitats is zero.

During the summer of 2015 the Tepee Springs wildfire burned approximately 93 percent (8,850 acres) of the Partridge Creek Allotment and approximately 15 percent (5,210 acres) of the Hard Creek Allotment. This fire will affect the occurrence of source habitat on and adjacent to these allotments. Any areas that were previously mapped as summer or winter source habitats and burned would continue to be source habitats. However, timber stands that had moderate and high burn severity would likely be converted to early seral habitats (e.g., shrub, seedlings, forb, and grass stands) and some of the low severity burn areas would potentially be converted to early seral habitats. Conversion to early seral habitat would open up forested areas and potentially

increase source habitats for bighorn sheep (dependent on meeting terrain and escape cover criteria). Based purely on acres of timber vegetation burned, potentially 1,500 acres of additional source habitat may now occur in the Partridge Creek Allotment and 200 acres of additional source habitat may occur in the Hard Creek Allotment.

The above estimates are very preliminary and approximate; an accurate prediction of available source habitat on these allotments would be dependent on modeling of source habitat with an updated LANDFIRE vegetation layer (e.g., post-fire). Any changes to source habitats would be dependent on pre-2015 and post-fire vegetation types, and meeting escape terrain criteria (Appendix B, Source Habitat Model). The existing vegetation layer from the national LANDFIRE layer (USGS 2010) was used to assess the current source habitat available for bighorn sheep. However, changes from the 2015 fire will not be reflected in LANDFIRE until after the next update, scheduled for 2018. Therefore, the analysis in this SEIS is based on the pre-fire conditions reflected in the current LANDFIRE data.

*Core Herd Home Range Model*

CHHR analysis uses bighorn sheep telemetry location points to identify and enclose an area that contains 95 percent of all telemetry points from radio-collared bighorn sheep. This process was carried out for each identifiable individual within a herd for whom more than 20 telemetry points were available. All other telemetry and observation points for herds that did not meet these criteria were excluded from the CHHR analysis, but were used to verify the accuracy of the final CHHR volume contours.

Analysis was conducted for summer and winter CHHRs. Bighorn sheep telemetry locations occurring May through October are used for determining summer CHHR, and bighorn sheep telemetry locations occurring November through April are used for modeling winter CHHR.

*Risk of Contact Model*

For analysis of the risk of contact, the BLM used a model that estimates the probability that foraying bighorn sheep will reach a domestic sheep allotment. However, within an allotment it is not possible to determine where and when domestic sheep would consistently occur or for how long. Use of some areas within an allotment may present less chance of contact with bighorn sheep than others, while some areas may have higher probability of occurrence (e.g., source habitats). Because of this uncertainty, the only feasible and suitable method to predict potential interspecies contact was to use the Risk of Contact Model and use the assumption that contact with an allotment results in interspecies contact. By definition, where a CHHR overlaps an allotment, there is contact with the allotment and the assumption is that one or more contacts per year may occur. Stray domestic sheep have been implicated in several die-offs for bighorn sheep, and in many rangeland settings, strays may pose a risk of disease transmission as large as or greater than from foraying bighorn sheep. However, the bighorn sheep risk of contact tool (USFS 2013) does not model the risk of stray domestic sheep and the subsequent potential for contact with bighorn sheep. Since there is currently no domestic sheep grazing on BLM allotments in the analysis area, there is no risk of contact with bighorn sheep within these allotments or from straying domestic sheep or foraying bighorn sheep.

The Risk of Contact model was used to determine the effects of alternatives as described in Chapter 4.

The contact model is based on an analysis of 16 years of bighorn sheep telemetry data from the Hells Canyon populations (see Appendix B); its construction involves two distinct analyses. First, the analysis is used to delineate areas where most animals in each herd spend at least 95 percent of their time (the CHHR); telemetry data from Hells Canyon and Salmon River bighorn sheep was used for this analysis. Next, the analysis examines the characteristics of bighorn sheep movements, or forays, outside of the CHHR. This foray analysis examines how frequently and at what season foray movements occur, as well as how far beyond the CHHR animals are likely to travel. Together, the habitat, CHHR, and foray models are used to estimate the probability that a ewe or a ram in any of the herds will reach any of the open allotments in a given year.

Modeling the CHHR provided information to analyze the impacts of domestic sheep grazing on BLM domestic sheep allotments and on the landscape level for bighorn sheep metapopulations. The analysis also highlighted the extent of the overlap and possible interaction among the different herds throughout the Hells Canyon and Salmon River metapopulations. The first step in developing the CHHR model was to calculate separately the home range of each individual animal. Occasional movement outside of the area could be exploratory in nature and was not considered part of the CHHR. These excursions, or forays, were of great interest to the modelers and were analyzed separately in the foray model.

The tools and processes used to complete CHHR analysis are common to home range analyses used for many other species. This analysis used observations and telemetry data collected by the Hells Canyon Initiative from 1997 to 2013 (ongoing). The data was then used to divide the bighorn sheep populations into herds. Although the Hells Canyon metapopulation is comprised of numerous herds, this analysis focuses on the following herd assignments that were based on transplant cohorts to specific locations and breeding groups of ewes that shared the same range: Upper Hells Canyon, Muir Creek, Myers Creeks, Big Canyon, and Sheep Mountain. The bighorn sheep in the Salmon River metapopulation are endemic rather than reintroduced, so herds divisions were defined differently. Named herds in the Salmon River were based on the type of observations available for describing their locations: the Main Salmon/South Fork included animals radio-collared as a part of the Salmon River study in 2007-2013 (ongoing); the Big Creek population included animals radio-collared by Akenson and Akenson (1992) in 1989 and 1990, and the Upper Salmon; and the Upper Main Salmon was comprised of animals in the Salmon River Canyon between the Upper Main Salmon/South Fork and Big Creek populations, for which no telemetry data were available. The allotment-specific CHHR acreage and distance from each herd CHHR is summarized in Table 3-2 and Table 3-3.

**Table 3-2: Summer and Winter Core Herd Home Ranges and Domestic Sheep Allotments**

| Core Herd Home Range Information | Partridge Creek Allotment | Marshall Mountain Allotment | Hard Creek Allotment | Big Creek Allotment | Total Acres |
|---|---|---|---|---|---|
| CHHR Acres[1, 2] | 5,127 S<br>7,533 W | 0 | 0 | 0 | 5,127 S<br>7,533 W |
| Little Salmon Area of Concern Acres[2] | 0 | 0 | 2,696 S | 0 | 2,696 S |

| Table 3-2: Summer and Winter Core Herd Home Ranges and Domestic Sheep Allotments | | | | | |
|---|---|---|---|---|---|
| **Core Herd Home Range Information** | **Partridge Creek Allotment** | **Marshall Mountain Allotment** | **Hard Creek Allotment** | **Big Creek Allotment** | **Total Acres** |
| Distance to Nearest CHHR (Miles)[1] | 0 | 1.25 S | 10.25 S | 12.96 S | --- |
| Distance to Little Salmon Area of Concern (Miles)[2] | 3.53 | 18.30 | 0.0 | 12.96 | --- |
| BLM Lands Leased for Domestic Sheep Grazing (Acres) | 9,544 | 4,212 | 5,210 | 439 | 19,405 |

[1]S = Summer CHHR and W = Winter CHHR. The Partridge Creek Allotment is the only allotment that has a grazing season that overlaps with bighorn sheep summer period (May–October) and winter period (November–April), consequently bighorn sheep CHHR acreage are identified for both use periods.
[2]The Partridge Creek Allotment has overlap with summer and winter CHHR for the Main Salmon/South Fork local population and the Hard Creek Allotment has overlap with Little Salmon area of concern.

| Table 3-3: Allotment Distances (Miles) from Core Herd Home Ranges and Little Salmon Area of Concern [1, 2] | | | | |
|---|---|---|---|---|
| **Herd Name** | **Partridge Creek Allotment** | **Marshall Mountain Allotment** | **Hard Creek Allotment** | **Big Creek Allotment** |
| Main Salmon/South Fork | 0 | 1.25 S | 12.20 S | 32.04 S |
| Little Salmon[2] | 3.53 S & W | 18.30 S | 0 | 12.96 S |
| Upper Hells Canyon | 15.40 S<br>16.60 W | 29.78 S | 10.25 S | 26.15 S |
| Myers | 5.98 S<br>13.21 W | 20.84 S | 11.28 S | 33.83 S |
| Muir | 15.72 S<br>14.44 W | 27.72 S | 21.25 S | 44.21 S |
| Big Canyon | 17.45 S<br>17.15 W | 29.12 S | 19.15 S | 41.85 S |
| Sheep Mountain | 44.97 S<br>46.02 W | 55.82 S | 30.63 S | 30.36 S |

[1]S = Summer CHHR and W = Winter CHHR. The Partridge Creek Allotment is the only allotment that has a grazing season that overlaps with bighorn sheep summer period (May–October) and winter period (November–April), consequently bighorn sheep CHHR distances are identified for both use periods.
[2]Distances are for Little Salmon area of concern.

Similar to bighorn sheep elsewhere, Hells Canyon and Salmon River bighorn sheep, particularly rams, make occasional long-distance movements beyond their CHHR. Singer et al. (2001) defined these forays as any short-term movement of an animal away from and back to its CHHR. This life-history trait can put bighorn sheep at risk of contact with domestic sheep, particularly when suitable habitats are well connected and overlap with domestic sheep use areas (Singer et al. 2000c; Gross et al. 2000), or even when domestic sheep use is outside of CHHR areas. The risk of contact between dispersing bighorn sheep and domestic sheep is related to the number of bighorn sheep in a herd, proximity of domestic sheep use areas (allotments) to a bighorn sheep CHHR, distribution of bighorn sheep source habitats across the landscape, and frequency and distance of bighorn sheep forays outside of the CHHR. Straying bighorn sheep can also increase

the risk of contact, which was not modeled. Factors to be considered for domestic sheep straying and interspecies contact include: distance from CHHRs; topography; vegetation; flock size; and grazing season of use. Straying domestic sheep also increase risk of interspecies contact with longer periods of time on the range.

The sequence of events by which a disease outbreak could result from contact between a bighorn sheep and a domestic sheep or goats in an active allotment located outside of bighorn sheep CHHR can be broken down into a number of steps. To reach an occupied allotment, a bighorn sheep must (1) leave the CHHR; (2) travel far enough to reach the allotment; then (3) intersect the allotment (i.e., rather than some other area at the same distance from the CHHR). Once this occurs, in order for disease transmission to occur, the bighorn sheep must (4) come into contact with domestic sheep in the allotment and (5) contract the disease from the domestic sheep. For an outbreak to affect the animal's home herd, the infected bighorn sheep must (6) make its way back to the CHHR and (7) transmit the disease to other members of the herd. Uncertainty is identified within the literature regarding what levels of interspecies contacts in a rangeland situation result in disease transmission and disease outbreaks within a bighorn sheep population. Because of this uncertainty, the BLM did not conduct herd specific modeling in regard to disease transmission and herd persistence.

The contact model described in this section aims to determine the probability that a bighorn sheep will reach an occupied allotment.

*Interpreting Contact Rates Relative to the Probability of Bighorn Sheep Disease Outbreaks and Population Trends*

A high degree of uncertainty exists regarding the probability that contact of a bighorn sheep with an allotment will lead to disease outbreak occurring within a herd (USFS 2010a, USFS 2013b; Carpenter et al. 2014; O'Brien et al. 2014). Quantification of disease transmission and outbreaks in bighorn sheep populations following contact with domestic sheep or goats, and the subsequent ability of a population to recover, are key to interpreting the results from the above models; however, the mechanisms of disease transmission and resulting disease outbreaks in bighorn sheep is not fully understood. We currently lack empirical data to accurately predict for all scenarios as to the frequency of outbreaks and the effects on population persistence. Therefore, the BLM relied on the following to assist with the interpretation:

- The effects of respiratory disease outbreaks on bighorn sheep populations are often severe (Besser et al. 2012a, b). Controlled pen experiments identified in Besser et al. 2012a resulted in complete or nearly complete die-offs of bighorn sheep following contact with domestic sheep. It has also been documented that disease perturbations can affect lamb recruitment for several years following a severe population decline resulting from a disease outbreak that rapidly affects many animals in a specific area at the same time (Besser et al. 2012b; Coggins and Matthews 1992; Foreyt 1990). In other words, young lambs die at a high rate (for many years) even if adult bighorn sheep survive the outbreak. Consequently, when bighorn sheep disease die-offs occur, there is a substantial immediate mortality (population decline) and a delayed recovery due to poor lamb recruitment that can follow the disease outbreak for many years (Besser et al. 2013). Population recovery is unlikely where interspecies contact, potentially resulting in

disease transmission and subsequent disease outbreak, occurs within a few decades of each other (Cassirer et al. 2013). There is no specific guidance on the number of decades required to recover from a disease outbreak; observations of herds that have experienced pneumonic events indicate it likely requires several.

- Another important trend of wild-domestic sheep disease transmission is that an illness's effect on individual bighorn populations can be long-lasting. For example, in the 1980s in California's Santa Rosa Mountains, lambs regularly died from pneumonia (DeForge et al. 1997; DeForge et al. 1982). According to DeForge and others (1997): "[In the] Santa Rosa Mountains…a disease outbreak reportedly struck bighorn in the late 1970s. This epizootic contributed to at least 13 years of poor recruitment and an 81 percent population decline in the…adult bighorn population between 1979 and 1996." Cahn and others (2011) explained the trend of suppressed lamb recruitment: "Whether mild or severe, most respiratory disease outbreaks in bighorn populations are followed by several years of pneumonia caused mortality of lambs resulting in low recruitment rates and juvenile survival. Continuing lamb infection apparently results from females that remain infective following an outbreak, although mortality or morbidity among the females may not be detectable. Such recurring lamb infections can substantially delay the recovery of depleted populations to pre-outbreak levels."

In order to sustain populations of bighorn sheep within the Hells Canyon and Main Salmon/South Fork metapopulations in the long term, it will be necessary to reverse the significant declining trends in populations depicted in Figures 3-1 and 3-2 above. Therefore, for this analysis, the BLM used the predicted number of disease outbreaks over a 50-year period that would result from contact with domestic sheep as an indicator of the effect on these bighorn sheep population trends.

The BLM recognizes the uncertainty regarding the relationship between the number of bighorn sheep contacts with a domestic sheep allotment and predictions for disease transmission and outbreaks. Consequently, in this SEIS the analysis was conducted at a herd level for the various alternatives to predict disease outbreak attributed to BLM authorized domestic sheep grazing over a 50-year period. Due to the uncertainty in the amount of contacts between domestic sheep and bighorn sheep needed to result in disease transmission to bighorn sheep and subsequent disease outbreak, the BLM analyzed a range of probabilities. These ranged from 0.05 (1 in 20 contacts would result in a disease outbreak) to 1.00 (every contact would result in a disease outbreak). The specific probability values modeled were: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00. The BLM then used the range of probabilities of disease outbreak to predict the number of outbreaks that would occur over a 50-year period.

It is important to disclose that accurate individual-level modeling of the impacts of disease events is difficult, as the dynamics of respiratory disease in the wild are only partly known. An individual-based model would require understanding many factors, such as the incubation period and active infection durations, the probability and rate of recovery from disease, the rate of effective contact between individuals within the herd, and the possible role of persistently infected individuals in harboring and spreading the disease. Variations in the resistance to disease of individual bighorn sheep and in the virulence of the disease-causing organisms themselves can also affect population dynamics.

Furthermore, modeling population dynamics of large herbivores at the individual level requires estimating numerous parameters, from adult and juvenile survival rates to age at sexual maturity, fecundity, and lamb survival (Gaillard et al. 2000). In addition, the average values for each of those life-history parameters may be modified by interacting impacts of density dependence, weather, forage availability, and predation. Properly estimating these parameters would require extensive age- and class-specific population data, ideally from the populations being modeled. Such data is not currently available.

#### 3.2.2.6 Risk of Interspecies Contact and Straying of Domestic Sheep from Grazing Allotments and While Trailing

The analysis in the FSEIS focused on interspecies contact resulting from foraying bighorn sheep intersecting with a domestic sheep allotment. However, another concern is the straying of domestic sheep from sheep bands on grazing allotments, or while trailing, and the potential contact with bighorn sheep (WAFWA 2010, 2012; USFS 2010a; Cahn et al. 2011).

A principal assumption from the published literature is that direct contact between domestic sheep and bighorn sheep results in a high likelihood of disease transmission to bighorn sheep and disease outbreaks in local bighorn sheep herds (Wehausen et al. 2011; WAFWA 2012). Risk factors include (1) distance between domestic sheep allotments and the nearest bighorn sheep populations; (2) amount and distribution of bighorn sheep habitat within and between domestic sheep allotments; (3) stray domestic sheep and forays of bighorn sheep, particularly males during the rut; and (4) seasonal bighorn sheep distribution and movement near the allotments when grazed by domestic sheep.

The potential for straying by domestic sheep is dependent on a variety of factors, including: dense vegetation and rugged terrain, which reduces the ability of sheepherders to observe or locate domestic sheep; experience and responsibility of sheepherders; maturity and effectiveness of herd/guard dogs; number of herders and herd/guard dogs; occurrence of sick or physically disabled domestic sheep in the band; lagging domestic sheep while trailing; adequacy of stray or loss domestic sheep monitoring or detection; and lack of a response plan regarding comprehensive search and stray sheep locating. In addition, the scattering and straying of domestic sheep may occur from predator disturbance or other human or natural conditions.

Coggins (2002) identified a stray domestic ewe that traveled at least 30 miles from private land to bighorn sheep range through rugged terrain and heavy timber, and across at least one river. These stray domestic sheep will continue to graze the same area or continue to wander, which would reduce the effectiveness of separation buffers that may be in place to reduce the risk of contact with bighorn sheep, increasing the risk of contact with bighorn sheep. This risk of contact is further dependent on proximity of occupied bighorn sheep habitats. Stray domestic sheep may utilize bighorn sheep habitats outside of the grazing season. Consequently, if stray domestic sheep utilize CHHR areas and other summer/winter source habitats, domestic sheep may come into contact with bighorn sheep for long periods of time, increasing the probability for disease transmission and risk of bighorn sheep disease outbreak. Stray domestic sheep may originate from domestic sheep placed on grazing allotments, or domestic sheep moving along trailing routes to and from grazing allotments and public/ private lands.

Bighorn sheep and domestic sheep have a gregarious behavior which increases the potential for interspecies contact and disease transmission. This gregarious behavior may be exacerbated during the rut or breeding period for the two species. During the rut (breeding period), male bighorn sheep are more active and rutting foray distances often increase with males in search of female bighorn sheep in estrus. In addition, grazing estrous domestic female sheep heightens the attraction and probability of association between bighorn sheep and domestic sheep (WAFWA 2012).

The risk of contact model may underestimate the potential contacts that occur because straying domestic sheep is not accounted for. Potential for interspecies contacts and associated risks from straying are likely to be more prevalent in allotments that are in close proximity to CHHRs. Portions of the Partridge Creek allotment overlap with Main Salmon/South Fork CHHR and the Marshall Mountain allotment occurs within 1.25 mile from the Main Salmon/South Fork CHHR. These two allotments have the highest risk from domestic sheep straying and contacting a bighorn sheep or a CHHR. The nearest CHHR from the Hard Creek Allotment is 10.25 miles (Upper Hells Canyon) and the nearest CHHR from the Big Creek Allotment is 26.15 miles (Upper Hells Canyon).

#### 3.2.2.7 Predation and Other Stressors

Stressors to bighorn sheep include overcrowding on limited range, loss of escape cover, harassment by dogs, encroachment by humans, heavy snowfall and other weather stressors, parasitism, poor nutrition, predation, and other human disturbances such as roads, habitat degradation, noise, genetics, high population densities, capture and restraint techniques, breeding behavior, the presence of other wildlife, and high dust levels (Bunch et al. 1999; Festa-Bianchet 1988; Jenkins et al. 2000; Jones and Worley 1994; Foreyt 1998; Monello et al. 2001). These stressors may reduce the ability of bighorn sheep to resist disease (Garde et al. 2005; See Appendix A for a review of research regarding these factors.)

Bighorn sheep have evolved with a variety of predators (Sawyer and Lindzey 2002; IDFG 2010), including mountain lions (*Puma concolor*), gray wolves (*Canis lupus*), coyotes (*Canis latrans*), bobcats (*Lynx rufus*), lynx (*Lynx lynx*), black bears (*Ursus americanus*), grizzly bears (*Ursus arctos horribilis*), wolverines (*Gulo gulo*), and golden eagles (*Aquila chrysaetos*). Disease transmission, human disturbance, overgrazing, and habitat loss are often cited as factors responsible for declines in bighorn sheep abundance and distribution, while predation is rarely considered a significant mortality factor (Wishart 1975, 1978).

Much of the literature suggests that efficient anti-predator strategies of bighorn sheep greatly reduce their vulnerability to predation (Buechner 1960; Hornocker 1970; Geist 1971; Jorgenson et al. 1997; Wishart 2000). Bighorn sheep gregariousness and the use of steep, rugged terrain appear to be effective adaptations to avoid predation by coursing predators such as wolves and coyotes (Wishart 2000). Stalking predators such as cougars, however, may be able to circumvent these strategies, and predation losses in some herds may be high if individual cougars specialize in preying upon bighorn sheep (Ross et al. 1997). Most accounts of bighorn sheep predation involve cougars or coyotes (Sawyer and Lindzey 2002). Coyote predation appears to be incidental, primarily restricted to lambs, and most often reported in areas that lack suitable

escape terrain; and cougars appear to be the only predators capable of causing significant mortality in bighorn sheep.

Wolves occasionally prey upon Dall sheep (Holleman and Stephenson 1981; Heimer and Stephenson 1982; Gasaway et al. 1983; Huggard 1993; Nichols and Bunnell 1999), but have not been reported as a significant source of mortality in bighorn sheep populations. Wolf predation has not been documented to cause population-level impacts on bighorn sheep (IDFG 2010). In Yellowstone National Park, wolves did not prevent the bighorn sheep population from increasing (7 percent annual increase from 1998 to 2005) during the decade after wolf reintroduction, when wolf numbers increased from 21 to a maximum of 106 (White et al. 2008). In the Salmon River Mountains of central Idaho, Husseman and others (2003) documented 120 wolf-killed and 98 mountain lion-killed ungulates. Of these documented kills, bighorn sheep comprised 1 percent of the mountain lion-killed ungulates and none of the wolf-killed ungulates.

In some conditions and environments, mountain lions have been documented to cause population-level impacts in bighorn sheep that occupy suitable habitat (Ross et al. 1997; Sawyer and Lindzey 2002). While mountain lion predation on bighorn sheep is widespread, it usually does not limit populations (IDFG 2010). Predation typically only has population-level effects on small bighorn sheep populations that are struggling due to other factors, such as disease or drought (IDFG 2010). Cassirer and Sinclair (2007) discussed mortality factors for bighorn sheep in Hells Canyon during the period of 1997 to 2003, during which time pneumonia was the most common cause of adult mortality (43 percent) and the primary factor limiting population growth. Mountain lion predation was the second most frequent source of adult mortality (27 percent), but did not significantly reduce the rate of population growth (Cassirer and Sinclair 2007).

#### 3.2.2.8 Habitat

Current source habitat does not appear to be limiting for bighorn sheep in the analysis area (see Maps 6 and 7), as much of the apparently suitable bighorn habitat appears to be unoccupied (HCBSRC 1997). In addition, the historic range of bighorn sheep within the analysis area was much more extensive. The IDFG (2010) identified that Idaho contains abundant habitat for bighorn sheep, the quality of which can be diminished by noxious weeds, conifer encroachment, roads and urban development, human disturbance, competition with livestock or other wild ungulates, and other factors. At scales below the watershed level, it is expected that the quality of habitat can have variances that cannot be detected at broader scales. The PRMP/FEIS (BLM 2008b) included successional modeling of both forested potential vegetation groups and shrub/grassland cover types. Comprehensive habitat modeling was not completed specifically for bighorn sheep habitat, since the information needed to model the change through time of grasslands, mountain mahogany, bitterbrush, and forest cover types with less than or equal to 10 percent canopy cover is sparse or unavailable, particularly in regards to proximity to rugged escape terrain.

The PRMP/FEIS did provide information on the general trends of vegetative response under each of the four alternatives, but it was not specific to domestic sheep allotments and bighorn sheep habitat. These generalized trends and conditions represent more than bighorn sheep habitat and 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 PRMP/FEIS

also discussed the generalized trends for deciduous riparian vegetation under the four alternatives, which Wisdom and others (2000) identified as a special habitat feature. Again, bighorn sheep habitat is a subset of deciduous riparian vegetation.

Other factors that affect bighorn sheep habitat include patch dynamics of non-forest and forested habitats and their juxtapositions to each other. For example, suppression of wildfires for several decades has resulted in a reduced fire return interval and larger wildfires in some vegetation types. One effect that has occurred to some extent on the community types used by bighorn sheep is the increase of patch size of burned areas relative to historical conditions. However, without specific information on the juxtaposition of needed patches on the landscape (size and arrangement) for this species, comparing trends further with the species' needs is difficult. 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 to move across the landscape, altering historical vegetation dynamics can potentially 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 post-fire succession occurs and a burned area returns 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. Habitat quality degradation through exotic weed invasion 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 habitat within the ecosystem may also be negatively affected by livestock grazing. Riparian systems can be particularly susceptible to high concentrations of livestock (Berry 1979). Defoliation, soil compaction, and floodplain water table subsidence due to channel widening or down-cutting have resulted in the loss of densely rooted graminoid and shrub species (Berry 1979; Kovalchik and Elmore 1992). Natural recovery of native riparian vegetation may be extremely slow, even with reductions in livestock grazing, because of structural changes to stream hydrology 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 species composition and seral stages. Often, lowered water tables resulting from heavy grazing pressure have modified or destroyed normal riparian vegetation and affected run-off and soil water storage capability within riparian areas, which has affected riparian ecosystem function. The ability of streams, associated vegetation, and wildlife populations to recover following reduced 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). The BLM recognizes that properly managed livestock can reduce potential for adverse impacts to riparian and upland habitats and that all herbivore activities (domestic and big game ungulates) can cause varying levels of impacts to habitats.

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 and associated human uses can increase disturbance to bighorn sheep during critical periods throughout the year. 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). Road construction can exacerbate effects from other risk factors, such as the spread of exotic species. In addition, off-highway vehicle use can facilitate the 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, some of which are able to out-compete native species. This can result in a substantial change in the overall biological diversity of the affected area and changes in historical fire regimes.

#### 3.2.2.9 Best Management Practices (BMP)

No known studies, research, or peer reviewed literature has documented the effectiveness of BMPs from preventing contact and disease transmission when domestic sheep or goats graze within or adjacent to occupied bighorn sheep habitats. Effective separation between bighorn sheep and domestic sheep and goats, which minimizes the potential for contact and disease transmission, has been identified as the key management strategy for conservation of bighorn sheep (Wild Sheep Working Group 2012). The Partridge Creek Allotment is currently under a U.S. District Court Temporary Restraining Order, which temporarily closed the allotment. This was based on the Court's finding that the strategy used to reduce contact on that allotment relied on BMPs that were voluntary and could not be enforced by the BLM, and effectiveness was not backed by any supporting science.

Varying levels of effectiveness may result from BMPs where they are added to or used in conjunction with large distance buffers between active domestic sheep allotments and occupied bighorn sheep habitats. Assuming the existence of large buffers, allotments which benefit from BMPs would still have to occur in open, gentle, non-bighorn sheep habitat where domestic sheep can be easily controlled and monitored, with a large buffer between the two species (Schommer 2009). This situation does not occur for three of the allotments analyzed in this SEIS (Partridge Creek, Marshall Mountain, and Hard Creek Allotments). These allotments are interspersed with forested areas, dense vegetation, and steep, rocky and rugged terrain. Control of domestic sheep, locating strays, and monitoring of bighorn sheep would be more difficult with these conditions, compared to areas that are open with moderate slopes. The Big Creek Allotment is more open and moderately sloped and has a large buffer between the nearest bighorn sheep occupied areas (Little Salmon River area of concern). In addition, implementing successful BMPs in a rangeland environment continuously year after year is very difficult, and the consequences of interspecies contact and disease outbreak may result in severe adverse impacts to local bighorn sheep populations.

The adoption of BMPs to prevent straying is designed to minimize the risk of contact with bighorn sheep; however, the adoption of such practices requires intensive monitoring efforts, vigilant herd management to reduce strays, and immediate response and effort to finding strays. The effectiveness of BMPs to reduce straying is not substantiated by research and may not always be effective, and thus BMPs are not a substitute for effective separation (adequate

buffers) as a material way to reduce interspecies contact. Stray domestic sheep are known to travel long distances and have been reported in areas not authorized for grazing or trailing and in areas during periods not identified for grazing.

Appendix C contains more information about the effectiveness of BMPs.

## 3.3 NATIVE AMERICAN TRIBAL USES

This section supplements the description provided in the 2008 PRMP/FEIS, for Native American Tribal uses. As identified in Section 1.8 of this SEIS, the planning issue to be addressed is: *Management of livestock grazing by the BLM, specifically domestic sheep and goats, may affect the availability of resources and uses (specially related to bighorn sheep) that are important to the interests and rights of the Nez Perce Tribe.*

### 3.3.1 Background

During the mid to late 1800s, Indians were displaced by settlers from large portions of their native land and relegated to reservations by the U.S. government. The pressure to obtain land increased, especially with the discovery of gold on additional Indian land. Negotiations with various Indian groups resulted in land being ceded to the United States government through treaty, but with numerous rights reserved by the Indians. Treaties are negotiated contracts made pursuant to the Constitution of the United States. They take precedence over any conflicting state laws, as stated in the supremacy clause of the Constitution (Article 6, Clause 2). Treaty rights are not gifts or grants from the United States, but are bargained-for concessions. These rights are grants-of-right *from* the tribes, rather than *to* the tribes.

The unique relationship between the United States government and federally recognized Indian tribes is defined by treaties, statutes, executive orders, judicial decisions, and agreements. This relationship has created a special federal trust responsibility; as such, the BLM has the responsibility to identify and consider potential impacts of BLM actions on Indian trust resources (e.g., fish, game, water quality, plant resources, etc.). The BLM also has the responsibility to ensure that meaningful consultation and coordination concerning Tribal treaty rights and trust resources are conducted on a government-to-government basis with federally recognized tribes.

The federally recognized[2] Nez Perce Tribe has long used natural resources and conducted its social and religious activities in the vicinity of the planning area. Between 1855 and 1863, the Nez Perce Tribe and the United States government signed various treaties and agreements that relinquished ownership of millions of acres of land to the government, and established and modified the Nez Perce Reservation to guarantee a permanent homeland for the Tribe. In 1855, the United States negotiated a treaty with the Nez Perce Tribe (12 Stat. 957) that was ratified in 1859. Article 3 of this treaty reserves numerous rights, including hunting, and states in part:

[2] Indian Entities Recognized and Eligible to Receive Services From the United States Bureau of Indian Affairs. 67 Fed Reg. 46330 (July 12, 2002).

> The exclusive right of taking fish in all the streams where running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land.

Taking of bighorn sheep is part of the reserved hunting right under Article 3.

The planning area is within the territory designated for use by the Nez Perce Tribe in 1967 by the Indian Claims Commission.[3] The rights reserved under the 1855 Treaty apply to this territory. As stated in the Indian Claims Commission report[4]: "Mountain sheep were found throughout the various mountains of the area, but were generally hunted by the Nez Perce in the following areas: … (2) Riggers[5], Idaho, area; … (5) the upper Salmon River tributaries area."

The BLM manages portions of these ceded lands that are within the traditional use area of the Nez Perce Tribe. The treaties also reserve hunting, fishing, and gathering rights for members of the Nez Perce Tribe on these federal lands outside the boundaries of their reservation.

### 3.3.2 Existing Conditions

Traditionally, socio-cultural values of the Nez Perce people reflect the close relationship with natural resources, including big game animals. In addition, socio-cultural values are intertwined with various natural resources and spiritual values are sometimes attributed to animals. For instance, the hunting of bighorn sheep is more than a subsistence activity. There are shared cultural beliefs involved that the sharing of a successful hunt strengthens family ties, maintains the connection of the Nez Perce people to the local ecology, forms a link to the past, and contributes, in part, to maintaining cultural continuity. Since hunting is a reserved right and is incorporated into the socio-cultural system, any change to these treaty-reserved opportunities has the potential to affect the socio-cultural system of the Nez Perce Tribe. Following is a brief description of the existing value of bighorn sheep use and the socio-cultural values to the Nez Perce Tribe.

The hunting of bighorn sheep currently does not have an economic market value, because the harvested resource is not sold on the open market. The Nez Perce Tribe does not track the number, the age class, and gender of the bighorn sheep that are taken. This cultural activity is accomplished at the family level, and is not reported to Tribal authorities. Rather, bighorn sheep are valued for their horns, hides, and meat. Chalfant (1974) states that "mountain sheep meat was considered as good as deer meat, and was therefore dried and cached for winter use." Currently,

[3] Indian Claims Commission in Docket 175 18 1. The Indian Claims Commission was created by the Indian Claims Commission Act of 1946, Pub. L. No. 79-726, ch. 959, Act of August 13, 1946, 60 Stat. 1049. The Act provided a forum for adjudication of Indian claims against the United States, many of the claims resulting from treaties.

[4] Indian Claims Commission in Docket 175 18 1, page 100.

[5] The Riggers area may be in reference to Riggins.

because of fewer bighorn sheep, there is less opportunity to obtain meat to supplement existing subsistence activities.

The horn of the bighorn sheep is highly prized and used in the building of bows. On bows made by the Nez Perce people, Spinden (1908) wrote: "[T]here were three kinds of bows, one simple and two sinew-backed. The finest bows were made from a single piece of mountain-sheep horn. A large horn was split and a slip taken out. This strip of horn retained its spiral coil and had to be steamed, stretched, and straightened by a long tedious process. After the horn had been shaped, a backing of deer sinew was added….These bows were highly valued." Knowledge on how to build these bows has diminished within the Tribe. Although there have recently been efforts to regain this knowledge, there are fewer bighorn sheep horn available for Tribal members to continue this cultural tradition.

The Nez Perce Tribe area of interest historically lies between the Pacific Coast and the Great Plains. As such, the Tribe became accomplished traders and would trade their items with the Coastal and Plains people, acting as an intermediary between the two areas. Several of the items traded by the Nez Perce across this broad region included horn bows as well as spoons and bowls of mountain sheep horn (Walker 1967). At one time items resulting from the taking of bighorn were a trade item and contributed to the economy of the Nez Perce people.

Bighorn sheep, while important for sustenance, tools, and clothing, also have a spiritual role in Nez Perce culture. Located in the Bitterroot Valley near Missoula, Montana, in 1877 was "a huge horn of a mountain sheep, its tip partly imbedded in the trunk of the tree eight feet above the ground, [that] gave the tree its reputation for possessing a strong spiritual power, and the Salish and Sahaptin travelers felt its spell and often sought its aid in ensuring success in hunts, fights, or other ventures on which they were embarked" (Josephy 1971).

Nez Perce Tribal ethnographer Josiah Pinkham summarized the value of the bighorn sheep to Nez Perce culture as follows:

> Bighorn Sheep have provided spiritual guidance to the Nez Perce since time immemorial. Over the countless generations bighorn sheep have given much to help the Nez Perce survive. They have provided food and other necessary things for the Nez Perce. Its meat was cooked and eaten or dried to be eaten later in winter months or during travel. The highly nutritional organs are considered a delicacy to the Nez Perce. The heart, liver and intestines are still consumed by Nez Perce people today. Bighorn sheep hides are highly sought after for making clothing for shirts, dresses and leggings. Bighorn sheep bones were used for tools and games for the people…. It is hard for the Nez Perce people to maintain their cultural ties to the Salmon and Snake River canyons when the once most common large herbivore in these canyons has been reduced in number to essentially a museum population (Pinkham 2007).

As previously described, the population of bighorn sheep has been in decline for many years, reducing the opportunity for taking of bighorn sheep. With fewer animals to harvest, the opportunity to practice socio-cultural activities has been reduced, which in turn impacts the ability of the Nez Perce to exercise their treaty rights.

## 3.4 LIVESTOCK GRAZING AND SOCIAL AND ECONOMIC CONDITIONS

This section supplements the description from the 2008 PRMP/FEIS, for livestock grazing and social and economic conditions. As identified in Chapter 1 of this SEIS, the planning issue to be addressed is: *Changes to management of livestock grazing by the BLM may affect the local economy*.

### 3.4.1 Background

#### 3.4.1.1 Livestock Grazing Background

The BLM manages livestock grazing on public land under the Taylor Grazing Act of June 28, 1934, as amended; the FLPMA, as amended by the Public Rangeland Improvement Act of 1978; the Public Rangelands Improvement Act of 1978; and Public Land Orders, Executive Orders, and agreements that authorize the Secretary to administer livestock grazing of specified lands under the Taylor Grazing Act or other authority as specified.

Land use plans establish allowable resource uses, related levels of use, and areas of use. Livestock grazing is a resource use managed and authorized in accordance with BLM grazing regulations (43 CFR Part 4100 (2005)). Under these regulations, the area of use is an allotment (an area of land designated and managed for grazing of livestock) and the amount of authorized forage use is specified in animal unit months (AUMs) (the amount of forage necessary to sustain one cow and her calf, or five sheep for a period of one month). The number of livestock authorized for a particular allotment is determined by dividing the number of AUMs that is available for livestock within that allotment by the number of months that the allotment may be grazed.

Applicants (grazing lessees) who meet qualifications listed in 43 CFR 4110 may apply for and receive a grazing lease or permit on an allotment for 10 years. A grazing lease or permit is a document that authorizes grazing use on the public lands under the Taylor Grazing Act. It specifies mandatory terms and conditions, including the kind and number of livestock, the period(s) of use, the allotment(s) to be used, and the amount of use in AUMs. Other terms and conditions may include class of livestock, breed of livestock, and specific management requirements. Upon lease expiration, the lessee who holds the expiring lease is given priority for a new lease, provided that the allotment(s) under the lease remain available for domestic livestock grazing, the lessee has been in compliance with the rules and regulations and the terms and conditions of the expiring lease, and the lessee accepts the terms and conditions of the new lease.

The Rangeland Reform process of 1994 modified the federal Range Management regulations by adding Subpart 4180 (Fundamental of Rangeland Health and Standards and Guidelines for Grazing Administration); and in 1997, the BLM Idaho State Director approved the Idaho *Standards for Rangeland Health and Guidelines for Livestock Grazing* (BLM 1997). These standards and guidelines are intended to provide a clear statement of agency policy and direction for those who use public lands for livestock grazing and who are responsible for their management and accountable for their conditions. The process by which standards and guidelines for grazing administration are implemented is outlined in 43 CFR 4180.2. In Idaho,

the BLM assesses allotments to ensure that livestock grazing use is compatible with meeting standards for rangeland health in eight areas: watersheds, riparian areas and wetlands, stream channel/floodplains, native plant communities, seedings, exotic plant communities other than seedings, water quality, and threatened and endangered plants and animals.

#### 3.4.1.2 Social and Economic Background

BLM management of recreation and forage for livestock grazing generates employment and income in the surrounding communities and counties, and generates revenue that is returned to the federal treasury or is used to fund additional activities on the ground to accomplish land management objectives. Economic effects are examined in terms of employment and income generated from the various alternatives. Social effects are examined in terms of amenity and social values.

Bighorn sheep-associated recreation, including wildlife viewing and hunting, contributes to the economy and river-related public enjoyment of the Main Salmon River and Little Salmon River canyons. For grazing use, adjustments or curtailment of domestic sheep grazing on BLM allotments would impact residents with regional connections unique to the sheep industry in revenue and the traditions of livestock operations.

Multiple statutes, regulations, and executive orders identify the general requirement for the application of economic and social evaluation in support of BLM planning and decision making. These include, but are not limited to, the Multiple-Use Sustained Yield Act of 1960 (74 Stat. 215: 16 USC 528-531), the NEPA (83 Stat. 852; 42 USC 4321, 4331-4335, 4341-4347), and the FLPMA. In addition, the preparation of NEPA documents is guided by CEQ regulations for implementing the NEPA [40 CFR 1500-1508], which requires that consequences to the human environment be analyzed and disclosed. The extent to which these environmental factors are analyzed and discussed is related, in part, to the nature of public comments received during scoping. As a result of these comments, economic impacts and non-market and social values are considered in this evaluation.

Many of the costs and benefits associated with federal management are not quantifiable in financial terms (e.g., the benefit to wildlife from habitat improvement from a project). These costs and benefits are described qualitatively in the *Non-market and Social Values* sections of this document. Title 40 CFR 1502.23 indicates the following:

> For the purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are qualitative considerations.

In addition, Executive Order 12898 (Environmental Justice) issued in 1994 requires federal agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations; as well as directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife.

### 3.4.2 Existing Conditions

#### 3.4.2.1 Livestock Grazing Existing Conditions

The CFO previously authorized domestic sheep grazing on four allotments (see Map 2 in Appendix D); these are Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek, totaling 19,405 acres. Goat grazing has never been a primary use of public lands in the CFO, although there may have been a few goats included in sheep bands from time to time. It is not expected that applications for grazing leases would be received where goats would be the primary grazing animals. Carlson Livestock Company has two BLM grazing leases, one for Marshall Mountain and one for Partridge Creek. Soulen Livestock Company holds one BLM grazing lease that authorizes grazing use on both the Hard Creek and Big Creek allotments. Specific information for these four domestic sheep allotments is summarized in Table 3-4.

**Table 3-4: Allotments with Sheep Grazing**

| Allotment Name | Partridge Creek | Marshall Mountain | Hard Creek | Big Creek |
|---|---|---|---|---|
| BLM Acres | 9,544 | 4,212 | 5,210 | 439 |
| Lessee Name | Carlson Livestock Company | Carlson Livestock Company | Soulen Livestock Company | Soulen Livestock Company |
| Expiration Date | 2/28/2024 | 2/28/2016 | 2/28/2019 | 2/28/2019 |
| Season of Use | 4/11 to 7/15<br>10/15 to 11/30 | 07/5 to 08/04 | 6/15 to 7/15 | 6/1 to 10/30 |
| Number of Sheep* | 833 | 815 | 1,050 | 8,000 |
| Permitted Sheep Use in AUMs on BLM | 431 | 166 | 218 | 81 |
| Current Status (until SEIS is completed) | District Court Temporary Restraining Order 10/14/2009 | Temporary Closure by BLM Decision 3/15/2011 | Lessee has voluntarily taken non-use | Lessee has voluntary taken non-use |
| *Total number of sheep on BLM and adjacent non-BLM lands within the allotment. | | | | |

The total permitted sheep use on these four allotments is 896 AUMs on 19,405 acres of public land. Historically, both lessees held USFS, Idaho Department of Lands, and BLM grazing leases or permits used in conjunction with grazing of private land to provide forage for their domestic sheep through the year.

Carlson Livestock Company historically used their private land in conjunction with lower elevation land in the BLM's Partridge Creek Allotment and USFS land managed by the Nez Perce National Forest on the north side of the Salmon River as fall, winter, and spring use areas. In late spring, the sheep bands moved to higher elevations in the Partridge Creek Allotment and onto other USFS lands managed by the Payette National Forest. The bands used various USFS allotments and the BLM's Marshall Mountain Allotment during the summer and early fall. In the fall, sheep bands were herded down in elevation, making their way back to the wintering areas along the Salmon River.

Soulen Livestock Company moved sheep through the Hard Creek Allotment in early summer on their way to grazing allotments on the Payette National Forest. Sheep may use minor BLM acreage in the Big Creek Allotment during the summer or fall either as longer term pasture for a

sheep band or in a transitory nature, as bands moved through the privately owned lands on the way to allotments managed by the Payette National Forest.

*Partridge Creek Allotment*

The Partridge Creek Allotment is located approximately 7 miles east of Riggins, Idaho (see Map 2 in Appendix D). The 9,544-acre BLM allotment is intermingled with, and used for livestock grazing in conjunction with other land ownership, including: 5,845 acres owned by Carlson Livestock Company; and 640 acres managed by Idaho Department of Lands. Carlson Livestock Company has held a BLM grazing lease on the allotment since 1937, and has used it every year up until 2009.

The BLM completed a Rangeland Health Assessment for the Partridge Creek Allotment during the spring and summer of 2003; and determined that the allotment was meeting all standards and guidelines. Subsequently the BLM issued Carlson Livestock Company a renewed 10-year grazing lease, which expired on February 28, 2014.

In 2007, the Idaho State Governor asked federal and state agencies to work with sheep producers to come up with a strategy to reduce the potential for contact between domestic and bighorn sheep (IDFG ISDA 2007). The 2008 BLM PRMP/FEIS identified a concern for disease transmission between bighorn sheep and domestic sheep on BLM allotments. In an effort to be proactive regarding domestic and bighorn sheep concerns on the Salmon River, the BLM, Carlson Livestock Company, IDFG, Idaho Department of Lands (IDL), and Idaho State Department of Agriculture developed a "Strategy for Reducing Risk of Contact between Bighorn Sheep and Domestic Sheep in the Salmon River Area" (ISDA 2009), which detailed management practices to:

- Reduce the risk of contact between bighorn sheep and domestic sheep
- Increase communication and management coordination with respect to bighorn sheep observations
- Improve management of straying domestic sheep
- Respond to contact incidents between bighorn sheep and domestic sheep

Carlson Livestock Company agreed to implement the strategy on all lands used in and adjacent to the allotment, including private lands. The cooperators signed the strategy in April 2009, and it was implemented during the 2009 grazing season as an interim measure until completion of this SEIS. Carlson Livestock Company and the IDFG also agreed to implement additional best management practices (BMPs) to reduce risk of contact on BLM, Forest Service, and State allotments within the Salmon River drainage (IDFG 2009).

