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

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# DRAFT
# Environmental Impact Statement
# for
# Domestic Sheep Grazing Permit Renewals

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**Gunnison Field Office**
**210 West Spencer Avenue, Suite A**
**Gunnison, CO 81230**

**DOI-BLM-CO-S060-2014-0001-EIS**

**June 2019**

Estimated total costs associated with developing and producing this EIS

$354,800

BLM

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# United States Department of the Interior

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In Reply Refer to:
4130 (LLCOF07000) DCR#0503340

Dear Reader,

Attached for your review and comment is the Draft Environmental Impact Statement (EIS) for the Domestic Sheep Grazing Permit Renewals. The Bureau of Land Management (BLM) Gunnison Field Office is in the process of renewing permits for nine domestic sheep grazing allotments within the field office. The BLM prepared the draft EIS in consultation with cooperating agencies, and in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, the Federal Land Policy and Management Act of 1976, as amended, implementing regulations, the BLM's NEPA Handbook (H-1790-1), and other applicable laws and policies.

The nine grazing allotments comprise 65,710 acres of public land in Gunnison, Hinsdale, and Ouray counties in Colorado. Colorado and the West has seen historic declines in Rocky Mountain bighorn sheep populations due to a host of environmental factors, but primarily from a respiratory disease often carried by domestic sheep. The potential for disease transmission is a concern when bighorn sheep habitat overlaps with domestic sheep grazing allotments and both species occupy a given area at the same time.

The draft EIS also addresses the effects of domestic sheep grazing on threatened and endangered plant and animal species regional socioeconomics, cultural resources, Native American religious concerns, and public land health.

The BLM developed alternatives to achieve the best separation of domestic sheep and Rocky Mountain bighorn sheep while considering the economic impacts to the grazers, the recreation and hunting community, and the region as a whole. The BLM ran a risk of contact model (ROC) for each of the action alternatives to aid in analyzing the potential levels of sheep interaction.

The BLM encourages the public to review and provide comments on the draft alternatives and analysis in the EIS. The draft EIS is available on the project website at: https://go.usa.gov/xQTyQ. Hard copies are also available for public review at the BLM

Gunnison Field Office. If you wish to submit comments on the draft EIS, please make your comments as specific as possible. Comments will be more helpful if they include suggested changes, sources, or methodologies, and reference to a section or page number. Comments containing opinions or preferences will be considered and included as part of the decision-making process, but will not receive a formal response from the BLM.

Public comments can be made electronically at the website above or by mail and will be accepted for 45 days following the Environmental Protection Agency's publication of Notice of Availability in the *Federal Register*.

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

Public meetings will be held at a time and date to be determined and will be announced at least 15 days in advance through public notices, media news releases, website, and/or mailings. The meetings will be an open-house format, and the purpose of these meetings is to provide an overview of the document, to give the public an opportunity discuss the EIS with BLM staff, and to take public (written) comments.

Thank you for your continued interest in the Domestic Sheep Grazing Permit Renewals in the BLM Gunnison Field Office. We appreciate the information and suggestions you contribute to the process.

Sincerely,

Catherine L. Cook

Catherine Cook
District Manager, Rocky Mountain District

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**U.S. Department of the Interior**
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**Gunnison Field Office**
**DOI-BLM-CO-S060-2014-0001-EIS**

# DRAFT ENVIRONMENTAL IMPACT STATEMENT

**NUMBER:** DOI-BLM-CO-S060-2014-0001-EIS

**PROJECT NAME:** Domestic Sheep Grazing Permit Renewals