Both Western Watersheds Project (WWP) and the Nez Perce Tribe expressed concern that the strategy would not adequately protect bighorn sheep. WWP litigated the BLM in the Idaho Federal District Court in October 2009 in an attempt to force closure of the Partridge Creek Allotment to sheep grazing. After a hearing the Court found that the strategy was deficient in that it relied on best management practices that were voluntary, could not be enforced by the BLM, and were not backed by any supporting science. The Court then issued a Temporary Restraining Order that required the BLM to temporarily close the Partridge Creek Allotment to domestic

sheep grazing. Later, the BLM Decided to extend the temporary closure until this SEIS was completed. The restraining order only applies to BLM land. Therefore, Carlson Livestock Company may still graze sheep on their private land and on permitted IDL, both of which adjoin the Partridge Creek Allotment.

Although the allotment remains closed to domestic sheep grazing by Court order, on February 28, 2014, the BLM re-issued Carlson Livestock Company a ten year grazing lease under the authority of Public Law 113-76. As required by this law the new lease contains the same terms and conditions as the expiring lease, which authorized both sheep and cattle to graze on the allotment. Due to the Court order, the portion of the lease authorizing domestic sheep grazing may not be implemented. However, cattle grazing on the Partridge Creek Allotment continues to occur.

*Marshall Mountain Allotment*

The Marshall Mountain Allotment is located approximately 20 miles east of Riggins, Idaho, and 2 miles south of the Salmon River (see Map 2 in Appendix D). All 4,212 acres of the allotment are managed by the BLM. Carlson Livestock Company has held a grazing lease on the allotment since 1981 and has used it every year up until 2011, except when taking non-use in 2000–2001. The allotment is a part of the forage base used in conjunction with the BLM's Partridge Creek allotment, the Carlson's IDL grazing permit, and grazing permits for Nez Perce and Payette National Forest allotments.

The BLM completed a Rangeland Health Assessment on the allotment during 2004; and determined that the allotment was meeting all standards and guidelines. Subsequently the BLM renewed Carlson Livestock Company's grazing lease, which expires on February 28, 2016.

The "Strategy for Reducing Risk of Contact between Bighorn Sheep and Domestic Sheep in the Salmon River Area" and BMP agreement described above for the Partridge Creek Allotment also applied to the Marshal Mountain Allotment.

Based on growing concerns regarding bighorn sheep, the BLM contacted Carlson Livestock Company in 2010 to see if they would consider taking voluntary non-use on the Marshall Mountain Allotment until such time that the SEIS was completed. Because Carlson Livestock Company wished to use the allotment for the 2011 grazing season in conjunction with their adjoining USFS allotments, they decided not to take voluntary non-use.

In early 2011, due to growing concerns regarding potential impacts to bighorn sheep, the Cottonwood Field Manager issued a "Notice of Potential Interim Closure of Domestic Sheep Grazing on the Marshall Mountain Allotment." This notice detailed the latest information and science regarding the risk of contact between domestic sheep and wild bighorn sheep, the potential transmission of disease to bighorn, and the fact that this allotment is within bighorn sheep distribution habitat identified by the IDFG. The allotment also provides summer source habitat for bighorn sheep and occurs in close proximity to bighorn sheep CHHRs identified by the Payette National Forest. This notice was sent to stakeholders and requested comments and input about the future of domestic sheep grazing on the BLM's Marshall Mountain Allotment.

On March 15, 2011, after considering the public's comments and the information regarding risks to bighorn sheep, the Cottonwood Field Manager decided to temporarily close the allotment to domestic sheep grazing until the SEIS could be completed. Carlson Livestock Company filed a timely notice of appeal and a petition to stay, which was denied by the United States Department of the Interior Office of Hearings and Appeals on June 2, 2011. Carlson Livestock Company subsequently withdrew its appeal, and the Marshall Mountain Allotment has been temporarily closed to sheep grazing until such time that the SEIS is completed.

*Hard Creek Allotment*

The Hard Creek allotment is located in the Little Salmon River drainage, approximately 15 miles south of Riggins, Idaho, east of Highway 95 (see Map 2 in Appendix D). The Hard Creek Allotment comprises 5,210 acres of public land managed by the BLM. Soulen Livestock Company has held a grazing lease on the allotment since 1975 and used the allotment each year until 2005. They have taken voluntary non-use on the allotment since that time; however, this was not directly related to the bighorn issue. Soulen Livestock Company was having problems with wolf depredation on domestic sheep on the Hard Creek Allotment, so wished to avoid the problem area until the depredation could be addressed. In 2006, information became available to the BLM that highlighted the risk associated with grazing sheep in bighorn sheep habitat; because Soulen Livestock Company was already taking voluntary non-use on the Hard Creek Allotment, the BLM did not issue a temporary closure.

The BLM completed a Rangeland Health Assessment on the allotment during 2004; and determined that the allotment was meeting all standards and guidelines. Subsequently the BLM renewed Soulen Livestock Company's grazing lease, which expires on February 28, 2016.

*Big Creek Allotment*

The Big Creek Allotment is located in the Little Salmon River drainage, approximately 5 miles southeast of New Meadows, Idaho (see Map 2 in Appendix D). The allotment consists of four small isolated tracts of BLM managed land, and is surrounded by private land. The Big Creek Allotment has some unique management challenges due to its intermingled land patterns. Since 1975, Soulen Livestock Company has held a BLM grazing lease on the allotment, and made use of the allotment from 1975 through 2006 and in 2008. The allotment was not utilized in 2007, and Soulen Livestock Company has taken voluntary non-use from 2009 to the present. Due to the amount of private land, usually used in conjunction with the allotment, Soulen Livestock Company can effectively graze on private land without grazing the BLM managed portions. In 2008, new information became available to the BLM that highlighted the risks associated with grazing domestic sheep in bighorn sheep habitat; however, because Soulen Livestock Company was already taking voluntary non-use, the BLM did not issue a temporary closure.

The BLM completed a Rangeland Health Assessment on the allotment during 2008, and found that the allotment was meeting all standards and guidelines. Subsequently the BLM renewed Soulen Livestock Company's grazing lease, which expires on February 28, 2021.

*U.S. Forest Service Sheep Allotments as they Relate to the BLM's Four Sheep Allotments*

The Nez Perce National Forest historically managed and authorized domestic sheep grazing on the Allison-Berg Allotment, whose southern boundary is the Salmon River. The Salmon River also forms the northern boundary of the BLM Partridge Creek Allotment (see Map 9 in Appendix D). WWP litigated the Nez Perce National Forest in District Court regarding grazing authorizations for this allotment due to concerns for disease transmission to bighorn sheep from domestic sheep. On November 13, 2007, the Idaho District Court ordered the Nez Perce National Forest not to permit domestic sheep grazing on the allotment. Closing the Allison-Berg Allotment removed access to grazing lands that historically provided winter and spring grazing for Carlson Livestock Company. The closure of this allotment necessitated a change in the number of domestic sheep that could be wintered on native range in proximity to Carlson Livestock Company's base of operation near Riggins. Consequently, Carlson Livestock had to find winter feed outside the area.

In July 2010, the Payette National Forest completed a Final SEIS and ROD to amend the Payette National Forest Plan in order to maintain the habitat necessary to support viable populations of bighorn sheep. The ROD implemented a phased closure of a number of sheep allotments from 2010 to 2013. The USFS allotment closures impacted the year-round sheep operations of both Soulen Livestock Company and Carlson Livestock Company.

The July 2010 Payette National Forest ROD determined that Soulen Livestock Company could graze sheep on three USFS allotments in 2011: Grassy Mountain, Vance Creek, and the northeast 75 percent of Hershey Lava – see Map 10. Beginning in 2012 and in subsequent years, Soulen Livestock Company would no longer be authorized to graze sheep on these three allotments. In addition, the ROD determined that starting in 2011, Carlson Livestock Company, would no longer be authorized to graze sheep on the three USFS allotments for which they held permits: Marshall Mountain, French Creek, and the western 75 percent of Bear Pete – see Map 10. Beginning in 2012 and in subsequent years, Carlson Livestock Company would not be authorized to graze any sheep on the remainder of the Bear Pete allotment.

As a result, domestic sheep grazing was no longer authorized on 169,870 acres in seven USFS allotments. Ninety percent of the federal lands that had been utilized for domestic sheep forage by Carlson Livestock Company and Soulen Livestock Company along historic sheep driveways was no longer available for that purpose. BLM's Partridge Creek, Marshall Mountain, and Hard Creek Allotments account for the remaining ten percent of federal acreage along these driveways. The USFS lands had provided forage and trailing routes which allowed movement of domestic sheep bands from private lands to summer forage and back during the season. Soulen Livestock Company no longer uses the driveway on the east side of the Hard Creek Allotment because the USFS allotments it accessed are no longer available for domestic sheep use. As a result of the closures, lessees made changes to their domestic sheep operations. Carlson Livestock Company sold their sheep bands. Thus, closure of these USFS allotments changed the potential role of adjacent BLM allotments in domestic sheep operations.

USFS allotments near the BLM's Big Creek Allotment remain available for domestic sheep grazing. Therefore, decisions about domestic sheep grazing on USFS lands did not influence the role of the Big Creek Allotment in the lessee's operation.

### 3.4.2.2 Social and Economic Existing Conditions

Certain defining features of every area influence and shape the nature of local economic and social activity. Among these are population characteristics, the presence of or proximity to large cities or regional population centers, types of longstanding industries such as agriculture and forestry, area racial and cultural characteristics, predominant land and water features, and unique area amenities. The CFO operates as a steward of many of these area resources and opportunities, thus playing a principal role in the community. This discussion gives further insight as to the character and extent of these community connections as they relate to the proposed action and alternatives.

*Affected Area*

The CFO lies within Latah, Clearwater, Nez Perce, Lewis, Idaho, and Adams counties of north-central Idaho. Social and economic characteristics of this area are reported in the Cottonwood PRMP/FEIS (Section 3.5.3). This assessment focuses specifically on the BLM's future management of domestic sheep grazing on allotments in Idaho and Adams counties. In addition, Washington County is included in the impact area due to economic connections between operators on the CFO allotments and the economy in Washington County. The area social and economic characteristics are dependent on the extent of the area examined, thus area information is presented for the potentially affected counties and smaller communities within Idaho and Adams counties, respectively: Riggins Census County Division (CCD) and New Meadows CCD (Figure 3-3).

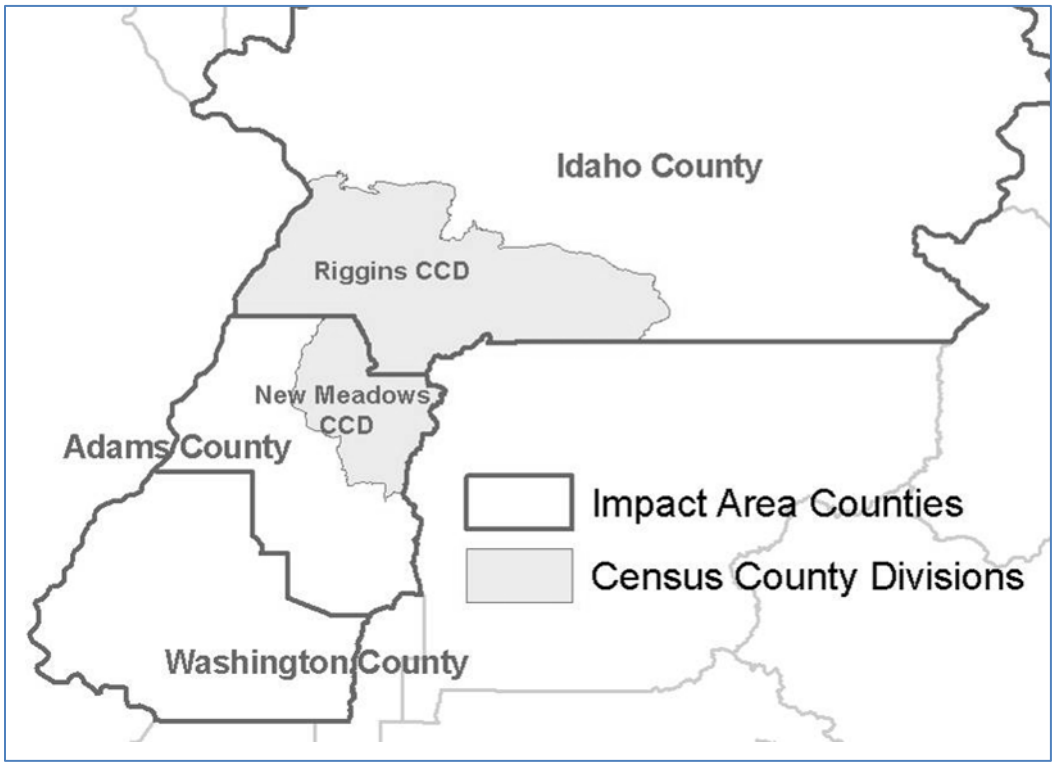


**Figure 3-3: Impact Area Counties and Component Census County Divisions**

*Population and Demographic Change*

From 2000 to 2010, the population of the three-county impact area grew from 28,964 to 29,994, an increase of 5 percent (Table 3-5). However, most of this growth was associated with Adams County. While Adams County and Idaho County grew by 13 and 3 percent, respectively, Riggins CCD decreased by 18 percent. The growth seen in the three-county area was less than the national growth rate and the State of Idaho (8 and 18 percent, respectively) (U.S. Department of Commerce, Census Bureau 2012).

**Table 3-5: Population Change**

| Assessment Area | Population 2010 | Population 2000 | Population Change (2000-2010) | Population Percent Change (2000-2010) |
|---|---|---|---|---|
| United States | 303,965,272 | 281,421,906 | 22,543,366 | 8 |
| Impact Area | 29,994 | 28,964 | 1,030 | 4 |
| State of Idaho* | 1,526,797 | 1,293,953 | 232,844 | 18 |
| Adams County* | 3,942 | 3,476 | 466 | 13 |
| New Meadows CCD | 1,441 | 1,298 | 143 | 11 |
| Idaho County | 15,947 | 15,511 | 436 | 3 |
| Riggins CCD | 1,144 | 1,397 | (253) | -18 |
| Washington County[1] | 10,105 | 9,977 | 128 | 1 |

[1]impact area

Identifying concentrations of minority and ethnic group populations are required in order to evaluate environmental justice. Recent data from the annual American Community Survey for 2006–2010 indicate that counties in the impact area contain shares of several racial and ethnic groups that are greater than shares in the in the state[6] (U.S. Department of Commerce, Census Bureau 2012). For instance, the percentage of those identifying themselves as Native American in Idaho County and Adams County was greater than the total for the state of Idaho (Table 3-6).

**Table 3-6: Racial and Hispanic Composition of 2010 Population (in percentages)**

| Location | White Alone | Black or African American Alone | American Indian and Alaska Native Alone | Asian Alone | Native Hawaiian and Other Pacific Islander Alone | Some other race alone | Two or more races | His-panic Origin |
|---|---|---|---|---|---|---|---|---|
| United States | 74.0 | 12.5 | 0.8 | 4.7 | 0.2 | 5.5 | 2.4 | 15.7 |
| Impact Area | 92.6 | 0.1 | 2.2 | 0.5 | 0.1 | 1.8 | 2.7 | 6.6 |
| State of Idaho | 92.2 | 0.6 | 1.2 | 1.2 | 0.1 | 2.2 | 2.4 | 10.6 |
| Adams County | 91.2 | 0.1 | 2.8 | 0.4 | 0.6 | 0.1 | 4.8 | 0.9 |
| New Meadows CCD | 91.2 | 0.1 | 2.5 | 1.2 | 0.4 | 0.1 | 4.4 | 0.3 |
| Idaho County | 94.1 | 0.1 | 2.6 | 0.1 | 0.0 | 0.6 | 2.5 | 2.4 |
| Riggins CCD | 96.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 3.9 | 2.5 |

[6]Race and ethnicity are separated since Hispanics can be of any race.

| Table 3-6: Racial and Hispanic Composition of 2010 Population (in percentages) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Location** | **White Alone** | **Black or African American Alone** | **American Indian and Alaska Native Alone** | **Asian Alone** | **Native Hawaiian and Other Pacific Islander Alone** | **Some other race alone** | **Two or more races** | **His-panic Origin** |
| Washington County | 90.6 | 0.2 | 1.4 | 1.1 | 0.0 | 4.5 | 2.1 | 1.3 |

*Economic Specialization and Employment*

Employment within impact area counties and the state are distributed among industry sectors (see Figure 3-4) (IMPLAN 2010). Identification of employment specialization within the three impact area counties provides a frame of reference for impacts under the alternatives. Specialization is examined using the ratio of the percent employment in each industry in the region of interest (impact area counties) to the percent of employment in that industry for a larger reference region (Idaho). For a given industry, when the percent employment in the analysis region is greater than in the reference region, local employment specialization exists in that industry (USFS 1998). Of particular interest are industries where specialization occurs within industries related to sheep grazing and recreation. The subsector with domestic sheep grazing represents agricultural employment in animal production, except cattle, poultry, and eggs, and represents 0.8 percent of impact area employment. The recreation-related sectors represent portions of larger sectors specifically related to recreation (Marcouiller and Xia 2008).

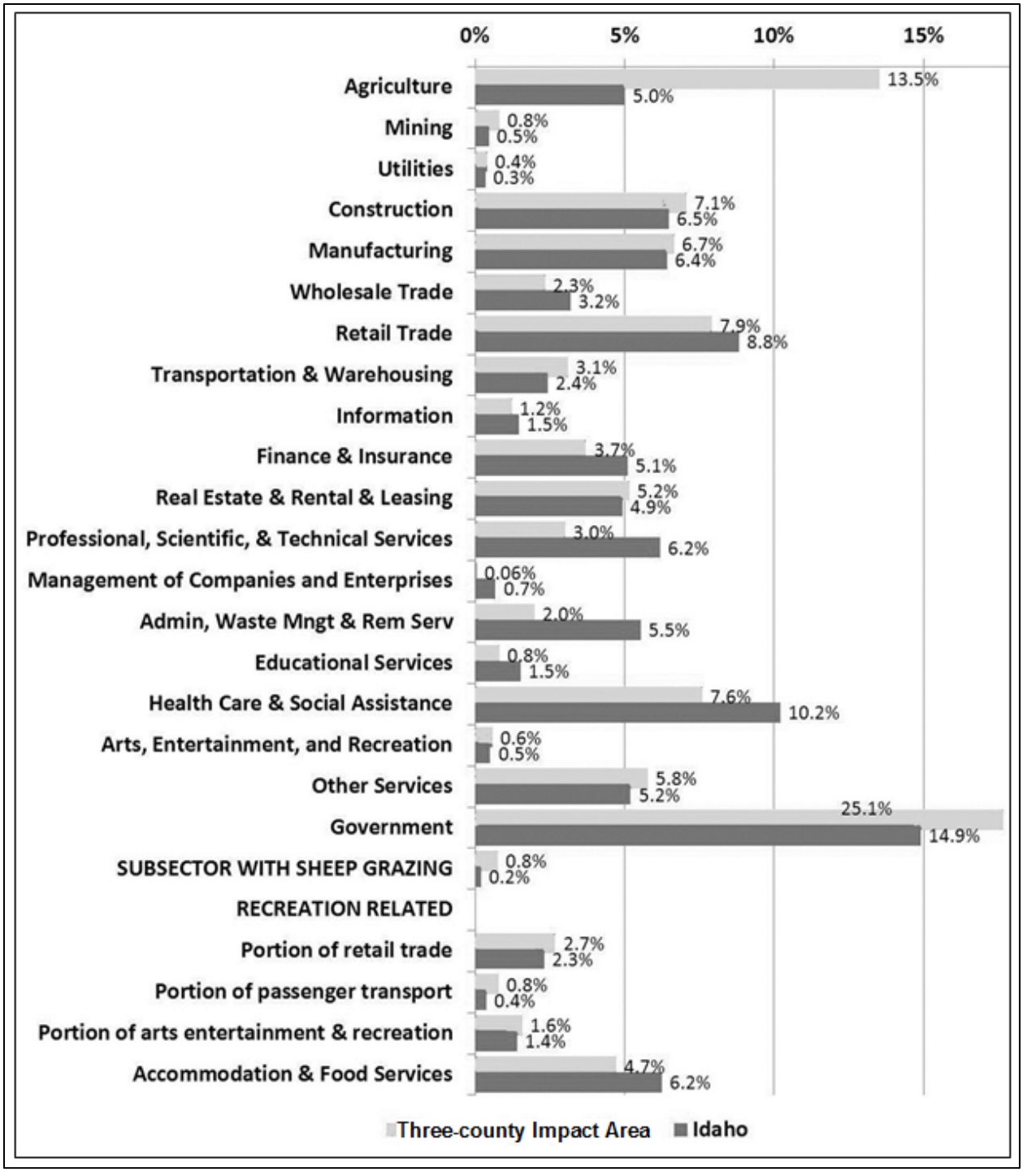


**Figure 3-4: Impact Area Employment Distribution (IMPLAN 2010)**

Using this criterion in conjunction with 2010 data, impact area counties can be characterized as most specialized with respect to the agriculture, government, and the transportation and warehousing sectors (shares of total employment in these sectors are respectively, 2.7, 1.7 and 1.2 percent greater than shares in the state) (IMPLAN 2010). Contributions from grazing and recreation on the CFO represent only a portion of the economic activity reflected in industry sectors (IMPLAN 2010).

Between 1998 and 2009 total employment in the three-county impact area has increased from 5,236 to 5,408 (down from 6,518 jobs in 2006). Much of this growth is attributable to employment in the services-related sectors (U.S. Department of Commerce, Census Bureau 2011). Services-related sectors consist of utilities; wholesale trade; retail trade; transportation and warehousing; information; finance and insurance; real estate and rental and leasing; professional, scientific, and technical; management of companies and enterprises; administrative and support services; educational services; health care and social assistance; arts, entertainment, and recreation; accommodation and food services; and other services. Non-services related sectors consist of mining, construction, manufacturing, agriculture, forestry, fishing, and hunting (EPS-HDT 2012).

From 1998 to 2009, employment in services-related sectors increased from 70.1 percent to 73.4 percent, while employment in the non-services-related sectors decreased from 29.9 percent to 26.6 percent (U.S. Department of Commerce, Census Bureau 2011). Thus, the services-related sectors, historically important to the area's economy, have increased in importance.

*Economic Well-being and Poverty*

In general, wages for service-related jobs do not pay as much as non-service jobs (Figure 3-5). In 2010, within the three-county impact area, the services and non-services-related sectors paid average annual wages of $26,285 and $30,554, respectively (U.S. Department of Labor 2011). Thus, increases in employment in sectors associated with lower wages alongside decreases in sectors associated with higher wages could indicate a decrease in area economic well-being. However, it is not clear whether decreases in economic well-being have resulted from increases in services-related sector employment, since higher labor force participation in the services-related sectors by groups such as women, minorities, and others taking a second job in the services-related sectors could increase the overall importance of certain sectors over others. In addition, population and employment changes are related to natural amenities often provided by public lands (Knapp and Graves 1989; Clark and Hunter 1992; Treyz et al. 1993; Mueser and Graves 1995; McGranahan 1999; Lewis et al. 2002). For instance, people might move to an area to take a services-related sector job despite the lower wage, because of the unique natural and cultural amenities. The CFO operates as a steward of many of these natural amenities and consequently supports a portion of area population and employment growth.

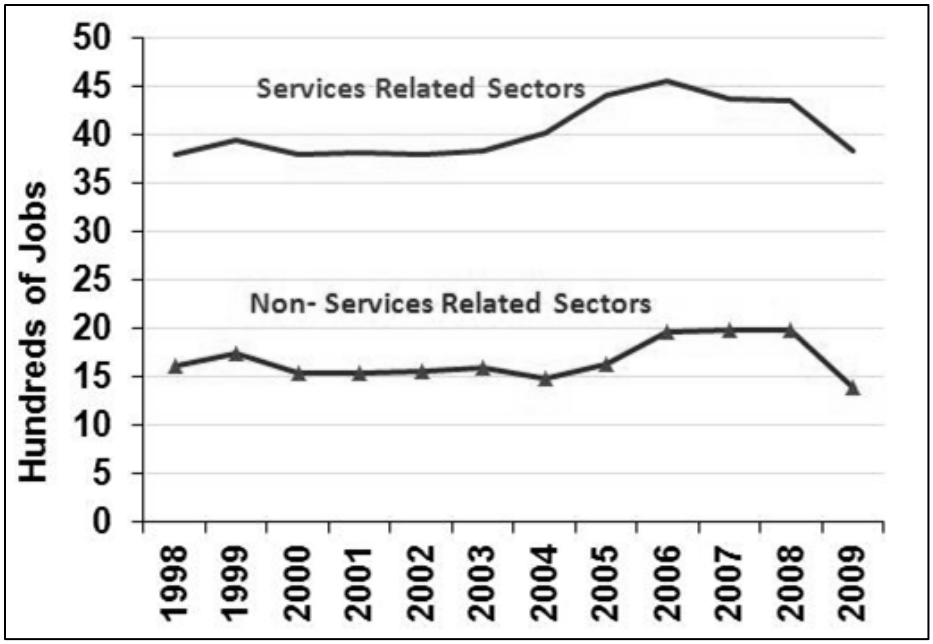


**Figure 3-5:** **Services and Non-services Employment History** (U.S. Department of Commerce, Census Bureau 2011) [7]

Total personal income (TPI) and per capita personal income (PCPI) are useful measures of economic well-being. From 1970 to 2010, annual TPI in the three-county impact area increased from $441,246 to $858,558, and annual PCPI increased from $18,741 to $28,185 (all measures adjusted for inflation to 2011 dollars). This translates to a TPI increase of 95 percent and a PCPI increase of 50 percent over this time period (U.S. Department of Commerce, Bureau of Economic Analysis 2011). While PCPI is a useful measure of economic well-being, it should be examined alongside changes in real earnings per job. Since PCPI includes income from 401(k) plans, as well as other non-labor income sources like transfer payments, dividends, and rent, it is possible for per capita income to rise, even if the average wage per job declines over time. While PCPI rose 50 percent between 1970 and 2010, average earnings per job fell 18 percent (from $35,553 to $28,986; values adjusted for inflation to 2011 dollars) (U.S. Department of Commerce, Bureau of Economic Analysis 2011). Thus while PCPI bounced back after job loss in the early 1980s, real earnings per job decreased.

From 1991 to 2007, average annual unemployment rates in the three-county impact area fell with national and state levels, from 12.1 to 4.7 percent. Since 2007, unemployment has continued to follow state and national trends and has risen to 11.7 percent in 2011 (U.S. Department of Labor 2012). New jobs created in an area are filled from two principal sources: local unemployment and in-migration. If unemployment remains high, new jobs are likely to be filled by local area residents; however, if unemployment falls, new jobs could be filled more often by new area residents.

[7] The numbers are not directly comparable to the IMPLAN numbers in Figure 3-4 since IMPLAN data include government, farm and proprietor employment in addition to wage and salary employment. The IMPLAN data also includes estimates for non-disclosures that similarly include farm and proprietor employment in addition to wage and salary employment.

Estimates of the share of people living under the poverty level in the New Meadows and Riggins CCDs (16 and 23 percent, respectively) were greater than their respective counties (12 percent in Adams County and 19 percent in Idaho County) and the state of Idaho (14 percent) (U.S. Department of Commerce, Census Bureau 2012).

*Components of Personal Income*

Further examination of personal income provides insight to the area economy and its connection to the CFO-managed lands and resources. There are three major sources of personal income: (1) labor earnings or income from the workplace, (2) investment income, or income received by individuals in the form of rent, dividends, or interest earnings, and (3) transfer payment income or income received as Social Security, retirement and disability, or Medicare and Medicaid.

Non-labor earnings were slightly greater than labor earnings in the three-county impact area, accounting for 50.2 percent of all income in 2010 (labor earnings accounted for 49.8 percent) (U.S. Department of Commerce, Bureau of Economic Analysis 2011). The government and agriculture sectors were the largest components of labor income in 2010 in the three-county impact area, containing 25.1 and 13.5 percent of total labor income, respectively (IMPLAN 2010). TPI from labor earnings has decreased from 1970 to 2010 (from 73.5 to 49.8 percent) while the share of non-labor income has risen (from 26.5 to 50.2 percent). As a share of TPI, investment income and transfer payments rose from 15.6 to 22.7 and 10.8 to 27.5 percent, respectively, over this 40-year time period (U.S. Department of Commerce, Bureau of Economic Analysis 2011).

These patterns reflect the importance of the aging population, which is more likely to have investment earnings than younger adults are. As the population of the area continues to age, the share of income from these non-labor sources should continue to rise as long as residents remain in the area after retirement or new retirees move in. As noted above, the development of rural recreation and retirement-destination areas are related to natural amenities often provided by public lands. The CFO operates as a steward of many of these natural amenities and consequently supports a portion of non-labor income.

*Recreational Use*

The habitat of the Salmon and Hells Canyon bighorn sheep herds includes public lands in the Lower Salmon River Special Management Recreation Area (SRMA), for which the CFO manages to provide structured recreational opportunities (i.e., activity, experience, and benefit opportunities). The Lower Salmon River SRMA encompasses 6,899 acres of the Salmon River from the Vinegar Creek (river mile 112.5) to the Hammer Creek (river mile 52.5) recreation sites. The confluence with the Little Salmon River in Riggins is at river mile 87.5. The Middle Salmon River Canyon is a Watchable Wildlife Area that includes 80 miles of the Salmon River east of Riggins, where Rocky Mountain bighorn sheep are often seen. A Special Recreation Permit (SRP) is required for commercial boating use of the Salmon River. No guides are licensed to hunt bighorn sheep in habitat within the Lower Salmon River SRMA, so no commercial permits are available or would be affected by any of the alternatives.

Wildlife-related recreation is important to Idaho's economy and culture. The IDFG (2010) identified that many people who have no interest in hunting bighorn sheep, yet are very interested in learning more about them and observing bighorn sheep in the wild. The outdoor recreation industry capitalized on this interest. For example, river rafting and jet boat touring companies frequently use the opportunity to view bighorn sheep to promote their trips. Bighorn sheep are among Idaho's most treasured wildlife species and there is widespread fascination with this majestic animal. Approximately, 0.75 million people spent 263 million dollars while participating in wildlife viewing in Idaho in 2006 (IDFG 2010).

The federal Watchable Wildlife Program is a cooperative, nationwide effort among 13 organizations, including the BLM that fosters the conservation of wildlife and wildlife habitats by:

- Providing enhanced opportunities for the public to enjoy wildlife
- Promoting learning about wildlife and habitat needs
- Contributing to local economies
- Enhancing active public support for resource conservation

The Middle Salmon River Canyon is one of four Watchable Wildlife Areas in the CFO. It includes 80 miles of the Salmon River, where Rocky Mountain bighorn sheep are often seen. The community of Riggins benefits from river-related recreation upstream and downstream of the Little Salmon confluence.

Wildlife and outdoor enthusiasts, hunters, photographers, and the general public value the opportunity to view and hunt bighorn sheep. Although there are no specific estimates for bighorn sheep, consumptive and non-consumptive wildlife activities are an important contributor to the economy in Idaho (IDFG 2010). Estimates for annual hunting and wildlife viewing participation in Idaho were 187,000 and 754,000 individuals in 2006 and resulted in gross expenditures of $259.7 million and $265.4 million, respectively (USFWS 2007). Within the CFO, recreational opportunities depend in part on bighorn sheep for hunting and wildlife viewing. For example, recreationists enjoy opportunities for river-related wildlife viewing on the Main Salmon and Little Salmon River canyons.

*Non-market and Social Values*

The value of resource goods traded in a market can be obtained from information on the quantity sold and market price; however, markets do not exist for some resources, such as recreational opportunities and environmental services. Measuring their value is important, since without estimates, these resources may be implicitly undervalued and decisions regarding their use may not accurately reflect their true value to society. Because these recreational and environmental values are not traded in markets, they can be characterized as non-market values.

Non-market values can be broken down into two categories, use and non-use values. The use value of a non-market good is the value to society from the direct use of the asset; within the vicinity of the planning area, this occurs through activities such as recreational fishing, hunting, and bird watching. The use of non-market goods often requires consumption of associated market goods, such as lodging, gas, and equipment.

Non-use values of a non-market good reflect the value of an asset beyond any use. These can be described as existence, option, and bequest values. Existence value is the amount society is willing to pay to guarantee that an asset simply exists. An existence value of BLM land within the planning area might be the value of knowing that sustainable populations of bighorn sheep exist on BLM land. Other non-use values are thought to originate in society's willingness to pay to preserve the option for future use; these non-use values are referred to as option and bequest values. Option values exist for something that has not yet been discovered, such as the future value of a plant as medicine, while bequest values apply to the value of satisfaction from preserving for future generations. In this case, examples include continued existence of future sustainable bighorn sheep populations or preserving sustainable future grazing traditions.

Non-market use and non-use values can be distinguished by the methods used to estimate them. Use values are often estimated using revealed preference methods or stated preference methods (willingness to pay) while non-use values can only be estimated using hypothetical methods. While use and non-use values exist for the planning area, evaluation is not always feasible during the planning process. However, this does not preclude their consideration in the planning process.

The sale and price of resident and non-resident bighorn sheep tags, including special auction and lottery tags (tags sold by authorized nonprofit organizations to enhance revenue that may be generated), can be attributed directly to bighorn sheep hunting opportunities and thus represent a portion of value attributable to bighorn sheep hunting opportunities. Bighorn sheep tag sales for the 2009 season included 85 controlled hunt permits/tags, 1 auction tag, and 1 lottery tag. Resident tags sell for $166.75 and non-resident tags for $2,101.75. Eight non-resident and 77 resident tags were allocated in 2009. The auction tag sold for $120,000 in 2009 and has averaged $82,450 per year over the past 10 years. It should be noted that non-market values associated with hunting are not considered. The IDFG cites information in a 2010 report from a Wyoming willingness to pay study (O'Laughlin and Cook 2010), which estimated that one typical bighorn sheep unit with five tags was worth $482,100 in 2008 dollars (IDFG 2010). Using the O'Laughlin and Cook estimate and scaling up to include all bighorn sheep hunting tags in Idaho indicates the non-market economic value of tags statewide was more than $40 million dollars in 2009. Non-market values associated with other bighorn sheep-related recreation opportunities are not available; however, they do exist and are discussed qualitatively here and in other parts of the SEIS. Approximately 750,000 people spent 263 million dollars while participating in wildlife viewing in Idaho in 2006 (IDFG 2010). Bighorn sheep values held by area tribes can also be characterized as non-market values (see Section 3.3.2 of this SEIS).

Sheep grazing on the CFO not only plays an important economic role, it also plays an important social role, as area residents identify with the tradition, land use, and history of livestock operations. A community characteristic of note is the intimate culture that surrounds the sheep industry attributable to shared values such as hard work, tradition, and a love for the animals and the land. These traditions are emphasized and cultivated in area events such as county fairs, where 4-H and Future Farmers of America programs contribute to youth education and a sense of community identity. In Cornelius Brosnan's *History of the State of Idaho*, he states that, "Idaho has become one of the greatest wool-producing States, but has long been noted for its mutton" (Brosnan 1918). Given these cultural and social connections, connections to quality of life related to sheep grazing in the affected area are examined under the alternatives.

As noted above, non-market and social values are not valued monetarily but rather discussed qualitatively. Not having monetary value assigned to these values does not lessen their importance in the decision-making process. Helpful inferences can still be made from the probability of herd extirpation and acres of protected bighorn sheep habitat available for domestic sheep grazing under the alternatives. These two factors allow the determination of how the alternatives potentially degrade, maintain, or enhance non-market values associated with affected bighorn sheep.

*Economic Aspects of Livestock Grazing*

The area affected by domestic sheep grazing use of CFO allotments includes the portions of the intermingled public and privately owned lands in Idaho and Adams counties, and extends to operations in Washington County and the Southwest Agricultural District in Idaho.

Since Cornelius Brosnan's 1918 statement regarding Idaho's notable stature as "one of the greatest wool-producing States," sheep and lamb inventory within the state has declined. According to the 2011 Idaho Agricultural Statistics, sheep and lamb inventory was 235,000 head at the end of 2011; however, this figure is up 25,000 from the record low of 210,000 a year earlier (the recorded high is 2,470,000 in 1920). Gross income from sheep and lamb production was $23,256,000 in 2010. The total number of sheep and lambs marketed was 178,000, yielding an average price per animal sold of $130.65. The value of wool production in Idaho is estimated at $2,444,000 in 2010 (see Table 3-7) (Idaho State Department of Agriculture. 2011).

**Table 3-7: Sheep and Lamb Inventory and Estimated Annual Forage Requirement**

| Region | Sheep/Lambs (number of animals) | Annual Forage Requirement (AUMs) |
|---|---|---|
| Adams County | 875 | 2,100 |
| Idaho County | 2,500 | 6,000 |
| **Counties Total** | **3,375** | **8,100** |
| **Idaho Total** | **235,000** | **564,000** |

According to state data, on January 1, 2012, there were 2,500 sheep and lambs in Idaho County, but no data was reported for Adams County. Long-term state data for Adams County indicate that an average of 875 sheep and lambs has existed annually from 1986 to 2012 (USDA 2012).

Due to an inability to project actual use as it relates to drought, financial limitations on operators, and market conditions, the examination of current contributions from CFO allotments examines the allocations for livestock grazing rather than actual use. Therefore, contributions represent the maximum possible contributions from CFO allotments if all allocated grazing were to occur on allotments.

The total amount of forage currently leased on the four allotments is 896 AUMs. Forage needed to accommodate annual average inventory in Adams County and 2012 inventory in Idaho County is estimated at 8,100 AUMs. Therefore, forage provided by the four allotments affected account for approximately 11 percent of the forage needed for current sheep inventory in Adams and Idaho counties.

While not the entire source of forage used by the lessees of the four allotments, forage provided by the CFO provides an important source of forage that complements additional sources during other parts of the year. Estimating the contribution of livestock grazing on the impact area using only BLM AUMs may underestimate the actual importance of the BLM as a forage resource, if BLM AUMs are part of an overall grazing system in which a change in BLM grazing affects the optimal use of other non-BLM forage resources. A previous study by Alevy and others (2007) in Elko County, Nevada estimated that one public land AUM supports 2.21 AUMs at the ranch level. Therefore, the 896 AUMs supported by the four allotments may support a total of 1,980 AUMs on BLM and other sources of forage. Thus, total forage potentially provided from a ranch production perspective could account for as much as 24.4 percent of the forage needed for sheep inventory in Adams and Idaho counties.

Sheep industry impacts would extend to allotments on the Payette National Forest in Washington County and industries in southwestern Idaho counties, and are included in this analysis because of regional connections unique to the sheep industry and its social role as area residents identify with the tradition, land use, and history of livestock operations. Recent decisions issued by the Payette National Forest not only affect the sheep industry in the same region as the subject BLM allotments, but also directly affect the same companies that hold leases on the BLM allotments.

# CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

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# CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

## 4.1 INTRODUCTION

Chapter 4 supplements the analysis from the 2008 Cottonwood PRMP/FEIS, and presents the direct, indirect, and cumulative impacts likely to occur with the implementation of each of the alternatives described in Chapter 2. Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place. Indirect impacts also result from implementing an action or alternative, but usually occur at a later time or are removed in distance (40 CFR 1502.16). Cumulative impacts are the incremental effects of the proposed action when added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action (40 CFR 1508.7).

The baseline used for analysis is the existing conditions or situation of the resources as described in Chapter 3. The information presented in this section presents an analysis of the environmental consequences of each alternative on:

- Bighorn Sheep (Section 4.2)
- Native American Tribal Interests and Treaty Rights (Section 4.3)
- Livestock Grazing and Social and Economic Conditions (Section 4.4)

Each resource analysis section begins with an overview, followed by a subsection for the method of analysis, and then by a description of the direct, indirect, and cumulative effects of each alternative.

### 4.1.1 Analytical Assumptions

As stated in Section 1.4, none of the alternatives for this RMP amendment authorize livestock grazing. Although the area, season of use, and AUMS authorized for livestock grazing must be in compliance with the RMP, including the allocations and constraints that result from this amendment, the actual authorization decision would be determined through site-specific analysis for grazing leases for each allotment. In order to analyze the effects of the alternatives, the BLM had to make the following assumptions regarding future authorizations:

- If allotments are unavailable for domestic sheep grazing, the BLM expects operators to seek authorization to graze cattle. The BLM will evaluate such requests on a case-by-case basis, and conduct a site-specific analysis to determine whether and to what extent cattle may be authorized. Some areas or allotments may be unsuitable or otherwise undesirable for cattle grazing for a number of reasons.
- For allotments and AUMS that are available for domestic sheep grazing, the BLM assumes that grazing will occur in accordance with the terms and conditions as identified in the current or the most recent grazing leases, with any additional requirements resulting from the RMP amendment applied. The grazing periods in these leases are based on seasonal accessibility and available forage. Although domestic sheep grazing is not currently occurring on any of the subject allotments, the BLM assumes that use will resume unless prohibited.

For the cumulative effects analysis, the BLM made the following assumptions regarding uncertainties related to domestic sheep and goat grazing on USFS and private lands in the analysis area:

- The USFS Allison-Berg Allotment (see Map 9 in Appendix D), recently closed by the Nez Perce National Forest pending further study, will remain closed indefinitely. While the USFS has not yet determined the permanent status of this allotment, which overlaps with the Main Salmon/South Fork CHHR, the BLM made this assumption based on similarity of the situation to that of USFS allotments closed by the Payette Forest Plan ROD.
- IDL domestic sheep grazing allotments (see Map 9 in Appendix D) will continue to be authorized within the analysis area. There is no indication the IDL has plans to change their current domestic sheep authorizations.
- Domestic sheep and goat grazing on private land that has been reported to, or observed by, the BLM within the past 5 years (see Map 9 in Appendix D) will continue in the future. The BLM is not aware of any formal documentation indicating that private land owners will stop grazing domestic sheep or goats on these lands in the future.

## 4.2 BIGHORN SHEEP

This section supplements the analysis from the 2008 PRMP/FEIS for wildlife and their habitat resources, and focuses on the effects of alternatives on Rocky Mountain bighorn sheep, specifically related to potential disease transmission from domestic sheep to bighorn sheep.

### 4.2.1 Overview

This analysis focuses on local bighorn sheep populations (herds) and habitat that occur within or near the four subject allotments, and includes the Hells Canyon and Salmon River metapopulations. This analysis primarily addresses the risk of contact from a bighorn sheep intersecting a domestic sheep allotment and does not quantify the risk of interspecies disease transmission or population persistence. These populations have varying levels of interconnectivity that provide a mechanism for the spread of disease (Cassirer et al 2013). Only portions of the two different metapopulations occur within the vicinity of the domestic sheep allotments and analysis area (see Map 1 in Appendix D). Traditional population analyses are usually conducted within the context of isolated populations (Hanski 1998); however, a population effects analysis restricted to bighorn sheep impacts resulting from BLM domestic sheep allotments occurring in the analysis area is meaningless unless the dynamics of the metapopulation are also considered. This includes the interconnectivity between local populations and bighorn sheep forays. Consequently, population effects discussions and analysis will extend beyond the borders of BLM domestic sheep allotments because of the potential of bighorn sheep coming into contact with domestic sheep and the potential for disease transmission to local populations occurring within the two metapopulations. The BLM acknowledges that domestic sheep may stray from allotments, use areas during unauthorized periods, and potentially come into contact with bighorn sheep, thus resulting in disease transmission.

Basic components of habitat include space, food, shelter, and water. The focus of this analysis involves the space component of habitat in regard to two species that cannot share the same space due to potential disease transmission.

### 4.2.2 Methods of Analysis

The BLM used outputs derived from the three models previously described (source habitats, CHHR, and risk of contact) to compare alternatives with respect to the risk of contact between domestic sheep and bighorn sheep. The BLM then made estimates for potential bighorn sheep disease outbreaks, based on modeled estimates of bighorn sheep intersecting a domestic sheep allotment. The analysis did not include any specific disease or population modeling for herd persistence. Instead, the BLM used the estimate for potential bighorn sheep disease outbreaks to predict the number of disease outbreaks that would likely occur over a 50-year period, and used this as an indicator of the effect on bighorn sheep population trends.

Disease and population modeling conducted for the Payette SEIS was reviewed and compared with analysis that was completed by the BLM. The BLM also recognized the additional potential for contact and disease transmission resulting from straying domestic sheep.

#### 4.2.2.1 Source Habitat

Winter and summer source habitats are important use areas for bighorn sheep; each of the four BLM grazing allotments has such habitats within their boundaries (see Section 3.2.2.5 and Table 3-2). For this analysis, the BLM identified summer and winter source habitats that would be available for (i.e., unaffected by) domestic sheep grazing under each alternative.

Generally, the closer an allotment is to CHHR and the higher number of acres of bighorn sheep source habitat that an alternative identifies as available for domestic sheep grazing, the more likely that alternative will result in potential interspecies contact. The configuration of source habitats, bighorn sheep use of these habitats, and the geographical proximity of bighorn sheep to domestic sheep allotments are significant factors in evaluating the potential for contact and disease transmission. Overlap of source habitats within domestic sheep allotments and overlap with or close proximity to CHHRs will result in increased potential for contact between species. Increased numbers of contacts will likely increase the potential for disease transmission.

Both summer (May–October) and winter (November–April) bighorn sheep source habitats were evaluated. However, the focus was primarily on summer source habitats since domestic sheep would be present on or near BLM domestic sheep allotments and near bighorn sheep source habitats during this period. The exception was the BLM Partridge Creek allotment, which also contains modeled winter source habitat because domestic sheep season of use overlaps with bighorn sheep winter source habitat periods.

The source habitat model was used to estimate the amount of bighorn sheep summer and winter source habitat that overlaps with areas allocated for domestic sheep grazing for each alternative. The juxtaposition and distances between bighorn sheep summer and winter source habitats, CHHR, and allocated rangelands for domestic sheep are important attributes that influence the probability of contact between the species.

#### 4.2.2.2 Core Herd Home Range and Risk of Contact

Allotment overlap with CHHRs or distances from CHHR are relevant in regard to the probability of contact. The closer an allotment that is available for domestic sheep grazing is to a CHHR, the greater the potential for contact and disease transmission. CHHRs that overlap with an allotment during periods of domestic sheep grazing are predicted to have one or more interspecies contacts per year.

The risk of contact model (CHHR and foray analyses) is perhaps the most critical aspect of the analysis since the consequences of even low levels of interspecies contacts are potentially severe for bighorn sheep. Because the model is based on a large telemetry data set and corroborated with source habitat, it is considered a reliable proxy for how the Hells Canyon and Salmon River metapopulations utilize the landscapes, and can be used to determine the likelihood that bighorn sheep will intersect domestic sheep allotments.

#### 4.2.2.3 Contact Rates Relative to Disease Outbreaks and Local Population Trends

The lower the estimated number of contacts per year, the more likely a bighorn sheep local population will persist. The risk of contact model (USFS 2013) was used to predict annual rates of contact between bighorn sheep and allotments. The risk of contact model does not predict or model potential for straying domestic sheep or goats contacting bighorn sheep. Consequently some level of underestimation of interspecies contact exists and should be considered when comparing and evaluating alternatives and management strategies regarding domestic sheep grazing. Increased rates of interspecies contact is correlated with higher potential for respiratory disease outbreaks.

As described in Chapter 3 (see 3.2.2.5 – *Interpreting Contact Rates Relative to Disease Outbreaks and Bighorn Sheep Population Trends*), Alternatives were compared in regard to predicted potential for disease outbreak and effects on population trends. Because of the uncertainty regarding the probability that contact of a bighorn sheep with an allotment will lead to disease outbreak within a population, modelers ran the disease model with assumptions for a range of values from 0.05 (1 in 20 contacts would result in a disease outbreak) to 1.00 (every contact would result in a disease outbreak). The BLM then used the range of probabilities of disease outbreak to predict the number of outbreaks that would occur over a 50-year period, which is an indicator of the effect on population trends. As stated previously, this analysis will not include any herd specific disease or population modeling from the various alternatives. Rather, analysis was conducted regarding bighorn sheep intersecting an allotment and used to infer potential for interspecies contact and disease transmission.

No specific local population disease modeling was conducted. Disease modeling is complex and the disease model requires consideration of a number of variables, including demographic characteristics of bighorn sheep herds, disease transmission rates resulting from contacts between domestic sheep and bighorn sheep, disease transmission rates resulting from infected bighorn sheep contacting uninfected bighorn sheep, lethality of the diseases, and time of recovery in infected bighorn sheep herds. Some of these variables have a high degree of uncertainty.

Results of the analysis support our current understanding of these bighorn sheep populations, and outputs can be explained based on the understanding of contacts and disease outbreaks resulting from contacts that would likely impact population levels and trends, with inferences made based on contacts per year and the various ranges for probability of disease outbreak.

#### 4.2.2.4 Straying of Domestic Sheep and Domestic Sheep Trailing

The BLM recognizes that straying domestic sheep from sheep bands on grazing allotments or while trailing increases potential contact with and disease transmission to bighorn sheep. However, due to the number of unpredictable variables, it is beyond the scope of this analysis to quantify this additional potential in relation to the alternatives. Overall, the closer an allotment available for domestic sheep grazing is to a local population CHHR, the higher the potential for straying that may result in interspecies contact. This is because domestic sheep grazing in close proximity to occupied bighorn sheep habitats are more likely to contact each other through bighorn sheep forays or a social attraction to each other. Consequently, alternatives that have higher predicted annual interspecies contacts are also at higher risks for domestic sheep straying and contact with bighorn sheep. Therefore, the risk of contact model may underestimate the potential contacts that occur because straying domestic sheep is not accounted for in the model. Interspecies contact rates attributed to straying cannot be accounted for, consequently this document does not adjust modeled contact rates for potential straying. Because potential interspecies contact attributed to straying domestic sheep is not accounted for in the probability of contact model, the proximity of allotment to CHHRs will be considered when comparing or evaluating alternatives.

Known use by bighorn sheep in the Little Salmon Area of Concern is an important analysis consideration as a single case of disease transmission involving a single bighorn sheep can result in dire population wide consequences. As described in Section 3.2.2.5, bighorn sheep and domestic sheep have a gregarious behavior which increases the potential for interspecies contact and disease transmission. During the rut and breeding season (e.g., October and November), bighorn sheep rams would be expected to have longer distance forays in search of ewes. Allotments that only have grazing seasons (current authorized grazing period) during the summer are also at risk from straying domestic sheep during the breeding period, because these unattended domestic sheep may stay on allotments for longer time periods which potentially may extend into breeding periods. Unattended straying domestic sheep may wander into areas occupied by bighorn which also increases potential for interspecies contact during non-breeding and breeding periods.

The BLM has no authorized trailing routes/stock driveways on BLM lands. However, trailing would occur to access portions of an allotment for grazing; across private lands, state lands and USFS lands; and also along county roads. Trailing was considered in developing Risk of Contact data, however, modeling for short duration (e.g., 1-3 days) and small areas resulted in insignificant increases in probability of contact. If trailing occurred within CHHR, it was already accounted for in the Cumulative Effects (i.e., one or more contacts annually) or accounted for in areas where domestic sheep grazing occurred (private lands, state lands, and USFS lands). In addition, some of the larger risks from trailing occur from straying.

### 4.2.3 Effects of Alternatives

#### 4.2.3.1 Effects from Alternative A

Under Alternative A, the No Action alternative, all four allotments, totaling 19,405 acres, would be available for domestic sheep grazing. Thus all bighorn sheep summer or winter source habitats and CHHRs that occur within the allotments would be available for domestic sheep grazing (Table 4-1).

**Table 4-1: Habitats and Core Herd Home Range Available for Domestic Sheep Grazing under Alternative A**

| Source Habitat Available (acres) | | CHHR Available (acres)[1] | |
|---|---|---|---|
| **Summer** | **Winter** | **Summer** | **Winter** |
| 7,249 | 4,706 | 5,127 | 7,533 |

[1]The Partridge Creek allotment is the only allotment that overlaps with CHHRs (summer and winter). The Hard Creek Allotment overlaps with 2,629 acres in the Little Salmon Area of Concern (no established herd or modeled CHHR).

Because of allotment overlap with CHHRs or close proximity to CHHRs, this alternative has the highest likelihood of contact between bighorn sheep and domestic sheep allotments. Increased bighorn sheep contacts with an allotment will result in a potentially higher number of contacts between bighorn sheep and domestic sheep. The majority of the predicted bighorn sheep contact with domestic sheep allotments would occur with the Main Salmon/South Fork local population because overlap with CHHRs exists for this population. The Little Salmon area of concern has no established herd, however, incidental bighorn sheep sightings have occurred in close proximity to the Hard Creek allotment over recent years.

The local bighorn sheep populations in Hells Canyon range from 5.98 miles to 17.45 miles (Table 4-2) from allotments that are available for domestic sheep grazing, resulting in the lower annual predicted interspecies contacts as compared to the Main Salmon/South Fork local population. Nevertheless, this alternative has the highest probability of interspecies contact for the Hells Canyon herds when compared to all other alternatives.

**Table 4-2: Model Results and Predicted Effects on Individual Herds from Alternative A**

| Herd/CHHR | Distance (mi) from Nearest Domestic Sheep Allotment | Predicted Allotment Bighorn Sheep Contacts/Year | Predicted Disease Outbreaks/50-Years[1] |
|---|---|---|---|
| Main Salmon/South Fork | 0.00 | 1.072+[2] | 2.68 – 53.6[2] |
| Upper Hells Canyon | 10.25 | 0.0017 | 0.00425 – 0.085 |
| Myers | 5.98 | 0.0014 | 0.0035 - 0.07 |
| Muir | 15.72 | 0.0031 | 0.0075 – 0.1555 |
| Big Canyon | 17.45 | 0.00241 | 0.006025 – 0.121 |
| **Total** | | **1.0806+** | |
| Little Salmon Area of Concern[3] | 0.00[3] | 0.045 [3] | 0.1125 – 2.25 |

| Table 4-2: Model Results and Predicted Effects on Individual Herds from Alternative A | | | |
|---|---|---|---|
| **Herd/CHHR** | **Distance (mi) from Nearest Domestic Sheep Allotment** | **Predicted Allotment Bighorn Sheep Contacts/Year** | **Predicted Disease Outbreaks/50-Years[1]** |

[1] The range of values modeled include: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00 (see Appendix B – Assumptions for Probability of Disease Outbreak for Alternatives Occurring in a 50-Year Period).
[2]Predicted bighorn sheep contacts with an allotment would be equal to or greater than value shown because allotments that overlap with CHHR may have one or more predicted annual contacts per year.
[3]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that occasionally use habitats that have had past fidelity for use.

The Main Salmon/South Fork predicted allotment contacts are primarily occurring from the Partridge Creek Allotment because of overlap of CHHR and followed by the Marshall Mountain Allotment because of close proximity to CHHR (1.25 miles). These two allotments also have the highest potential for straying domestic sheep to come into contact with bighorn sheep.

Straying of domestic sheep adds an additional risk of contact between the species as well as disease transmission and outbreak; potentially affecting bighorn sheep population trends. Herding domestic sheep in steep and rugged terrain with forest/shrub/grassland habitats increases the potential for straying of domestic sheep. Highest potential for straying and interspecies contact would occur from domestic sheep grazing in the Partridge Creek allotment because of overlap with Main Salmon/South Fork CHHR and close proximity (1.25 miles) of Marshall Mountain allotment to Main Salmon/South Fork CHHR. The Hard Creek allotment occurs in proximity to habitats that have had some apparent bighorn sheep fidelity for use and also near incidental bighorn sheep sightings that have occurred in the past (Little Salmon area of concern).

The BLM sensitive species determination for bighorn sheep from this alternative is "*may impact individuals or habitat and may likely cause trend toward federal listing or reduce viability for the population (Main Salmon/South Fork) or species*". As discussed above this is primarily because of the overlap of the Partridge Creek allotment with CHHR and the close proximity of the Marshall Mountain allotment to CHHR, potential for bighorn sheep forays intersecting allotments, and risk associated with straying domestic sheep. Considering the predicted number of disease outbreaks that could occur in the Main Salmon/South Fork herd over a 50-year period (2.68-5.36), especially if the higher probabilities hold true (more than one disease outbreak per year), implementation of this alternative would likely result in a continued, or even expedited downward population trend for this herd.

Alternative A is rated sixth for effects (highest potential for adverse effects) to bighorn sheep because it has the highest amount of bighorn sheep source habitats and CHHRs available for domestic sheep grazing, highest predicted bighorn sheep contacts with domestic sheep allotments and increased potential for interspecies contact and subsequent impacts to sustaining population levels and desired trends for one local population (Main Salmon/South Fork). The Little Salmon area of concern has risks from estimated probability of interspecies contact and disease outbreak, which is dependent on occasional bighorn sheep use of the area.

### 4.2.3.2 Effects from Alternative B

Under Alternative B, 439 acres in the Big Creek Allotment would be available for domestic sheep grazing. This would include only 1 acre of summer source habitat, no winter source habitat, and no CHHR (Table 4-3). None of the other allotments would be available for domestic sheep grazing.

**Table 4-3: Habitats and Core Herd Home Range Available for Domestic Sheep Grazing under Alternative B**

| Source Habitat Available (acres) | | CHHR Available (acres) | |
|---|---|---|---|
| **Summer** | **Winter** | **Summer** | **Winter** |
| 1 | 0 | 0 | 0 |

A very low or discountable level of interspecies contact is predicted for the Little Salmon River area of concern, and no contacts are predicted for the Main Salmon/South Fork and Hells Canyon local populations (Table 4-4). The nearest area available for domestic sheep grazing (Big Creek Allotment) is 12.96 miles away from the Little Salmon area of concern and 31.8 miles away from the Main Salmon/South Fork local population CHHR. The Hells Canyon local populations range from 26.15 miles to 44.21 miles from the nearest area available for domestic sheep grazing. The Big Creek allotment primarily consists of habitat that does not meet criteria for source habitat and only has one acre of summer source habitat. Consequently bighorn sheep would likely prefer other areas providing more desirable habitats.

**Table 4-4: Model Results and Predicted Effects on Individual Herds from Alternative B**

| Herd/CHHR | Distance (mi) from Nearest Domestic Sheep Allotment | Predicted Allotment Bighorn Sheep Contacts/Year | Probability of Disease Outbreak/50-Years[1] |
|---|---|---|---|
| Main Salmon/South Fork | 32.04 | 0.00 | 0.00 |
| Upper Hells Canyon | 26.15 | 0.00 | 0.00 |
| Myers | 33.83 | 0.00 | 0.00 |
| Muir | 44.21 | 0.00 | 0.00 |
| Big Canyon | 41.85 | 0.00 | 0.00 |
| **Tota1** | | **0.00** | |
| Little Salmon Area of Concern[2] | 12.96 | 0.00002 | 0.00005 – 0.001 |

[1] The range of values modeled include: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00 (see Appendix B – Assumptions for Probability of Disease Outbreak for Alternatives Occurring in a 50-Year Period).

[2]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that occasionally use habitats that have had past fidelity for use.

Since one allotment would be available for domestic sheep grazing, straying of domestic sheep may occur under this alternative. The habitats associated with this allotment are relatively moderate sloped with open grass/shrub and interspersed timbered areas; but, potential for straying does exist. However, distances from CHHRs range from 26.15 miles to 44.21 miles for

Hells Canyon and Salmon River herd CHHRs and 12.96 miles from the Little Salmon area of concern, which would reduce the risk of contact from straying domestic sheep. These interspecies separation buffers are effective for reducing risk of contact within the analysis area.

This alternative would also require that the grazing lease for Big Creek Allotment include the terms and conditions listed in Appendix C and the preparation of a separation response plan. These measures, along with effective separation between areas grazed by domestic sheep and CHHRs would reduce, but not completely eliminate, the potential for contact. Appendix C contains more information about the effectiveness of best management practices specified as terms and conditions.

The BLM sensitive species determination for bighorn sheep under this alternative is "*may impact individuals or habitat but not likely to cause trend toward federal listing or reduce viability for the population or species*". As discussed above this is primarily because that all risks for foraying bighorn sheep or straying domestic sheep cannot be completely eliminated, even if such risks are discountable or very low. This alternative provides effective separation between domestic sheep allotments and CHHRs so that BLM authorized grazing effects would result in very low or discountable risks for inter-species contact and disease transmission to Hells Canyon and Salmon River local populations and the Little Salmon area of concern. Since there would be no predicted disease outbreaks occurring in any of the bighorn herds over a 50-year period, implementation of this alternative would likely contribute toward a sustainable trend for bighorn populations.

Overall, this alternative is rated second for least adverse effects on bighorn sheep in regard to source habitats and CHHRs available for domestic sheep grazing, predicted bighorn sheep contact with domestic sheep allotments, and contribution to a sustainable trend for bighorn sheep populations.

#### 4.2.3.3 Effects from Alternative C

None of the allotments would be available for domestic sheep grazing under Alternative C, Eliminate Domestic Sheep and Goat Grazing; thus there would also be no source habitat or CHHR available for use. There would be no opportunity for straying of domestic sheep from BLM allotments or trailing associated with movement of domestic sheep from or to BLM allotments. Considering only direct and indirect effects from this alternative, there would be no risk of bighorn sheep intersecting a BLM domestic sheep allotment. Overall, this alternative is rated first for least adverse effects (none) to bighorn sheep.

The BLM sensitive species determination for bighorn sheep from this alternative is "*no impact"* to *individuals or habitat*" and the supporting rationale attributed to BLM authorized grazing for this determination is discussed above. Eliminating domestic sheep grazing on the BLM allotments would reduce the potential for disease outbreak in bighorn herds and contribute toward a sustainable trend for bighorn populations.

### 4.2.3.4 Effects from Alternative D

Under Alternative D, Restrict Grazing on Partridge Creek and Hard Creek, 4,651 acres of the Marshall Mountain and Big Creek grazing allotments would be available for domestic sheep grazing. A total of 1,202 acres (Table 4-5) of summer source habitat and no winter source habitat would be available for domestic sheep grazing. No CHHR would be available for domestic sheep grazing since neither allotment overlaps with CHHR.

**Table 4-5: Habitats and Core Herd Home Range Available for Domestic Sheep Grazing under Alternative D**

| Source Habitat Available (acres) | | CHHR Available (acres) | |
|---|---|---|---|
| **Summer** | **Winter** | **Summer** | **Winter** |
| 1,202 | 0 | 0 | 0 |

A relatively high level of contact is predicted for the Main Salmon/South Fork local population due to the close proximity (1.25 miles) of the Marshall Mountain Allotment to CHHR; however, this potential is slightly reduced because the Marshall Mountain Allotment has a use period that is only one month long. A very low level of interspecies contact is predicted for the Little Salmon River area of concern and Hells Canyon local populations (Table 4-6). The nearest area available for domestic sheep grazing (Big Creek Allotment) is 12.96 miles away from the Little Salmon area of concern, while the Hells Canyon local populations (CHHR) range from 20.84 miles to 29.12 miles from the nearest area available for domestic sheep grazing.

**Table 4-6: Model Results and Predicted Effects on Individual Herds from Alternative D**

| Herd/CHHR | Distance (mi) from Nearest Domestic Sheep Allotment | Predicted Allotment Bighorn Sheep Contacts/Year | Probability of Disease Outbreak/50-Years[1] |
|---|---|---|---|
| Main Salmon/South Fork | 1.25 | 0.066 | 0.165 – 3.30 |
| Upper Hells Canyon | 26.15 | 0.00 | 0.00 |
| Myers | 20.84 | 0.00 | 0.00 |
| Muir | 27.72 | 0.00 | 0.00 |
| Big Canyon | 29.12 | 0.00 | 0.00 |
| **Tota1** | | **0.066** | |
| Little Salmon Area of Concern[2] | 12.96 | 0.00004 | 0.0001 – 0.002 |

[1] The range of values modeled include: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00 (see Appendix B – Assumptions for Probability of Disease Outbreak for Alternatives Occurring in a 50-Year Period).

[2]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that occasionally use habitats that have had past fidelity for use.

Straying of domestic sheep may occur under this alternative, adding an additional risk of contact between the species, potentially leading to disease transmission and outbreak and subsequent impacts to sustaining population levels and desired trends for the Main Salmon/South Fork herd.

Herding domestic sheep in steep and rugged terrain with forest/shrub/grassland habitats increases the potential for straying of domestic sheep. Because the Marshall Mountain Allotment is only 1.25 miles from the Main Salmon/South Fork CHHR, there is an increased risk for straying domestic sheep and an increased risk of disease transmission in consideration of the varying assumptions for disease outbreak identified in Appendix C.

A lesser potential risk would occur from the Big Creek Allotment and straying domestic sheep because the Little Salmon area of concern occurs 12.96 miles from the allotment and ranges from 26.15 to 44.21 from all Hells Canyon and Salmon River CHHRs. Overall, very low or discountable risks for inter-species contact and disease transmission is predicted to occur from domestic sheep grazing in the Big Creek allotment and any bighorn sheep use in the Little Salmon area of concern.

The BLM sensitive species determination for bighorn sheep from this alternative is "*may impact individuals or habitat and may likely cause trend toward federal listing or reduce viability for the population (Main Salmon/South Fork herd) or species*". As discussed above this is primarily because of the close proximity of the Marshall Mountain allotment to the Main Salmon/South Fork CHHR, potential for bighorn sheep forays intersecting allotment, and risk associated with straying domestic sheep.

Considering the predicted number of disease outbreaks that could occur in the Main Salmon/South Fork herd over a 50-year period (0.165 – 3.30), if the higher probabilities hold true, implementation of this alternative would likely result in a continued downward population trend for this herd.

Overall, this alternative is rated third-least for bighorn sheep effects in regard to source habitats and CHHRs not available for domestic sheep grazing, predicted bighorn sheep contact with domestic sheep allotments, and population trends attributed to BLM authorized grazing.

### 4.2.3.5 Effects from Alternative E

Under Alternative E, Restrict Grazing on Partridge Creek Only, 9,861 acres of the Marshall Mountain, Hard Creek, and Big Creek allotments would be available for domestic sheep grazing, including 1,973 acres of summer source habitat and 2,629 acres of Little Salmon Area of Concern areas (Table 4-7). Since the Partridge Creek Allotment would not be available, none of the winter source or Main Salmon/South Fork CHHR would be affected.

**Table 4-7: Habitats and Core Herd Home Range Available for Domestic Sheep Grazing under Alternative E**

| Source Habitat Available (acres) | | CHHR Available (acres)[1] | |
|---|---|---|---|
| **Summer** | **Winter** | **Summer** | **Winter** |
| 1,958 | 0 | 0 | 0 |

[1]Hard Creek Allotment overlaps with 2,629 acres in the Little Salmon Area of Concern (no established herd or modeled CHHR).

A relatively high level of bighorn sheep contact (0.072) with the Marshall Mountain allotment is predicted for the Main Salmon/South Fork local population due to the proximity (1.25 miles) of

the allotment to CHHR; however, this is lowered because the use period for this allotment is only 1 month long. A relatively high risk (0.073) of bighorn sheep contact with an allotment is also predicted for the Little Salmon area of concern due to an overlap with areas available for domestic sheep grazing within the Hard Creek allotment. The Hard Creek allotment occurs in proximity to habitats that have had some apparent bighorn sheep fidelity for occasional use that has occurred in the past. A very low level of contact with domestic sheep allotments is predicted from the Hells Canyon local populations, which range from 10.25 to 21.26 miles from the nearest area available for domestic sheep grazing (Table 4-8).

**Table 4-8: Model Results and Predicted Effects on Individual Herds from Alternative E**

| Herd/CHHR | Distance (mi) from Nearest Domestic Sheep Allotment | Predicted Allotment Bighorn Sheep Contacts/Year | Probability of Disease Outbreak/50-Years[1] |
|---|---|---|---|
| Main Salmon/South Fork | 1.25 | 0.072 | 0.165 – 3.30 |
| Upper Hells Canyon | 10.25 | 0.00028 | 0.00 |
| Myers | 11.28 | 0.00002 | 0.00 |
| Muir | 21.26 | 0.000002 | 0.00 |
| Big Canyon | 19.15 | 0.00001 | 0.00 |
| **Tota1** | | **0.072312** | |
| Little Salmon Area of Concern[2] | 0.00 | 0.045 | 0.1125 – 2.025 |

[1] The range of values modeled include: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00 (see Appendix B – Assumptions for Probability of Disease Outbreak for Alternatives Occurring in a 50-Year Period).

[2]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that incidentally use habitats that have had past fidelity for use.

Straying of domestic sheep may occur under Alternative E, adding an additional risk of contact between the species, potentially leading to disease transmission and outbreak and subsequent impacts to sustaining population levels and desired trends. Herding domestic sheep in steep and rugged terrain with forest/shrub/grassland habitats increases the potential for straying of domestic sheep. Because the Marshall Mountain Allotment is only 1.25 miles from the Main Salmon/South Fork CHHR, there is an increased risk for straying domestic sheep and an increased risk of disease transmission.

The Hard Creek allotment overlaps with the Little Salmon area of concern and would have risks associated with straying and interspecies contact. A lesser potential risk would occur from the Big Creek Allotment and straying domestic sheep because the Little Salmon area of concern is the nearest local population and occurs 12.96 miles from the allotment.

The BLM sensitive species determination for bighorn sheep from this alternative is "*may impact individuals or habitat and may likely cause trend toward federal listing or reduce viability for the population (Main Salmon/South Fork herd) or species*". As discussed above this is primarily because of the close proximity of the Marshall Mountain allotment to the Main Salmon/South Fork CHHR, potential for bighorn sheep forays intersecting allotment, and risk associated with straying domestic sheep.

Considering the predicted number of disease outbreaks that could occur in the Main Salmon/South Fork herd over a 50-year period (0.165 – 3.30), if the higher probabilities hold true, implementation of this alternative would likely result in a continued downward population trend for this herd.

Overall, this alternative is rated fifth (least) for adverse effects on bighorn sheep in regard to source habitats and CHHRs not available for domestic sheep grazing, predicted bighorn sheep contact with domestic sheep allotments, and population trends.

#### 4.2.3.6 Effects from Alternative F

Under Alternative F, Restrict Grazing on Partridge Creek and Marshall Mountain, 5,649 acres in the Hard Creek and Big Creek grazing allotments would be available for domestic sheep grazing. This includes a total of 772 acres of summer source habitat and the Hard Creek allotment would overlap with 2,629 acres of the Little Salmon area of concern (Table 4-9). No winter source habitat or summer and winter CHHRs would be affected.

**Table 4-9: Habitats and Core Herd Home Range Available for Domestic Sheep Grazing under Alternative F**

| Source Habitat Available (acres) | | CHHR Available (acres)[1] | |
|---|---|---|---|
| **Summer** | **Winter** | **Summer** | **Winter** |
| 772 | 0 | 0 | 0 |

[1]Hard Creek Allotment overlaps with 2,629 acres in the Little Salmon Area of Concern (no established herd or modeled CHHR).

A relatively high risk (0.045) of bighorn sheep contact with the Hard Creek allotment is predicted for the Little Salmon area of concern due to an overlap with this allotment and areas available for domestic sheep grazing, but a relatively low level of bighorn sheep and allotment contact is predicted for the Main Salmon/South Fork and Hells Canyon local populations. The Hard Creek allotment occurs in proximity to habitats that have had some apparent past bighorn sheep fidelity for use and in proximity to incidental bighorn sheep sightings. The Salmon River/South Fork CHHR is 12.20 miles from the nearest area available for domestic sheep grazing. The Hells Canyon CHHRs range from 10.25 miles to 21.25 miles from the nearest area available for domestic sheep grazing (Table 4-10).

**Table 4-10: Model Results and Predicted Effects on Individual Herds from Alternative F**

| Herd/CHHR | Distance (mi) from Nearest Domestic Sheep Allotment | Predicted Allotment Bighorn Sheep Contacts/Year | Probability of Disease Outbreak/50-Years[1] |
|---|---|---|---|
| Main Salmon/South Fork | 12.20 | 0.006 | 0.015 – 0.300 |
| Upper Hells Canyon | 10.25 | 0.00028 | 0.0007 – 0.014 |
| Myers | 11.28 | 0.00002 | 0.00005 – 0.0001 |
| Muir | 21.25 | 0.000002 | 0.000005 – 0.0001 |
| Big Canyon | 19.15 | 0.00001 | 0.000003 – 0.00005 |
| **Tota1** | | **0.006312** | |

| Table 4-10: Model Results and Predicted Effects on Individual Herds from Alternative F | | | |
|---|---|---|---|
| **Herd/CHHR** | **Distance (mi) from Nearest Domestic Sheep Allotment** | **Predicted Allotment Bighorn Sheep Contacts/Year** | **Probability of Disease Outbreak/50-Years[1]** |
| Little Salmon Area of Concern[2] | 0.00 | 0.045 | 0.1125 – 2.025 |

[1] The range of values modeled include: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00 (see Appendix B – Assumptions for Probability of Disease Outbreak for Alternatives Occurring in a 50-Year Period).

[2]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that incidentally use habitats that have had past fidelity for use.

Straying of domestic sheep may occur under this alternative, adding an additional risk of contact between the species, potentially leading to disease transmission and outbreak and possibly contributing to continued downward population trends. Herding domestic sheep in steep and rugged terrain with forest/shrub/grassland habitats increases the potential for straying of domestic sheep. The Hard Creek allotment overlaps with the Little Salmon area of concern and would have potential for some risk from domestic sheep straying and interspecies contact from the occasional use of the area by bighorn sheep. A lesser potential risk would occur from the Big Creek Allotment and straying domestic sheep because the Little Salmon area of concern occurs 12.96 miles from the allotment and only has occasional use by bighorn sheep. Dependent on bighorn sheep occasional use of the Little Salmon area of concern, potential inter-species contact and disease transmission may range from low to high.

The BLM sensitive species determination for bighorn sheep from this alternative is "*may impact individuals or habitat but not likely to cause trend toward federal listing or reduce viability for the population or species*". As discussed above this is primarily because all risks for foraying bighorn sheep or straying domestic sheep cannot be completely eliminated, even if such risks are discountable or very low. This alternative provides effective separation between domestic sheep allotments and CHHRs so that BLM authorized grazing effects would result in low risks for inter-species contact and disease transmission to Hells Canyon and Salmon River local populations. Dependent on the level of bighorn sheep occasional use of the Little Salmon area of concern varying levels of inter-species risk or contact may occur, primarily from domestic sheep grazing of the Hard Creek allotment. Since there would be practically no predicted disease outbreaks occurring in any of the bighorn herds over a 50-year period, implementation of this alternative would likely contribute toward a sustainable trend for bighorn populations.

Overall, this alternative is rated fourth (least) for adverse effects to bighorn sheep in regard to source habitats and CHHRs not available for domestic sheep grazing, predicted bighorn sheep contact with domestic sheep allotments, and population trends.

### 4.2.3.7 Comparison of Effects from Alternatives

Table 4-11 compares the acres of source habitat and CHHR that is within the grazing allotments that would be available for domestic sheep grazing under each of the alternatives. The potential for contact between species increases with the amount of source habitats and CHHR available for domestic sheep grazing.

| Table 4-11: Source Habitat and Core Herd Home Range Available for Domestic Sheep Grazing by Alternative | | | | | | |
|---|---|---|---|---|---|---|
| **Habitat/Range** | **Alt A** | **Alt B** | **Alt C** | **Alt D** | **Alt E** | **Alt F** |
| Summer Source Available (acres) | 7,249 | 1 | 0 | 1,202 | 1,958 | 772 |
| Winter Source Available (acres) | 4,706 | 0 | 0 | 0 | 0 | 0 |
| Summer CHHR Available (acres) | 5,127 | 0 | 0 | 0 | 0 | 0 |
| Winter CHHR Available (acres) | 7,533 | 0 | 0 | 0 | 0 | 0 |
| Little Salmon Area of Concern Available (acres) | 2,629 | 0 | 0 | 0 | 2,629 | 2,629 |

Table 4-12 compares the distance between herd CHHR and BLM allotments available for domestic sheep grazing under each alternative. A shorter distance indicates a higher potential for contact between species.

| Table 4-12: Distance between Herd Core Herd Home Range, Little Salmon Area of Concern, and BLM Lands Available for Domestic Sheep Grazing by Alternative | | | | | | |
|---|---|---|---|---|---|---|
| | **Distance between CHHR and Available Allotment (miles)** | | | | | |
| **Herd CHHR** | **Alt A** | **Alt B** | **Alt C[2]** | **Alt D** | **Alt E** | **Alt F** |
| Main Salmon/South Fork | 0.0 | 32.04 | N/A | 1.25 | 1.25 | 12.20 |
| Upper Hells Canyon | 10.25 | 26.15 | N/A | 26.15 | 10.25 | 10.25 |
| Myers | 5.98 | 33.83 | N/A | 20.84 | 11.28 | 11.28 |
| Muir | 15.72 | 44.21 | N/A | 27.72 | 21.26 | 21.25 |
| Big Canyon | 17.45 | 41.85 | N/A | 29.12 | 19.15 | 19.15 |
| **Nearest CHHR** | 0.0 | 26.15 | N/A | 1.25 | 1.25 | 11.28 |
| **Little Salmon Area of Concern[1]** | 0.0 | 12.96 | N/A | 12.96 | 0.0 | 0.0 |

[1]Little Salmon Area of Concern has no established bighorn sheep herd or modeled CHHR. The Little Salmon Area of Concern was determined by past incidental bighorn sheep sightings and habitats that have had past fidelity for bighorn sheep use.

[2]Non-Applicable (N/A) - No allotments/BLM lands available for domestic sheep grazing under Alternative C.

Table 4-13 compares the probable contacts per year for each potentially affected herd. Alternative A would have the highest probability of contact (ranked 6), and Alternative C would have the least potential for contact (ranked 1).

| Table 4-13: Comparison of Alternatives Based on Annual Modeled Contacts between Bighorn Sheep and Domestic Sheep Allotments | | | | | | |
|---|---|---|---|---|---|---|
| | **Probable Contacts/Year** | | | | | |
| **Herd/Population** | **Alt A** | **Alt B** | **Alt C** | **Alt D** | **Alt E** | **Alt F** |
| Main Salmon/South Fork | 1.072+[1] | 0.0000 | 0.0000 | 0.066 | 0.072 | 0.006 |
| Little Salmon[2] | 0.045 | 0.00002[2] | 0.0000 | 0.00004[2] | 0.045 | 0.045 |
| Upper Hells Canyon | 0.0017 | 0.0000 | 0.0000 | 0.0000 | 0.00028 | 0.00028 |
| Myers | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.00002 | 0.00002 |
| Muir | 0.0031 | 0.0000 | 0.0000 | 0.0000 | 0.000002 | 0.000002 |
| Big Canyon | 0.00241 | 0.0000 | 0.0000 | 0.0000 | 0.00001 | 0.00001 |
| **Total Modeled Contacts** | **1.1264+** | **0.00002** | **0.0000** | **0.06604** | **0.1173** | **0.0513** |

| Table 4-13: Comparison of Alternatives Based on Annual Modeled Contacts between Bighorn Sheep and Domestic Sheep Allotments | | | | | | |
|---|---|---|---|---|---|---|
| | Probable Contacts/Year | | | | | |
| Herd/Population | Alt A | Alt B | Alt C | Alt D | Alt E | Alt F |
| Ranking of Alternatives for Reducing Contacts | 6 | 2 | 1 | 4 | 5 | 3 |

[1]Predicted bighorn sheep contacts with an allotment would be equal to or greater than value shown because allotments that overlap with CHHR may have one or more predicted annual contacts per year.

[2]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and bighorn sheep that occasionally use habitats that have had past fidelity for use.

### 4.2.4 Cumulative Effects

Domestic sheep grazing occurs on USFS, state, and private lands (see Map 3 and Map 9 in Appendix D) within the vicinity of previously identified CHHRs and the Little Salmon Area of Concern, which comprise the cumulative effects analysis area. As in the direct and indirect effects analysis, the cumulative effects analysis focuses on how likely disease transmission is to occur from domestic sheep allotments to bighorn sheep local populations. It should be noted that if a local population is at risk for disease transmission, other local populations in the metapopulation may experience an increased risk of contracting the disease.

Domestic sheep grazing on lands not controlled by the BLM (e.g., on private, IDL or USFS property) can and often does occur within or in close proximity to bighorn sheep CHHRs or source habitats. This includes grazing by small farm flocks as well as those who graze domestic sheep as a primary source of income. Goats are also used on private lands for the control of invasive weeds in the lower Salmon River and Snake River drainages. These weed-eating goats may graze private lands periodically as needed by the private land owner. Domestic sheep and goat grazing on private land will be a factor in the risk of disease transmission for bighorn sheep populations within the analysis area, regardless of the amount of domestic sheep grazing authorized on any of the four BLM allotments. Domestic sheep or goat grazing on other federal, state, and private lands contribute to varying levels of potential for interspecies contact and disease transmission. The total effects to the two metapopulations are unknown, since the potential risk of contact from lands other than the BLM domestic sheep allotments is not completely known. However, the risk of contact model was run for cumulative effects using the assumptions identified in Section 4.1.1.

The Payette National Forest prior to the recent amendment to its Forest Plan had 100,310 acres of suitable range available for domestic sheep grazing and no acres of protected bighorn sheep summer source habitat. With implementation of the recent amendment a total of 31,592 acres of suitable range is available for domestic sheep grazing and 346,696 acres of bighorn sheep summer source habitat is protected (94%). The Nez Perce – Clearwater National Forest Allison-Berg Allotment contains 13,858 acres of summer CHHR and 14,470 acres of winter CHHR and is currently not available for domestic sheep grazing. The Allison-Berg Allotment also contains 16,660 acres of summer source habitat and 14,366 acres of winter source habitat. By eliminating these areas for domestic sheep use, these recent FS decisions have significantly reduced the potential contact and resulting disease transmission from domestic sheep to bighorn sheep.

Implementation of the Payette FSEIS/ROD (USFS 2010b) resulted in the closure of seven domestic sheep allotments that are adjacent to and in proximity of the BLM Partridge Creek, Marshall Mountain, and Hard Creek allotments (see Map 10 in Appendix D). Still, a substantial number of domestic sheep are grazed in and around the BLM lands at issue on state and private lands. Table 4-14 identifies the BLM modeled contacts per year on state, private, and USFS lands, as well as the cumulative total modeled contacts by alternative. As shown in the table, these domestic sheep pose serious threats to bighorn sheep populations.

**Table 4-14: Modeled Contact Rates between Bighorn Sheep and Domestic Sheep Allotments and Total Cumulative Effects from Adjacent Land Ownerships**

| Herd | Predicted Contacts/Year State/Private | Predicted Contacts/Year USFS | Cumulative Total Contacts/Year by Alternative (BLM, State/Private, and USFS)[1] | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | E | F |
| Main Salmon/South Fork | 1.0+ | 0.0400 | 2.112+ | 1.040+ | 1.040+ | 1.106+ | 1.112+ | 1.046+ |
| Upper Hells Canyon | 0.0100 | 0.0300 | 0.0417 | 0.040 | 0.040 | 0.40 | 0.04028 | 0.04028 |
| Myers | 0.0100 | 0.0000 | 0.0103 | 0.010 | 0.010 | 0.010 | 0.01002 | 0.01002 |
| Muir | 0.0100 | 0.0000 | 0.0131 | 0.010 | 0.010 | 0.010 | 0.010002 | 0.010002 |
| Big Canyon | 0.0000 | 0.0000 | 0.00241 | 0.000 | 0.000 | 0.00001 | 0.00001 | 0.00001 |
| Total Contacts/Year | 1.100+ | 0.0700 | 2.3045 + | 1.100+ | 1.100++ | 1.166+ | 1.172312 + | 1.106312 + |
| Little Salmon[2] | 0.045 | 0.0100 | 0.05504 | 0.055 | 0.05504 | 0.05504 | 0.100 | 0.100 |

[1]Predicted bighorn sheep contacts with an allotment would be equal to or greater than value shown because allotments that overlap with CHHR may have one or more predicted annual contacts per year. "+" = indicates overlap with CHHR (e.g., one or more contacts per year)

[2]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that incidentally use habitats that have had past fidelity for use.

The implications of these additional contacts, particularly from state and private lands, are substantial; primarily for the Main Salmon/South Fork and Little Salmon area of concern. Applying the same inference regarding disease transmission and population trends used in the previous analysis, results in a prediction of a continued downward population trend for the Main Salmon/South Fork local population and Little Salmon area of concern, regardless of the BLM alternative considered. Thus, the largest bighorn sheep population (Main Salmon/South Fork), even under the most favorable alternative (C), would likely continue to have a downward population trend under this cumulative effects scenario because of domestic sheep and goat grazing which may occur on private and State lands. This is because domestic sheep and goat grazing that may occur on private and State lands overlaps with the Main Salmon/South Fork CHHR. The BLM's Alternatives B, D, E, and F would reduce, at varying levels, the potential that domestic sheep grazing on BLM land would contribute to downward bighorn sheep population trends, and Alternative C would eliminate the potential for adverse effects attributable to BLM authorized grazing. The potential also exists for domestic sheep or goat strays from non-BLM lands, which would add to the probability for contact, disease transmission, and continued downward population trends. However, no domestic sheep grazing is presently authorized within the Nez Perce – Clearwater National Forest, and the nearest allotment available for domestic sheep grazing on the Payette National Forest is approximately 14.9 miles from the Main

Salmon/South Fork summer CHHR. The nearest allotment available for domestic sheep grazing on the Payette National Forest from a Hells Canyon herd is approximately 9.5 miles from the Upper Hells Canyon summer CHHR. Therefore, the federal lands that compose the majority of areas that overlap with CHHRs and would have historically been grazed by domestic sheep would no longer be available for grazing on federal lands under the BLM proposed amendment and FS current management direction.

Cumulatively, the Main Salmon/South Fork herd would have the highest potential for effects as discussed above and identified in Table 4-14. The Main Salmon/South Fork summer CHHR totals 139,881 acres (see Map 3). The Main Salmon/South Fork winter CHHR totals 157,576 acres (see Map 4). Table 4-15 identifies acreage and percentage of the Main Salmon South/Fork CHHR that would be available for domestic sheep and goat grazing under each alternative.

**Table 4-15: Bighorn Sheep Main Salmon/South Fork CHHRs Overlap with BLM Domestic Sheep Allotments and Total Cumulative Overlap from Adjacent Land Ownerships**

| CHHR Overlap with State/Private | CHHR Overlap with USFS | Cumulative Total CHHR Overlap by Alternative (BLM, State/Private, and USFS) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F |
| **SUMMER CHHR** | | | | | | | |
| 2,885 acres<br>2.1% | 0 acres | 8,012 acres<br>5.7% | 2,885 acres<br>2.1% | 2,885 acres<br>2.1% | 2,885 acres<br>2.1% | 2,885 acres<br>2.1% | 2,885 acres<br>2.1% |
| **WINTER CHHR** | | | | | | | |
| 5,294 acres<br>3.3% | 0 acres | 12,827 acres<br>8.1% | 5,294 acres<br>3.3% | 5,294 acres<br>3.3% | 5,294 acres<br>3.3% | 5,294 acres<br>3.3% | 5,294 acres<br>3.3% |

Trailing routes are the stock trails that producers use to move domestic sheep onto and off of the Payette National Forest, and BLM and private lands. Trailing routes are treated as linear features in the model and are rated separately, depending on their relationship to CHHRs, bighorn sheep foray routes, and current domestic sheep allotments (where domestic sheep are likely to exist). Trailing routes that intersect, or are in close proximity to bighorn sheep CHHRs have a higher probability of contributing to interspecies contacts and potential for disease transmission.

Trailing can also result in stray domestic sheep that then utilize habitats occupied by bighorn sheep outside of the grazing season (e.g., potential contacts on winter source habitats), as some trailing routes are near or on bighorn sheep CHHRs (e.g., Salmon River Road – private trailing). Strays from trailing domestic sheep may come into contact with these sheep for prolonged periods, thus threatening herd sustainability. BMPs for trailing sheep that address temporal and spatial separation for domestic sheep and bighorn sheep may reduce potential for interspecies contact by designating trailing routes in areas that have minimal or no risk for contact and disease transmission. Other trailing BMPs used to minimize potential interspecies contact include short durations of trailing across areas (no lingering or grazing), close herding, extra herders and dogs to reduce strays, monitoring or surveying for bighorn sheep in area, accountability for domestic sheep being trailed (counting), no trailing of sick or injured domestic sheep, and quick search and location of strays.

Under the Payette FSEIS/ROD (USFS 2010b), trailing routes on rangelands identified as suitable for domestic sheep would result in 31 percent of the existing domestic sheep trailing routes being

left open. The USFS completed a contact analysis that displayed the risk of contacts with a trailing route area. However, it was determined that because domestic sheep only use these areas for a short time, the results were not significant (USFS 2010b).

## 4.3 NATIVE AMERICAN TRIBAL USES

This section supplements the analysis from the 2008 Cottonwood PRMP/FEIS, specific to addressing how the six alternative livestock grazing management strategies would affect treaty-reserved resources, consistent with meeting the BLM's obligations to the Nez Perce Tribe.

### 4.3.1 Overview

This analysis presents the potential direct, indirect, and cumulative impacts of the six alternatives as described in Chapter 2. A change in occurrence or availability of bighorn sheep in the ceded lands is an indicator of an impact to the ability of Nez Perce Tribal members to exercise their treaty rights.

### 4.3.2 Methods of Analysis

As outlined in Section 3.3, the BLM has a trust responsibility to the Nez Perce Tribe to manage bighorn sheep habitat. Objective NA-1.1 of the Cottonwood ROD/RMP states: "Maintain and, where possible, improve natural and cultural resource conditions to enhance opportunities to exercise Native American traditional uses." Bighorn sheep are intertwined into Nez Perce socio-cultural activities, and a change in hunting opportunities changes the ability to practice and maintain cultural traditions. Thus, this analysis on the effects to Tribal treaty hunting rights as they relate to bighorn sheep is tied to the following factors:

- The continued availability of the species over time in harvestable numbers
- The amount of area inhabited by bighorn sheep that Tribal members wish to utilize for their hunts

Grazing of domestic sheep adjacent to known bighorn sheep populations impacts the ability of the bighorn populations to pioneer, explore, expand, or co-mingle with other isolated groups to increase their populations. The result is a reduced area for the Tribes to hunt that may or may not overlay with areas that were historically and/or traditionally important.

Information regarding the number of bighorn sheep that Tribal members have harvested or wish to harvest is not available. Therefore, this discussion centers on the availability of bighorn sheep habitat and populations over time. The BLM made three assumptions for the Native American Tribal Uses in this analysis:

- Opportunities to hunt bighorn sheep are directly related to population trends.
- The amount of area available to hunt bighorn sheep increases as the amount of source habitat available to bighorn sheep without domestic sheep presence increases

- As the amount of area available to hunt bighorn sheep increases, the opportunity to hunt in areas either traditionally or culturally important to Tribal members also increases

The alternatives to be analyzed vary in the magnitude of risk for contact between bighorn sheep and domestic sheep. This results in varying degrees of subsequent implications for the persistence of bighorn sheep populations over time and their potential distribution. For these reasons, direct, indirect, or cumulative potential effects on treaty resources available to the Nez Perce Tribe could be expected as a result of BLM activities.

### 4.3.3 Effects of Alternatives

#### 4.3.3.1 Effects from Alternative A

Compared to all other alternatives, the model predicts the highest potential for bighorn sheep contact with domestic sheep under this alternative (see Table 4-2). This alternative does not provide for long-term sustainable trends for bighorn sheep populations with the Main Salmon/South Fork herd and the Little Salmon Area of Concern having the highest risk (see Table 4-2). All acres of source habitat within the allotments (see Table 4-1) would be used for domestic sheep grazing under this alternative; thus, Alternative A would reduce Tribal hunting opportunities and the opportunity to maintain associated traditional socio-cultural values in traditional areas more than any other alternative.

#### 4.3.3.2 Effects from Alternative B

Alternative B, the BLM proposed RMP amendment, would provide greater opportunity for Tribal harvest than would alternatives A, D, E, and F, as effects on bighorn sheep populations would be more favorable under this alternative. In addition, the probability for contact between species is lower than for alternatives A, D, E, and F (see Table 4-13). Since there would be no predicted disease outbreaks occurring in any of the bighorn herds over a 50-year period (see Table 4-4), implementation of this alternative would likely contribute toward a sustainable trend for bighorn populations. The amount of source habitat available to bighorn sheep without the presence of domestic sheep would be the greatest compared to all alternatives, except Alternative C (see Table 4-11). Considering only the direct and indirect effects, opportunities for Tribal hunting and maintaining associated traditional socio-cultural values in traditional areas would be greater under Alternative B compared to all other alternatives, except Alternative C.

#### 4.3.3.3 Effects from Alternative C

Alternative C, Eliminate Domestic Sheep and Goat Grazing, would remove all potential bighorn sheep contact with domestic sheep (see Table 4-13) on BLM land, as no domestic sheep grazing would be permitted on the BLM administered allotments. Eliminating domestic sheep grazing on the BLM allotments would reduce the potential for disease outbreak in bighorn herds and contribute toward a sustainable trend for bighorn populations. The amount of source habitat available to bighorn sheep without domestic sheep presence is greatest under Alternative C (see Table 4-11). In the long term, considering only the direct and indirect effects, this alternative

would provide the greatest Tribal hunting opportunities and maintaining of associated traditional socio-cultural values in traditional areas when compared to all other alternatives.

#### 4.3.3.4 Effects from Alternative D

The modeled contact and associated potential for disease outbreak is less under Alternative D, Restricts Grazing on Partridge Creek and Hard Creek, than Alternatives A and E, but more than Alternatives B, C, and F (see Table 4-13). Considering the predicted number of disease outbreaks that could occur in the Main Salmon/South Fork herd over a 50-year period (see Table 4-6), if the higher probabilities hold true, implementation of this alternative would likely result in a downward population trend for this herd.

This alternative opens up more potential area to bighorn sheep than would alternatives A, E, and F, but less than Alternatives B and C (see Table 4-11). Considering only the direct and indirect effects of each alternative, Alternative D would provide more opportunities for Tribal hunting and maintaining associated traditional socio-cultural values in traditional areas than would alternatives A, E, and F, but less than alternatives B and C.

#### 4.3.3.5 Effects from Alternative E

Alternative E, Restrict Grazing on Partridge Creek Only, would benefit the Main Salmon/South Fork population. The modeled contact risk and associated potential for disease outbreak is lower than for Alternative A for bighorn sheep populations, but higher than all other alternatives (see Table 4-13). Considering the predicted number of disease outbreaks that could occur in the Main Salmon/South Fork herd over a 50-year period (see Table 4-8), if the higher probabilities hold true, implementation of this alternative would likely result in a downward population trend for this herd.

Alternative E would open up more potential area to bighorn sheep, as the amount of area available for domestic sheep grazing would be less than under Alternative A, but there would be less area available for bighorn sheep than alternatives B, C, D, and F (see Table 4-11). Considering only the direct and indirect effects of each alternative, Alternative E would provide more opportunities for Tribal hunting and maintaining associated traditional socio-cultural values in traditional areas than Alternative A but less than all other alternatives.

#### 4.3.3.6 Effects from Alternative F

The modeled contact risk and associated potential for disease outbreak for Alternative F, Restricts Grazing on Partridge Creek and Marshall Mountain, is lower than for Alternatives A, D and E for bighorn sheep populations, but higher than Alternatives B and C, **(**Table 4-13**)**. Since there would be less predicted disease outbreaks occurring in any of the bighorn herds over a 50-year period (see Table 4-10), implementation of this alternative would likely contribute toward a sustainable trend for bighorn populations.

Alternative F would open up more potential area to bighorn sheep, as the amount of area available for domestic sheep grazing would be less than for Alternatives A and E but there would

be less area available for bighorn sheep than there would for Alternatives B, C, and D (see Table 4-11). Considering only the direct and indirect effects of each alternative, Alternative F would provide more opportunities for Tribal hunting and maintaining associated traditional socio-cultural values in traditional areas than alternatives A, D and E.

### 4.3.4 Cumulative Effects

The area and assumptions used in this cumulative effect analysis are the same as those identified in the cumulative effects analysis for bighorn sheep (see Sections 4.2.4 and 4.1.1).

Table 4-14 displays the estimated cumulative contacts per year in addition to those modeled under the BLM alternatives previously described. As depicted in Section 4.2.4, the probability of contact with domestic sheep managed on state and private increases the potential contact per year regardless of the BLM alternative. Even so, some BLM alternatives contribute to a reduction of the overall modeled risk of contact. Tribal treaty hunting opportunities and the maintenance of associated traditional socio-cultural values will be affected by the continued downward bighorn population trend under the cumulative scenario. Fewer numbers of bighorn sheep may also result in a reduced area in which the Tribe can hunt successfully, thus removing opportunities that were historically and/or traditionally important to the Tribe for hunting.

## 4.4 LIVESTOCK GRAZING AND SOCIAL AND ECONOMIC CONDITIONS

This section supplements the analysis from the 2008 Cottonwood PRMP/FEIS for Resource Uses and Livestock Grazing, as well as Social and Economic Conditions. This section is also an update of the effects analysis in the Cottonwood PRMP/FEIS, focusing specifically on the alternatives presented in Chapter 2 of this SEIS.

### 4.4.1 Overview

This section describes the direct, indirect, and cumulative impacts that could result from any of the alternatives proposed for changes to livestock grazing, as well as the effects on social and economic conditions related to the effects from domestic sheep grazing and potential disease transmission to bighorn sheep.

### 4.4.2 Methods of Analysis

#### 4.4.2.1 Livestock Grazing

Any effects of the alternatives would be dependent on whether domestic sheep grazing would be prohibited within any of the four allotments. The method of analysis for livestock grazing focuses on allocation of forage (AUMs), areas open or closed to domestic sheep grazing, and logistical effects on the lessees' livestock operation and use of rangelands on BLM allotments and adjacent areas. Information used includes data from the Rangeland Administration System (RAS), grazing case files, and GIS datasets. The analysis is also based on the assumptions identified in Section 4.1.1.

### 4.4.2.2 Social and Economic Conditions

The analysis of economic effects considers job and labor income effects in an economic impact analysis through input-output modeling. Non-market values, such as the value of recreation experiences and ecological services, by nature are difficult to quantify. Direction provided in the BLM Land Use Planning Handbook – Appendix D, suggests the use of benefit transfer to evaluate the effects of these non-market values. In the absence of quantitative information for other non-market values and social effects, they are discussed qualitatively here and in other parts of this SEIS.

The measures and analysis methods listed in Table 4-16 offer consistent measures for comparing alternatives, but should not be viewed as a complete answer; considering these impacts alongside additional social, ecological, or other non-market values provides a complete comparison of the alternatives.

**Table 4-16: Measures and Analysis Methods**

| Measures | Analysis Method | Analysis Tool |
|---|---|---|
| Economic Impacts (Jobs and Labor Income) | Input-Output Analysis | IMPLAN, 2010 |
| Non-market and Social Values | Indicators discussed below | Discussion in text |
| Environmental Justice | Varies based on effects to populations of interest | Discussion in text |

*Employment and Labor Income Impacts*

Economic impacts in terms of employment and labor income are used to evaluate potential direct, indirect, and cumulative effects on the impact area economy. Economic impacts are estimated using an input-output analysis, which is a means of examining relationships within an economy, both between businesses and between businesses and final consumers; it captures all monetary market transactions for consumption in a given time period. The resulting mathematical representation allows an examination of the effect of change (the impact analysis), if any, on economic activities on an entire economy. The input-output modeling tool most commonly used by the USFS and BLM is IMPLAN. The IMPLAN modeling system allows the user to build regional economic models of one or more counties for a particular year. IMPLAN translates changes in final demand for goods and services into resulting changes in economic effects, such as labor income and employment of the affected area's economy. The model for this updated analysis used 2010 IMPLAN data.

The economic impact effects are measured by estimating the direct employment and labor income, both of which directly affect the local economy, from (1) changes in sheep grazing under the alternatives, and (2) potentially affected recreation. Additional indirect and induced multiplier effects (ripple effects) are generated by the direct activities. Together, the direct and multiplier effects comprise the total economic impacts to the local economy.

*Methods Specific to Estimating Sheep Grazing Effects*

Employment and income effects from grazing are assessed using direct, indirect, and induced multipliers developed by the BLM for Idaho (U.S. Department of Interior 2013). The analysis is also based on the assumptions in Section 4.1.1 regarding grazing use.

*Methods Specific to Estimating Recreation Effects*

Recreation dependent on potentially affected bighorn sheep herds includes opportunities inside and outside the bighorn sheep analysis area. For example, the Salmon River herd may be affected by management actions under the alternatives, and consequently, hunting and wildlife watching opportunities would be affected inside and outside of that area. As these visitors travel to the area, they spend money on goods and services in the local economy. Since levels of recreation related to bighorn sheep are not known, the total economic impact for every 1,000 visits is estimated and discussed below. The response coefficients for hunting and viewing wildlife provide the economic effect specific to bighorn sheep recreation opportunities in the three-county impact area, thus providing a frame of reference for a qualitative discussion under the alternatives.

The discussion of potential jobs and income impacts typically occurs alongside consideration of non-market and social values. Changes to goods and services provided by the BLM can affect employment and income in the area. However, employment and income would likely be supported in other areas if a substitute for livestock grazing is provided by other means.

Effects on cultural and social values related to bighorn sheep are also discussed qualitatively in the non-market and social values sections below, because the value of bighorn sheep-associated recreational experiences cannot be characterized solely on their market transactions.

*Non-market and Social Values*

Non-market values, such as the value of recreation experiences and ecological services, by their nature are difficult to quantify. Direction provided in the BLM's Land Use Planning Handbook (Appendix D; pages 6, 7 and 10) suggests the use of benefit transfer to evaluate the effects of these non-market values. Since levels of recreation related to bighorn sheep are not known, the total change in non-market value cannot be assessed quantitatively; however, qualitative discussion is included relative to non-market values discussed in Chapter 3.

The qualitative discussion of change in non-market and social values is based on estimated effects on bighorn sheep hunting opportunities in the impact area; the predicted number of contacts within a 50-year period (see Table 4-2,Table 4-4, Table 4-6, Table 4-8, and Table 4-10) and resulting effects on bighorn sheep population trends; and acres of protected bighorn sheep habitat (see Table 4-11) under each of the alternatives. These factors allow the determination of how the alternatives potentially degrade, maintain, or enhance non-market values associated with affected bighorn sheep. In addition, other non-market aspects of each alternative are described in other resource sections of this document as well as supporting technical reports.

### 4.4.3 Effects of Alternatives

#### 4.4.3.1 Effects from Alternative A

*Livestock Grazing*

Under Alternative A, domestic sheep grazing would continue on all four allotments, as shown in Table 4-17.

**Table 4-17: Alternative A – Continue Use of Domestic Sheep Allotments**

| Allotment Name | Acres | Permitted AUMs |
|---|---|---|
| Partridge Creek | 9,544 | 431 |
| Marshall Mountain | 4,212 | 166 |
| Hard Creek | 5,210 | 218 |
| Big Creek | 439 | 81 |
| **Total** | **19,405** | **896** |

Domestic sheep grazing on BLM lands in these allotments would continue to provide a source of forage to complement the lessees' sheep ranching operations on private and potentially IDL lands.

Using the IMPLAN input-output model, estimates of the BLM employment and income contribution were calculated from the forage allocation that would be available under this alternative (see Table 4-17). Direct employment and labor income affect employees and their families; therefore, affecting the local economy. Indirect and induced multiplier effects (ripple effects) are then generated by the direct activities. Indirect effects accrue to connected industries when purchases are made in support industries and induced effects occur as employees spend wages in the impact area. Together, the direct and multiplier effects comprise the total economic impacts to the impact area economy.

Direct contributions to the agricultural sector from domestic sheep grazing on the four relevant allotments include an added 2.3 jobs to the impact area (Table 4-17). In addition, 0.5 indirect and induced jobs are supported in the impact area on an average annual basis through grazing on the four allotments. While this number may appear small, these employment and income estimates account for the portion attributable to use on BLM land and not the entire job, thus multiple lessees and their employees could be included in the estimate of a single job. For example, the 2.3 direct jobs could account for four people who work half of the year (2 total jobs annually) on forage provided by BLM and the last 0.3 jobs accounts for another family member who works a third of the year on forage provided by BLM.

Forage provided by the CFO provides an important source that complements additional sources during other parts of the year. Consequently, estimating the effect of livestock grazing using only BLM AUMs may underestimate the actual importance of BLM land as a forage resource; where a change in BLM grazing affects the optimal use of the rest of forage resources. Using the input-output methodology described above (and ranch production relationships presented in Chapter 3), consideration of the entire ranch production perspective attributes the additional direct and indirect employment and labor income from CFO sheep grazing (Table 4-18).

| Table 4-18: Effects on Local Employment and Income from Sheep Grazing by Alternative | | | | | | |
|---|---|---|---|---|---|---|
| | Employment (Full- and Part-time Jobs) | | | Labor Income (2012 Dollars) | | |
| Alternative | Direct Effects | Indirect and Induced Effects | Total | Direct Effects | Indirect and Induced Effects | Total |
| Alternative A | 2.3 | 0.5 | 2.8 | 9,916 | 17,040 | 26,956 |
| Alternative B | 0.2 | 0.0 | 0.3 | 896 | 1,540 | 2,437 |
| Alternative C | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Alternative D | 0.6 | 0.1 | 0.8 | 2,733 | 4,697 | 7,431 |
| Alternative E | 1.2 | 0.3 | 1.5 | 5,146 | 8,843 | 13,989 |
| Alternative F | 0.8 | 0.2 | 0.9 | 3,215 | 5,524 | 8,740 |
| **Ranch Production Perspective** | | | | | | |
| Alternative A | 2.8 | 0.7 | 3.4 | 11,998 | 20,619 | 32,617 |
| Alternative B | 0.2 | 0.1 | 0.3 | 1,085 | 1,864 | 2,949 |
| Alternative C | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Alternative D | 0.8 | 0.2 | 0.9 | 3,308 | 5,684 | 8,991 |
| Alternative E | 1.4 | 0.3 | 1.8 | 6,227 | 10,701 | 16,927 |
| Alternative F | 0.9 | 0.2 | 1.1 | 3,890 | 6,685 | 10,575 |

The impact area is dependent on agriculture for 13.5 percent of employment and can be considered specialized with respect to employment in the subsector that includes sheep grazing (animal production except cattle, poultry, and eggs) (Figure 3-4). Under Alternative A, 5.1 direct jobs could be contributed (from both grazing on BLM and the ranch production perspective) to the sheep grazing subsector depicted in Figure 3-4. This represents the maximum possible contribution from BLM allotments if all permitted grazing under Alternative A were to occur. These maximum potential contributions would represent approximately 5 percent of employment in the subsector that includes sheep grazing, and less than 0.5 percent in the agriculture sector within the three-county impact area.

Ranching has played a historic role in the community. Because grazing would resume should the BLM decide to make these allotments available for domestic sheep grazing, the quality of life associated with grazing on BLM land (see Chapter 3, Section 3.4.2.2 *Non-market and Social Values*, for discussion of quality of life associated with grazing on the BLM) could continue unchanged under Alternative A. In addition, associated quality of life for ranching could be higher under this alternative than the others since the forage allocation is higher and could thus accommodate increases in use with favorable market conditions and willing lessees.

*Bighorn Sheep-related Recreation*

Visitors often spend money in the impact area economy when participating in bighorn sheep-related recreation. Visitor data for area National Forests are used for this analysis, as expenditures of these visitors specific to the CFO is not available. Analyses of the expenditures reported by National Forest visitors indicate that the primary factor in determining the amount spent by a visitor was the type of trip taken, not the specific activity or National Forest visited

(Stynes and White 2005). In other words, recreation visits were distinguished for local visitors (individuals residing within 30 miles of the National Forest boundary) and nonlocal visitors (individuals residing more than 30 miles from the National Forest boundary). Local and nonlocal visitors were further divided by those staying overnight and those on day trips. The four trip type segments were:

- Nonlocal visitors on day trips
- Nonlocal visitors staying overnight
- Local residents on day trips
- Local residents staying overnight

National Visitor Use Monitoring data sample sizes were too small at the individual Forest level to sufficiently represent visitor spending profiles for hunting and viewing wildlife visits for individual Forests (Stynes and White 2006). To account for spending differences, profiles were estimated by grouping forests with above- or below-average spending, which were identified by comparing spending averages for each Forest with the national average[8]. The Nez Perce, Payette, and Wallowa Whitman National Forests were characterized as average-spending forests. These expenditures-per-visit are shown for all activity and trip types in Table 4-19.[9]

**Table 4-19: Expenditures per Visit by Activity and Trip Type**

| | Expenditures ($ per visit in 2012 dollars) | | | |
|---|---|---|---|---|
| | **Nonlocal Day Use** | **Nonlocal Overnight** | **Local Day Use** | **Local Overnight** |
| Downhill skiing | 55.72 | 275.83 | 31.17 | 142.62 |
| Driving | 24.11 | 246.87 | 16.33 | 141.85 |
| Snowmobile | 55.29 | 245.68 | 34.47 | 114.91 |
| Cross-country skiing | 43.31 | 230.16 | 15.23 | 106.74 |
| Hunting | 49.63 | 207.53 | 34.15 | 132.87 |
| Hiking/biking | 22.32 | 202.73 | 11.84 | 64.29 |
| Nature-related/Viewing Wildlife | 27.86 | 187.71 | 18.02 | 87.06 |
| Fishing | 26.79 | 147.78 | 20.36 | 69.00 |
| OHV-use | 46.72 | 123.67 | 29.59 | 62.43 |
| Other | 25.72 | 117.87 | 16.48 | 74.21 |
| Developed camping | NA | 76.11 | NA | 59.11 |
| Primitive Camping/backpacking | NA | 57.43 | NA | 53.58 |

Source: USFS 2012

[8] Day and overnight visitor spending averages (excluding non-primary visitors) were estimated based on the sample of visitors on each forest. To control for differences between day and overnight visitor trips across forests, a standardized average was computed for each forest, assuming a fixed mix of 60 percent for day trips and 40 percent for overnight trips. The standardized average for each forest was compared to the national standardized average.

[9] Expenditures per visit were obtained by dividing average expenditures per party trip by average party size. Party sizes by primary activity are reported in Appendix A of Stynes and White (2006).

Nonlocal downhill skiers staying overnight spend the most while local hikers/bikers spend the least. Nonlocal hunters staying overnight spend the fifth highest per visit ($208) while nonlocal wildlife viewers staying overnight spend the seventh most of all activity types ($188). While expenditures per visit give some comparison between activity types, the economic impacts of these activities depend on the economic characteristics of the three-county impact area discussed above.

The estimated employment and labor income response coefficients by activity type are shown in Table 4-20. Response coefficients indicate the number of full- and part-time jobs and dollars of labor income generated per 1,000 visits by activity type; they are useful for understanding the economic effects tied to a given use level and for understanding the differences in employment and labor income effects by activity type. Response coefficients are unique to the three-county impact area depicted in Figure 3-3.

**Table 4-20: Employment and Labor Income Response Coefficients by Activity Type**

| | | Employment (Jobs per 1,000 Visits) | | | Labor Income (2012 Dollars) ($ per 1,000 Visits) | | |
|---|---|---|---|---|---|---|---|
| | | Direct Effects | Indirect and Induced Effects | Total | Direct Effects | Indirect and Induced Effects | Total |
| Hunting | Local Day | 0.23 | 0.05 | 0.28 | 5,150 | 1,288 | 6,438 |
| | Local OVN | 0.69 | 0.18 | 0.87 | 17,203 | 4,275 | 21,478 |
| | Nonlocal Day | 0.30 | 0.07 | 0.37 | 7,192 | 1,795 | 8,987 |
| | Nonlocal OVN | 1.24 | 0.28 | 1.52 | 25,992 | 6,698 | 32,690 |
| Viewing Wildlife | Local Day | 0.15 | 0.03 | 0.18 | 2,812 | 729 | 3,542 |
| | Local OVN | 0.49 | 0.12 | 0.61 | 10,671 | 2,735 | 13,406 |
| | Nonlocal Day | 0.23 | 0.05 | 0.27 | 4,285 | 1,103 | 5,388 |
| | Nonlocal OVN | 1.05 | 0.21 | 1.26 | 18,714 | 4,823 | 23,538 |

The following generalizations are presented in Table 4-20:

- Local hunting and viewing wildlife generates lower employment and labor income effects per 1,000 visits than nonlocal visits, because local visitors spend less per visit (see Table 4-20).
- Economic effects vary across hunting and viewing wildlife activity types; the lowest employment and labor income contribution is tied to local day users viewing wildlife and the largest contribution is associated with nonlocal hunters who stay overnight.

While response coefficients may be greater for certain activity types, the economic effects to the impact area also depend on the number of visitors participating. Hunting or wildlife viewing attributable to opportunities affected under this SEIS are not available, thus the response coefficients provide a frame of reference for discussion of effects. These response coefficients reflect an economic structure that is a snapshot in time and, therefore, are not applicable to visitation numbers that are dramatically different from current recreation levels. If recreational activities and/or visits were to change radically, there would be a structural shift in the economy

as spending patterns change, and these response coefficients would no longer reflect underlying economic processes.

Because grazing use on BLM land would not change under Alternative A, it is predicted to have the greatest adverse effect on bighorn sheep population trends of all the alternatives. Consequently, fewer potential bighorn sheep hunting opportunities or other bighorn sheep-related recreation (e.g., wildlife viewing) in the impact area would occur for this alternative, resulting in fewer employment and income contributions to the impact area.

As shown on Figure 3-4, the impact area is dependent on recreation-related sectors for 11 percent of employment and can be considered specialized with respect to portions of three sectors related to recreation: retail trade, passenger transport and arts, and entertainment and recreation. As a result, decreases in employment and income contributions to the recreation-related economy of the impact area would be highest under Alternative A.

*Non-market and Social Values*

The economic analysis assesses the economic effects of the direct use of resources in terms of jobs and income. This type of analysis does not include other types of economic values often referred to as non-market values, which are difficult to quantify. Insufficient data exist to assess the effects of management actions on these values. However, the fact that no monetary value is assigned to these values does not lessen their importance in the decision-making process. Helpful inferences can still be made using estimated effects on bighorn sheep hunting opportunities in the impact area, bighorn sheep population trends (Section 3.2.2.3, Figure 3-1 and Figure 3-2), and acres of bighorn sheep habitat that would be available for domestic sheep grazing (see Section 4.2.3.1, Table 4-1). Because the fewest bighorn sheep hunting opportunities are anticipated for Alternative A, levels for non-market values (bighorn sheep tags statewide were more than $40 million in 2009 [O'Laughlin and Cook 2010]) could be lowest as well. Considering only the direct and indirect effects of the alternatives, these results suggest visitors and area residents would not experience the past level of value associated with higher population levels of bighorn sheep.

### 4.4.3.2 Effects from Alternative B

*Livestock Grazing*

Alternative B, the BLM proposed RMP amendment, would prohibit domestic sheep grazing on the Partridge Creek, Marshall Mountain, and Hard Creek allotments (see Table 4-21). The Big Creek Allotment would remain available for domestic sheep grazing.

**Table 4-21: Alternative B – Domestic Sheep Acreage and Forage Allocations**

| Allotment Name | Acres/AUMs Available | Difference in Acres/AUMs from Alternative A |
|---|---|---|
| Partridge Creek | 0/0 | -9,544/-431 |
| Marshall Mountain | 0/0 | -4,212/-166 |
| Hard Creek | 0/0 | -5,210/-218 |

| Table 4-21: Alternative B – Domestic Sheep Acreage and Forage Allocations | | |
|---|---|---|
| Big Creek | 439/81 | No Change |

Alternative B eliminates domestic sheep grazing on both allotments used by Carlson Livestock and one of two allotments used by Soulen Livestock. This amounts to a reduction of one hundred percent of the total number of domestic sheep AUMs from the BLM available to Carlson Livestock (597 of 597) and seventy-three percent (218 of 299) of the total domestic sheep AUMs available to Soulen Livestock.

*Partridge Creek Allotment* – Prohibiting domestic sheep use of the allotment would disrupt the historical year-round sheep operation and cause logistical and financial hardships on the lessee. The lessee would have to find an alternate method to move sheep across the landscape that would be limited to private or leased land.

*Marshall Mountain Allotment* – Prohibiting domestic sheep grazing on this allotment would disrupt the year round sheep operations of the lessee and cause them to find another source of summer forage.

*Hard Creek Allotment* – Prohibiting domestic sheep grazing would disrupt future options to support the lessee's ranching operation.

*Big Creek Allotment* – The grazing lessee would be able to utilize the BLM allotment in conjunction with private property that surrounds the allotment, to provide forage and support ranching operations during the summer months (June through October).

Using the IMPLAN input-output model described above, estimates of the BLM employment and income contribution are calculated from the forage allocations available under this alternative. If grazing were to resume on the Big Creek allotment under Alternative B, direct contributions from sheep grazing on BLM lands to the agricultural sector would account for less than 0.5 jobs in the impact area. This alternative would support 3 fewer total jobs (direct, indirect, and induced) than Alternative A (Table 4-20).

As shown in Figure 3-4, the impact area is dependent on agriculture for 13.5 percent of employment and can be considered specialized with respect to the sheep grazing subsector (animal production except cattle, poultry, and eggs). Under Alternative B, 0.4 direct jobs could be contributed from grazing on BLM land and the ranch production perspective, to the subsector that includes sheep grazing depicted on Figure 3-4. Total employment effects (direct, indirect, and induced) would be approximately 6 jobs fewer than under Alternative A (Table 4-20). This represents the maximum possible effect from changes to grazing on CFO lands, using all permitted grazing under Alternative A as a reference point for past levels of use. These maximum potential effects would represent 5 percent of employment in the subsector that includes sheep grazing and less than 0.5 percent in the agriculture sector within the three-county impact area. Currently there is no grazing on the Big Creek allotment, therefore no effect relative to current conditions would occur.

Ranching has played a historic role in the community. Since the allocation is lower than the other alternatives it would accommodate lower levels of use than the other alternatives, apart from

Alternative C (with favorable market conditions and willing lessees). Consequently, quality of life associated with grazing on BLM land would be less than the other alternatives, apart from Alternative C. (See Chapter 3, Section 3.4.2.2 *Non-market and Social Values*, for discussion of quality of life associated with grazing.)

The BLM has assumed that for allotments where domestic sheep grazing is prohibited, a qualified applicant would apply for and, after a BLM site-specific analysis is conducted, receive authorization to graze cattle. Under this assumption, a portion of the decreases in employment and income relative to Alternative A could be regained, and effects on the social role of ranching in the community could be reduced.

*Bighorn Sheep-related Recreation*

Since grazing use on the BLM would only be allowed on the Big Creek Allotment, this alternative would have the least adverse effect on bighorn sheep population trends of all the alternatives, except for Alternative C. Consequently, the indirect effects of this alternative would be more potential bighorn sheep hunting opportunities and other bighorn sheep-related recreation (e.g., wildlife viewing), resulting in more employment and income contributions to the impact area, except for Alternative C.

As shown in Figure 3-4, the impact area is dependent on recreation-related sectors for 10 percent of employment and can be considered specialized with respect to retail trade, passenger transport and arts, and entertainment and recreation. As a result of this alternative, employment and income contributions to the recreation-related economy of the impact area would be greatest among all the alternatives, except for Alternative C.

*Non-market and Social Values*

With the exception of Alternative C, Alternative B would have more bighorn sheep hunting opportunities than for any of the other alternatives; consequently, levels of non-market values (bighorn sheep tags statewide were more than $40 million in 2009 [O'Laughlin and Cook 2010]) could be highest as well. Other non-market values associated with bighorn sheep would be highest as well. Considering only the direct and indirect effects of the alternatives, these results suggest visitors and area residents would experience levels of value associated with population levels of bighorn sheep that are higher than the other alternatives, again with the exception of Alternative C.

#### 4.4.3.3 Effects from Alternative C

*Livestock Grazing*

Alternative C would prohibit domestic sheep grazing on all four allotments Table 4-22. Impacts for the Partridge Creek, Marshall Mountain, and Hard Creek allotments would be the same as described for Alternative B. In addition, prohibiting domestic sheep grazing on the 439 acres of public lands in the Big Creek Allotment would decrease the forage available by an additional 81 AUMs.

| Table 4-22: Alternative C – Domestic Sheep Acreage and Forage Allocations | | |
|---|---|---|
| **Allotment Name** | **Acres/AUMs Available** | **Difference in Acres/AUMs from Alternative A** |
| Partridge Creek | 0/0 | -9,544/-431 |
| Marshall Mountain | 0/0 | -4,212/-166 |
| Hard Creek | 0/0 | -5,210/-218 |
| Big Creek | 0/0 | -439/-81 |

Alternative C eliminates domestic sheep grazing on both BLM allotments use by Carlson Livestock and both allotments used by Soulen Livestock. This amounts to a reduction of one hundred percent of the total number of domestic sheep AUMs available to these two lessees.

Under this alternative, employment effects (direct, indirect, and induced) would be approximately 6 jobs fewer than under Alternative A (Table 4-18). This represents the maximum possible effect from changes to grazing within the CFO, using all permitted grazing under Alternative A as a reference point for past levels of use. These maximum potential effects would represent 6 percent of employment in the sheep grazing subsector and less than 0.5 percent in the agriculture sector within the three-county impact area. Currently, there is no grazing on the BLM allotments, therefore no effect relative to current conditions would occur.

Since no domestic sheep grazing would be permitted under this alternative, quality of life associated with sheep grazing on the CFO would not be supported, and decreases in available grazing would decrease the quality of life of individual operators. Currently, there is no grazing on these BLM allotments, therefore no effect relative to current conditions would occur. In addition, lessees would likely depend on other sources of forage on state and other private land. This alternative would eliminate domestic sheep grazing on BLM lands in the analysis area and end the rich culture associated with traditional herdsman tending flocks on open public lands.

The BLM has assumed that for allotments where domestic sheep grazing is prohibited, a qualified applicant would apply for and, after a BLM site-specific analysis is conducted, receive authorization to graze cattle. Under this assumption, decreases in employment and income relative to Alternative A could be partly regained, and effects on the social role of ranching in the community could be reduced.

*Bighorn Sheep-related Recreation*

Eliminating domestic sheep grazing on the BLM allotments would reduce the potential for disease outbreak in bighorn herds and contribute toward a sustainable trend for bighorn populations. Consequently, the indirect effects of this alternative would be more potential bighorn sheep hunting opportunities and other bighorn sheep-related recreation (e.g., wildlife viewing), resulting in more employment and income contributions to the impact area.

As shown on Figure 3-4, the impact area is dependent on recreation-related sectors for 10 percent of employment and can be considered specialized with respect to retail trade, passenger transport and arts, and entertainment and recreation. As a result of this alternative, employment and income contributions to the recreation-related economy of the impact area would be greatest among all the alternatives.

*Non-market and Social Values*

The indirect effects of this alternative would be more bighorn sheep hunting opportunities than under any other alternative; consequently, levels of non-market values (bighorn sheep tags statewide were more than $40 million dollars in 2009 [O'Laughlin and Cook 2010]) could be highest under this alternative. Other non-market values associated with bighorn sheep would be highest as well. Considering only the direct and indirect effects of the alternatives, these results suggest visitors and area residents would experience an increase of value associated with higher population levels of bighorn sheep.

### 4.4.3.4 Effects from Alternative D

*Livestock Grazing*

Alternative D would allow domestic sheep grazing on the Marshall Mountain and Big Creek allotments to continue, but would prohibit it on the Partridge Creek and Hard Creek allotments, for a total loss of 649 AUMs of forage for the lessees (Table 4-23).

**Table 4-23: Alternative D – Domestic Sheep Acreage and Forage Allocations**

| Allotment Name | Acres/AUMs Available | Difference in Acres/AUMs from Alternative A |
|---|---|---|
| Partridge Creek | 0/0 | -9,544/-431 |
| Marshall Mountain | 4,212/166 | No Change |
| Hard Creek | 0/0 | -5,210/-218 |
| Big Creek | 439/81 | No Change |

This alternative would eliminate domestic sheep grazing on one of two allotments used by Carlson Livestock and one of two allotments used by Soulen Livestock; amounting to a reduction of 72 percent (431 of 597) and 73 percent (218 of 299) of the total number of BLM domestic sheep AUMs available to Carlson Livestock and Soulen Livestock, respectively.

Using the IMPLAN input-output model, estimates of the BLM employment and income contribution are calculated from the forage allocations that would be available under this alternative. If grazing were to resume on the Big Creek and Marshal Mountain allotments, direct contributions under this alternative from domestic sheep grazing on BLM lands to the agricultural sector would account for less than 1 job in the impact area. Relative to Alternative A, this alternative would support 2 total jobs (direct, indirect, and induced) less than Alternative A (Table 4-18).

Under this alternative, 1.4 direct jobs could be contributed (from both BLM grazing on the CFO and the ranch production perspective) to the sheep grazing subsector as depicted in Figure 3-5. Total employment effects (direct, indirect and induced) would be approximately 5 jobs fewer than for Alternative A (Table 4-18). This represents the maximum possible effect from changes to grazing on BLM land using all permitted grazing under Alternative A as a reference point. These maximum potential effects would represent 4 percent of employment in the subsector that includes sheep grazing and less than 0.5 percent in the agriculture sector within the three-county

impact area. Currently, there is no grazing on the BLM allotments, therefore no effect relative to current conditions would occur.

Since the allocation is lower than for the other alternatives, Alternative D would accommodate lower levels of use than alternatives A and E (with favorable market conditions and willing lessees). Consequently, quality of life associated with grazing on BLM land would be less than alternatives A and E, but potentially greater than alternatives B and C. (See Chapter 3, Section 3.4.2.2 *Non-market and Social Values*, for discussion of quality of life associated with grazing on the BLM land.)

The BLM has assumed that for allotments where domestic sheep grazing is prohibited, a qualified applicant would apply for and, after a BLM site-specific analysis is conducted, receive authorization to graze cattle. Under this assumption, decreases in employment and income relative to Alternative A could be partly regained, and effects on the social role of ranching in the community could be reduced.

*Bighorn Sheep-related Recreation*

Since grazing use on the BLM would be allowed on the Big Creek and Marshall Mountain allotments, contribution to downward bighorn sheep population trends is less than that for alternatives B C, and F, but greater than A and E. Consequently, more potential bighorn sheep hunting opportunities or other bighorn sheep-related recreation (e.g., wildlife viewing) would be provided, resulting in more employment and income contributions, than for alternatives A and E, but less than B, C, and F.

As shown in Table 3-4, the impact area is dependent on recreation-related sectors for 10 percent of employment and can be considered specialized with respect to retail trade, passenger transport and arts, and entertainment and recreation. Employment and income contributions to the recreation-related economy of the impact area would be greater than alternatives A, E, and F, but less than alternatives B and C.

*Non-market and Social Values*

More bighorn sheep hunting opportunities are anticipated for Alternative D than alternatives A and E, but less than B, C, and F; consequently, levels of non-market values could be greater than for alternatives A and E, but lower than for alternatives B, C, and F. Other non-market values associated with bighorn sheep would be ranked accordingly. These results suggest that visitors and area residents would experience more value associated with higher population levels of bighorn sheep than they would under alternatives A and E, but less than alternatives B, C and F.

### 4.4.3.5 Effects from Alternative E

*Livestock Grazing*

Alternative E would allow for domestic sheep grazing to occur on the Marshall Mountain, Hard Creek, and Big Creek allotments as shown in Table 4-24. With the exception of domestic sheep

grazing being prohibited on Partridge Creek Allotment, impacts would be similar to those described for Alternative A.

| Table 4-24: Alternative E – Domestic Sheep Acreage and Forage Allocations | | |
|---|---|---|
| **Allotment Name** | **Acres/AUMs Available** | **Difference in Acres/AUMs from Alternative A** |
| Partridge Creek | 0/0 | -9,544/-431 |
| Marshall Mountain | 4,212/166 | No Change |
| Hard Creek | 5,210/218 | No Change |
| Big Creek | 439/81 | No Change |

Alternative E would eliminate domestic sheep grazing on one of two allotments used by Carlson Livestock, amounting to a 72 percent reduction of the total number of BLM domestic sheep AUMs available to Carlson Livestock (431 of 597). There would be no reduction of the domestic sheep AUMs allocated to Soulen Livestock.

Using the IMPLAN input-output model, estimates of the BLM employment and income contribution are calculated from the allocations for this alternative. Direct contributions from sheep grazing on BLM land would account for 1.2 jobs in the impact area. Relative to Alternative A, this alternative would support approximately 1 less job (direct, indirect and induced) (Table 4-18).

For this alternative, 2.6 direct jobs could be contributed from both BLM grazing within the CFO and the ranch production perspective to the sheep grazing subsector depicted in Figure 3-4. Total employment effects (direct, indirect, and induced) would be approximately three jobs fewer than under Alternative A (Table 4-18). This represents the maximum possible effect from changes to grazing, using all permitted grazing under Alternative A as a reference point. These maximum potential effects would represent 3 percent of employment in the sheep grazing subsector and less than .5 percent in the agriculture sector within the three-county impact area. Currently, there is no grazing on the Big Creek Allotment, and thus no effect relative to current conditions would occur.

With the exception of Alternative A (with favorable market conditions and willing lessees), Alternative E would accommodate the highest levels of use; consequently, quality of life associated with grazing on BLM land would be greater than for the other alternatives. (See Chapter 3, Section 3.4.2.2 *Non-market and Social Values*, for discussion of quality of life associated with grazing on BLM land.)

The BLM has assumed that for allotments where domestic sheep grazing is prohibited, a qualified applicant would apply for and, after a BLM site-specific analysis is conducted, receive authorization to graze cattle. Under this assumption, decreases in employment and income relative to Alternative A could be partially regained, and effects on the social role of ranching in the community could be reduced.

*Bighorn Sheep-related Recreation*

Since grazing use on the CFO would be allowed on all allotments except Partridge Creek, this alternative would contribute more to the downward trend in bighorn sheep populations than other alternatives, apart from Alternative A. Consequently, fewer potential bighorn sheep hunting opportunities or other bighorn sheep-related recreation (e.g., wildlife viewing) would be provided, resulting in less employment and income contributions to the impact area.

As shown in Figure 3-4, the impact area is dependent on recreation-related sectors for 10 percent of employment and can be considered specialized with respect to portions of retail trade, passenger transport and arts, and entertainment and recreation. As a result of this alternative, employment and income contributions to the recreation related economy of the impact area would be the least among all the alternatives, apart from Alternative A.

*Non-market and Social Values*

With the exception of Alternative A, fewer bighorn sheep hunting opportunities are anticipated under Alternative E than for other alternatives; consequently, levels of non-market values could be lower under this alternative. Other non-market values associated with bighorn sheep would be lower as well. These results suggest that visitors and area residents would experience levels of value associated with population levels of bighorn sheep that are lower than the other alternatives, apart from Alternative A.

#### 4.4.3.6 Effects from Alternative F

*Livestock Grazing*

Alternative F would allow domestic sheep grazing on the Hard Creek and Big Creek allotments to continue, but would prohibit domestic sheep grazing on the Partridge Creek and Marshall Mountain allotments (Table 4-25).

**Table 4-25: Alternative F – Domestic Sheep Acreage and Forage Allocations**

| Allotment Name | Acres/AUMs Available | Difference in Acres/AUMs from Alternative A |
|---|---|---|
| Partridge Creek | 0/0 | -9,544/-431 |
| Marshall Mountain | 0/0 | -4,212/-166 |
| Hard Creek | 5,210/218 | 0/0 |
| Big Creek | 439/81 | 0/0 |

This alternative would eliminate domestic sheep grazing on both allotments used by Carlson Livestock; Soulen Livestock would be unaffected. This amounts to a 100 percent reduction of the total number of BLM domestic sheep AUMs allocated to Carlson Livestock (597 of 597), and no reduction for Soulen Livestock.

Using the IMPLAN input-output model, estimates of the BLM employment and income contribution are calculated from the forage allocations that would be available under this alternative. If grazing were to resume on the Big Creek and Hard Creek allotments under this

alternative, direct contributions from sheep grazing on BLM land to the agricultural sector would account for less than 1 job in the impact area. Relative to Alternative A, this alternative would support 1.4 total jobs (direct, indirect, and induced) less than Alternative A (Table 4-18).

Under Alternative F, 1.7 direct jobs could be contributed from both grazing on BLM land and the ranch production perspective to the sheep grazing subsector depicted in Figure 3-4. Total employment effects (direct, indirect, and induced) would be approximately 4 jobs less than under Alternative A (Table 4-18). This represents the maximum possible effect from changes to grazing on BLM land, using all permitted grazing under Alternative A as a reference point. These maximum potential effects would represent 4 percent of employment in the sheep grazing subsector and less than 0.5 percent in the agriculture sector within the three-county impact area. Currently, there is no grazing on these allotments; therefore no effect relative to current conditions would occur.

With the exception of alternatives B and C, Alternative F would accommodate the lowest levels of use; consequently, quality of life associated with grazing within the CFO would be less. (See Chapter 3, Section 3.4.2.2 *Non-market and Social Values*, for discussion of quality of life associated with grazing on the CFO.)

The BLM has assumed that for allotments where domestic sheep grazing is prohibited, a qualified applicant would apply for and, after a BLM site-specific analysis is conducted, receive authorization to graze cattle. Under this assumption, decreases in employment and income relative to Alternative A could be partially regained, and effects on the social role of ranching in the community could be reduced. This alternative would end historic domestic sheep grazing on all BLM lands in the Salmon River Canyon east of Riggins within the analysis area, and end the rich culture associated with traditional herdsman tending flocks on open public lands.

*Bighorn Sheep-related Recreation*

The potential for adverse effects on bighorn sheep population trends is ranked third of all the alternatives because grazing use within the CFO would only be allowed on the Big Creek and Hard Creek allotments; consequently, fewer bighorn sheep potential hunting opportunities and other bighorn sheep-related recreation (e.g., wildlife viewing) would be provided than under alternatives B and C, resulting in less employment and income contributions to the impact area. The inverse would be true compared to Alternatives A, D, and E.

As shown in Figure 3-4, the impact area is dependent on recreation-related sectors for 10 percent of employment and can be considered specialized with respect to retail trade, passenger transport and arts, and entertainment and recreation. As a result of this alternative, employment and income contributions to the recreation-related economy of the impact area would be less than under Alternatives B and C, but more than under alternatives A, D, and E.

*Non-market and Social Values*

Compared with alternatives A, D, and E, fewer bighorn sheep hunting opportunities are anticipated under this alternative; consequently, levels of non-market values could be lower. Other non-market values associated with bighorn sheep would be lower as well; suggesting that visitors and area residents would experience levels of value associated population levels of

bighorn sheep that are lower than the other alternatives. The inverse would be true when compared to Alternatives B and C.

*4.4.3.7 Environmental Justice*

Direct effects on employment in the agricultural sector could disparately affect minority populations if sheepherders are predominantly minorities or ethnic groups. However, there is no current sheep grazing use on BLM allotments, thus no disparate effects relative to current conditions are possible. While changes in permitted levels of grazing under the alternatives are expected to result in indirect and induced changes in employment and labor income relative to current conditions, these changes would be spread throughout the population and would not disproportionately affect minority and low-income populations. These contributions would likely remain a small share of total employment and labor income within the planning area, but may be more important for smaller communities within the planning area.

Actions under the alternatives have potential effects on the area bighorn sheep population and could affect environmental justice populations within the impact area. Harvest ability depends on the bighorn sheep population available for hunting. Because the effect on harvest ability would be spread among all segments of the general population, Tribal, other minority, or low-income communities would not be disproportionately affected. Therefore, disparate effects to environmental justice populations within the impact area are not anticipated.

In addition, the Nez Perce Tribe is a cooperating agency in preparation of this SEIS and the BLM has considered input from the Tribe in this analysis.

### 4.4.4 Cumulative Effects

In the proximity of the analysis area domestic sheep grazing occurs on USFS, state, and private lands (see Map 9). Implementation of the recent Payette Forest Plan Amendment FSEIS/ROD (USFS 2010b) resulted in closure of seven of their domestic sheep allotments. For this analysis, the BLM assumed that the Allison Berg Allotment, which is adjacent to the BLM Partridge Creek Allotment and was temporarily closed by the Nez Perce - Clearwater National Forest, would remain closed. The Carlson Livestock Company and Soulen Livestock Company also used some of these USFS allotments. For this analysis, the BLM assumed that Carlson Livestock Company will continue to graze sheep on their private and state lands in the Lower Salmon drainage, and Soulen Livestock Company will continue to graze sheep on private land south of New Meadows, adjoining the Big Creek Allotment and their USFS grazing permits outside of bighorn sheep habitat. Other domestic sheep grazing occurs across north-central Idaho under commercial operations and with small farm flocks. There is domestic sheep grazing on private lands south of Riggins along the Little Salmon to Tamarack (see Map 9).

Cumulative effects are examined for the same impact area assessed above. The economy can be affected by a variety of factors, including population growth, interest rate changes, location of new industries, recession, new sector growth, tax policy, and state economic policy. When compared to these types of variables, managing sheep grazing on the four BLM allotments has a relatively small regional effect. For example, the maximum potential effect from changes in sheep grazing under all the alternatives constitutes less than 0.5 percent of total employment in

the impact area. Because the changes in economic activity previously discussed would be largely unnoticeable regionally, there should be no cumulative economic effects across the region. However, for individual sectors of the economy and smaller areas within the impact area, the cumulative effects are noteworthy.

Past and present cumulative economic activity has already been absorbed by the local economy. However, estimating the direct and indirect effects specific to other future reasonably foreseeable projects is not possible due to unavailable information specific to these projects. Individually, these projects would likely have a minimal impact on economic conditions; however, cumulatively they may affect employment and income levels in the impact area. The degree to which the economic environment would be impacted, as well as the distribution of effects, cannot be determined from the information available.

As noted in the analysis of employment and labor income impacts above, the maximum potential effect under the alternatives would represent approximately 6 percent of employment in the sheep grazing subsector and less than 0.5 percent in the agriculture sector within the three-county impact area (under Alternative C). Consequently, actions under this SEIS could have small cumulative economic impacts relative to the agriculture sector but larger effects relative to the subsector that includes sheep grazing. The degree to which the economic environment would be impacted, as well as the distribution of effects, cannot be determined from the information available. While specific quantitative cumulative economic effects are unknown, actions and trends affecting recreation related to bighorn sheep and the subsector that includes sheep grazing are discussed qualitatively below.

Management decisions regarding adjacent USFS lands have impacted current conditions and the potential domestic sheep lessees utilizing the BLMs Partridge Creek, Marshall Mountain and Hard Creek Allotments. The unavailability of seven USFS allotments that were formerly used in concert with the three BLM allotments for domestic sheep forage, constituting 90% of the federal acreage, impacted the sheep operations of Carlson Livestock Company and Soulen Livestock Company around the BLM's Hard Creek Allotment. The unavailability of forage and historical driveways for domestic sheep on USFS lands changed the way lessees could utilize three of the four BLM allotments included in this analysis.

For analysis purposes, the BLM assumed that allotments available for use by domestic sheep in each alternative would be utilized at authorized levels. However, without sheep driveways through USFS lands to the BLM's Marshall Mountain Allotment, it is unlikely this allotment would be utilized for domestic sheep grazing even if available as the expense of trucking animals to the area for the limited amount of forage may not be a sound economic decision. The same holds true with the Hard Creek Allotment. Domestic sheep grazing could resume as a farm flock operation in the Partridge Creek Allotment in conjunction with use of private and state lands. Since the Big Creek Allotment is near USFS allotments that remain open to domestic sheep use, it could still play a viable role in traditional domestic sheep trailing.

BLM decisions about availability of the four allotments for domestic sheep grazing would have minimal contribution to the cumulative impacts which have already resulted from USFS decisions regarding nearby allotments. Cumulative impacts to the historical domestic sheep

industry of the area have already occurred and are not likely to change regardless of BLM decisions.

The Payette National Forest FSEIS/ROD (USFS 2010b) noted that the traditional and historical role sheep grazing has played is declining. This decline is confirmed by decreasing state and county sheep inventories (USFS 2010a). In addition, the Payette National Forest Plan noted that urban communities will look to the Southwest Idaho Ecogroup National Forests with an increased need and desire to provide recreational and undeveloped areas, as USFS recreation visitor-days are projected to increase over time (USFS 2003; Table SO-18). This growth in recreation use may create additional recreation-related jobs in area communities, which could buffer recreation-related effects to industries and communities dependent on bighorn sheep-related recreation, should bighorn sheep populations continue to decline.

Sheep grazing management on other lands (e.g., private, state, USFS) will cause additional bighorn sheep cumulative economic effects. Due to domestic sheep and goat grazing on private and state lands, and resulting contacts and potential disease transmission, the largest bighorn sheep population (Main Salmon/South Fork) would likely continue to trend downward. This would drastically reduce bighorn sheep related recreation, such as wildlife viewing and other bighorn sheep-related economic benefits.

## 4.5 IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES

Section 1502.16 of CEQ regulations requires the discussion of environmental consequences to include a description of "…any irreversible or irretrievable commitment of resources which would be involved in the proposal should it be implemented."

An irreversible commitment of resources refers to decisions impacting the use of nonrenewable resources (e.g., minerals). Since the alternatives for this RMP Amendment/SEIS address only renewable resources (e.g., forage and wildlife habitat), none of the alternatives would result in irreversible commitment of non-renewable resources.

An irretrievable commitment of resources refers to decisions that result in the loss of production or use of a resource. While all of the action alternatives would reduce domestic sheep and goat grazing, none of them would prevent grazing by other types of livestock. Therefore, the forage that is not available to domestic sheep and goats is not irretrievably lost.

# LIST OF PREPARERS

## List of Preparers

The following BLM and Forest Service (USFS) employees comprised the interdisciplinary team and were the primary preparers of the SEIS:

| | |
|---|---|
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In addition, the following provided advice and assistance:

| | |
|---|---|
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## Cooperators

The Nez Perce Tribe and Payette National Forest were cooperating agencies that provided expertise. Technical experts from these agencies who participated include the following:

| | |
|---|---|
| Mike Lopez | Nez Perce Tribe |
| Keith Lawrence | Nez Perce Tribe (retired) |
| Angela Sondenaa | Nez Perce Tribe |
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| Kerey Barnow-Meyer | Nez Perce Tribe |
| | |
| Chans O'Brien | Payette National Forest |
| Patricia Anderson Soucek | Payette National Forest |

# GLOSSARY

**Animal Unit Month (AUM) –** An Animal Unit Month (AUM) is the amount of forage to sustain one cow and her calf, one horse, or five sheep or goats for one month.

**Allowable Uses** – In accordance with the BLM Land Use Planning Handbook (BLM 2005), land use plans must identify uses, or allocations, that are allowable, restricted, or prohibited on the public lands and mineral estate. These allocations identify surface lands and/or subsurface mineral interests where uses are allowed, including any restrictions that may be needed to meet goals and objectives. Land use plans may also identify lands where specific uses are excluded to protect resource values.

**Best Management Practices (BMPs)** – Best Management Practices (BMPs) for domestic sheep and goat grazing include a variety of grazing lease or permit stipulations to reduce risks for domestic sheep or goats contacting bighorn sheep and potential for disease transmission. Typically these are implemented as a term and condition of the grazing lease or permit. In general, BMPs are techniques that guide, or may be applied to, management actions to aid in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a land use plan decision unless the plan specifies that they are mandatory. They may be updated or modified without a plan amendment if they are not mandatory. BMPs can be applied and monitored using adaptive management techniques. Similar to guidelines, rationale must be documented for deviating from applicable BMPs during implementation.

**Big Game Management Unit** – Units designated by the Idaho Department of Fish and Game for big game management purposes, such as hunting recommendations and setting population and demographic objectives.

**Core Herd Home Range** – The area within which most herd individuals spend most (95 percent) of their time.

**Core Herd Home Range Analysis** – Analysis used to estimate core herd home ranges from telemetry observations of individual bighorn sheep. First, fixed kernel analyses are used to estimate the home ranges of all observed individuals in a herd, and then those estimates are aggregated. The core herd home range is the area within the 95th volume contour of the aggregated home range estimates.

**Desired Outcomes** – In accordance with the BLM Land Use Planning Handbook (BLM 2005), land use plans must identify desired outcomes expressed in terms of specific goals and objectives.

**Disease Model** – A simulation model that uses the estimated rate of contacts between bighorn sheep and domestic sheep allotments to estimate the population's dynamics of bighorn sheep herds in the Salmon River and Hells Canyon metapopulations. The model incorporates estimates of current population sizes as well as demographic and disease impact parameters drawn from the literature on bighorn sheep biology.

**Effective Contact** – Any contact between domestic and bighorn sheep resulting in the transmission of disease from the domestic sheep to the bighorn.

**Effective Separation** - The spatial or temporal separation between wild sheep and domestic sheep or goats to minimize the potential for association and probability of transmission of disease between species. Effective separation will result in a high degree of confidence that there will be a low to no risk of inter-species contact with wild sheep.

**Epizootic** – A disease attacking a large number of animals simultaneously. The disease is prevalent among a group of animals.

**Extirpation** – Extirpation, also known as local extinction, is the condition of a species which cease to exist in a specific geographic area, though it still exists elsewhere.

**Fixed Kernel Analysis** – A method of mapping the core herd home range of an individual on the landscape that uses a 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 which assumes the width of the standard bivariate normal kernel placed at each observation is the same throughout the plane of the utilization distribution.

**Foray** – A movement of a bighorn sheep outside of the core herd home range. Rams, in particular, make occasional long distance foray movements.

**Foray Analyses** – Analyses of the frequency and pattern of foray movements. For animals of each sex, and during each season ("Summer" = May–October, "Winter"= November–April), telemetry observations are used to determine the probability of a foray movement and the distribution of distances traveled in those forays.

**Herd** – A group of bighorn sheep that remain together as a loose group with a tighter group of breeding ewes as the core. Most of the Hells Canyon herds are named and identified based on a general geographical location they occur in or the group of reintroduced animals from which they descend. Used interchangeable with the term population or local population.

**Metapopulation** – A collection of populations that interact with each other due to occasional movement of animals between populations.

**Planning Area** – The planning area for this amendment process is limited to four BLM grazing allotments (Partridge Creek, Marshall Mountain, Hard Creek, and Big Creek) in Idaho and Adams Counties of Idaho as depicted on Map 1.

**Population** – Interchangeable with the term "herd". (See above).

**Population Management Unit** – Metapopulations are divided into Population Management Units (PMU) which are designated by Idaho Department of Fish and Game. The PMU and the population, are the levels at which many management activities occur.

**Risk of Contact Model** – A model for predicting contact between bighorn sheep and domestic sheep expressed either as the expected number of contacts per year, or as the percent probability of at least one contact per year. The model uses the source habitat, core herd home range, and foray analyses results to generate the output.

**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 and topography that contribute to positive population growth for a species in a specified area and time. It is different from habitats associated with species occurrence, which 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.

**Source Habitat Model** – GIS modeling, validated with telemetry observations, used to map areas of winter and summer bighorn source habitat. The model uses vegetation cover type and structure, along with topological variables (elevation, slope and aspect) to identify areas qualifying as bighorn source habitat.

**Sustainable** – The term is synonymous with the term "sustained yield" as defined by the Federal Land Policy and Management Act of 1976, as amended (43 U.S.C. §1701 *et seq.*). The term means the achievement and maintenance in perpetuity of a high level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple use.

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# Appendix A – Disease Transmission between Domestic Sheep and Bighorn Sheep

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## Respiratory Disease Outbreaks in Bighorn Sheep

Early evidence of an association of bighorn sheep and domestic sheep with bighorn sheep die-offs was largely anecdotal. A variety of field observations spanning many decades led to the hypothesis that bighorn sheep have a high probability of developing fatal pneumonia following contact with domestic sheep, and numerous attempts to disprove the contact hypothesis under controlled conditions have failed (Wehausen et al. 2011). Since at least 1937, multiple die-offs of bighorn sheep throughout North America have been 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; Lawrence et al. 2010; Besser et al. 2012). As with other native North American wild ruminants, epidemics in bighorn sheep typically followed settlers and introduction of domestic livestock grazing and may have reflected an historical introduction of new pathogens into native wildlife populations by 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; consequently, the role of *Pasteurella* spp. in bighorn sheep epidemics was probably underestimated in studies reported prior to 1980 (Frank et al. 2004).

In North America, epizootic pneumonia is a devastating, outbreak of disease that rapidly affects many animals in a specific area at the same time, and has been identified as a population-limiting disease in bighorn sheep (Besser et al. 2012a; Cassirer and Sinclair 2007; Hobbs and Miller 1992; McCarty and Miller 1998; Monello et al. 2001; Miller 2001). Although various stressors and organisms are implicated in outbreaks of bacterial pneumonia in bighorn sheep, the most commonly associated organisms are bacteria in the genera *Pasteurella* and *Mannheimia*, in particular *Mannheimia haemolytica* (formerly *Pasteurella haemolytica1*) and *Bibersteinia trehalosi* (formerly *P. haemolytica* biotype T) (Foreyt 1990). Both genera belong to the *Pasteurellaceae*— an incredibly large and diverse group of bacteria that continues to undergo reclassification (Garde et al. 2005). *Pasteurella* and *Mannheimia* spp. infect most mammalian families, as well as many if not all non-vertebrates (Miller 2001). They are common commensals (relationship between two organisms) on the mucous membranes of animal species in all climatic zones, most of whom are asymptomatic carriers (not producing indications of disease) (Biberstein 1979).

Miller and others (2012) identified that a clear, invariant (consistent) relationship between a single agent and field outbreaks has not yet been documented, in part due to methodological limitations and practical challenges associated developing rigorous study designs. However, to help clarify the uncertainty of pneumonia epizootics among bighorn sheep and uncertain etiology (cause or origination of disease), Besser and others (2012a) used culture and culture-independent methods to compare the prevalence of the bacterial respiratory pathogens *Mannheimia haemolytica*, *Bibersteinia trehalosi*, *Pasteurella multocida*, and *Mycoplasma ovipneumoniae* in lung tissue from 44 bighorn sheep from herds affected by 8 outbreaks in the western United States. The results of a Besser and others (2012a) study support a relationship between a single primary agent as the most consistently detected agent and the only agent that exhibited single strain types within each outbreak. The results of the Besser and others (2012a) study support the hypothesis that *M. ovipneumoniae* is a primary agent in the etiology of epizootic bighorn sheep

pneumonia in populations across the western United States and that it acts to induce the secondary infection with opportunistic pathogens that take advantage of certain situations. The normal host range of *M. ovipneumoniae* (members of Old World Caprinae), is consistent with many observations that epizootic bighorn sheep pneumonia frequently follows contact with these hosts (Besser et al. 2012a). The likelihood of *M. ovipneumoniae* having a primary role in bighorn sheep pneumonia is consistent with the association between some epizootics of this disease and contact with domestic sheep because domestic sheep carry this agent at high prevalence (Besser et al. 2012a).

To test the hypothesis that *M. ovipneumoniae* is an important agent of the bighorn sheep pneumonia that has previously inevitably followed experimental commingling with domestic sheep, Besser and others (2012b) commingled *M. ovipneumoniae*-free domestic and bighorn sheep (4 each). One bighorn sheep died with acute pneumonia 90 days after commingling, but the other three remained healthy for >100 days. This unprecedented survival rate is significantly different (P=0.002) from that of previous bighorn-domestic sheep contact studies but similar to (P>0.05) bighorn sheep survival following commingling with other ungulates. The absence of epizootic respiratory disease in this experiment supports the hypothesized role of *M. ovipneumoniae* as a key pathogen of epizootic pneumonia in bighorn sheep commingled with domestic sheep (Besser et al. 2012b). The significant finding of this study was the unprecedented majority survival of bighorn sheep commingled with domestic sheep in the absence of *M. ovipneumoniae*. This finding is consistent with the hypotheses that *M. ovipneumoniae* is an important agent in epidemic pneumonia in bighorn sheep, but additional research will be required to substantiate this hypothesis further (Besser et al. 2012b).

Manlove et al. (2014) found that lamb mortalities were affected by female social connections during years when disease was present, but not in the absence of disease. Ewe-subpopulations accounted for most of the variation in lamb mortality, while individual ewe, year and population-level variation were relatively unimportant (Manlove et al. 2014). Mortalities were structured at the subpopulation scale and therefore the assumption that all ewes in a population mix homogeneously during lamb disease epidemics is not supported (Manlove et al. 2014).

Despite being ubiquitous among mammals, including native North American ruminants (Biberstein 1979; Thorne 1982; Jaworski et al. 1998), these bacteria cause only sporadic cases of pasteurellosis (usually associated with *Pasteurella multocida*) in bison, elk, moose, mountain goats, mule deer, and pronghorn (Thorne 1982). While pasteurellosis is one of the most common bacterial infections of domestic sheep, the most severe outbreaks kill 2.5 percent of the domestic sheep in a herd, not even close to the mortality seen in die-offs of bighorn sheep (Gilmour and Gilmour 1989; Donachie 2007; Miller 2001).

In contrast to most other wild and domesticated mammal species, bighorn sheep are notable in their extreme susceptibility to some strains of *Pasteurellaceae* (Miller 2001). Pneumonia associated with *Pasteurella* causes die-offs that can kill some, many, or all adult bighorn sheep in a herd (Bunch et al. 1999). Chronic or sporadic low levels of adult mortality and elevated mortality of lambs can continue for many years (>20 years) further impairing population recovery and stability (Foreyt 1990; McCarty and Miller 1998; Miller et al. 2000; Cassirer et al. 2001; Miller 2001; Cassirer and Sinclair 2007; Frank et al. 2004; George et al. 2008; Cassirer et al. 2013). It has been speculated that once *Pasteurella* spp. 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) or until adult bighorn sheep previously exposed to pneumonia are removed from the population through natural mortality (Besser et al. 2012a, Plowright et al. 2013, Cassirer et al 2013).

Although a high likelihood for bighorn sheep mortality following direct contact with domestic sheep exists, domestic sheep appear to be resistant 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. Marten and others (1996) summarized over 30 cases where bighorn die-offs are believed to have resulted from contact with domestic sheep. In many cases, over 50 percent of the bighorn herd died. Domestic sheep always remained healthy.

The physiological and cellular causes of bighorn sheep's susceptibility to *Pasteurella* spp. are an area of active research. On a general level, bighorn sheep did not co-evolve with the same set of pathogens as domestic sheep (Dubay et al. 2002), and domestic animals have likely been selected for disease resistance (Jessup 1985). Divergences in host–parasite co-evolutionary paths may explain observed differences in defense mechanisms between bighorn and domestic sheep (Silflow et al.1989).

Phenotypic traits (observable physical or biochemical characteristics) of *Pasteurella* spp. isolated from bighorn sheep are similar to those of isolates from domestic ruminants, so the susceptibility of bighorn sheep is due to the biology of the animals (Frank et al. 2004). Physiologically, domestic and bighorn sheep have different alveolar macrophage (surface of lung alveoli) function and arachidonic acid metabolism, which may cause increased sensitivity of bighorn sheep to respiratory disease (Silflow et al. 1991). Furthermore, in vitro studies have revealed a reduced capacity of bighorn sheep immune systems to kill bacteria compared with domestic sheep immune systems (Dubay et al. 2002). Silflow and Foreyt (1994) found that bighorn sheep neutrophils were more susceptible to cytotoxin (toxin effect on cells) damage than domestic sheep neutrophils (white blood cells essential for fighting disease). All ruminant leukocytes (specific type of white blood cell) are particularly susceptible to cytolysis (cell destruction) by the *M. haemolytica* leukotoxin (Shanthalingam and Srikumaran 2009). Leukotoxin secreted by *M. haemolytica* appears to be its main virulence factor in bighorn sheep, indicating that the basis of bighorn sheep's susceptibility to the bacteria may lie in the details of the interaction between leukotoxin and their leukocytes (Dassanayake et al. 2009).

Domestic goats have been implicated in fatal disease transmission to bighorn sheep. Some goats are carriers of *Mannheimia* and *Pasteurella* species that have been identified in bighorn sheep disease events. DNA analysis conducted during a 1995 to 1996 Hells Canyon bighorn die-off revealed that a feral goat and two bighorn sheep shared a genetically identical *P. multocida* and *M. haemolytica* (Rudolph et al. 2003; Weiser et al. 2003).

Developing immunity to pasteurellosis in bighorn sheep is complex and poorly understood (Miller 2001) and vaccines to protect bighorn sheep have proven ineffective (Foreyt 1992a; Foreyt 1998; Foreyt and Silflow 1996). Research is ongoing regarding the creation of a vaccine to protect bighorn sheep and it may be over a decade until such a vaccine is perfected (Dr. Subramaniam Srikumaran letter to Payette National Forest Supervisor).

## Evidence of Disease Transmission from Domestic Sheep

The role that domestic sheep contribute to causing pneumonia in bighorn sheep is an important issue for wildlife management, livestock grazing, and multiple-use management (WAFWA 2012; Besser et al. 2012a; Cahn et al. 2011; Lawrence et al. 2010; Foreyt et al. 1994; Hurley 1999; Schommer and Woolever 2001; Schwantje et al. 2006). In the past 25 years, much research has been devoted to the question of whether contact with healthy domestic sheep leads to die-offs of bighorn sheep populations, due to the transmission of organisms that are non-pathogenic in domestic sheep but deadly in bighorn sheep. Evidence contributing to an answer to that question takes a variety of forms, each of which has its own inherent limitations. The next four sections discuss several types of evidence, derived from controlled experiments and field observations. The discussion notes the limitations of each type of observation and is structured to show how each one complements the others so that together they point toward a common conclusion that contact with domestic sheep does pose a substantive risk to free-ranging bighorn sheep populations. Ultimately, the research shows that contact between bighorn sheep and domestic sheep and goats can likely lead to respiratory disease and fatal pneumonia in bighorn sheep (Besser et al. 2012a; Wehausen et al. 2011; Lawrence et al. 2010).

## Inoculation experiments

Inoculation experiments have been used to test the hypothesis that healthy domestic sheep carry pneumonia-causing bacteria that can kill bighorn sheep. In one series of experiments, isolates of a particular strain of *M. 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 none of the seven domestic sheep showed symptoms (Foreyt et al. 1994). In two similar experiments, inoculation with *M. haemolytica* cultures from domestic sheep resulted in the death of five of five bighorn sheep (Foreyt and Silflow 1996; Onderka et al. 1988).

More recently, Dassanayake and others (2009) isolated a particular strain of the A1 serotype of *M. haemolytica* from domestic sheep that they thought would be fatal in bighorn sheep. While they typically carry both A1 and A2 serotypes, A2 serotypes are the primary cause of pneumonia in domestic sheep (Dassanayake et al. 2009). All four bighorn sheep injected with the strain died within 48 hours, while none of the domestic sheep were apparently affected by the bacteria. In addition, by injecting some bighorn sheep with a mutant of serotype A1 from which the leukotoxin gene had been deleted, the researchers succeeded in pinpointing the single gene that is the primary virulence factor of *M. haemolytica*.

These inoculation experiments together indicate that domestic sheep carry at least some strains of bacteria that are not pathogenic to them but are highly lethal to bighorn sheep. Inoculation experiments themselves, however, cannot show whether such bacteria can be transmitted by contact between domestic and bighorn sheep.

## Pen experiments

Pen experiments are designed to test the hypothesis that contact can lead to transmission of disease from domestic sheep to bighorn sheep. In a pen experiment, healthy bighorn sheep are

put in contact or close proximity with healthy individuals of other species, and are watched for the development of disease. In six independent pen studies since 1982, 44 of 46 bighorn sheep have died of pneumonia or become so sick that they were euthanized (Foreyt and Jessup 1982; Onderka and Wishart 1988; Foreyt 1989; Foreyt 1994; Callan et al. 1991; Lawrence et al. 2010).

For example, 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. *M. haemolytica* was found in 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 of exposure to the domestic sheep. *M. 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 euthanized, and *M. haemolytica* was found in two of them.

A recent pen experiment definitively demonstrated a case in which a deadly pathogen was transferred from domestic sheep to bighorn sheep (Lawrence et al. 2010). Four isolates of *M. haemolytica* were obtained from domestic sheep and were tagged with a plasmid carrying genes for a green fluorescent protein and for resistance to the antibiotic ampicillin. The tagged bacteria were put back into four domestic sheep, who then entered a pen experiment with four bighorn sheep. The bighorn sheep all contracted pneumonia and died. More informatively, tagged bacteria, which glowed green and grew even in the presence of ampicillin, were found in all four bighorn sheep. The study shows unambiguously that transmission of *M. haemolytica* from domestic sheep to bighorn sheep occurs and that it can result in pneumonia and death of the bighorn sheep.

Comingling of domestic and bighorn sheep under experimental conditions clearly results in transmission of fatal pneumonia to bighorn sheep. However, pen experiments do not completely account for the transmission of fatal disease between domestic sheep and bighorn sheep in the wild but does provide evidence that comingling could result in fatal pneumonia to bighorn sheep. No known science or research have documented that disease transmission does not occur in the wild or that disease transmission in the wild is different than pen experiments. One of the reasons that inter-specie's transmission rates have not been conducted in the wild is the difficulty in designing controlled experiments and a concern about using wild sheep populations in fatal experiments that may have population-wide significance. A substantive amount of scientific evidence suggests transmission does occur in the wild and no evidence that transmission rates would be substantively different than penned experiments exists.

## Observations of outbreaks following contact between domestic and free-ranging bighorn sheep

Since the early 1980s, there have been anecdotal field reports of bighorn deaths due to pneumonia following contact with domestic sheep (Foreyt and Jessup 1982; Coggins 1988; George et al. 2008). Given the evidence from pen experiments, it is likely that transmission of pneumophilic bacteria also occurs in which inhalation of the bacteria can infect bighorn sheep in similar situations in the wild when interspecies contact occurs. Bighorn sheep and domestic sheep are attracted to each other, particularly during rut, which increases the probability that they

will make the close contact necessary for disease transmission when they are in the vicinity of one another (Onderka et al. 1988; Foreyt 1989; Ward et al. 1997; Dubay et al. 2002).

Evidence that disease transmission and subsequent die-offs occurs in the wild comes from numerous observations of bighorn sheep die-offs following contact between free-ranging bighorn sheep wand domestic livestock (e.g., Onderka and Wishart 1984; Coggins 1988; Callan et al. 1991; George et al. 2008). Onderka and Wishart (1984) describe a major die-off of bighorn that began in southeastern British Columbia after bighorn sheep were observed mixing with domestic sheep and proceeded to spread south over the course of three winters, eventually reaching Glacier National Park. Coggins (1988) reports a die-off that killed two-thirds of a herd of 100 animals in the Wallowa Mountains in northeastern Oregon. Almost 2 months before the outbreak, two bighorn rams and a ewe had been observed with a domestic ewe. In December 1997, on Sugarloaf Mountain in Colorado, George and others (2008) observed a single domestic ram grazing with a group of bighorn sheep, 8.70 miles (14 kilometers) from the nearest herd of domestic sheep. It was the first and only time during a 10-year study that the authors saw domestic sheep associating with bighorn sheep, and it coincided with the beginning of an outbreak that eventually spread to two additional herds.

While some debate still continues whether disease transmission from domestic sheep to bighorn sheep has triggered die-offs of wild bighorn sheep populations, the preponderance of relevant scientific literature supports the hypothesis that there is a significant risk resulting from interspecies contact that warrants considerations by managers (Carpenter et al. 2014). The BLM is not aware of any science that indicates disease transmission does not occur in the wild or that transmission rates are different than those documented through scientific studies in penned experiments. A substantive body of scientific evidence suggests disease transmission does occur in the wild and no evidence that transmission rates would be substantively different than those documented in penned experiments when interspecies contact occurs.

## Analyses Correlating Bighorn Population Performance with Distance from Domestic Sheep

The few attempts to quantitatively test whether contact with domestic sheep poses a general risk of die-off or extirpation of bighorn sheep populations have examined the correlation between population performance and distance from domestic sheep. Monello and others (2001) analyzed population records of 99 bighorn sheep herds ranging from the southwestern United States to Alaska, in an investigation designed to discover the ecological correlation of pneumonia epizootics. They found that bighorn sheep populations that had suffered a pneumonia-induced die-off were located, on average, significantly closer to domestic sheep allotments (14.97 ± 7.15 miles than either those that had not suffered a die-off (24.61 ± 5.28 miles) or those that had suffered a die-off not induced by pneumonia.

Singer and others (2000d) analyzed factors contributing to the success of 100 translocations of bighorn sheep in 6 western states and found that the 30 unsuccessful translocations were, on average, significantly closer to domestic sheep (3.73 ± miles) than either modestly successful or successful translocations. Finally, based on an analysis of 24 herds, Singer and others (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.

While these analyses indicate that bighorn sheep populations perform more poorly when they are closer to domestic sheep, they typically do not include observations of contact or direct evidence of transmission of a pathogen from domestic sheep to bighorn sheep.

Sells and others (2015) developed a model for herds in Montana that identifies risk factors and addresses biological questions about risk for pneumonia epizootics in bighorn sheep. Sells et al. (2015) found that amount of private lands, weed control using domestic sheep or goats, pneumonia history, and herd density were positively associated with risk of pneumonia epizootics in 43 herds that experienced 22 epizootics out of 637 herd-years from 1979-2013. The area of highest risk for pathogen exposure was identified as the area of each herd distribution plus a 14.5-kilometer buffer from the boundary (Sells et al. 2015).

Bighorn sheep (*Ovis canadensis*) across North America have experienced large population losses due to pneumonia, generally thought to be initiated by the bacteria *Mycoplasma ovipneumoniae* transmitted from domestic sheep and goats. Heinse et al. (2015) surveyed 40 owners of sheep and goats living near wild bighorn sheep herds in central and southeast Washington. Over one-third of the sheep and goat owners had no knowledge that their animals could transmit pathogens to bighorn sheep. Heinse et al. (2015) detected *Mycoplasma ovipneumoniae* in 41% of the sheep or goat herds sampled, and animals escaped their enclosures in 78% of these herds. It was concluded that physical contact between bighorns and domestics is probable due to the geographic overlap and social nature of both species, and a combination of solutions is necessary to reduce this risk.

## Disease Summary

Besser and others (2012a) identified that epizootic pneumonia of bighorn sheep is a devastating disease and etiology regarding the bacterial respiratory pathogens is unclear. To help clarify the etiology, Besser and others (2012a) used culture and culture-independent methods to compare the prevalence of the bacterial respiratory pathogens in lung tissue from 44 bighorn sheep from herds affected by 8 outbreaks. *Mannheimia haemolytica*, was the only agent detected at significantly higher prevalence in animals from outbreaks (95 percent) than in animals from unaffected healthy populations (0 percent) and the other respiratory pathogens were frequently but inconsistently detected (Besser et al. 2012a). Transmission of *Mannheimia haemolytica* from domestic sheep to bighorn sheep was irrefutable, as demonstrated by Lawrence and others (2010), and provides justification sufficient for preventing range overlap and potential association of domestic sheep and goats with bighorn sheep (WAFWA 2012).

It is true that no one form of evidence can conclusively demonstrate that contact with domestic sheep frequently leads to die-offs off bighorn sheep populations in the wild. Taken together, however, the experiments and observations from the lab and the field do indicate that contact of wild bighorn populations with domestic sheep does pose a risk of disease transmission and die-offs in free-ranging bighorn populations. Lab experiments demonstrate the particular sensitivity of bighorn sheep to some pneumonia-causing bacteria. The controlled conditions available in inoculation and pen experiments show that healthy domestic sheep often carry bacteria that are

fatal to bighorn sheep, and that they can transmit those bacteria through close contact. Finally, nearly a century of observations in the field supports the view that proximity to domestic sheep is a risk factor for bighorn sheep due to disease transmission from domestic sheep to bighorn sheep.

Garde and others (2005) offers the following conclusions summarizing the risk to wild bighorn sheep from *Pasteurella* spp. and *Mannheimia* spp.

- These bacteria can cause pneumonia in bighorn sheep, but there are benign commensal strains in the upper respiratory tract which have no harmful effects.
- Pathogens that are benign in domestic sheep can be lethal in bighorn sheep.
- The transference of pathogens from domestic to bighorn sheep has been documented in laboratory settings with resulting mortality in bighorn sheep.
- 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 (e.g., fine mist from breathing).
- 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.

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. These experiments provide strong corroboration that bighorn sheep have a high probability of contracting fatal pneumonia following contact with domestic sheep.

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. Biologists with the U.S. Department of Agriculture (USDA) Forest Service Region 2 identified that the risk of disease outbreaks resulting from contact with domestic sheep and goats is the most significant threat facing bighorn sheep 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). Given the substantial concern raised in the published literature over the past 30 years, management guidance has focused on the separation of these species to prevent disease transmission from domestic sheep to bighorn sheep (The Wildlife Society 2014; WAFWA 2012; Cahn et al. 2011; Foreyt 1989; O'Brien et al. 2014).

## Other Factors/Stressors

Recent research suggests that the interaction of disease outbreaks with other stressors (both disease and otherwise) in bighorn sheep populations is poorly understood. Miller and others (2012) considered direct and indirect causes of bighorn sheep mortality and potential interactions among proposed environmental, host, and agent determinants of disease. Miller and others (2012) reviewed hypothesized determinants associated with bighorn sheep field outbreaks concluded that a clear, invariant relationship between a single agent and field outbreaks, and has not yet been documented. Recent research (Tomassini et al. 2009; Dassanayake et al. 2010; and Lawrence et al. 2010) suggests the complex interactions of disease agents themselves increases uncertainty in diagnosis and may also predispose bighorn sheep to secondary disease events. For example, Tomassini and others (2009) suggests that pathogens typically associated with bighorn sheep mortality are secondary pathogens, indicating that there are likely other pathogens involved in primary infections that have yet to be identified. Dassanayake and others (2010) found in laboratory tests that Bibersteinia trelahosi would overgrow and inhibit *M. haemolytica*, suggesting the difficulty in isolating the latter in wildland disease investigations. This may be why routine isolation of *Pasteurella* spp. and *Mannheimia* spp. in wildland environments is uncommon (Foreyt 1989). Additional research is needed on the interactions of disease pathogens, but it is reasonable to expect that these factors potentially predispose bighorn sheep to diseases caused by multiple pathogens that result in multiple disease cycles (e.g., *Mycoplasma ovipneumoniae*, viruses, internal and external parasites, and other bacterial taxa). Some combination of disease agents with other stressors may cause the organism to shift from being commensal to pathogenic (Srikumaran 2007). Although the exact mechanism for developing pneumonia and other diseases in bighorn sheep following association with domestic sheep is unknown, experimental and field data indicate the two species are not compatible on the same ranges (Foreyt 1992a, b).

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, genetics, high population densities, capture and restraint techniques, breeding behavior, the presence of other wildlife, and high dust levels (Festa-Bianchet 1988; Jenkins et al. 2000; Jones and Worley 1994; Foreyt 1998; Monello et al. 2001). These stressors may reduce the ability of bighorn sheep to resist disease (Garde et al. 2005).

To test the possibility that it is only the stress of being housed with other animals, not the transmission of pathogens that causes bighorn sheep to fall ill, researchers have conducted pen experiments in which bighorn sheep are co-housed with other animals. Of 46 bighorn sheep in three studies, housed with elk, deer, mountain goats, llamas, cattle, horses, and steers, only two died of pneumonia (Foreyt 1992b; Foreyt et al. 1994; Foreyt and Lagerquist 1996; Besser et al. 2012b). These studies provide evidence that stress is not the sole factor causing disease in bighorn sheep when they are penned with domestic sheep. Current modeled bighorn sheep habitat suggests that the Hells Canyon Lower Salmon River population management units (PMU) could support more bighorn than current population levels (IDFG 2010). However, within the Lower Salmon River PMU there are limitation based on specific habitat needs such as lambing and wintering habitat and further refinement of habitat models and available habitat will likely reduce the estimate of potential population size (IDFG 2010). Within the Hells Canyon

PMU there is extensive lambing and year round habitat but further refinement of habitat models could reduce or increase estimates of available habitat and potential population size (IDFG 2010).

Researchers have hypothesized that disease transferred from domestic sheep was a major factor in the widespread loss of bighorn sheep populations (Valdez and Krausman 1999; Wehausen et al. 2011; WAFWA 2012; The Wildlife Society 2014). Current research identifies respiratory disease as the main obstacle to recovery of bighorn sheep populations (Cahn et al. 2011; George et al. 2008; The Wildlife Society 2014). Respiratory disease resulting in pneumonia is the most serious disease at a population level when bighorn sheep share ranges with domestic sheep; in addition, other diseases and parasites, including but not limited to scabies, anaplasma, babesia, ovine parapox (contagious ecthyma), and infectious keratoconjunctivitis (pink eye), may be communicable (Jessup and Boyce 1993). Earlier research also reported bighorn sheep deaths in die-offs were typically due to bacterial pneumonia coincident with huge infestations of lungworms in the affected populations (Heimer 2002). It was hypothesized that lungworms predisposed bighorn sheep to bacterial pneumonia, eventually, controlled laboratory tests showed lungworm-free bighorn sheep would still die of pneumonia if infected with bacteria from healthy domestic sheep (Heimer 2002).

## Uncertainties Identified Regarding Disease Transmission

There are scientists and others, primarily from agricultural disciplines, who contend that disease transmission between bighorn sheep and domestic sheep is not a relevant factor in bighorn sheep distribution and population declines. The following contentions and comments were received during the public scoping process and public meetings held during the planning process of completing the Payette FSEIS (USFS 2010a) for domestic sheep allotments and bighorn sheep viability and similar concerns have been identified for the BLM planning and analysis process:

- The mechanisms and causal agents leading to epizootic disease events in bighorn sheep are not completely understood.
- The hypothesis that bighorn sheep have a high likelihood of contracting fatal respiratory disease following contact with domestic sheep has not been scientifically demonstrated in wildland conditions.
- Bighorn sheep die-offs have occurred in the absence of domestic sheep.
- Sources of error or omission and data limitations have not been presented by those advocating that disease transmission does occur between the species.
- The peer review process does not support the contention that disease transmission occurs between the species.
- Research evaluating disease transmission between the species lacks proper experimental design that is not accounted for in the results.
- Current, ambient levels of pathogens occur in bighorn sheep, regardless of how those pathogens were introduced, making separation from domestic sheep irrelevant.

- Given the probabilities of contact from off-federal private lands sources, excluding domestic sheep on federal lands is futile.

Ward and others (1997) could not conclusively attribute a bighorn sheep die-off in Nevada to disease transmission, although he did note that the die-off occurred after domestic sheep were detected on those ranges. The study did find *Pasteurella* spp. isolates in both species and suggests a disease transmission event. They further advise separation of the species given the propensity for contact and disease transmission.

Miller and others (2012) identified that a clear, invariant relationship between a single agent and field outbreaks has not yet been documented, in part due to methodological limitations and practical challenges associated with developing rigorous study designs. Miller and others (2012) identified a need to develop predictive models for outbreaks and validated mitigation strategies, as uncertainty remains as to whether outbreaks are due to endemic or recently introduced agents.

We have learned a tremendous amount from recent research on pathogen transfer between the species, and the fact that some pathogens that are non-lethal in domestic sheep have high lethality in bighorn sheep (Dassanayake et al. 2009). We also know that specific pathogens are transmitted from domestic sheep to bighorn sheep, resulting in bighorn sheep mortality (Lawrence et al. 2010; Besser et al. 2012a).

As discussed above, uncertainties regarding disease transmission have been identified, and specifically where findings very clearly infer disease transmission between the species, citing improper experimental design or other flaws in research design. However, the referenced papers have been published in widely recognized scientific publications and have undergone rigorous peer review prior to publication (USFS 2010b). The Wild Sheep Working Group (WAFWA 2012) identified that since the cause of the start of a disease outbreak is unknown that separation is the most prudent action to take.

Some contend a lack of evidence of disease transmission between domestic sheep and bighorn sheep in wildland environments. Much of the evidence is circumstantial; however, the compilation of cases throughout several decades contributes to an increasing body of evidence that overwhelmingly demonstrates bighorn sheep near domestic sheep are at risk for disease transmission, even though contact may not have actually been observed. Monello and others (2001) states that bighorn sheep herds classified in a pneumonia-induced die-off category were located significantly closer (less than15 miles) to domestic sheep allotments than those in a non-die-off category (more than 25 miles). George and others (2008) document a winter die-off in Colorado that affected three bighorn sheep herds that was traced to contact with a single domestic ewe.

Additional arguments state that since disease pathogens have already been transferred to domestic sheep, separation at this point is moot, or that private lands provide risks to bighorn sheep that cannot be offset, regardless of actions taken on federal lands (USFS 2010b). These contentions claim that management on federal lands to provide separation will not be effective due to changed conditions that cannot be offset. The uncertainty in these contentions poses all of the risk to be borne by bighorn sheep. They do not consider that pathogens likely evolve as they move within and between species, or existing or new diseases that are virulent to bighorn sheep

(e.g., mycoplasms) may still be transferred between domestic and bighorn sheep. Recent serological research (Dassanayake et al. 2009) demonstrates that pathogens, in this case *Mannheimia haemolytica* serotype A1, which are not lethal to domestic sheep, are transferrable to bighorn sheep and are highly lethal to them. In another recent experiment, pathogens were tagged and followed as they passed from domestic to bighorn sheep and resulted in bighorn sheep mortality (Lawrence et al. 2010).

The disease review sections of this document consider a large body of peer-reviewed and published literature, spanning several decades, that addresses the allegations. While there are gaps in the knowledge base on the causal factors and mechanisms of bighorn sheep die-offs and disease transmission between these species, the vast majority of literature supports the potential for disease transmission between the species, documents bighorn sheep die-offs near domestic sheep, and supports the management option of keeping these species separate to prevent disease transmission (WAFWA 2012; Wehausen et al. 2011). Further, there is no peer-reviewed literature that suggests bighorn sheep can be grazed with domestic sheep without concern for disease transmission between the species (Wehausen et al. 2011). Lawrence and others (2010) provided research documentation that *Mannheimia haemolytica* was irrefutably transferred from domestic sheep to bighorn sheep and provides sufficient justification to prevent range overlap and potential association of domestic sheep and goats with wild sheep (WAFWA 2012). Scientists from both sides of the issue also recommend that the species be kept separate until the disease transmission science is better-understood (USFS 2010b; Foreyt 1994; Foreyt et al. 1994).

Don Knowles, Research Leader, Animal Disease Research Unit, Agricultural Research Unit, submitted a comment letter to the Payette National Forest on their Record of Decision for the Final Supplemental Environmental Impact Statement and Forest Plan Amendment Identifying Suitable Rangeland for Domestic Sheep and Goat Grazing to Maintain Habitat for Viable Bighorn Sheep Populations (USFS 2010b). Knowles' (2010) comment letter provided clarifying information pertaining to research he was involved with and co-authored (Lawrence et al., 2010), specifically in regard to quantification of time and distance for transmission of *Mannheimia haemolytica* between domestic and bighorn sheep. Knowles clarified that the study shows that contact, as related to transmission and disease development, involves complex concepts. Knowles further specified that data from the Lawrence et al. (2010) study showed that the contact time requirements for disease transmission required varying time periods dependent on distance maintained between domestic sheep and bighorn sheep (e.g., 10 meters to co-mingling). He also noted that transmission of an organism doesn't necessarily lead to disease and many factors are involved in determining the outcome of organism transmission, but a key factor is organism dose (amount) transmitted.

# Appendix B – Model Analysis Details

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This appendix contains detailed information about the three types of models used in this analysis: source habitat, probability and distance that a foraying bighorn sheep leaves its CHHR, and the predicted contacts that a bighorn sheep will have after leaving a CHHR and intersects a domestic sheep allotment (USFS 2013a; O'Brien et al. 2014; Carpenter et al. 2014).

## Source Habitat Model

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). Bighorn sheep have habitat preferences and select habitat based on factors such as proximity of steep-sloped escape terrain, forage availability, and horizontal visibility (USFS 2013a; O'Brien et al. 2014; HCBSRC 1997).

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 with 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, providing foraging and security opportunities for bighorn sheep (Valdez and Krausman 1999).

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; Raphael et al. 2001). Source habitats contribute to source environments, which represent the composite of all environmental conditions that result in stationary or positive population growth in a specified area and within a specified time (Wisdom et al. 2000; Raphael et al. 2001). Wisdom and others (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, while upland herbland and shrubland are used in both seasons, depending on elevation (Wisdom et al. 2000). Old-forest and stand initiation stages of whitebark pine and the stand initiation stages of other forested cover types are other contributors to source habitat.

Escape terrain is so critical for ewes during lambing (Blood 1961; Kovach 1979; Hall 1981) that they will sacrifice access to high-quality forage for security (Festa-Bianchet 1989; Cook 1990; Bleich et al. 1997). Escape terrain must contain the following characteristics (HCBSRC 2004):

- 300 meter$^2$ buffer of all areas with a slope between 31 and 85 degrees
- If two or more pieces of escape terrain are within 1,000 meters (m), they are buffered so that their total area is connected
- An area of least 1.6 hectares

Source habitat for bighorn sheep occurs within BLM domestic sheep allotments and adjacent landscape. 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, infestations of undesirable vegetation, trampling of reproducing tree and shrub seedlings, soil erosion, and other habitat degradation. Currently, none of the four allotments is being grazed by domestic sheep. However, past grazing by domestic sheep has resulted in areas receiving varying levels of grazing use, which resulted in overall low to moderate localized impacts to the vegetation and soil resources within the allotments. Small and localized concentrated use areas (e.g., bedding grounds) are more prone to vegetation and soil disturbances. In summary, with the exception of space component of habitat (e.g., disease transmission), past grazing impacts to source habitats (e.g., water, forage, and security) were at low to moderate levels within localized areas.

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 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). Past grazing by domestic sheep on the four allotments has not indicated any apparent competition for forage between domestic sheep and bighorn sheep, primary concern was competition for space and potential for disease transmission.

The existing vegetation layer from the national LANDFIRE layer (USGS 2010) was used to assess the current source habitat available for bighorn sheep. This information was utilized because it allows analyzing landscapes that extend beyond but include the BLM domestic sheep allotments, and can be used to address habitat connectivity issues at broader scales. The vegetative cover types used by the Hells Canyon Restoration Committee (HCBSRC 2004) and Wisdom and others (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.

For this source habitat model, a component was added to the escape terrain to filter out areas that have the steepness but not the ruggedness that contributes to source habitat capacity. A ruggedness surface was created using an ArcGIS script (Sappington et al. 2007), and then the telemetry and observations were overlaid to create a histogram of the ruggedness with a range from 0 to 3,455. Based on the histogram, areas with a ruggedness value of 310 or less were excluded from the map of source habitat capacity to limit over-mapping. Vegetation is not considered a component of source habitat capacity since vegetation will vary in response to successional and disturbance processes, while escape terrain remains constant. Therefore, while source habitat capacity is constant, source habitat will vary spatially and temporally across the landscape.

This mid-scale habitat modeling may not represent finer-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. Although the effects of fires within the BLM Cottonwood Field Office Management Area on bighorn sheep habitat and movement are unknown, these fires may have opened up additional movement corridors and summer habitats for bighorn sheep. 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).

## Risk of Contact Model

### Telemetry Data

Telemetry and observational data for Hells Canyon were collected by the Hells Canyon Initiative and overlapped with the BLM Cottonwood Field Office Management Area (see Map 8 in Appendix D). The Hells Canyon Initiative is a tri-state coordination group that has been focused on restoring bighorn sheep populations to Hells Canyon and is comprised of the fish and wildlife agencies of Idaho, Oregon, and Washington, as well as the U.S. Forest Service, Bureau of Land Management, and other private entities. These data include more than 54,000 telemetry points, representing approximately 400 individuals from 16 Hells Canyon herds and 2 Salmon River herds. The data used for analysis were collected from March 1997 through December 2012 for Hells Canyon bighorn sheep and 2007 through 2012 for Salmon River bighorn sheep. Telemetry and observation data for the Salmon River metapopulation was collected from multiple sources. Telemetry data for the Main Salmon/South Fork Herd was collected by the Nez Perce Tribe under a cooperative study, which includes the Nez Perce Tribe, Idaho Department of Fish and Game, Nez Perce National Forest, Payette National Forest, and the BLM Cottonwood Field Office (see Map 9 in Appendix D). The rest of the observations were collected on many different dates. The Main Salmon/South Fork and Hells Canyon bighorn sheep telemetry and observation data collection is an ongoing effort and additional data is currently being collected.

These telemetry data suggest that bighorn sheep utilize habitats within and adjacent to allotments managed by the Cottonwood Field Office. Maps 8 and 9 (Appendix D) display telemetry points or observations of bighorn sheep documented on BLM domestic sheep allotments and adjacent landscapes.

Telemetry data for the Hells Canyon was collected as part of the Hells Canyon Initiative by the Idaho Department of Fish and Game (IDFG), Oregon Department of Fish and Wildlife (ODFW), and U.S. Forest Service. In any given year, approximately 150 animals have telemetry collars as part of an ongoing effort since 1997 (Map 8 in Appendix D).

Telemetry data and observations for the Salmon River metapopulations are not as extensive at the Hells Canyon data set; consequently, there is more uncertainty about the risk of contact and

potential for disease transmission, which is considered relatively high based on the data collected to date for the BLM domestic sheep allotments occurring in the Salmon River and Little Salmon River drainages.

The IDFG, Payette National Forest, Nez Perce National Forest, BLM Cottonwood Field Office, and Nez Perce Tribe have a cooperative project (the Salmon River Bighorn Sheep Project [SRBSP]) that places telemetry collars on Salmon River bighorn sheep. Initially, 15 sheep were collared in fall 2007 and spring 2008. A total of 68 bighorn sheep (28 rams and 40 ewes) has been captured and telemetry-collared during the project duration, and 30 bighorn sheep are currently being monitored (June 2013) with active telemetry collars (Map 9 in Appendix D). This information has provided additional bighorn sheep movement data for Salmon River canyon lands and mountains and the BLM Cottonwood Field Office management area. Forested areas and large rivers, which bighorn sheep do not prefer for movement and which serve as partial barriers to bighorn sheep movement (Singer et al. 2000c), are located between bighorn sheep habitat and some of the lands leased for domestic sheep grazing. Bighorn sheep have, however, been observed swimming large rivers and have been found in locales at which they arrived via unknown routes.

Akenson and Akenson's (1992) 5-year study of bighorn sheep in the Big Creek drainage, which included observations of 12 radio-collared ewes, provides an additional source of information about bighorn sheep movements on the Payette National Forest. They observed ewes from different parts of the winter range utilizing four different drainages for lambing and 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 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).

Several incidental observations show that at least some bighorn sheep in the Salmon River metapopulation reach areas far from the mapped core herd home ranges (CHHR). One bighorn ram caught in a leg-hold trap was observed near Josephine Lake (Payette National Forest Josephine Allotment). On the North Fork Lick Creek allotment (Payette National Forest), three ewes were sighted in 1 year, and the following year, two ewes were seen along the border with the Lake Fork allotment (Payette National Forest). These individuals entered the allotments when domestic sheep were present (May–October). The lack of more extensive telemetry data makes it impossible to know how frequently other bighorn sheep utilize domestic sheep allotments.

### Core Herd Home Range Modeling

Home range modeling was completed using the Home Range Extension version 1.1 for ArcGIS (Rodgers et al. 2007), a software package designed for this purpose. The Home Range Extension uses a standard bivariate normal probability density function as the kernel employed to estimate the intensity with which animals use each mapped area. A kernel is essentially a small three-

dimensional hill placed over the location of each telemetry observation. Where many observations are clustered together, these hills overlap and pile up, and their total height indicates the probability of finding an animal at a given location. The width of the kernels, *href*, is calculated as the square root of the mean variance in *x* (var *x*) and *y* (var *y*) coordinates divided by the sixth root of the number of points (Worton 1995):

$$\text{Href} = n^{-1/6}\sqrt{\frac{var\ x + var\ y}{2}}$$

This method of selecting *href* is widely used as a means of extrapolating from the dispersion of observed locations to the likely extent of the full home range.

This process of home range analysis was carried out for each identifiable individual within a herd for whom more than 20 telemetry points were available. All other telemetry and observation points for a herd that did not meet these criteria were excluded from the CHHR analysis but were used to verify the accuracy of the final CHHR volume contours. The results of these analyses were a collection of surface rasters, one for each animal, from which the volume contours were created.

To create an overall CHHR, the raster surfaces from the individuals were added together. Then, volume contours, known as isopleths, were created from the merged herd surface using Hawth's Analysis Tools version 3.27 Extension for ArcGIS (Beyer 2004). Isopleths are contours meant to enclose a given percentage of the telemetry observations; the 95th isopleth for example, is drawn to enclose an area in which 95 percent of the telemetry points are found. Volume contours were calculated for the 50th, 60th, 70th, 80th, 90th, and 95th isopleths, and are shown for each herd in the Appendix L of the Payette FSEIS (USFS 2010a). The CHHR is defined as the area contained within the 95th isopleth. Points beyond the 95th isopleth were considered forays and analyzed separately (described below).

**Foray Analysis**

The foray model analyzed how often bighorn sheep leave the CHHR, whether they travel far enough to reach an allotment, and whether they then actually intersect an allotment (i.e., rather than intersecting a different area at the same distance from the CHHR). Movement behavior estimates were formed by analyzing the same large telemetry dataset of bighorn sheep movements in Hells Canyon that was used to determine each herd's CHHR. In the Salmon River system, only one and one-half years of telemetry data from 30 individuals in the Main Salmon/South Fork herd was available. That data was useful in estimating the herd's CHHR, but not sufficient to characterize their foray behavior. As a result, modelers used the much more extensive data collected for the Hells Canyon herds to estimate the probable movement patterns of bighorn sheep in herds throughout the Payette National Forest and BLM SEIS analysis area.

The foray analysis most likely underestimates the true frequency of longer-distance forays. The reason for this underestimation is that the vast majority of the telemetry data are from standard VHF (very-high frequency) collars (rather than from GPS collars which collect and store or transmit data from everywhere an animal travels). With VHF collars, locations are determined by

triangulation from a plane or boat travelling a route every few days or weeks through the areas in which the bighorn sheep of a herd are usually seen. The farther a bighorn sheep has travelled from its CHHR, the farther it is likely to be from the observers, and the less likely it is to be detected. There are several cases in the telemetry data where rams last observed on a foray have disappeared for a couple of months before reappearing, likely from a journey that carried them beyond the range of detection of the survey.

For bighorn sheep moving through forested areas, detection may also be hampered by line-of-sight and signal bounce issues. Finally, even when an animal on foray is detected in every survey, the large interval between observations means that it is unlikely to be observed at the furthest extent of its foray. The extent to which these forms of sampling bias underestimate the frequency of long-distance movements in the foray analysis is unknown.

The path taken by a bighorn sheep traveling outside its CHHR might intersect any part of an allotment; therefore, the analysis began by calculating the probability of intersecting an allotment within each of 35 rings or annuli, each 1 km wide, located between 1 and 35 km from the CHHR boundary. That probability was broken into two parts: probability of a foray movement, and probability that a bighorn sheep on a foray will reach a ring and intersect an allotment within that ring.

**Probability of a Foray Movement**

Most bighorn sheep, especially ewes, never move beyond the CHHR in most years. Map displays the maximum distance of ram forays outside of CHHR areas (95 percent isopleth) for the data set. Forays from all but one bighorn sheep were between 0 and (26 km); one ram had a documented foray that extended (35 km) from its CHHR. Foray distances were stratified into (1 km) concentric rings that originated from CHHR areas, and were used as a basis for calculating the probability of contact.

The frequency of foray movements by both rams and ewes in summer (May–October) and winter (November–April) are shown in Table B-1. The probability of bighorn sheep–domestic sheep contact in summer and winter were calculated separately because characteristic movement patterns differ between seasons (e.g., the rut occurs in November/December and produces relatively frequent and long-distance exploratory forays by rams), and three of the allotments are only open to domestic sheep during the summer period, and the Partridge Creek allotment has domestic sheep grazing during summer and winter periods.

According to Table B-1, 28.8 percent of radio-collared rams left the CHHR at least once (in summer) during the years they were observed. In any one summer, however, just 14.1 percent of rams left the CHHR. Accordingly, in the foray model, each ram was given a 14.1 percent probability per summer of making a foray outside of the CHHR. Similarly, ewes were given a 1.5 percent probability of leaving the CHHR each summer.

| Table B-1: Telemetry Observations Made Outside of the Core Herd Home Range | | | | |
|---|---|---|---|---|
| Timeframe | Percentage of Animals Observed | Number out of Total Observations | Percentage of Animals Observed | Number out of Total Observations |
| **Summer (May–October)** | **Ewes** | | **Rams** | |
| Animals leaving CHHR at least once | 6.5 | 14/215 | 28.8 | 30/104 |
| Animal-years with at least one foray | 1.5 | 15/985 | 14.1 | 44/311 |
| Telemetry points outside of CHHR | 0.2 | 29/17,258 | 4.4 | 160/3,674 |
| **Winter (November–April)** | **Ewes** | | **Rams** | |
| Animals leaving CHHR at least once | 12.9 | 28/217 | 34.9 | 38/109 |
| Animal-years with at least one foray | 5.6 | 60/1,062 | 17.8 | 68/380 |
| Telemetry points outside of CHHR | 0.8 | 109/12,941 | 3.7 | 156/4,200 |

## Probability that a Bighorn Sheep Will Intersect an Allotment

Many animals (particularly ewes) may not travel far, even if they are observed outside of the CHHR. The probability that a bighorn sheep on a foray will reach an allotment decreases as the travelling distance increases. Bighorn sheep rams are more mobile and leave CHHRs during summer and winter periods significantly more than ewes (see Table B-1) and have a higher probability of interspecies contact. Consequently, the discussion and graphs below are focused on foraying bighorn sheep rams. To characterize that decreasing probability, the modelers first extracted from each foray, the maximum distance from the CHHR at which an animal was observed (Figures B-1 and B-3) and then the proportion which an animal reaches each ring (Figures B-3 and B-4). In the dataset, the maximum distance was 35 km (summer) and 50 km (winter), so the model distribution extends to that distance.

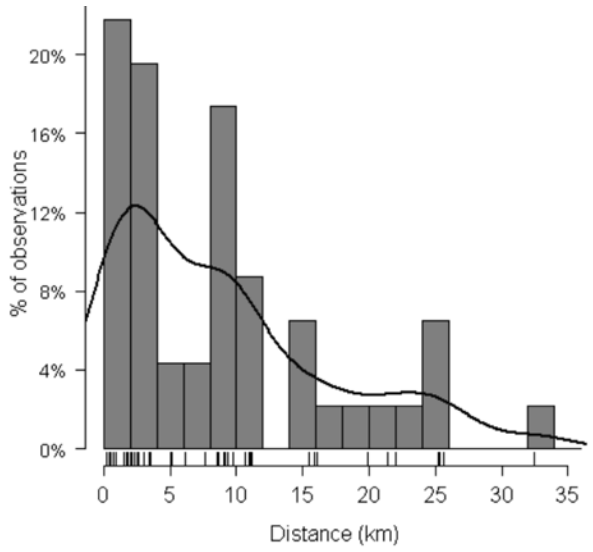


**Figure B-1: Maximum Distance of Ram Summer Forays beyond the CHHR**
(Source: USFS 2010a)

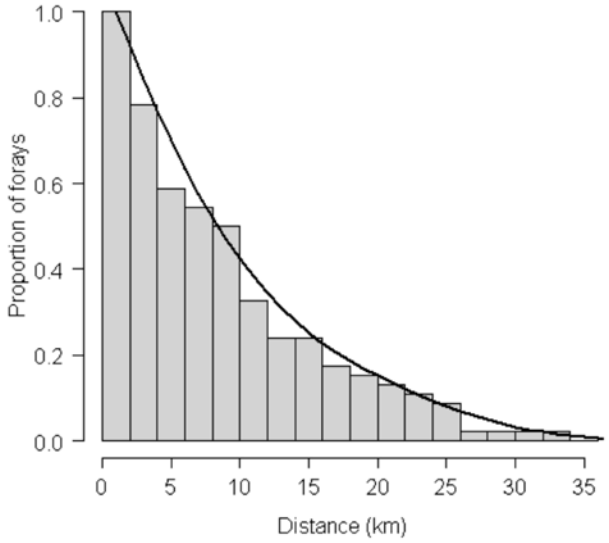


**Figure B-2: Proportion of Ram Summer Forays Reaching Each Ring**
(Source: USFS 2010a)

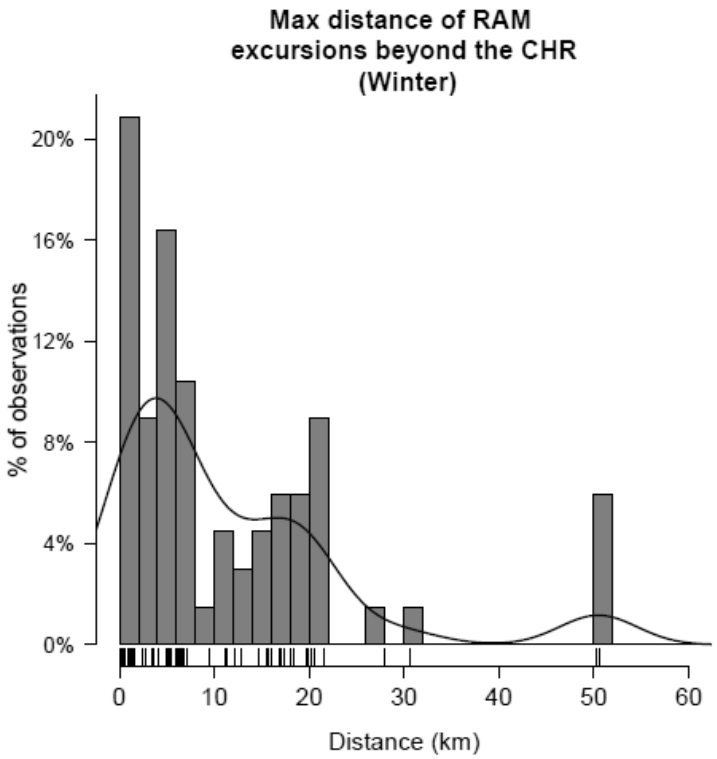


**Figure B-3: Maximum Distance of Ram Winter Forays beyond the CHHR**
(Source: USFS 2010a)

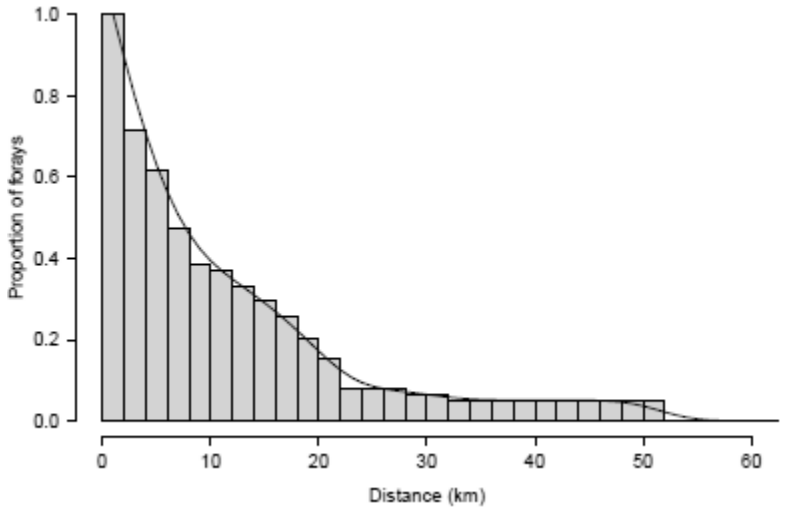


**Figure B-4: Proportion of Ram Winter Forays Reaching Each Ring**

(Source: USFS 2010a)

An animal located 25 km from the CHHR has crossed each ring between itself and the CHHR. In addition, 100 percent of the animals that make a foray intersect at least the first ring around the CHHR. More generally, the proportion of animals whose forays intersect each ring is equal to the proportion known to have reached it or one of the rings beyond it. Approximately half of the rams who leave the CHHR travel at least 10 km (summer and winter) from the CHHR and almost a quarter of the rams travel 16 km. However, just one ram has been observed during the summer to travel more than 26 km and one ram during the winter was observed to travel more than 50 km from the CHHR. This model uses the distribution to calculate the probability that an animal will reach any given ring surrounding its CHHR, (Animal reaches ring foray).

Given that an animal has reached a ring, the probability that it will be in an allotment is proportional to the size of the allotment and to the quality of the habitat in the allotment relative to the size and quality of habitat in the ring as a whole. Calculating the size of the allotment is simple, but determining if a bighorn sheep will intersect an allotment first requires knowing bighorn sheep habitat preference.

Based on the source habitat model, all areas within 35 km of the CHHRs were assigned to one of three habitat classes—source habitat, connectivity area, and non-habitat. Source habitats are areas fitting the criteria described in *Source Habitat Model*, on page B-1. Connectivity areas do not meet those criteria but are located within 350 m of source habitat. Areas of non-habitat do not meet those criteria and are located more than 350 m from source habitat. Connectivity areas were distinguished from non-habitat because even when bighorn sheep are of source habitat, all but 80 have been within 350 m of source habitat.

Next, the relative preference of bighorn sheep for these three classes of habitat was calculated using a resource selection function (Manly et al. 1993, Boyce et al. 2002). The habitat classes consisted of habitat, habitat connectivity, and non-habitat. The habitat class is the same as summer source habitat. Habitat connectivity was created by using a two-stage buffer on the summer source habitat. The first stage is a simple buffer around patches of habitat at 350 m, which was determined by measuring the distance of all telemetry data that fell outside habitat

and finding one standard deviation of those distances. The second stage was a buffer of 1,050 m (three times the distance of the first stage), which is only applied to pieces of habitat connectivity that are within the 1,050 m distance. The second stage is designed to connect fragmented complexes of habitat. The third habitat class consists of the rest of the area that is not covered by the first two classes. The resource selection function was constructed using a use/availability approach that yields high values for habitat classes with many observations of bighorn sheep relative to their area. If the animals in a herd have equal areas of Habitat A and Habitat B available, but spend 90 percent of their time in Habitat A, their preference for Habitat A would be 9 times their preference for Habitat B.

While on forays, bighorn sheep in the Hells Canyon herds prefer source habitat to connectivity areas, and prefer both of those to non-habitat. Specifically, within the 35-km-wide ring surrounding a CHHR, bighorn sheep were 5.6 times more likely to be found in a given square-kilometer of source habitat than in a square-kilometer of connectivity area, and 35 times more likely to be found in source habitat than in non-habitat.

Finally, habitat preference and the distribution of habitat within each ring surrounding a CHHR was used to calculate the probability that a bighorn sheep that reaches a particular ring would cross the ring into an allotment. The map in Figure B-5 is a visualization of the estimated probabilities that bighorn sheep on a foray will reach each location within 35 km of the CHHR. Dark blues represent the highest probabilities, and light yellows the lowest. Moving outward from the CHHR, colors lighten as the probability of a foray reaching that distance drops. Within each ring, the darkest color (highest relative probability) marks areas of habitat, the lightest color (lowest relative probability) marks areas of non-habitat, and the intermediate color marks areas of connectivity habitat.

**Foray Analysis Results in the Context of Other Published Works**

Both the frequency and distances of foray movements by Hells Canyon bighorn sheep were consistent with other reports in the literature. Singer and others (2001) calculated annual foray rates of bighorn sheep in 10 published studies. In those herds, the annual number of forays per radio-collared animal of either sex ranged from 0 to 0.23 (mean 0.10, standard deviation 0.09), comparable to 14 percent of rams and 1.5 percent of ewes making summer forays from herds in the Hells Canyon metapopulation.

In southwestern Alberta, Festa-Bianchet (1986) relocated rams as far as 48 km from the site of their capture. A recent 17-month study of three bighorn herds in Montana, (DeCesare and Pletscher 2006) found relatively long (19 to 33 km) movements by four of five radio-collared males. Finally, Singer and others (2000c) followed 31 translocated populations of bighorn, and documented numerous colonizations of nearby patches of habitat. In that study, the probability of colonization (75 percent) was highest for patches located 12.3 km from a bighorn sheep population indicating that such movements occur with relatively high frequency. This parallels our finding that nearly 25 percent of forays by Hells Canyon bighorn sheep reach a distance of at least 15 km from the CHHR.

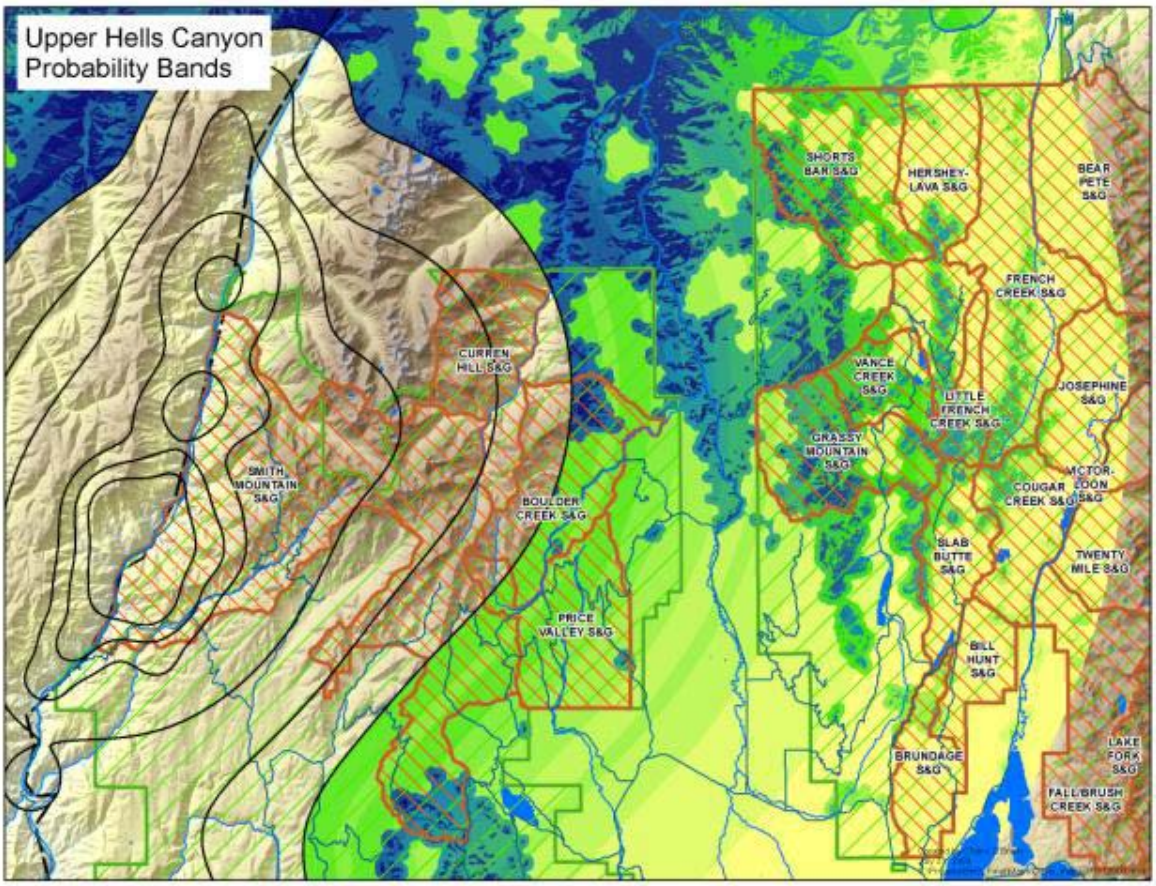


**Figure B-5: Visualization of Foray Probabilities for the Upper Hells Canyon Herd**
(Source: USFS 2010a)

## Assumptions for Probability of Disease Outbreak for Alternatives Occurring in a 50-Year Period

There is no scientific evidence to support a specific assumption for acceptable risk-of-contact and disease outbreak. The model used in this SEIS to predict bighorn sheep intersection with an allotment (USFS 2013a) follows well-documented and peer reviewed protocols and logical processes. The results should be viewed as a means of comparing the relative risks of disease outbreaks occurring from the various alternatives, not as definitive values. Results of the model support the current knowledge and characteristics of the bighorn sheep herds and the science based on the understanding of disease outbreaks potentially occurring from contact of a bighorn sheep within an allotment.

Because of the uncertainty regarding the probability that contact of a bighorn sheep within an allotment will lead to disease outbreak within a population, modelers ran the disease model with assumptions for a range of values from 0.05 (1 in 20 contacts would result in a disease outbreak) to 1.00 (every contact would result in a disease outbreak). The range of values modeled include: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00. Qualitative comparisons of alternatives will be made on the basis of assumption for the probability of a disease outbreak given contacts are low (0.05

or 1 in 20 contacts results in disease outbreak), moderate (0.25 or 1 in 4 contacts lead to a disease outbreak) or high (1.00 or every contact results in a disease outbreak). The terms low, moderate, and high are only intended as relative terms used for comparisons of alternatives. The following Tables A-1 – A-5 includes herd specific analysis regarding disease outbreak occurring within a 50-year period under varying assumptions for each alternative. No summary table was prepared for Alternative C, because no BLM allotments would be available for domestic sheep grazing and no interspecies contact or disease outbreaks would be attributed to BLM authorized grazing.

**Table B-2: Predicted Disease Outbreak That Would Occur Under Varying Assumptions for Probability of Disease Outbreak Given Contact during a 50 Year Period from Alternative A**

| Herd/CHHR | Disease Outbreak per 50 Year Period Under Varying Assumptions Given Contact | | | | | | |
|---|---|---|---|---|---|---|---|
| | **0.05** | **0.10** | **0.25** | **0.50** | **0.75** | **0.90** | **1.00** |
| Main Salmon/South Fork | 2.68 | 4.66 | 13.4 | 26.8 | 40.2 | 48.23 | 53.6 |
| Upper Hells Canyon | 0.00425 | 0.0085 | 0.02125 | 0.0425 | 0.0675 | 0.0765 | 0.085 |
| Myers | 0.00075 | 0.015 | 0.00375 | 0.0075 | 0.01125 | 0.0135 | 0.015 |
| Muir | 0.00775 | 0.0155 | 0.03875 | 0.0775 | 0.11625 | 0.1395 | 0.155 |
| Big Canyon | 0.006025 | 0.006020 | 0.01205 | 0.06025 | 0.09375 | 0.10845 | 0.1205 |
| Little Salmon Area of Concern[1] | 0.1125 | 0.025 | 0.5625 | 1.125 | 1.6875 | 2.025 | 2.025 |

[1]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that incidentally use habitats that have had past fidelity for use.

**Table B-3: Predicted Disease Outbreak That Would Occur Under Varying Assumptions for Probability of Disease Outbreak Given Contact during a 50 Year Period from Alternative B**

| Herd/CHHR | Disease Outbreak per 50 Year Period Under Varying Assumptions Given Contact | | | | | | |
|---|---|---|---|---|---|---|---|
| | **0.05** | **0.10** | **0.25** | **0.50** | **0.75** | **0.90** | **1.00** |
| Main Salmon/South Fork | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Upper Hells Canyon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Myers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Muir | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Big Canyon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Little Salmon Area of Concern[1] | 0.00005 | 0.0001 | 0.00025 | 0.0005 | 0.00075 | 0.0009 | 0.001 |

[1]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that incidentally use habitats that have had past fidelity for use.

**Table B-4: Predicted Disease Outbreak That Would Occur Under Varying Assumptions for Probability of Disease Outbreak Given Contact during a 50 Year Period from Alternative D**

| Herd/CHHR | Disease Outbreak per 50 Year Period Under Varying Assumptions Given Contact | | | | | | |
|---|---|---|---|---|---|---|---|
| | **0.05** | **0.10** | **0.25** | **0.50** | **0.75** | **0.90** | **1.00** |
| Main Salmon/South Fork | 0.165 | 0.33 | 0.825 | 1.65 | 2.475 | 2.97 | 3.30 |
| Upper Hells Canyon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Myers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Muir | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Big Canyon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Table B-4: Predicted Disease Outbreak That Would Occur Under Varying Assumptions for Probability of Disease Outbreak Given Contact during a 50 Year Period from Alternative D**

| Herd/CHHR | Disease Outbreak per 50 Year Period Under Varying Assumptions Given Contact | | | | | | |
|---|---|---|---|---|---|---|---|
| | **0.05** | **0.10** | **0.25** | **0.50** | **0.75** | **0.90** | **1.00** |
| Little Salmon Area of Concern[1] | 0.0001 | 0.0002 | 0.0005 | 0.001 | 0.0015 | 0.0018 | 0.002 |

[1]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that incidentally use habitats that have had past fidelity for use.

**Table B-5: Predicted Disease Outbreak That Would Occur Under Varying Assumptions for Probability of Disease Outbreak Given Contact during a 50 Year Period from Alternative E**

| Herd/CHHR | Disease Outbreak per 50 Year Period Under Varying Assumptions Given Contact | | | | | | |
|---|---|---|---|---|---|---|---|
| | **0.05** | **0.10** | **0.25** | **0.50** | **0.75** | **0.90** | **1.00** |
| Main Salmon/South Fork | 0.18 | 0.36 | 0.90 | 1.80 | 2.70 | 3.24 | 3.60 |
| Upper Hells Canyon | 0.0007 | 0.0014 | 0.0035 | 0.0007 | 0.0105 | 0.0126 | 0.014 |
| Myers | 0.00005 | 0.0001 | 0.00025 | 0.0005 | 0.00075 | 0.00009 | 0.0001 |
| Muir | 0.000005 | 0.00001 | 0.000025 | 0.00005 | 0.000075 | 0.00009 | 0.0001 |
| Big Canyon | 0.000003 | 0.000005 | 0.0000125 | 0.000025 | 0.0000375 | 0.000045 | 0.00005 |
| Little Salmon Area of Concern[1] | 0.1125 | 0.225 | 0.5625 | 1.125 | 1.6875 | 2.025 | 2.25 |

[1]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that incidentally use habitats that have had past fidelity for use.

**Table B-6: Predicted Disease Outbreak That Would Occur Under Varying Assumptions for Probability of Disease Outbreak Given Contact during a 50 Year Period from Alternative F**

| Herd/CHHR | Disease Outbreak per 50 Year Period Under Varying Assumptions Given Contact | | | | | | |
|---|---|---|---|---|---|---|---|
| | **0.05** | **0.10** | **0.25** | **0.50** | **0.75** | **0.90** | **1.00** |
| Main Salmon/South Fork | 0.015 | 0.030 | 0.075 | 0.150 | 0.225 | 0.270 | 0.300 |
| Upper Hells Canyon | 0.0007 | 0.0014 | 0.0035 | 0.0007 | 0.0105 | 0.0126 | 0.014 |
| Myers | 0.00005 | 0.0001 | 0.00025 | 0.0005 | 0.00075 | 0.00009 | 0.0001 |
| Muir | 0.000005 | 0.00001 | 0.000025 | 0.00005 | 0.000075 | 0.00009 | 0.0001 |
| Big Canyon | 0.000003 | 0.000005 | 0.0000125 | 0.000025 | 0.0000375 | 0.000045 | 0.00005 |
| Little Salmon Area of Concern[1] | 0.1125 | 0.225 | 0.5625 | 1.125 | 1.6875 | 2.025 | 2.25 |

[1]Little Salmon Area of Concern has no established bighorn sheep herd and predicted contacts based on past incidental sightings of bighorn sheep that occurred in the area. Predicted allotment contacts would potentially occur from bighorn sheep use of area (based on incidental sightings) and transmission of disease to bighorn sheep that incidentally use habitats that have had past fidelity for use.

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# Appendix C – Domestic Sheep and Goats Grazing Lease Terms and Conditions

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## Domestic Sheep and Goats Grazing Lease Terms and Conditions

The most viable current management option to reduce bighorn sheep and domestic sheep and goat transmission of disease is effective separation (spatial and temporal). The following terms and conditions would supplement effective separation (i.e., no risk or very low risk for interspecies contact) that is applied between domestic sheep and goat allotments and bighorn sheep CHHRs. In addition to the preparation of an allotment specific separation response plan; the following terms and conditions would primarily be used to reduce straying of domestic sheep and account for any observed bighorn sheep encounter that may occur and actions needed. Modification of terms and conditions or additional practices may be appropriate based on site-specific circumstances and current science.

1. Immediately report incidents of interspecies contacts to IDFG and BLM. Immediately initiate actions to remove co-mingling bighorn sheep with IDFG or other authorized party in accord with approved plan and protocol. Any sightings of bighorn sheep on an active domestic sheep allotment may trigger adaptive management actions to avoid interspecies contact, consequently, all such sightings should be immediately reported to IDFG and the BLM. Immediate actions by grazing lessee would include moving domestic sheep and hazing bighorn sheep away from herd.
2. Count domestic sheep on the allotments at the start of the grazing season, and off the allotment at the end of the season. Counts will be verified by BLM staff presence during the time counts are conducted. Count domestic sheep during the grazing season as often as possible to determine if strays or small groups moved off from the main band.
3. Maintain an appropriate ratio of marker domestic sheep within bands; depending on local needs and conditions, ratios should be no less than 1 marker for every 50 adult sheep. More markers may be required when dictated by local conditions.
4. At a minimum, count marker domestic sheep twice a day (e.g., mid-day and when bedded) and immediately any time sheep scatter.
5. Place bells on at least 1 in every 100 mature domestic ewes to facilitate identification and locating sheep relative to other sheep and determining if movement occurred outside the herd or straying occurring.
6. Always count marker domestic sheep after they emerge from locations where they are difficult to observe such as dense vegetation or in steep and rugged terrain.
7. Increase sheepherder monitoring (minimum two patrols around band, at least 4-hours apart) on bright moonlit nights because sheep may be more prone to rise and graze under these conditions.
8. Develop a strategy for reporting, searching, and quick recovery of stray domestic sheep.
9. Herders will be equipped with binoculars, radios, phones (cell and/or satellite) or other communication response equipment.
10. Herders will have firearms, which may be used for hazing of bighorn sheep or predator control. Predators may scatter and disperse sheep and cause potential straying.

11. Use a minimum of one mature and effective guard dog, and two mature and effective herding dogs per domestic sheep band.
12. Use propane (Zon) guns to haze bighorn sheep.
13. The lessee will not turnout sheep or goats with observed or known respiratory infection or disease (e.g., Mycoplasma or Pasteurella-type pneumonia bacteria) on grazing allotments or trailing routes, or for use in vegetation management activities, or authorized/recreational activities.
14. Remove sick or physically infirmed domestic sheep from the band. Remove all sheep that are unable to keep with the band, regardless of reason, from the allotment.
15. Grazing domestic ewes while in estrus heightens the possibility of contact between wild sheep and domestic sheep or goats. Decrease inter-species attraction by only turning out ewes and nannies that are known to be pregnant or with lamb(s) during the grazing period in areas of potential for contact with wild sheep.
16. Immediately locate and gather strays when predator attacks occur, and document domestic sheep that were killed.
17. Require close bedding (5-acres or less) of domestic sheep at night, some areas designated for bedding may include fenced (temporary or electric) areas for increased control and monitoring.
18. When trailing in areas where physical separation cannot be assured, use trucking instead of trailing.
19. Herders will be required to maintain daily log books to account for location and duration of domestic sheep or goat grazing, document implementation of terms and conditions, documents straying of domestic sheep and actions taken, document bighorn sheep sightings, document predation, and other pertinent events. This information will be made available to BLM personnel upon request periodically during grazing season and the log book will be submitted to the CFO at the end of the grazing period.

**Effectiveness of Best Management Practices**

No known studies, research, or peer reviewed literature has documented the effectiveness of BMPs from preventing contact and disease transmission when domestic sheep or goats graze within or adjacent to occupied bighorn sheep habitats. Effective separation between bighorn sheep and domestic sheep and goats, which minimizes the potential for contact and disease transmission, has been identified as the key management strategy for conservation of bighorn sheep (Wild Sheep Working Group 2012). Literature review (Wehausen et al. 2011) and experimental evidence (Lawrence et al. 2010) support the goal that domestic sheep or goats should not concurrently occupy areas where conservation of bighorn sheep is a clearly stated management goal (Wild Sheep Working Group 2012). Overall, without effective separation, BMP effectiveness is minimal. Consequently, the focus of analysis conducted for this SEIS was on effective separation (i.e., spatial and temporal) to minimize potential for contact and disease transmission. Following is a brief summary and discussion regarding implementation and effectiveness of BMPs within or adjacent to habitats occupied by bighorn sheep. Refer to Appendix C, which identifies lease terms and conditions (BMPs) that would provide some

additional measures to reduce risk of interspecies contact, however, such would be applicable after effective separation occurs.

If there are large buffers between domestic sheep grazing allotments and bighorn sheep habitats, then BMPs can be marginally helpful in providing additional protections against species contact in emergency situations. However, BMPs would only be effective in this regard in certain types of allotments; specifically, varying levels of effectiveness may be applied to BMPs under management scenarios that that maintain effective separation (adequate buffers) and have a large buffer between active domestic sheep allotments and occupied bighorn sheep habitats, and such a buffer minimizes potential for disease transmission. Such allotments would also have to occur in open, gentle, non-bighorn sheep habitat where domestic sheep can be easily controlled and monitored and a large buffer exists between the two species (Schommer 2009). Such habitats do not occur on three of the four analysis allotments at issue in this SEIS for three analysis allotments (Partridge Creek, Marshall Mountain, and Hard Creek Allotments) being assessed in this SEIS. The typical terrain and habitats found on these three domestic sheep allotments are areas that are very steep and rugged and interspersed with a mixture of forest, shrub, dense vegetation, and grassland areas. Overall, the Big Creek Allotment has the most moderately sloped terrain and open habitats compared to the other allotments, which have steep and rugged terrain and a variety of habitats that would reduce potential for effective implementation and effectiveness of BMPs.

Control and monitoring of domestic sheep within the topography and habitats typically found in three of the allotments in this SEIS would be very difficult; and monitoring forays of bighorn sheep would be even more difficult, particularly when the majority of bighorn sheep do not have radio collars. Another consideration regarding effectiveness of BMPs is the social nature of domestic sheep and goats and bighorn sheep; these animals may be "attracted to each other," which would further reduce effectiveness of BMPs in a rangeland situation that is not completely controlled and the majority of animals are not monitored (e.g., radio collared or visual observation) during the entire day.

Schommer (2009) completed a position statement regarding the effectiveness of a large number of BMPs that have been used to reduce contact between bighorn sheep and domestic sheep and goats. Following is a list of BMPs that were evaluated by Schommer (2009):

- guard dogs
- propane guns (scare bighorn sheep)
- trucking of sheep
- bedding of sheep in a tight controlled area
- counting of sheep to document straying; improved herder communication
- bighorn sheep monitoring
- removal of sick domestic sheep
- search and removal for stray domestic sheep

Schommer (2009) identified varying levels of concern regarding the effectiveness of the above BMPs in providing separation particularly when such BMPs would be best implemented when domestic sheep allotments occurred in open, gentle, non-bighorn sheep habitat where domestic sheep can be easily controlled and monitored and a large buffer exists between the species. The

previous conditions do not apply to three of the allotments under consideration for this SEIS. Other BMPs not listed above that have been utilized in the past regarding domestic sheep grazing in proximity to bighorn sheep habitats included increased number of herders, increased number of herd dogs, removal of bighorn sheep when in proximity to domestic sheep (e.g., lethal removal, capture and relocation, hazing), fencing or confinement of domestic sheep and goats, removal of domestic sheep from range allotments during breeding season, and others. Overall, these BMPs would also have the same level of concerns for effectiveness as identified above. An exception to the above BMPs would be removal of domestic sheep from allotments during breeding season, which would provide acceptable spatial and temporal separation; however, associated contact risks would still occur during non-breeding periods.

In summary, the effectiveness of BMPs in providing adequate separation has not been verified by studies, research, or peer-reviewed literature when domestic sheep or goat grazing occurs in proximity to occupied bighorn sheep habitats. However, stipulating BMPs as terms and conditions for the authorization of domestic sheep grazing will be expected to have varying levels of effectiveness that is primarily dependent on proper implementation, terrain, vegetation, and effective distances from occupied bighorn sheep habitats that provide no risk or very low risk for interspecies contact. Effective separation cannot be accomplished by using BMP's solely for preventing interspecies contact when domestic sheep or goats graze in proximity to occupied bighorn sheep habitats. The most viable current management option is to provide for effective spatial and temporal separation between domestic sheep allotments and bighorn sheep habitat (WSWG 2012; Cahn et al. 2011; Foreyt 1989; O'Brien et al. 2014; TWS 2014).

# Appendix D – Maps

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**Map 1: Hells Canyon and Salmon River Bighorn Sheep Metapopulations and BLM Domestic Sheep Allotments**

**Map 2: BLM Domestic Sheep Allotments**

**Map 3: Domestic Sheep Allotments, Summer Core Herd Home Ranges, and IDFG Big Game Management Units**

**Map 4: Domestic Sheep Allotments, Winter Core Herd Home Ranges, and IDFG Big Game Management Units**

**Map 5: BLM Domestic Sheep Allotments and Alternatives**

**Map 6: Bighorn Sheep Summer Source Habitat**

**Map 7: Bighorn Winter Source Habitat**

**Map 8: Bighorn Sheep Telemetry and Observation Locations within Analysis Area**

**Map 9: Forest Service, BLM, Private, and State Domestic Sheep Allotments**

**Map 10: Payette National Forest Plan Amendment**

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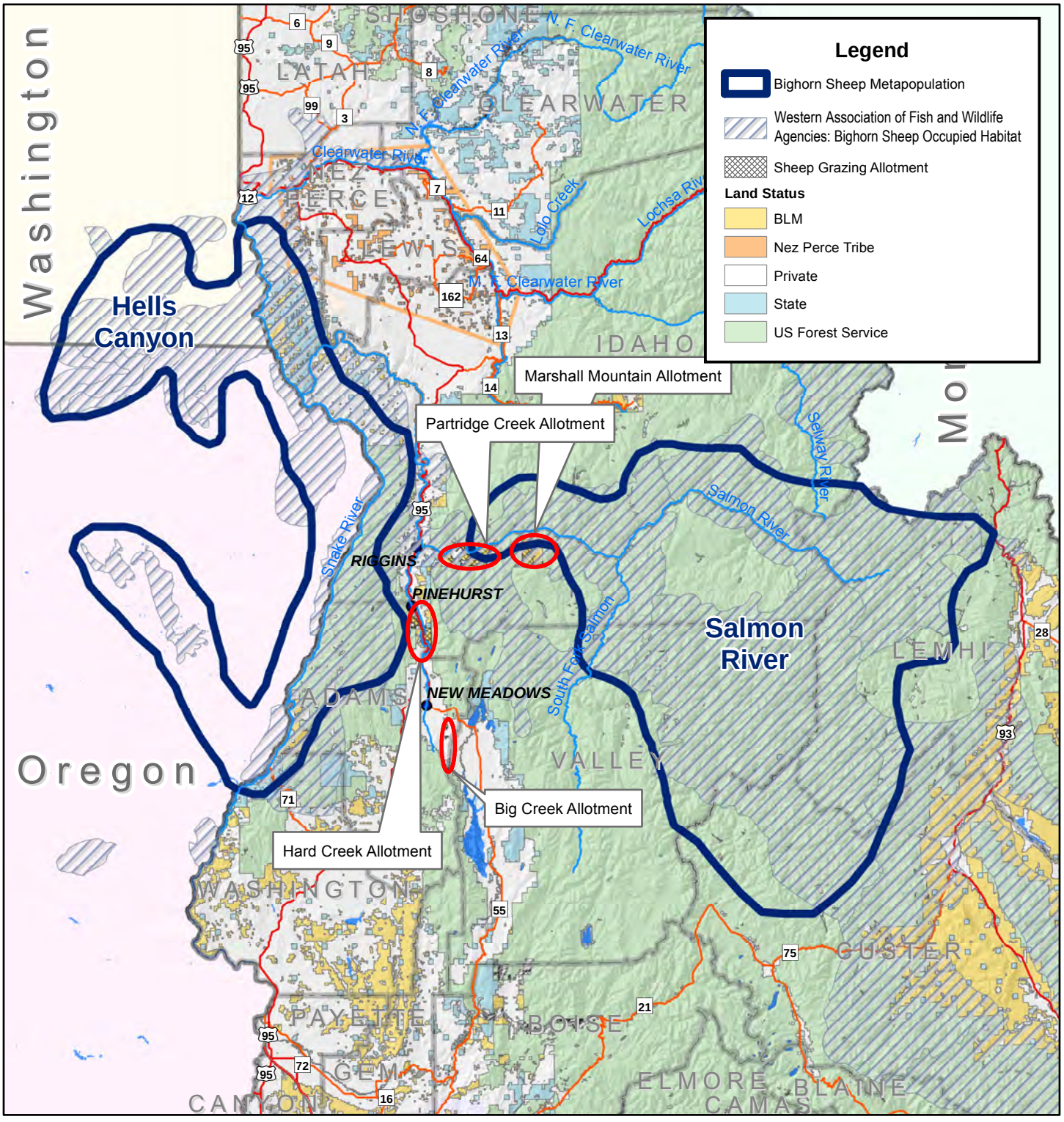
Map 1

# Hells Canyon and Salmon River Bighorn Sheep Metapopulations and BLM Domestic Sheep Allotments




The surface management status ("land ownership") should be used as a general guide only. Official land records, located at the Bureau of Land Management (BLM) and other offices, should be checked for up-to-date information concerning any specific tract of land.

1:1,750,000

0 5 10 20 30 40 Miles

Data displayed in UTM Zone 11N, NAD83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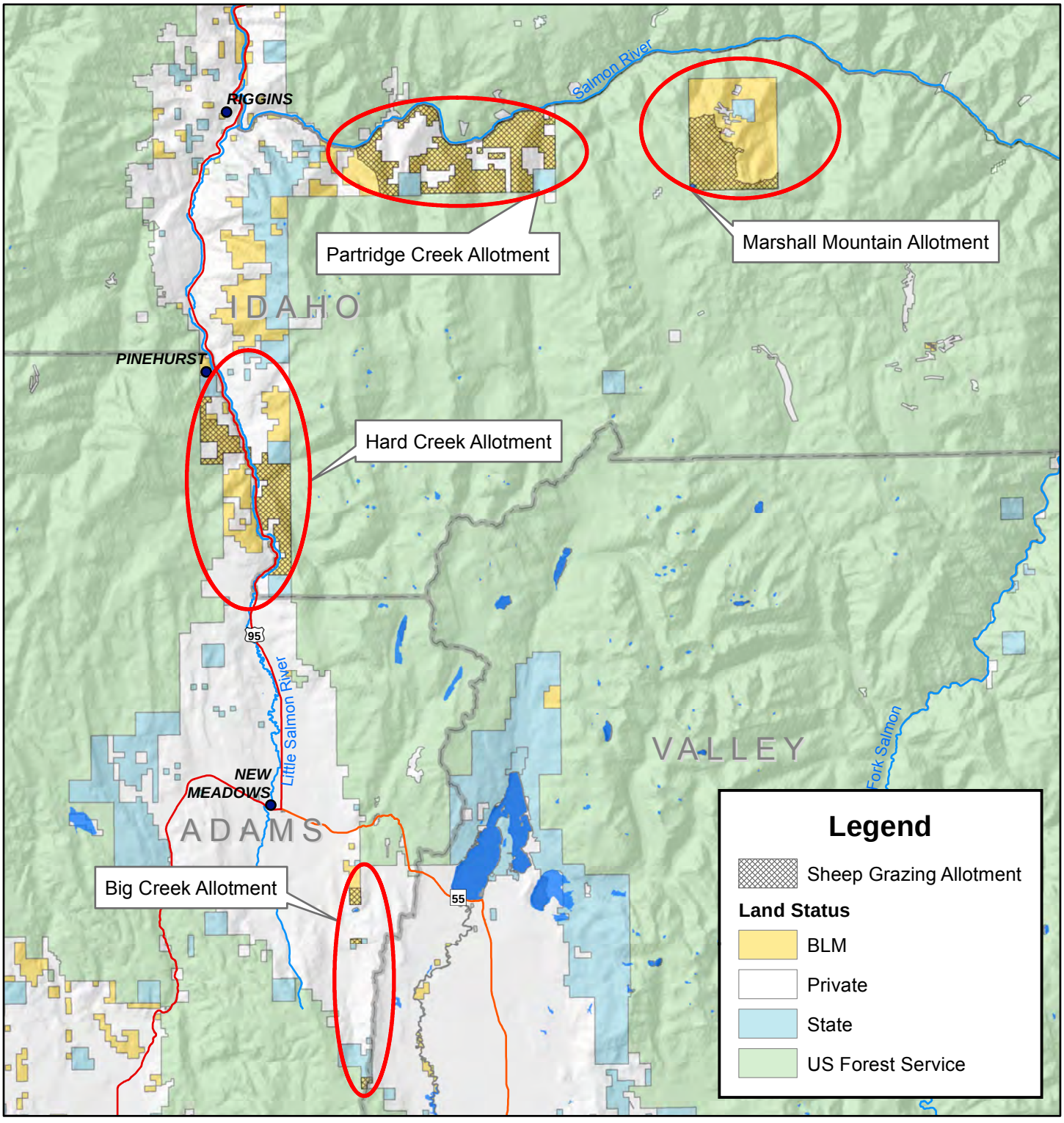
Map Created: 10/27/2011

Map 2

# BLM Domestic Sheep Allotments




The surface management status ("land ownership") should be used as a general guide only. Official land records, located at the Bureau of Land Management (BLM) and other offices, should be checked for up-to-date information concerning any specific tract of land.

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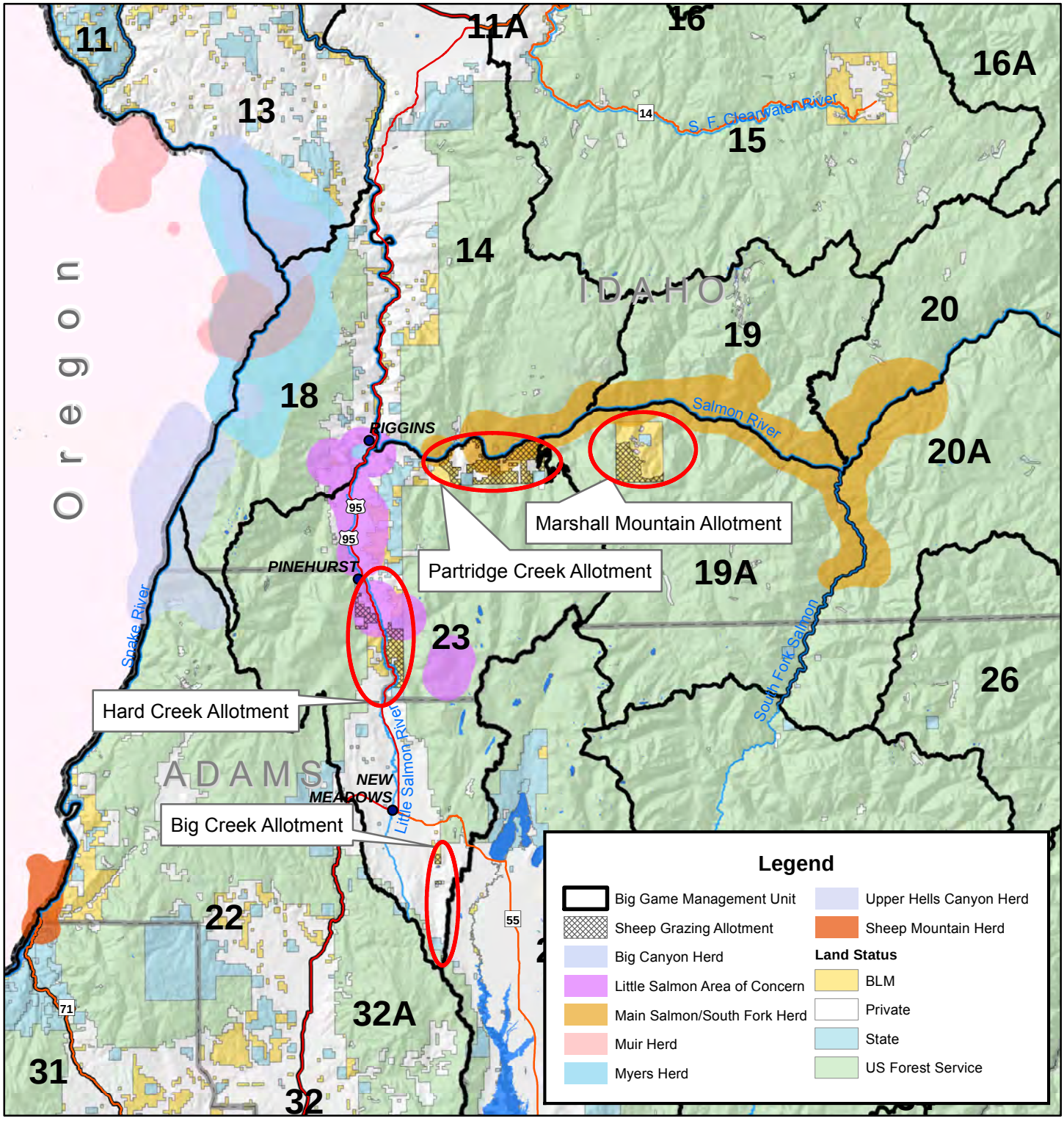
Map Created: 10/27/2011

Map 3

# Domestic Sheep Allotments, Summer Core Herd Home Ranges, and IDFG Big Game Management Units




The surface management status ("land ownership") should be used as a general guide only. Official land records, located at the Bureau of Land Management (BLM) and other offices, should be checked for up-to-date information concerning any specific tract of land.

1:750,000

0 2.25 4.5 9 13.5 18 Miles

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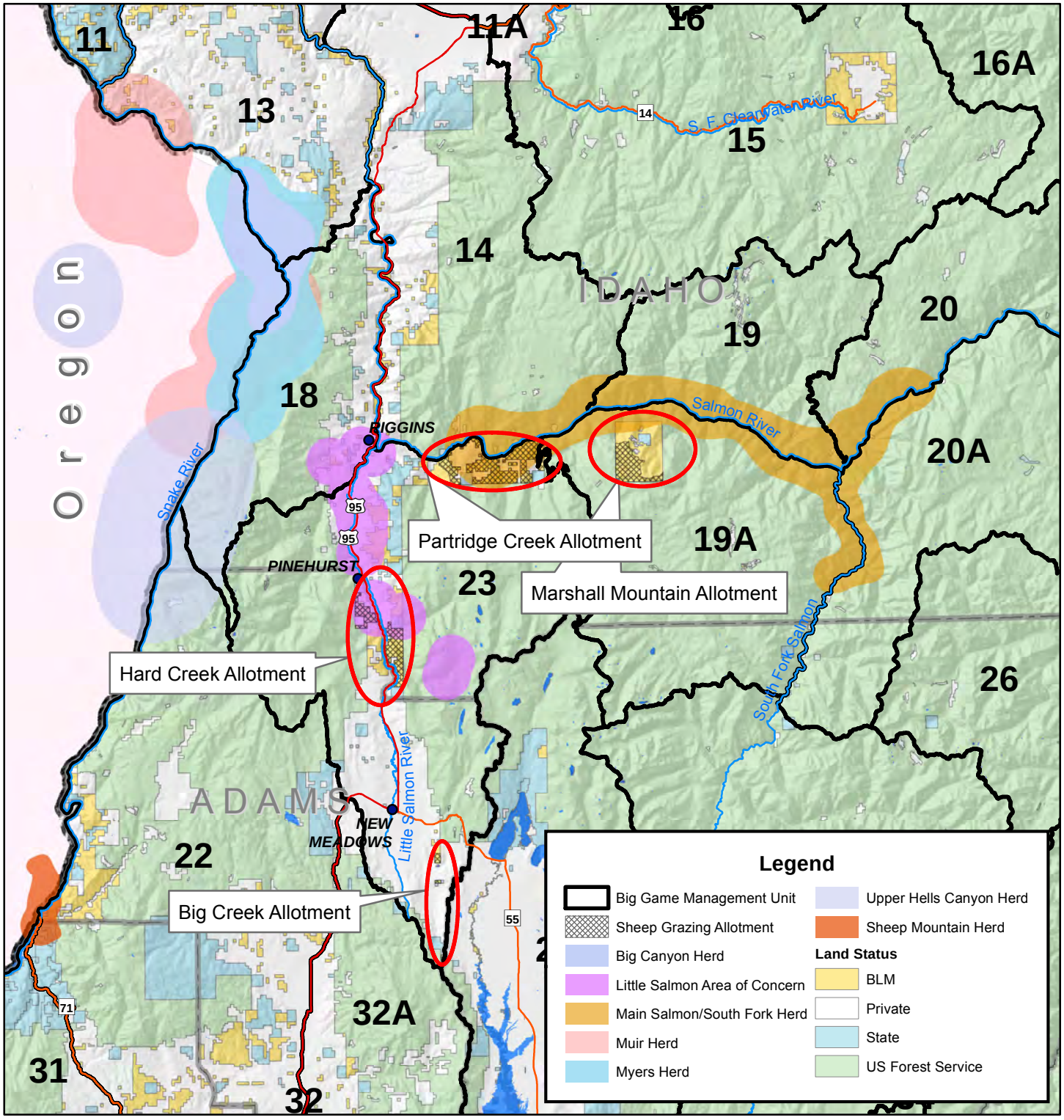
Map Created 11/10/2014

Map 4

# Domestic Sheep Allotments, Winter Core Herd Home Ranges, and IDFG Big Game Management Units




The surface management status ("land ownership") should be used as a general guide only. Official land records, located at the Bureau of Land Management (BLM) and other offices, should be checked for up-to-date information concerning any specific tract of land.

1:750,000

0 2.25 4.5 9 13.5 18 Miles

Data displayed in UTM Zone 11N, NAD83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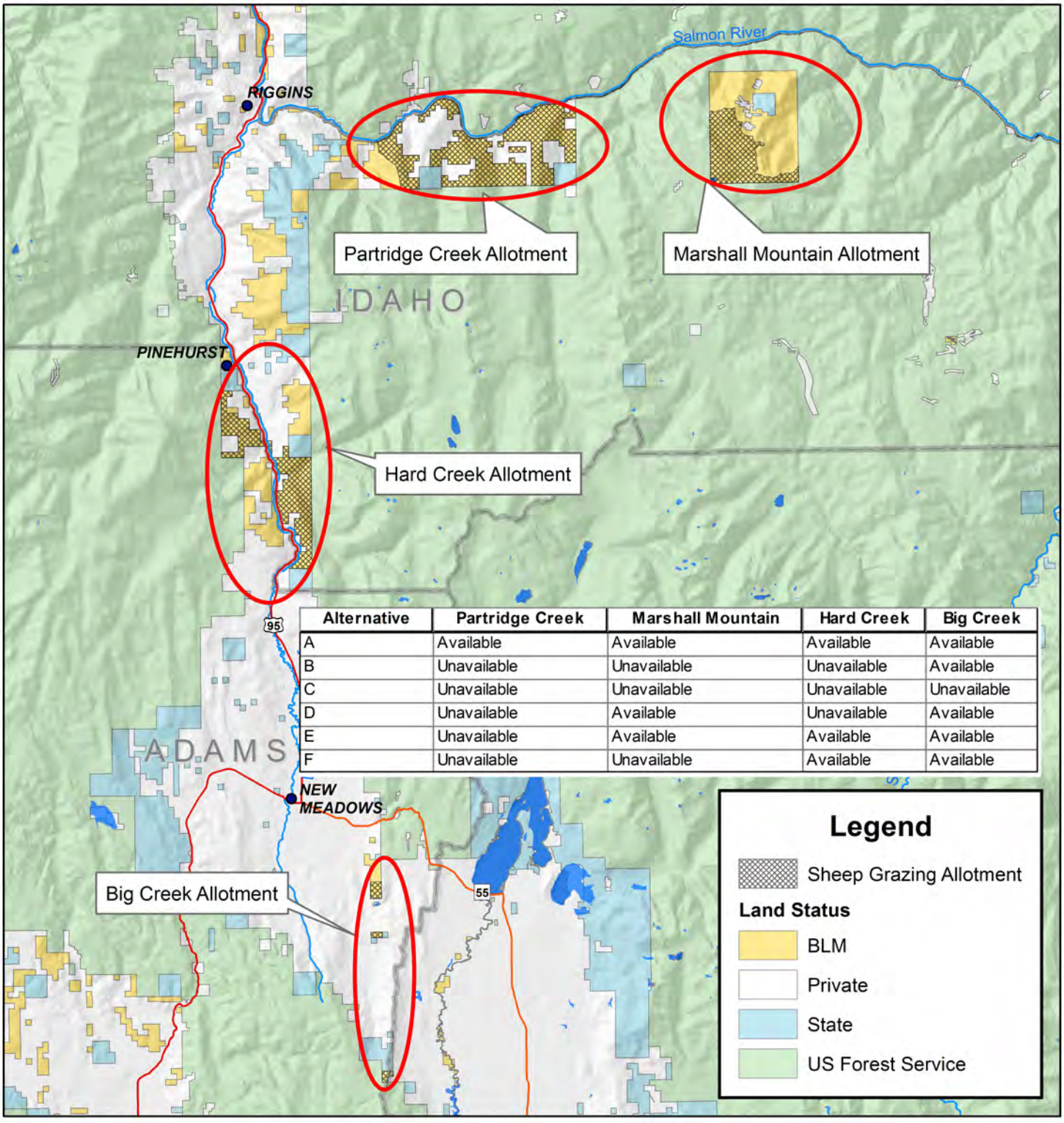
Map Created 11/10/2014

# BLM Domestic Sheep Allotments and Alternatives

Map 5




| Alternative | Partridge Creek | Marshall Mountain | Hard Creek | Big Creek |
|---|---|---|---|---|
| A | Available | Available | Available | Available |
| B | Unavailable | Unavailable | Unavailable | Available |
| C | Unavailable | Unavailable | Unavailable | Unavailable |
| D | Unavailable | Available | Unavailable | Available |
| E | Unavailable | Available | Available | Available |
| F | Unavailable | Unavailable | Available | Available |

The surface management status ("land ownership") should be used as a general guide only. Official land records, located at the Bureau of Land Management (BLM) and other offices, should be checked for up-to-date information concerning any specific tract of land.

1:400,000

0 1.25 2.5 5 7.5 10 Miles

Data displayed in UTM Zone 11N, NAD83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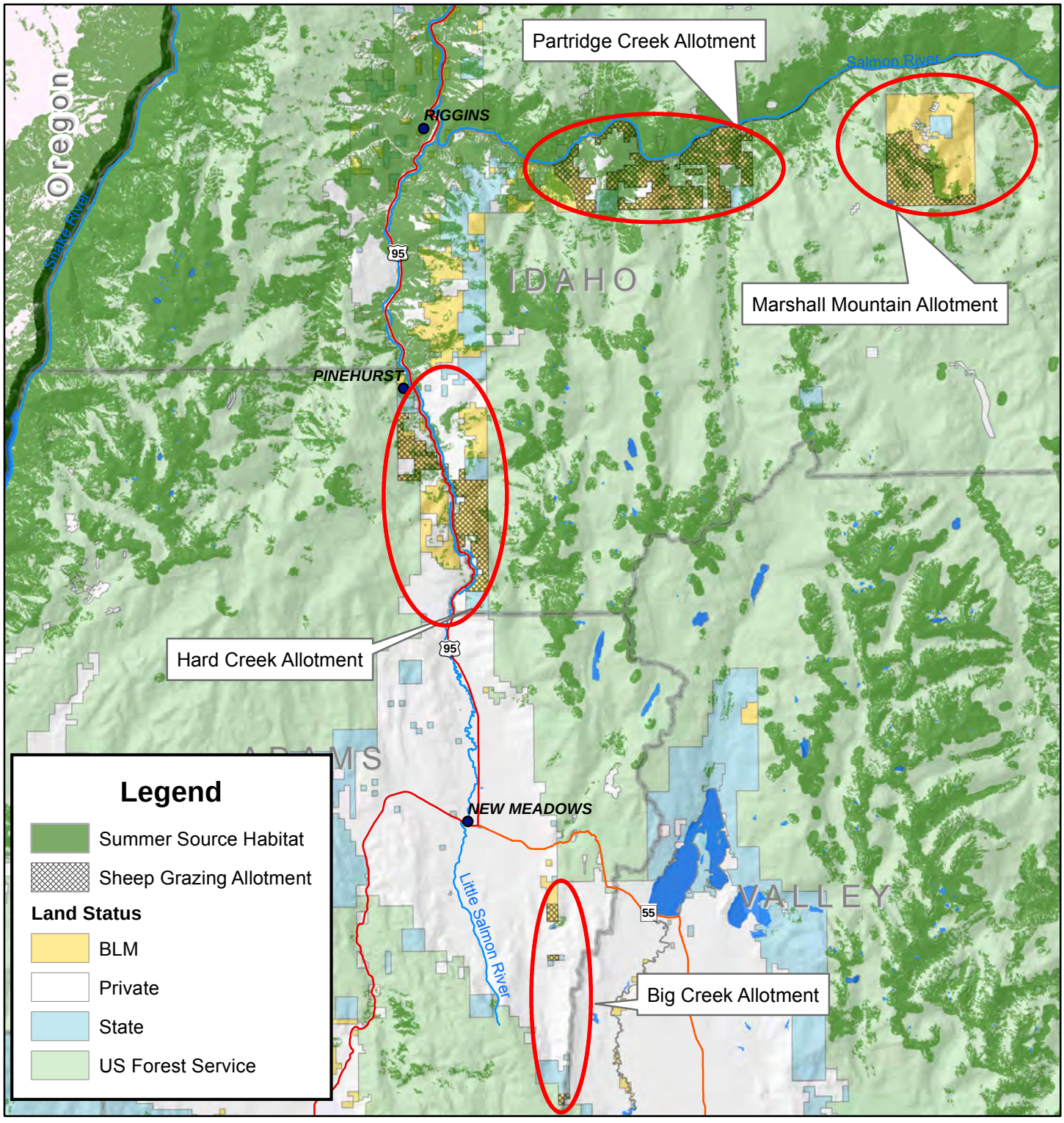
*No warranty is made by the Bureau of Land Management. The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed. The following cannot be made Section 508 compliant. For help with its data or information, please contact the BLM Idaho State Office Webmaster at 208-373-4000.*

Map Created: 10/27/2011

# Bighorn Sheep Summer Source Habitat

Map 6

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1:400,000

0 1.25 2.5 5 7.5 10 Miles

Data displayed in UTM Zone 11N, NAD83


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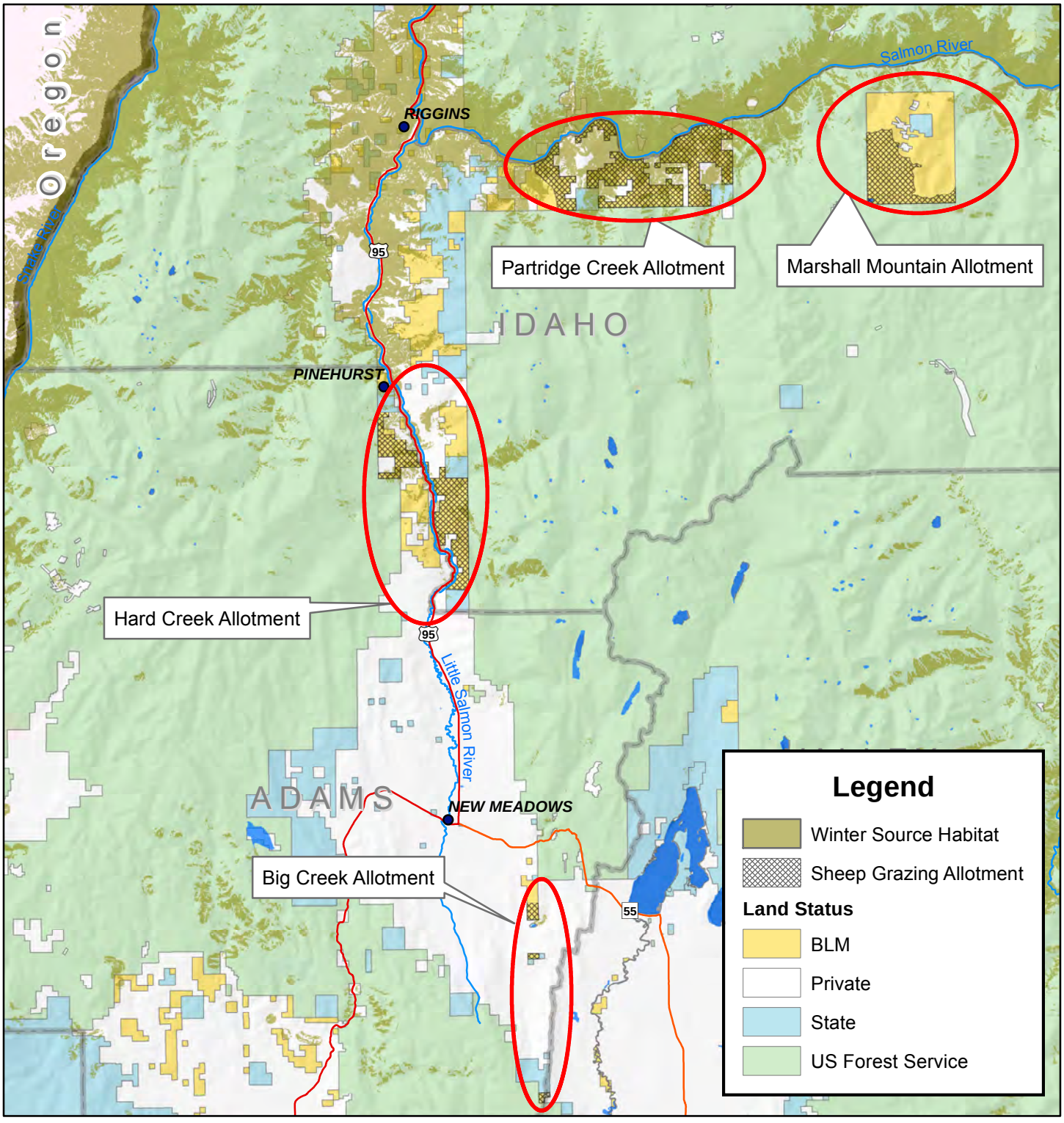
Map Created 11/10/2014

# Bighorn Sheep Winter Source Habitat

**Map 7**

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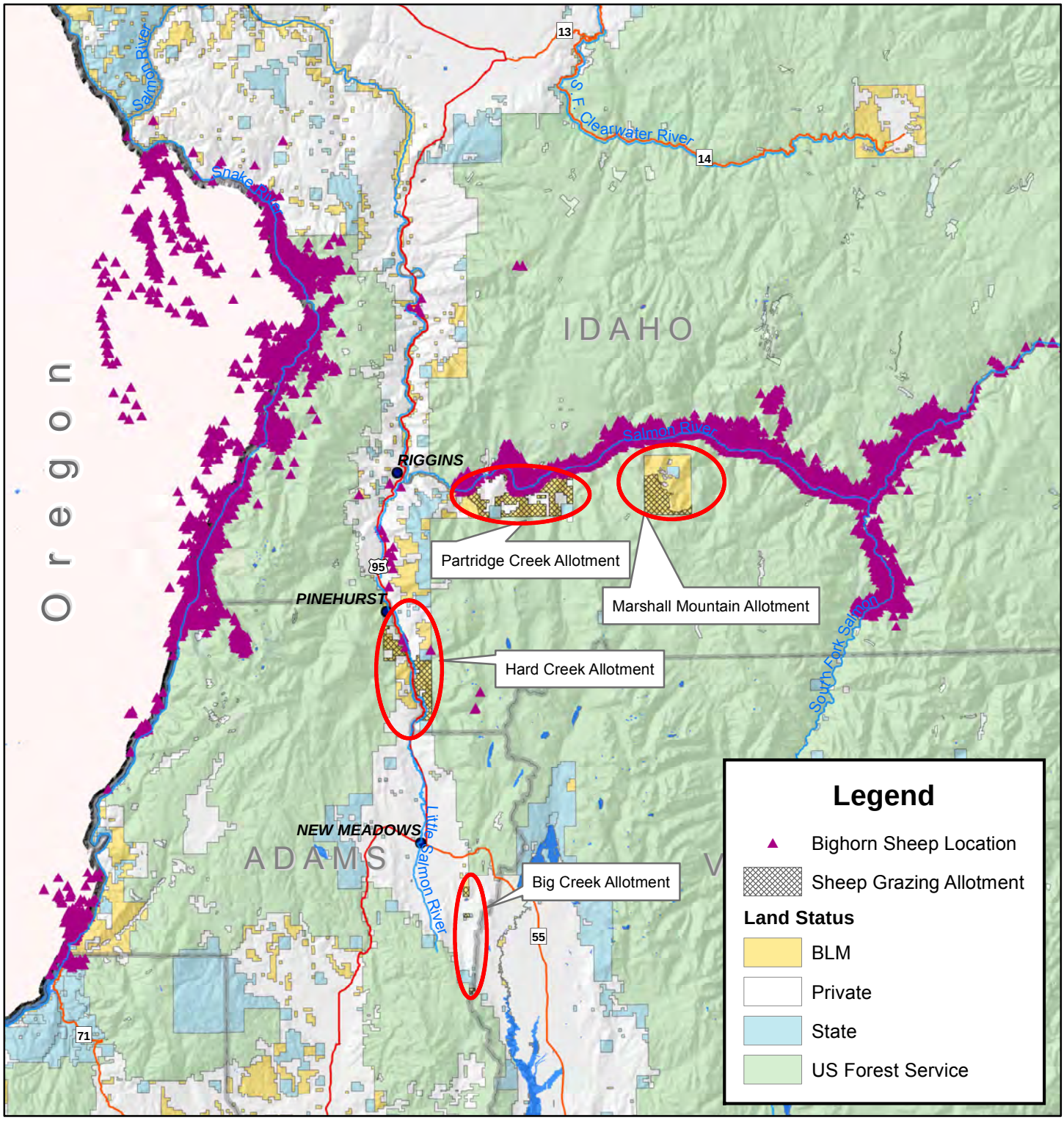
Map Created 11/10/2014

Map 8

# Bighorn Sheep Telemetry and Observation Locations within Analysis Area




The surface management status ("land ownership") should be used as a general guide only. Official land records, located at the Bureau of Land Management (BLM) and other offices, should be checked for up-to-date information concerning any specific tract of land.

1:750,000

0 2.25 4.5 9 13.5 18 Miles

Data displayed in UTM Zone 11N, NAD83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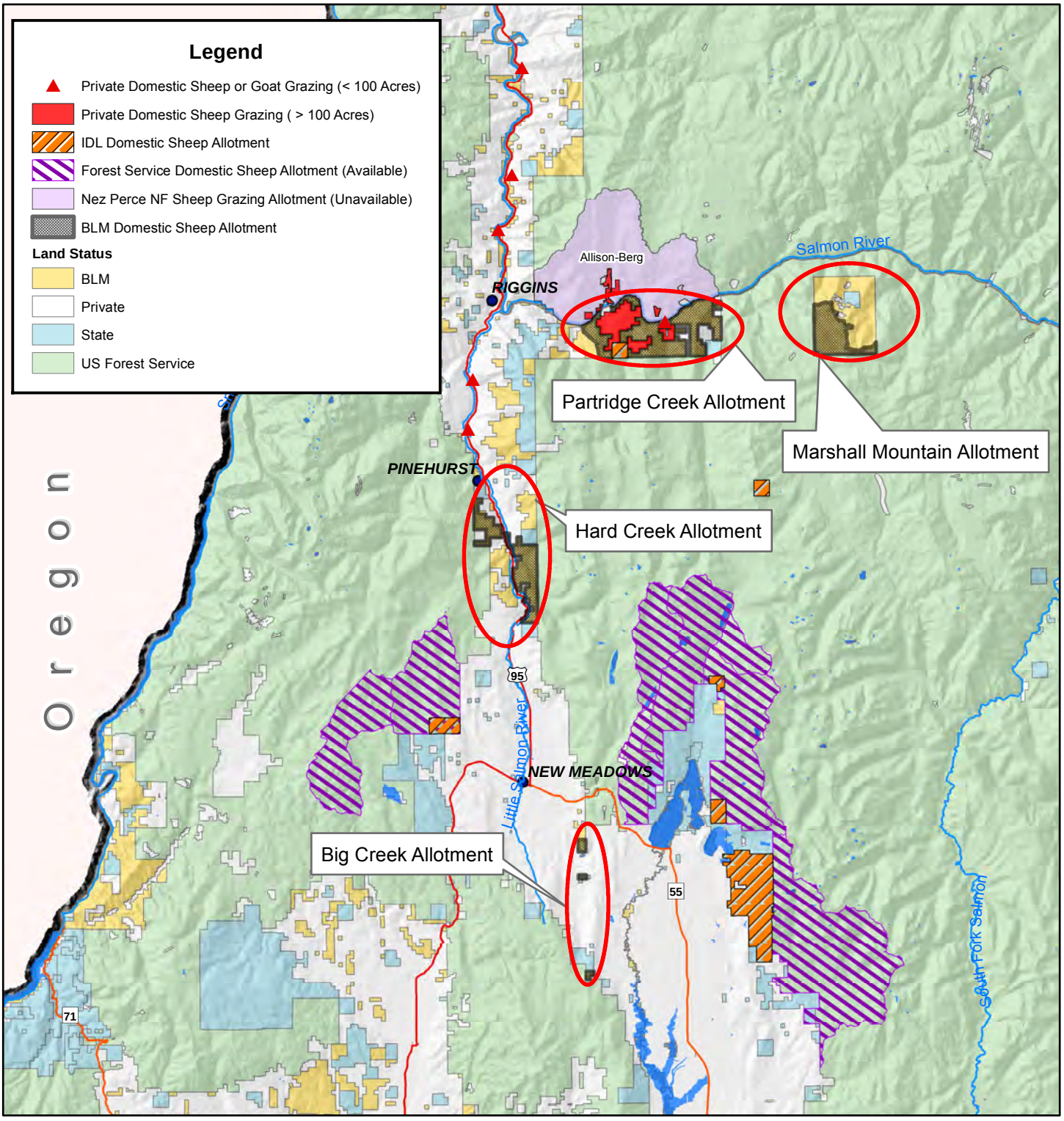
Map Created 11/10/2014

# Map 9
# BLM, Forest Service, and State Domestic Sheep Allotments and Private Sheep and Goat Grazing Areas




The surface management status ("land ownership") should be used as a general guide only. Official land records, located at the Bureau of Land Management (BLM) and other offices, should be checked for up-to-date information concerning any specific tract of land.

1:575,000

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Data displayed in UTM Zone 11N, NAD83


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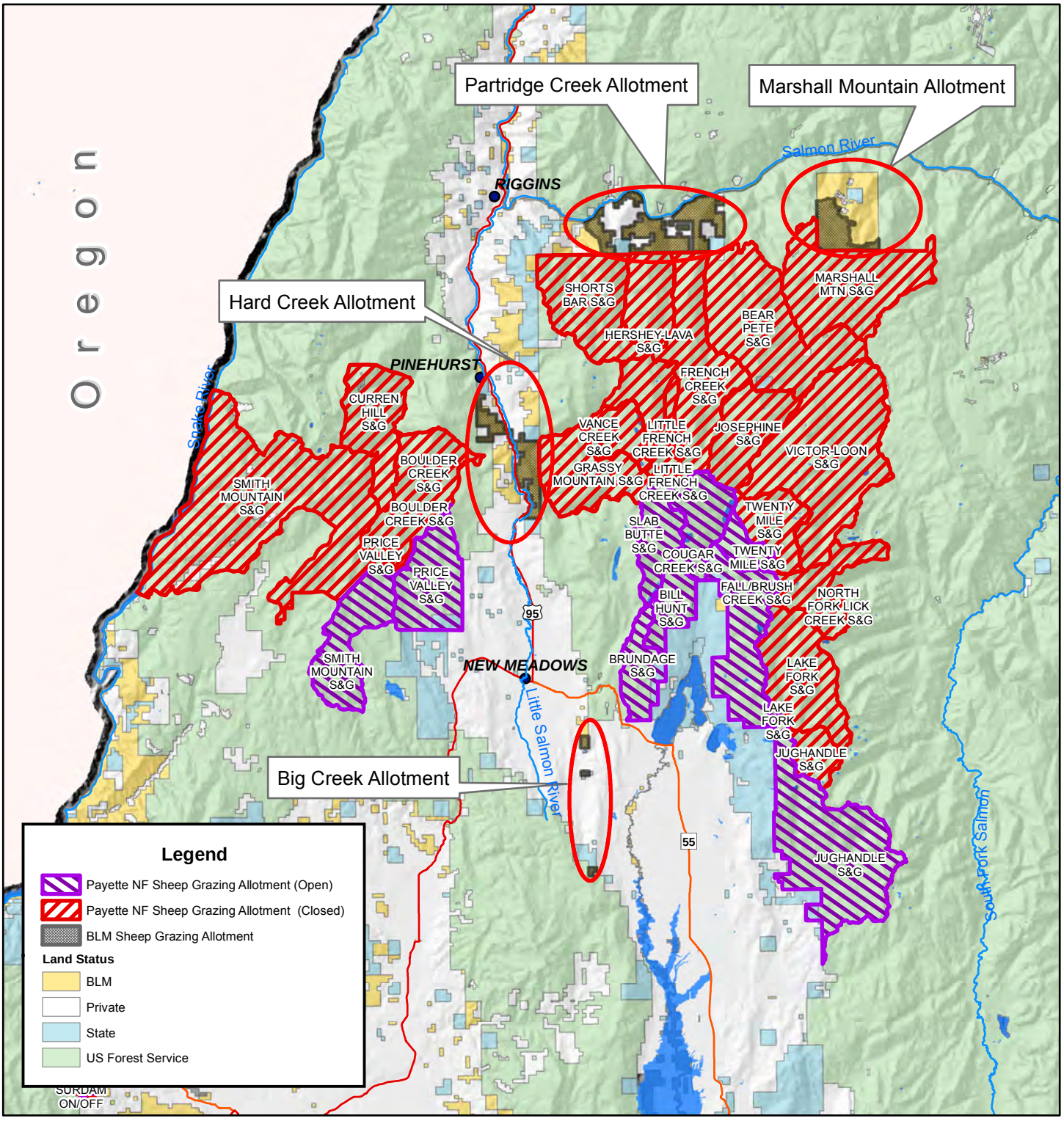
Map Created: 10/27/2011

Map 10

# Payette National Forest Plan Amendment




The surface management status ("land ownership") should be used as a general guide only. Official land records, located at the Bureau of Land Management (BLM) and other offices, should be checked for up-to-date information concerning any specific tract of land.

1:575,000

0 2.5 5 10 15 20 Miles

Data displayed in UTM Zone 11N, NAD83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Map Created: 10/27/2011

# Appendix E – Response to Public Comments on the Draft RMP/SEIS

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## Comment Analysis

During the public review period for the Draft RMP Amendment/SEIS (BLM 2014b), the BLM received 11,933 comment submissions in the form of letters and emails. The BLM is only required to respond to substantive comments. As described in the BLM NEPA Handbook (BLM 2008a), substantive comments are those that:

- question, with reasonable basis, the accuracy of information in the EIS or EA.
- question, with reasonable basis, the adequacy of, methodology for, or assumptions used for the environmental analysis.
- present new information relevant to the analysis.
- present reasonable alternatives other than those analyzed in the EIS or EA.
- cause changes or revisions in one or more of the alternatives.

Comments that are not considered substantive include the following:

- comments in favor of or against the proposed action or alternatives without reasoning that meet the criteria listed above.
- comments that only agree or disagree with BLM policy or resource decisions without justification or supporting data that meet the criteria listed above.
- comments that don't pertain to the project area or the project.
- comments that take the form of vague, open-ended questions.

The CEQ regulations at 40 CFR 1503.4 recognize several options for responding to substantive comments, including:

- modifying one or more of the alternatives as requested.
- developing and evaluating suggested alternatives.
- supplementing, improving, or modifying the analysis.
- making factual corrections.
- explaining why the comments do not warrant further agency response, citing cases, authorities, or reasons.

The BLM reviewed all submissions received and identified the substantive comments they contained. The BLM used the above criteria as a guide, but applied these loosely to provide the greatest opportunity to have public comments acknowledged in the FSEIS.

From each substantive comment, the BLM then determined the issue raised by the comment. Some of the submissions raised issues that were the same or similar to those in other submissions. Table E-1 below identifies commenters and the number codes assigned to the comment issues raised in their submissions. The section following the table contains a description of each of the comment issues, the assigned issue number, and the BLM's responses.

**Table E-1: Commenter Index**

| Commenter* | Comment Issue Numbers |
|---|---|
| William Bringham | 4, 12, 27, 31 |

| Table E-1: Commenter Index | |
|---|---|
| **Commenter*** | **Comment Issue Numbers** |
| Carlson Livestock Company | 16, 19, 21, 30 |
| Governor of Idaho | 3 |
| Friends of the Clearwater | 7, 25, 26 |
| Idaho Wild Sheep Foundation | 1, 2, 5, 12 |
| Idaho Wildlife Federation | 1, 2, 5, 12, 13, 18 |
| Idaho Department of Fish and Game | 2, 8, 17 |
| Idaho State Department of Agriculture | 3, 8, 16, 28 |
| Keith Lawrence | 1, 5, 3, 8, 11, 16, 18, 22, 24, 28, 29 |
| Nez Perce Tribe | 5, 6, 12, 13, 16 |
| Oregon Chapter, Foundation for North American Wild Sheep | 1, 2, 5, 12, 13, 18 |
| David Potter | 14 |
| The Wilderness Society, Idaho Conservation League, and Hells Canyon Preservation Council | 1, 2, 5, 12, 13 |
| Lorrie West | 3, 9, 10, 15, 17, 19, 20, 21, 30, 32 |
| Western Watersheds Project | 5, 12 |

*Commenters are not listed if the BLM found that their submissions only included comments that did not require a direct response (e.g., comments expressing support or opposition to an alternative or components of alternatives).

Of the 11,933 submissions, 11,909 were form letters/emails. These form letters had almost identical content expressing support for the proposed RMP amendment and did not include substantive comments.

## Comment Issues and Responses

The comment issues and responses are organized by the section of the Draft RMP Amendment/SEIS to which the issue pertained. The description of the comment issues primarily uses the text from the submissions, but may include some minor changes for clarification or context. When multiple commenters raised the same issue, the description of the issue includes text from one or more of the submissions.

## Section 1.3: Purpose and Need

| Issue # | Issue Description | Response |
|---|---|---|
| 1 | The Purpose and Need (Page ES-1) for the decision says it is to provide RMP direction that includes "reasonable means to avoid or mitigate contact with bighorn sheep. The BLM does not present any analysis to support the concept that there is means to mitigate the impacts of disease transmission from domestic sheep to bighorn sheep even though several have been tried throughout the region none have been determined to be effective. The "Purpose and Need" should be amended to incorporate the strategy found in 4.2.2.5, which is to establish separation sufficient to reduce the risk of contact and disease transmission to a very low frequency.<br>Which planning regulations that the BLM is citing requires a test of “reasonable means”. Please cite the basis of this test so I can understand how the test will be applied. The phrase “reasonable means” suggests a subjective judgment of some kind. The criteria for the subjective decision are not defined. It is not clear if the “reasonable means” is applied to the domestic sheep or to the bighorn sheep.<br>The analysis focus, which should relate to the purpose and need for this document, is to reduce the risk of contact between domestic sheep and bighorn sheep following a strategy of separation as outlined in section 4.2.2.5 on page 4-6. The Purpose and Need should be changed to link to the focus of the analysis.<br>The purpose and need statement should be to develop management actions that restore bighorn sheep populations to the Salmon River Canyon and Hells Canyon. As written, BLM is implying that bighorns will always play “second fiddle” to livestock grazing while the BLM searches for “reasonable…mitigation.” The BLM can’t “mitigate” extirpation of bighorns. The BLM needs to acknowledge, up front, that the preponderance of published research concludes that contact with domestic sheep results in large scale die-offs of bighorn sheep. That fact needs to drive BLM’s analysis, not some search for ways to be “reasonable” to the domestic producers. | The BLM feels that mitigation is an important consideration. Item #1 in Appendix C (Domestic Sheep and Goats Grazing Lease Terms and Conditions), which calls for immediate removal of co-mingling bighorn sheep, is an example of mitigation considered in this analysis.<br>The term "reasonable means" has been removed from the purpose and need statement to eliminate ambiguity.<br>As stated in Section 1.2, this SEIS and RMP Amendment is a response to protests to the Proposed Cottonwood RMP (BLM, 2008), which were granted by the Director of the BLM. The granted protest issue specifically focuses on the range of alternatives for domestic sheep grazing for the four subject allotments with regard to potential disease transmission from domestic to bighorn sheep. This is reiterated in the Planning Criteria (Section 1.5). Changes or additions to decisions in the Cottonwood RMP that were approved in the ROD (BLM 2009), including those regarding bighorn sheep (as outlined in Section 2.2), are not within the scope of this supplemental analysis. |

## Section 1.5: Planning Criteria

| Issue # | Issue Description | Response |
|---|---|---|
| 2 | The RMP should provide direction that grazing allotments be limited to cattle/horses in all areas where there is potential for conflict between bighorns and domestic sheep or goats.<br>The BLM should incorporate the recommendations of the Nez Perce Tribe and the Idaho Department of Fish and Game (IDF&G) regarding supporting bighorn sheep restoration. It is important that the BLM recognizes that management designed to simply maintain the current bighorn sheep population is not sufficient. The goal should be, as the Nez Perce Tribe has stated, to restore bighorn sheep to historic habitats and densities across the Salmon and Hells Canyon areas. Bighorn sheep populations in the analysis area have not recovered from prior epidemics nearly two decades later. Simply removing the source of the infection has not been sufficient to restore the bighorn sheep resource in Hells Canyon. The BLM should change Wildlife Goal WS-1 and Objective WS-1.10 on page 2-1 to recognize a commitment to support and contribute to the restoration of bighorn sheep populations in the Salmon and Little Salmon River drainages through joint actions with the Nez Perce tribe and the IDF&G and the adjoining federal land managers. The current language is not sufficient as it limits the BLM actions to habitat and research. | The BLM agrees that this should be considered and it is another way of describing Alternative C. Under this alternative, domestic sheep use would not be allowed within any of the 4 subject allotments, which are the only domestic sheep allotments within the Cottonwood Field Office. These allotments would remain available for grazing of cattle or horses. The Approved Cottonwood RMP (BLM 2009) already contains an action that prohibits the conversion of existing cattle or horse allotments to domestic sheep or goats where there is potential risk for disease transmission to bighorn sheep populations or affects the potential for bighorn sheep expansion into suitable habitats (see Section 2.2, page 2-1, Action WS-1.10.3).<br>As stated in Section 1.2, this SEIS and RMP Amendment is a response to protests to the Proposed Cottonwood RMP (BLM, 2008) that were granted by the Director of the BLM. The granted protest issue specifically focuses on the range of alternatives for domestic sheep grazing for the four subject allotments with regard to potential disease transmission from domestic to bighorn sheep. This is reiterated in the Planning Criteria (Section 1.5). Changes to decisions in the Cottonwood RMP that were approved in the ROD (BLM 2009), including those regarding bighorn sheep (as outlined in Section 2.2), are not within the scope of this supplemental analysis. |

## Section 1.9: Collaboration

| Issue # | Issue Description | Response |
|---|---|---|
| 3 | It appears from the draft SEIS that the BLM has overlooked the important function the State of Idaho plays in wildlife management. The Federal Land Policy and Management Act (FLPMA) of 1976 instructs the BLM to develop land use plans through "harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." FLPMA § 103(c) (43 USC§ 1702) (emphasis added). Idaho plays a critical role in managing wildlife within its borders. Unfortunately, BLM's interpretation and implementation of its authority ignores the State's role. I urge you to reconsider the process now underway. Idaho must have a seat at the table in developing a plan that attempts to address wildlife management issues. An appropriate balance must be struck between wildlife concerns and agricultural and rural interests. This can only be accomplished by working with State agency experts.<br>The SEIS fails to identify any appropriate BLM authority to consider wildlife viability in its decision making process. References to an internal policy manual (Manual 6500, Wildlife and Fisheries Management (BLM 1988)) and an internal memorandum (BLM Idaho Instruction Memorandum 2011-004 (BLM 20 II b)) fails considerably short of identifying the necessary legal authority to take the actions described in the SEIS. More importantly, the species at issue in the SEIS, bighorn sheep, is governed, managed and controlled by the State of Idaho. The SEIS must be amended to identify the appropriate legal authorities supporting the actions proposed, specifically where the BLM has the authority to manage wildlife populations and disease transmission. Any final action should recognize the State of Idaho's overarching responsibility to manage bighorn sheep viability and respect the limits of BLM's jurisdiction as it relates to wildlife management. A new SEIS addressing the concerns sighted above should be developed with greater input from the State. In preparing the Final EIS, there is an opportunity to coordinate with other State agencies, such as the Idaho Department of Agriculture and Idaho Department of Lands. | The BLM agrees that the State has special expertise and jurisdiction regarding wildlife and management of adjacent State lands and resources. In June 2010, the BLM invited the IDFG and IDL to participate as cooperating agencies in the development of this SEIS. However, both agencies declined the invitation. Section 1.9 (Collaboration) has been modified to include this additional information.<br>As described in Section 1.9, the BLM coordinated with the IDFG regarding the *Idaho Bighorn Sheep Management Plan* (IDFG 2010) and participated in the WAFWA working group that developed the *Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat* (WAFWA 2012). Both of these documents were considered and are referenced in the SEIS.<br>The BLM also worked with Carlson Livestock Company, IDFG, IDL, and Idaho ISDA to develop the “Strategy for Reducing Risk of Contact between Bighorn Sheep and Domestic Sheep in the Salmon River Area.” Although federal courts dismissed the strategy, lessons learned in this collaborative process have been incorporated into this SEIS. See sections 1.9 (Collaboration) and 3.4.2.1 (Livestock Grazing Existing Conditions) for more information about this strategy.<br>The comments submitted by State agencies and offices during the review of the DSEIS are formal means of involvement. The State will also have a formal opportunity to provide input during the Governor's consistency review of the Proposed RMP Amendment/Final SEIS.<br>Consideration of the effects of a proposed action (i.e., the potential effects of domestic sheep grazing on bighorn sheep populations) and development of alternatives to avoid or mitigate adverse effects is required by Federal Regulations for Implementing the Procedural Provision of the National Environmental Policy Act (40 CFR Parts 1500-1508). This was the basis for granting the protest point that resulted in the preparation of this SEIS, as described in Section 1.2 (Background). These regulations at 1500.2 specifically state:<br>(e) Use the NEPA process to identify and assess the reasonable alternatives to proposed action that will avoid or minimize adverse effects of these actions upon the quality of the human environment.<br>(f) Use all practicable means, consistent with the requirements of the Act [NEPA] and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment.<br>The alternatives outlined in this document identify management options for domestic sheep grazing on BLM-administered public lands, considering the potential effects of disease transmission to bighorn sheep. The BLM's authority comes from the FLPMA and 43 CFR 4100.0-8, as described in Section 1.4 of the SEIS. The alternatives do not address management of bighorn sheep populations (see response to Issue 17). Also, FLPMA specifically identifies wildlife as one of the multiple resources for which the BLM must manage public lands. |

## Section 2.3: Description of the Alternatives

| Issue # | Issue Description | Response |
|---|---|---|
| 4 | Tables E-2, page ES-3, and E-3, page ES-4: Comparing the grazing quality of the allotments by dividing AUM’s into acres, Big Creek is head and shoulders above the other three--acres/AUM is about 5, while the other three are in the 22-24 acres/AUM. Five-acre country to me envisions lush meadows/riparian areas/pastures and gentle rolling country, while 22-24 acre-country is run-of-the-mill sage brush/scattered grass, probably steeper. Is this how it is? | The general synopsis of the reason for widely varying acre/AUM values is correct. Forage allocations for each allotment are based upon a variety of factors including productivity (lbs. forage produced/acre), vegetation types, topography (steepness), availability (can the animals get to the forage), amount of rock, etc. Big Creek Allotment is near New Meadows, Idaho and is of relatively gentle topography and high productivity. Therefore, fewer acres are needed to produce the forage for an AUM. In contrast, Partridge Creek is of lower productivity (generally dryer and less productive plant community), has more rock (no forage production) and is steeper, resulting in less access by the animals. Therefore, there are more acres required to produce the necessary forage for an AUM. |

| Issue # | Issue Description | Response |
|---|---|---|
| 5 | BMPs are included in the management direction of the preferred alternative, but, even the analysis recognizes that there is no conclusive evidence to support whether they are effective. Bighorn sheep experts from Service and ODFW have submitted previous testimony in federal court rejecting BMPs as a viable disease management tool in steep, rugged terrain such as the Salmon and Snake River canyon countries. In a 2009 opinion enjoining DS grazing on the Partridge Creek allotment, Judge Winmill expressly rejected, as "meaningless and irrelevant" and without scientific basis, an Idaho state law requiring that BMPs voluntarily adopted by the domestic sheep producer will result in the reduction of the risk of disease transmission to an acceptable level for bhs viability."<br>Further, the BLM analysis does not contain recognition the BLM and the IDF&G, with the support of others, has entered into agreement with the Carlson Livestock Company to implement BMPs designed to maintain separation between domestic sheep and bighorn sheep at Partridge Creek. The analysis does not acknowledge that contact was reported (the BMPs failed to maintain separation) within a month of implementation. Commenter recommends the results of the tests on the domestic sheep associated with the BMP failure should be included in the analysis, and suggests the following amendments to the BMP analysis:<br>1. The BLM revise the BMP discussion to clearly state BMPs will not be used in or adjacent to bighorn sheep habitat.<br>2. References to the relative effectiveness of the BMPs should be deleted as the available analysis does not ascribe a value or effectiveness for any single or collection of BMPs.<br>3. The BMPs do not have any documented level of effectiveness.<br>4. The BMPs, in their current configuration have been reviewed in federal court and found to not be supported by science or scientific analysis.<br>5. The BMPs will be used, simply as sound management practices, without reference to their effectiveness, on any allotments where domestic sheep grazing is allowed. Further, the domestic sheep grazing will be restricted to areas where there is no bighorn sheep habitat and the allotment is buffered from when there is a buffer between active domestic sheep allotments and Core Herd Home Ranges for bighorn sheep.<br>The proposed Separation Response Plan (Plan) is a good first step, but does not go far enough. The Plan as described might address short-term emergencies when separation has failed, but it does not provide a mechanism for a long-term resolution to failed separation situations. As an example, Lease and Condition number 1 requires the immediate removal of any co-mingling bighorn sheep. This action may prevent spread of disease, but does not address a long-term solution for regaining and maintaining separation.<br>Change language "However, stipulating BMPs as terms and conditions for the authorization of domestic sheep grazing will be expected to have varying levels of effectiveness ... " to /(Including terms and conditions for the authorization of domestic sheep grazing are not intended to reduce the potential of risk of contact or provide separation and will have varying levels of effectiveness ... "; or similar. May also add /(Lease terms and conditions are helpful to coordinate domestic sheep grazing management and implement and coordinate Separation Response Plan actions between the permittee, BLM, and IDFG" or similar. Also provide for BLM presence to verify allotment on and off counts at beginning and end of grazing season and require herders to maintain daily log books. Lastly, eliminate the use of the term "BMP" in "Analytical Assumptions" section of the DSEIS. | The BLM acknowledges that BMPs are not effective in providing separation between bighorn sheep and domestic sheep when allotments overlap with CHHRs or when allotments are in close proximity to CHHRs. The FSEIS, Section 4.2.2.5, specifically identifies that no known studies, research, or peer reviewed literature has documented the effectiveness of BMPs from preventing contact and disease transmission when domestic sheep or goats graze within or adjacent to occupied bighorn sheep habitats. In addition, refer to Section 2.4 Alternatives Considered But Eliminated From Detailed Study, and Section 2.4.6, Alternative L - Allow Domestic Sheep and Goat Grazing on All Allotments with Leasing Terms and Conditions to Reduce Potential Interspecies Contact. Alternative L was eliminated because it would not provide effective separation when allotments are overlapping with CHHRS or in close proximity to occupied bighorn sheep habitats. The FSEIS analysis identifies that there is no conclusive evidence to support the effectiveness of BMPs for providing interspecies separation and no claim to such has been made in the document. The Separation Response Plan addresses short term emergencies regarding interspecies contact and the FSEIS was updated to clarify that the separation response plan is not intended to address long-term maintenance of separation between domestic sheep and goats and bighorn sheep (Section 2.3.1).<br><br>Updates to the FSEIS will further clarify that terms and conditions (required BMPs) identified in Appendix C and a Separation Response Plan identified in Section 2.3.1 are simply additional good management practices and are not meant to replace effective interspecies separation (spatial and temporal). The FSEIS identifies that no effectiveness will be attributed to the use of BMPs for providing adequate separation or preventing interspecies contact when domestic sheep or goats graze in proximity to occupied bighorn sheep habitats.<br>The FSEIS does not identify anywhere that the cooperative Strategy for Reducing Risk of Contact Between Bighorn Sheep and Domestic Sheep in The Salmon River Area (2009) provides effective separation to reduce potential for interspecies contact and is not proposing such under any alternative. The above referenced strategy was specific to the Partridge Creek and Marshall Mountain Allotments only and is no longer in effect. The FSEIS is not proposing to use BMPs in or adjacent to bighorn sheep habitat and does not say that this would provide effective separation. The 2009 bighorn sheep ram encounter with domestic sheep on private lands occurred on the north side of the Salmon River (private lands) and did not occur in the Partridge Creek or Marshall Mountain Allotments. The FSEIS was updated to include a brief summary of the interspecies encounter which occurred between a collared bighorn sheep ram and domestic sheep occurring on private lands located on the north side of Salmon River (see Section 3.2.2.2, Disease History of Salmon River Metapopulation). In the FSEIS reference to BMPs and analysis was removed from Section 4.1.1 Analytical Assumptions. |
| 6 | The proposed Separation Response Plan (Plan) is a good first step, but it is important the BLM adopt an adaptive management approach incorporating regular reassessments of risk of contact to insure long-term separation in response to changing bighorn sheep numbers and distribution and domestic sheep movements and management through time. Incorporate a mechanism into the Separation Response Plan to automatic re-asses risk of contact whenever actions are needed to provide for separation (e.g., the plan is triggered) and/or separation has failed and/or bighorn and domestic sheep are sighted within close proximity. The purpose of ongoing risk assessments should be to evaluate if long-term changes in domestic sheep grazing management are warranted to maintain long-term effective separation. | Section 2.3.1 Common to All Alternatives, does identify that the Separation Response Plan that would be prepared for any authorized domestic sheep grazing provide for adaptive management regarding updated bighorn sheep distribution and population information. The FSEIS now includes the requirement to reassess the risk of contact when additional separation actions are needed, separation has failed, and when bighorn sheep and domestic sheep are in close proximity (see Section 2.3.1, Separation Response Plan and Adaptive Management). Updates in the FSEIS to the Separation Response Plan are now included that identify that reassessment of risk of contact would occur when bighorn sheep or domestic sheep are observed in close proximity (e.g., within allotment boundary or within one-mile of allotment) or bighorn sheep distribution and CHHRs have changed (i.e., expanded). |
| 7 | No alternative would close the allotments to grazing by any domestic livestock. Cattle can also carry vectors that affect bighorn sheep, though they don’t appear to have the same negative impacts as domestic sheep. As such, the range of alternative could have been improved. | See discussion in Section 2.4.9. In response to this comment, the BLM considered an alternative that would close all four allotments to all types of livestock grazing. However, this alternative was eliminated from detailed analysis because it would have essentially the same effects as Alternative C. Alternative C would prohibit domestic sheep grazing on all four allotments, but make them available for other types of livestock. Use of the allotments by other livestock would not change the effects analysis, which focuses on transmission of disease from domestic sheep to bighorn sheep. Effects of cattle on bighorn sheep were not part of the protest issue addressed in this SEIS. |

## Section 2.4: Alternatives Considered but Eliminated from Detailed Study

| Issue # | Issue Description | Response |
|---|---|---|
| 8 | Eliminating grazing on BLM allotments often times does not result in separation of domestic sheep and bighorn sheep. That appears to be the case in this instance given the private and state lands in the area. A critical component to the bighorn sheep viability analysis is where displaced sheep and goats will go following the allotment closures. Page 3-37 discusses the Partridge Creek Allotment closure and states that Carlson Livestock Company may still graze sheep on their private land and on permitted Idaho Department of Lands, both of which adjoin the Partridge Creek Allotment. This would also hold true for the other allotments discussed in the document. This is an important reason for BLM to make alternative allotments available to displaced sheep on public lands prior to closing these allotments. If the displaced sheep are moved to private and state lands adjoining the Partridge Creek Allotment (and the same for other allotments in the document) the preferred alternative accomplishes nothing other than to displace producers and deprive them of grazing opportunities. The possibility of domestic sheep and bighorn sheep interactions may still occur on the state lands and the private lands. This very issue underscores the necessity for the BLM to collaborate with appropriate state agencies to find effective solutions.<br>If, after consultation with the State, the BLM chooses to close or modify an allotment, an alternative allotment should be identified and made available to displaced permittees that provide the equivalent AUMs. Preferably, such analysis would be completed prior to a decision on the RMP amendment, would exchange cattle/horse AUMs for domestic sheep AUMs, and would provide domestic sheep grazing in areas with no potential for risk of contact with bighorn sheep. Additionally, an effort to convert sheep allotments to cattle and/or horse allotments should be made where practicable. | The FSEIS Section 4.2.4, assesses the cumulative effects that could continue to occur from domestic sheep grazing on private and/or State lands even if domestic sheep grazing is not allowed on adjacent BLM allotments. The FSEIS analysis concluded that complete interspecies separation would not occur when private and State land domestic sheep grazing continues when such areas were in similar proximity or overlapped with CHHRs.<br><br>In response to this comment, the BLM considered an additional alternative that would call for no net loss of domestic sheep grazing AUMs. However, this alternative (Alternative M) was eliminated from detailed study because it is not feasible (see Section 2.4). |
| 9 | The BLM does not propose any alternatives with action(s) other than closing one or all of the four allotments historically available and used for grazing by domestic sheep. Except for Alternative A (No Action), the RMP Amendment alternatives all propose to (significantly) reduce the acres available for grazing by sheep. The Draft SEIS fails to include any consideration of any action(s) that emphasize the Balanced Resource Protection and Use approach of the selected Alternative B from the Cottonwood RMP/Final EIS, and does not consider any actions to meet the Increased Resource Production/Decreased Resource Protection approach of Alternative D. To develop a reasonable range of alternatives, the BLM must consider measures, in consultation with the affected Lessee (Carlson Livestock Company or Soulen Livestock Company), measures to mitigate the direct effects of the proposed grazing closures to their sheep ranching operations. The ‘collaborative scoping’ process used by the BLM appears to have excluded affected livestock interests, despite BLM NEPA, land-use planning, and grazing administration policies that explicitly require their involvement. There is no evidence that the development of the alternatives included any coordination with the affected Lessees of the allotments (Carlson Livestock Company and Soulen Livestock Company), as required by NEPA and BLM’s regulations for the administration of livestock grazing (43 CFR part 4100). | In addition to the action alternatives, the BLM considered 5 other alternatives for managing domestic sheep grazing that were eliminated from detailed analysis for reasons stated in Section 2.4 (pages 2-5 to 2-7).<br>The FSEIS only addresses the granted protest point/issue. The themes (i.e., balanced protection and use, or increased production) for the alternatives in the Proposed RMP/Final EIS are not practical for addressing this issue. Alternatives B, D, E, and F for the plan amendment are all variations of balanced resource protection and use, and increased production would not address the issue.<br>Although not specifically identified as a mitigation measure, the continued allocation of the allotments and forage for grazing by livestock other than domestic sheep or goats is a means of mitigating the impact to the livestock industry and lessees.<br>Collaboration describes a wide range of external and internal working relationships. See changes to Section 1.9 (Collaboration) for additional information regarding previous coordination with the lessees, the State of Idaho, and other stakeholders. |
| 10 | BLM Idaho has not considered designating the bighorn sheep as a “BLM Special Status Species” as was done by the Forest Service, and has been requested by the Nez Perce Tribe. See discussion for eliminating Alternative K (Draft SEIS, section 2.4.6, page 2-7). | As described in Section 2.4.5 (page 2-7), designation of special status species is not within the scope of an RMP amendment or this analysis. However, through a separate review and approval process the BLM has updated the BLM Idaho Sensitive Species list and designated the bighorn sheep as a BLM sensitive species (Section 2.4.5). |
| 11 | During a public meeting Mr. Carlson suggested he would reserve the area above French Creek on the Salmon and its tributaries for bighorn sheep and reserve the area below French Creek for domestic sheep; a concept referred to as "zoning". This concept creates zones where the bighorn sheep are free to roam and areas where they would not be allowed to remain. To create the zone for the domestic sheep you would need to remove bighorn sheep. I suggest the BLM not consider zoning as a management style for this area. If the BLM does consider zoning further I believe you would need to re-analyze the threat to viability of decreasing the population of bighorn sheep in the area to make room for domestic sheep grazing. Based on the collective experience of the Idaho Department of Fish and Game, the Nez Perce Tribe and the Bureau of Land Management, "Zoning" has already been tried on the Salmon River and failed. | The FSEIS specifically addresses domestic sheep or goat grazing on the four BLM sheep allotments. The BLM considered an alternative (Alternative N) that would create zones, but eliminated it from further study because this is beyond the scope of this FSEIS (see Section 2.4.8). The cumulative effects analysis (Section 4.4.4) addresses domestic sheep and goat grazing occurring on Forest Service, State, and private lands within the analysis area and potential contact effects to bighorn sheep herds. |

## 3.2: Affected Environment – Bighorn Sheep

| Issue # | Issue Description | Response |
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| 12 | There is no scientific evidence to support the assumptions behind the use of 8% as a threshold for acceptable risk of contact. If this threshold is used in this analysis, then it may set a precedent for other BLM offices to use when analyzing similar situations in other areas. Basically the PNF analysis is more conservative than the BLM. In fact the BLM 8% risk for a herd level contact yearly is double that recommended in the PNF ROD. An 8% annual risk of contact is too great to consistently assure effective separation across a broad range of conditions; underlying analysis assumptions are not based in science; no distinction is made between landscape- and herd-level risks. The BLM repeatedly stated population recovery is unlikely should a bighorn population suffer a disease outbreak more frequently than once every 50 years, but did not reference this statement in the scientific literature or provide another explanation for the bases of this statement. The BLM recognized a lack of scientific data to accurately estimate the probability of an outbreak given contact. Regardless, the BLM assumed a 0.05, 0.25, and 1.0 probability of an outbreak given contact as low, moderate, and high respectively and adopted the moderate (0.25 or 1 in 4 contacts leads to disease outbreak) probability for purposes of analysis and Contact Tool interpretation. Justification for choosing this value and skewed "moderate" category appears to be that these values are based on the same assumptions made by the Payette National Forest (PNF) in their 2010 Record of Decision. | It is acknowledged that there is no scientific evidence to support a specific value for acceptable risk-of-contact and disease outbreak which is identified in the FSEIS. The model does follow well-documented and peer reviewed protocols and logical processes, the results should be viewed as a means of comparing the relative risks of disease outbreaks occurring from the various alternatives, not as definitive values. Results of the model support the current knowledge and characteristics of the bighorn sheep herds and the science based on the understanding of disease outbreaks potentially occurring from contact of a bighorn sheep with an allotment used for domestic sheep grazing. Because of the uncertainty regarding the probability that contact of a bighorn sheep with such an allotment will lead to disease outbreak within a population, modelers evaluated the analytical assumption of disease outbreak occurring based on bighorn sheep contacts with an allotment and potential for disease outbreak within a 50-year period. The values evaluated ranged from 0.05 (1 in 20 contacts would result in a disease outbreak) to 1.00 (every contact would result in a disease outbreak).<br><br>Chapters 3 and 4, and Appendix B now include additional information addressing the level of uncertainty surrounding the probability that contact of a bighorn sheep with an allotment will result in disease outbreak. The previous assumption regarding a threshold has been deleted and is not considered in the effects analysis or comparison of alternatives in the FSEIS. |
| 13 | Risk of Contact does not incorporate the movements of stray domestic sheep upon the risk of Contact. The BLM recognizes that the Risk of Contact analysis is based upon the movements of bighorn sheep towards domestic sheep. The additional risk of domestic sheep straying off the allotment and moving toward bighorn sheep is not evaluated. The Idaho Wildlife Federation recommendation is: a) The BLM should enter into an agreement with the Payette National Forest to fund a joint effort to identify domestic sheep straying patterns, distances and circumstances to be able to incorporate the risk of domestic straying into the risk of contact model. b) The BLM, when considering what risk of contact is acceptable, must consider the risk of contact model actually underestimates the risk of contact because the straying of domestic sheep is not considered in the model. The Contact Tool should, at a minimum, be updated to include a stray domestic sheep element to better account for the increased risk of contact posed by stray domestic sheep. | This comment is correct. The Risk of Contact Tool does not model movements of stray domestic sheep or contacts with bighorn sheep. Section 3.2.2.6 (Risk of Interspecies Contact and Straying of Domestic Sheep from Grazing Allotments and While Trailing) provides a discussion of the risks associated with straying domestic sheep and potential contacts with bighorn sheep. Sections 3.2.2.6 and 4.2.2.4 contain updated information regarding the fact that underestimates of interspecies contact exist because straying is not modeled for domestic sheep and needs to be considered when comparing and evaluating alternatives. Effective separation (spatial and temporal) is the primary BMP to reduce potential for interspecies contact; however, several other BMPs do provide for additional reduced risks from straying when effective separation is occurring.<br>The BLM also acknowledges that additional research and studies regarding the potential straying of domestic sheep would provide additional data for comparison of alternatives. Research conducted would need to be specific to varying terrain, vegetation, season of use, and allotments proximity to bighorn sheep CHHR. Updating the Risk of Contact model to address straying with science based research data, peer review, and validation for the FSEIS would be beyond the scope of this analysis; however, as noted above, risk of straying will be considered when evaluating alternatives. |
| 14 | It was common knowledge that domestic sheep were death on wild sheep because domestic sheep infected water sources with lungworms. Wild sheep became infected and many [most?] died from it. | The FSEIS includes a summary of diseases and parasites that may be transmitted from domestic sheep to bighorn sheep. Current research has identified respiratory disease resulting in pneumonia is the most serious disease at a population level when bighorn sheep share ranges with domestic sheep. Additional discussion regarding lungworms and earlier research hypothesizing that lungworms predisposed bighorn sheep to pneumonia is included in the FSEIS (see Appendix A, Other Factors/Stressors). |
| 15 | Protection of the Salmon River herd would likely be enhanced using the telemetry data collected since 2009 as part of the cooperative study with the Nez Perce Tribe, IDFG, Forest Service and BLM, and by limiting grazing of domestic sheep at times when bighorns are not likely to be using habitat outside of the core herd home range. | The FSEIS considers Salmon River bighorn sheep telemetry data collected since 2008 as part of the cooperative study with the Nez Perce Tribe, IDFG, Forest Service, and BLM. The FSEIS includes an analysis of bighorn sheep forays occurring outside of CHHRs for summer and winter use periods. |

| Issue # | Issue Description | Response |
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| 16 | The BLM uses the following statements and language throughout the SEIS: "assumption(s)" used 31 times; the document states numerous times that "disease transmission has potentially contributed to declines; is a possible contributing factor: may have been caused by disease; there is limited knowledge of transmission dynamics; it is assumed: the literature includes circumstantial evidence linking bighorn die offs in the wild to contact with domestic animals; a high degree of uncertainty exists regarding the probability that contact of a bighorn sheep with an allotment will lead to disease outbreak occurring within a herd; BLM relied on assumptions: and BLM recognizes the uncertainty regarding the relationship between the number of bighorn sheep contacts with a domestic sheep allotment and predictions for disease transmission and outbreaks." With the above statements based on no hard or conclusive science concerning this issue, how does the BLM arrive at their preferred alternative? Making a decision based on such speculation, circumstantial evidence and uncertainty as identified in this draft document will result in severe impacts to Idaho sheep producers. These uncertainties as identified in the above paragraph and throughout the Draft Cottonwood Resource Management Plan Amendment are being used as the basis for proposing to close three out of four allotments to domestic sheep grazing. Ironically, it was the uncertainty of the effectiveness of separation Best Management Practices (BMPs) the BLM relied on to dismiss BMPs as a management option.<br>The document should not discount disease transmission in the wild. This is contrary to the wider body of scientific literature, expert opinion, and management recommendations for separation. Suggest strengthening pertinent sections to more accurately reflect current state of knowledge. The tribe knows of no science that indicates disease transmission does not occur in the wild or that transmission rates are different than those documented through scientific studies in penned experiments. A substantive body of scientific evidence suggests transmission does occur in the wild and no evidence that transmission rates would be substantively different than those documented in penned experiments. | No science or research proves with certainty that interspecies disease transmission does not occur in the wild. No known published reports could be found that document fenced or free-ranging bighorn sheep herds remaining healthy when living directly with domestic sheep herds. The FSEIS cites pertinent controlled experiments and disease-caused mortality events that have been recorded in wild populations of bighorn sheep immediately after contact with domestic sheep (see Appendix A). Current science supports that the most viable management option is to provide for spatial and temporal separation between domestic sheep allotments and wild sheep habitat. The FSEIS recognized that uncertainty does exist regarding the probability that a specific contact event will result in a disease outbreak.<br>The FSEIS includes additional analysis, current science, and documentation to support that conclusion that spatial and temporal separation between domestic sheep and domestic sheep allotments is the preferred management option (Section 3.2.2.3. Disease Transmission; Appendix A).<br>The BLM does not discount that disease transmission can occur in the wild (see Appendix A). Additional supporting discussion has also been included in the FSEIS to support that disease transmission can occur in the wild (see Appendix A). |
| 17 | The Payette National Forest and BLM's analysis both appear to treat the four animals observed in the Little Salmon Area of Concern as a herd, with a core herd home range. Thus, effects based on the distance of the allotment to the Little Salmon core herd home range are exaggerated, especially for the Hard Creek Allotment. The Hard Creek Allotment has been identified in the Draft SEIS as an area of relatively high risk of contact between domestic sheep and wild sheep in the Little Salmon area (1.0+ contacts/year) even though the allotment falls outside of IDFG's identified bighorn sheep distribution polygon (IDFG 2010). The BLM model identified both summer and winter bighorn sheep core-herd-home-ranges within the Hard Creek Allotment based on relatively few data points. IDFG assumes these data points originate from one yearling ram and one ewe that were seen in the area in 2010. The ram was known to have made contact with domestic goats and was subsequently dispatched in accordance with Idaho's separation strategy (IDFG and ISDA 2008). The ewe was seen again in 2012 and was inadvertently killed when IDFG staff attempted to radio-collar the ewe. The Draft SEIS also identified both summer and winter source habitats within the allotment. IDFG staff have recognized the Little Salmon area as a potential dispersal corridor for bighorn sheep based on bighorn sheep sightings and available habitat. Additionally, IDFG biologists believe it is reasonable to anticipate rare and infrequent bighorn sheep movements through the area. However, because of the lack of an established herd, limited amount of suitable habitat, including the presence of private land, and the exclusion of the area as actively managed for bighorn sheep under the State Management Plan (IDFG 2010), we request the BLM work with IDFG on the analysis for the Final SEIS to include the likelihood of additional bighorn sheep forays or dispersal in the Little Salmon area and whether such forays or dispersal are atypical movements or indicative of normal bighorn sheep range. | The FSEIS acknowledges that consideration of the Little Salmon Area of Concern is based on relatively few incidental sightings of bighorn sheep that have occurred over the past five years, and that neither telemetry data nor observations exist to document that there is an established herd in the area. However, because a domestic sheep allotment (Hard Creek) occurs in proximity to recent incidental sightings further analysis regarding potential for bighorn sheep and domestic sheep contact was needed. Updates to the FSEIS include additional characterization of the Little Salmon Area of Concern in regards to limited suitable habitats, lack of established herd, IDFG management direction for area, and the likelihood of bighorn sheep dispersal or foray movements within the area (see Section 3.2.2.1, Analysis Area, Little Salmon Area of Concern). Where appropriate, the FSEIS includes additional clarification in discussions, analysis, and maps to distinguish the differences between the Area of Concern and CHHRs. The FSEIS includes updated analysis for the Little Salmon Area of concern, particularly in regards to the fact that no CHHR has been documented as occurring in the area and predicted bighorn sheep contacts with the Hard Creek allotment when the area is grazed (see Section 4.2.3 Effects of Alternatives). |
| 18 | A final report regarding the results on the testing of the domestic sheep, done by the IDF&G, pursuant to the terms of the Agreement the BLM entered into with Mr. Carlson in April 2009, should be discussed. It is important to recognize what a potential contact or prolonged contact could have yielded if the contact had not been observed and promptly reported. The 2009 agreement requires testing of the domestic sheep involved in the contact when they can be identified and the bighorn sheep remained on the landscape. Please include the report in the FSEIS. | The 2009 cooperative Strategy for Reducing Risk of Contact Between Bighorn Sheep and Domestic Sheep in The Salmon River Area was specific to the Partridge Creek and Marshall Mountain allotments located on the south side of the Salmon River and is no longer in effect. The 2009 bighorn sheep ram encounter with domestic sheep occurred on the north side of the Salmon River on private lands in the vicinity of Allison Creek. The FSEIS has been updated to include a brief summary of the interspecies encounter which occurred between a collared bighorn sheep ram and domestic sheep occurring on private lands located on the north side of Salmon River (see Section 3.2.2.2, page 3-10, Disease History of Salmon River Metapopulation). |
| 19 | Why doesn't the BLM's analysis focus on protecting the Salmon River herd? The analysis area for bighorns in your SEIS should not have included the Snake River's population because the Main Salmon River populations are native genetic stock. | The FSEIS recognizes the importance of the Salmon River native bighorn sheep and does focus on protecting the Salmon River population as exemplified in alternative development (see FSEIS, Section 2.3, Descriptions of the Alternatives). The analysis further recognizes the importance of the Salmon River native bighorn sheep populations in Section 3.2.2.1, Analysis Area. However, bighorn sheep forays into the BLM allotments from the Snake River populations may also occur and these herds were therefore included in the analysis. The two allotments that occur in the Little Salmon River drainage are closer to some of the Snake River bighorn sheep populations than the Salmon River population, consequently, it was critical to the analysis to include these populations (see FSEIS, Table 3-3, page 3-13). |

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| 20 | It is unclear if the BLM has 'adopted' the mapping of 'suitable habitat' of the Western Association of Fish and Wildlife Agency, or their guidelines incorporated within the Bighorn Sheep Management Plan (Idaho Department of Fish and Game, 2010). | We assume that reference to "suitable habitats" was referring to "occupied habitats" as mapped by Western Association of Fish and Wildlife Agencies. The mapping of "occupied habitat" by Western Association of Fish and Wildlife Agencies provides a large scale portrayal of bighorn sheep occupied habitat and metapopulations occurring within the analysis area, and is presented in Map 1. See Affected Environment – Section 3.2.2.1 for further clarification about habitats. Criteria for documentation of suitable summer and winter bighorn sheep source habitats are documented in the FSEIS (see Section 3.2.2.5). Western Association of Fish and Wildlife Agency guidelines are referenced and acknowledged in the FSEIS, but the BLM has not formally adopted them (see Chapter 1, Section 1.9 Collaboration). The BLM would collaborate with IDFG in accordance with the Idaho Bighorn Sheep Management Plan (IDFG 2010) to reduce potential for inter-species contact on any allotment(s) as appropriate where domestic sheep grazing would occur. |
| 21 | Why did the BLM base their decision to stop sheep grazing using the Payette analysis of assumptions? The Payette analysis used assumptions that may or may not be valid in issuing BLM's decision to close their allotments. The Payette model was designed to address the viability of the transplanted Hells Canyon herds. Limited information for the Salmon River population was to be supplemented with BLM's use of the model. The Payette analysis used assumptions that may or may not be valid, or appropriate, in issuing BLM's decision to close their allotments. | The BLM used modeling to determine the impacts from domestic sheep grazing on BLM lands to bighorn sheep populations, similar to the Payette National Forest. Analysis and consideration of such impacts is required by the NEPA. The analysis and assumptions used in the FSEIS and the peer reviewed modeling were valid tools for the BLM to use in conducting analysis of the potential risk of bighorn sheep contacting active BLM domestic sheep allotments (see Executive Summary, Affected Environment, page ES-5). The models used for the FSEIS along with background information and the user's guide are included in the *Bighorn Sheep Risk of Contact Tool Users Guide* (USFS 2013a). Methods provided by the referenced Risk of Contact Tool provide land managers a framework for addressing and calculating the probability and rates of contact between bighorn sheep and domestic sheep allotments and potential for disease transmission; and subsequent development of bighorn sheep conservation measures (USFS 2013a). The FSEIS includes updated peer reviewed literature citations to provide additional validity to the analytical assessment conducted for the four BLM domestic sheep allotments (O'Brien et al. 2014; Carpenter et al. 2014). |
| 22 | There is documentation about bighorn sheep populations and domestic sheep grazing during early post-European settlement that was not included in the affected environment. The BLM analysis does not include a complete documentation of references regarding the historic presence and human use of bighorn sheep. Information could be obtained from other federal agencies or local historians. Henry Spalding's diary of his work at the Mission near the mouth of Lawpai Creek documents the presence of domestic sheep in Idaho in 1839. These diaries document the Spaldings did not arrive with domestic sheep but they later acquired some in the late 1830s. Where the domestic sheep were grazed is not well documented, but since the diaries talk about the losses of domestic sheep to dogs and wolves and how Henry Spalding ran out of his house at night to kill wolves attacking the sheep, it is assumed they spent a lot of time near the mouth of Lapwai Creek. These diaries document the early presence of domestic sheep in Idaho.<br><br>The document does not include a complete documentation of pre-European bighorn sheep presence or importance to tribes. Wallowa-Whitman National Forest has archeological information regarding Nez Perce use of bighorn sheep in Hells Canyon. The band of Native Americans known as the Sheepeaters were believed to be heavily reliant on bighorn sheep. They lived upriver but adjacent to the area analyzed. Being reliant on a resource usually indicates it is available in quantity over a long period of time to meet the needs of the people reliant on the resource.<br><br>Complete historical documentation of bighorn sheep die-offs needs to be included. There are also documented sitings of bighorn sheep and contacts between domestic and bighorn sheep that are missing but should also be included. Dr. Dale Toweill documents there were die-offs of bighorn sheep when domestic sheep were introduced in Idaho. It may be possible that the bighorn sheep were exposed to pneumonia when domestic sheep were introduced to the area and then died in large numbers, all before the Carlson family oral history begins. | Chapter 3 of the FSEIS (Section 3.2.2.2, Historical Context) does include documentation regarding pre- and post-European settlement and bighorn sheep in Idaho. Chapter 3, Section 3.3 Native American Tribal Uses also summarizes the importance of bighorn sheep to Native American Tribal Uses. Chapter 3, Section 3.2.2.2, Historical Context, and Section 3.2.2.3, Disease Transmission, does include a summary of bighorn sheep die-offs and disease transmission for the analysis area and Idaho. The FSEIS also includes additional documentation regarding pre-European settlement bighorn sheep information, pertinent archeological information, and importance to Native American tribes not previously included in the DSEIS (see Section 3.2.2.2 Historical Context). |
| 23 | The Salmon River bighorn sheep populations are significant due to their native status; there have been no introduction of non-native bighorn sheep in this area. The bighorn sheep resource in the Salmon River above Riggins is a significant portion of the total population of Rocky Mountain Bighorn Sheep in Idaho. The data obtained and summarized by the Nez Perce Tribe, based on reports/presentations and summaries I have seen, indicates the bighorn sheep, although segregated into smaller groups outside the breeding season, stay in contact with adjoining groups through the year. The combined factors of contiguous habitat and the small groups of animals in contact with each other means the consequences of a domestic sheep transmitting disease to the bighorn sheep should be expected to affect the entire population of bighorn sheep. The bighorn sheep resource that could be potentially affected is significant in terms of the total population in Idaho. There has not been any bighorn sheep transplanted into the area between Riggins upstream nearly to Corn Creek. Thus this population of bighorn sheep could be a unique resource genetically. It has been documented bighorn sheep are resident to the area, are more abundant than has been documented by IDF&G trend surveys and are a unique resource among bighorn sheep herds in the state since they were never extirpated and never mixed with animals from other locations such as with transplanted animals. | The FSEIS, Section 3.2.2.1, Analysis Area, Salmon River Metapopulation, discusses the significance of the native Salmon River bighorn sheep population and interconnectivity of the subpopulations. Because of the interconnectivity of the subpopulations, the FSEIS identifies the associated risks with the spread of disease between bighorn sheep local populations.<br><br>The FSEIS also includes additional information regarding bighorn sheep connectivity and potential for disease spread for the Salmon River population that was not included in the DSEIS (see Section 3.2.2.1 Salmon River Metapopulation). |

| Issue # | Issue Description | Response |
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| 24 | The document needs to include more specific information regarding risks of contact between domestic sheep and bighorn sheep specific to the Partridge Creek and Marshall Mountain Allotments which occur in the Salmon River drainage. A higher risk is associated with the Partridge Creek allotment because of the close proximity of the Partridge Creek allotment to known bighorn sheep on the north side of the river and documented occurrences of bighorn sheep on the south side of the river within the allotment. Areas used by domestic sheep in the Partridge Creek allotment should receive increased awareness and monitoring for potential interaction with bighorn sheep. Bighorn sheep may swim the river or cross bridges to the south side. Stray domestic sheep may cross the Salmon River to the north side, where potential for interaction with bighorn sheep would increase. Grazing management actions for domestic sheep on the south side of the river (Partridge Creek allotment) that minimize time grazed in close proximity to the Salmon River and increase distance from the Salmon River may reduce risk of contact between domestic sheep and bighorn sheep. Recent bighorn sheep occurrences along the Salmon River have been documented approximately 2.5 air miles north from areas authorized for domestic sheep grazing in the Marshall Mountain allotment. | The BLM believes that the information regarding specific risks associated the Partridge Creek and Marshall Mountain allotments and proximity of these domestic sheep grazing allotments to Salmon River/South Fork herds within the Salmon River drainage, in the FSEIS Chapter 3, Section 3.2 Bighorn Sheep; and Chapter 4, Section 4.2, sufficiently supports our analysis.<br><br>The FSEIS also includes additional analysis information regarding bighorn sheep risks associated with contacting an allotment and risks from domestic sheep straying that are specific to the four analysis domestic sheep allotments that was not in the DSEIS (see Sections 3.2.2.1, 4.2.2.3 and 4.2.2.4. |
| 25 | Most scientists no longer recognize the California sheep as a subspecies. There is a distinct subspecies in the southern Sierra, but those were not the sheep reintroduced into southwest Idaho. The old California subspecies is now generally regarded as the same as the Rocky Mountain subspecies. | Reference to the California subspecies in this document is related to IDFG management direction for bighorn sheep state-wide. Southwest Idaho is outside of the analysis area, therefor, clarification about recognition of that subspecies is not relevant to this analysis. |
| 26 | The analysis also indicates, regarding sheep ranching:<br><br>“Of note is the intimate culture that surrounds the sheep industry, which is attributable to values such as hard work, tradition, and a love for the animals and the land. These values are emphasized and cultivated in area events such as county fairs, where 4-H and Future Farmers of America programs contribute to youth education and a sense of community identity. In History of the State of Idaho, Cornelius Brosnan states that, "Idaho has become one of the greatest wool-producing States, but has long been noted for its mutton" (Brosnan 1918).<br><br>This is hardly a scientific analysis but comes across as more of the agency's value judgment regarding sheep ranchers. Does the BLM mean to imply that somehow sheep ranchers are more virtuous than other citizens and cultures including the Nez Perce? These kind of value-laden and biased attributions detract from the integrity of the analysis, especially when the DEIS doesn't engage in bias regarding other groups. For example, the DEIS is clear in describing what the Nez Perce "believe." Observational objectively is not maintained regarding the sheep industry. Thus, the DEIS appears seriously biased. | The BLM does not feel this discussion of the social interests affected environment is bias. It is simply a description of the connection between the local culture (and cultural values) and the sheep industry, based on the observations indicated, not value judgment. The comment provides no evidence supporting the claim that this affected interest received more attention or weight in the analysis than did the Nez Perce Tribal cultural and social interest related to bighorn sheep, described in Section 3.3. |

## Section 4.2: Environmental Consequences – Bighorn Sheep

| Issue # | Issue Description | Response |
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| 27 | Do any of the maps show the domestic sheep trailing routes/stock driveways discussed on page 4-16? That would have been most helpful, as the discussion about these left the reader wondering if they were actually considered, for example, in developing the Risk of Contact data discussed in the Cumulative Effects section pages 4-16 to 4-18. Please refine the final product to address this issue. | Currently, the BLM has no authorized trailing routes/stock driveways on BLM lands. Localized trailing that occurs within allotment boundaries is accounted for in the modeling conducted for specific allotments and season of use. Trailing does occur across private lands, State lands and Forest Service lands; and also along County roads. Trailing was considered in developing Risk of Contact data; however, modeling for short duration (e.g., 1-3 days) and small areas resulted in minor insignificant increases in probability of contact. If trailing occurred within CHHR, it was already accounted for in the Cumulative Effects (i.e., one or more contacts annually) or accounted for in areas where domestic sheep grazing occurred (private lands, State lands, and Forest Service lands). In addition, some of the larger risks from trailing occur from straying (see Section 3.2.2.6 - Risk of Interspecies Contact and Straying of Domestic Sheep From Grazing Allotments and Section 4.2.2.4 - Straying of Domestic Sheep and Domestic Sheep Trailing).<br><br>The FEIS includes additions to address analysis and rationale in regards to trailing (see Sections 3.2.2.6 and 4.2.2.4). |
| 28 | The document seems to focus more on the negative impacts from improper livestock grazing practices. All herbivore activities, including grazing from wildlife species such as deer, elk, antelope, bighorn sheep etc. can and do cause various impacts on habitat. However, the draft document needs to clarify that it is improper grazing that creates the negative impacts to the habitat, and not properly, well managed livestock grazing. With proper grazing management practices, impacts from livestock grazing can be minimized and reduced to acceptable levels that will not create the negative impacts that can occur from improper grazing management practices. | The FSEIS and alternatives focus on addressing potential contact and disease transmission between domestic sheep and bighorn sheep, not on negative impacts from improper livestock grazing practices. The BLM recognizes that improper grazing can create negative impacts to the habitat and properly managed livestock can reduce potential for adverse habitat impact (refer to Section 3.2.2.8). Additions to the FSEIS identify that properly managed livestock can reduce adverse impacts to habitat and also acknowledge that all herbivore activities can cause impacts to habitats (see Section 3.2.2.7 Habitat).<br>The FSEIS primarily addresses the "shared space" component of habitat and needed separation to reduce potential for interspecies contact and disease transmission. The Purpose and Need (Section 1.3) identifies the disease transmission from domestic sheep to bighorn sheep has potentially contributed to significant declines in bighorn populations, and in some cases, extirpation. |

## Section 4.4: Environmental Consequences – Livestock Grazing, and Social and Economic Conditions

| Issue # | Issue Description | Response |
|---|---|---|
| 29 | Additional details about BLM allotments and past use (the 2009 separation response plan) should be considered in the Affected Environment for Livestock Grazing. | The information submitted is a copy of the 2009 separation response plan and does not contain additional information for affected environment. The role of 2009 separation response plan is adequately described under Section 3.4.2.1. Information about the allotments is already included in the allotment descriptions in Section 3.4.2.1. |
| 30 | The BLM should clearly disclose the direct effects felt by Carlson Livestock Company and Soulen Livestock Company. Without this, the analysis fails to disclose the cumulatively significant effects on their operations, when considered in combination with the effects of the actions of other State and Federal agencies, beginning with the transplantation of the Hells Canyon bighorn herds and continuing with implementation of the Payette decision. BLM appears to justify their determination of the (un)suitability of the allotments for domestic sheep by claiming that the acres and forage would still be available for use by cattle or horses. It is questionable if it is truly 'reasonably foreseeable' that the effects of eliminating sheep grazing can be offset by conversion to cattle or horses.<br><br>Carlson states that, having lost the use of the BLM sheep allotments as well as the sheep allotments on both the Payette and Nez Perce National Forest, his primary income decreased significantly, and this has also devalued all his private land. | Section 4.4.4 was modified to describe both the significance of effects to the individual livestock operators and the impact to the historical industry. In addition, a discussion of the potential actual use by cattle and horses was added to sections 4.1.1 and 4.4.3.2-4.4.3.6. |

## Appendix D: Maps

| Issue # | Issue Description | Response |
|---|---|---|
| 31 | There are NO MAPS in Appendix D-just the list of them on page D-1. | The maps are available on the "Maps" page of the website which can be accesses through the menu on the left side of the "Home" page. |

## Other – Not Specific to a Section of the Document

| Issue # | Issue Description | Response |
|---|---|---|
| 32 | The Draft SEIS does not include a List of Preparers and Distribution List that is required for an EIS.<br><br>It would also be helpful if BLM would make supporting information referenced in the Sheep SEIS readily available, to avoid making non-governmental organizations and interested parties obtain information via a request under the Freedom of Information Act. Although the Approved Cottonwood RMP is available on BLM's public website, the Proposed RMP and Final SEIS that BLM is amending and supplementing is not. Other information that should be on the RMP Amendment website, includes: June 2, 2011 – Denial of the Carlson Livestock Company Petition for Stay of the March 15, 2011 decision to close the Marshall Mountain Allotment October 2011 Newsletter Scoping Report | A list of preparers has been added to the FSEIS.<br><br>The *Cottonwood Proposed RMP and Final EIS* is now available online and there is a link to it from the Cottonwood RMP Amendment for Domestic Sheep Grazing and SEIS project website.<br><br>The Newsletter is also available on the project website.<br><br>The BLM did not prepare a final scoping report for this analysis. Section 1.8 has been corrected.<br><br>Other identified information must be requested by filing a Freedom of Information Act request. |

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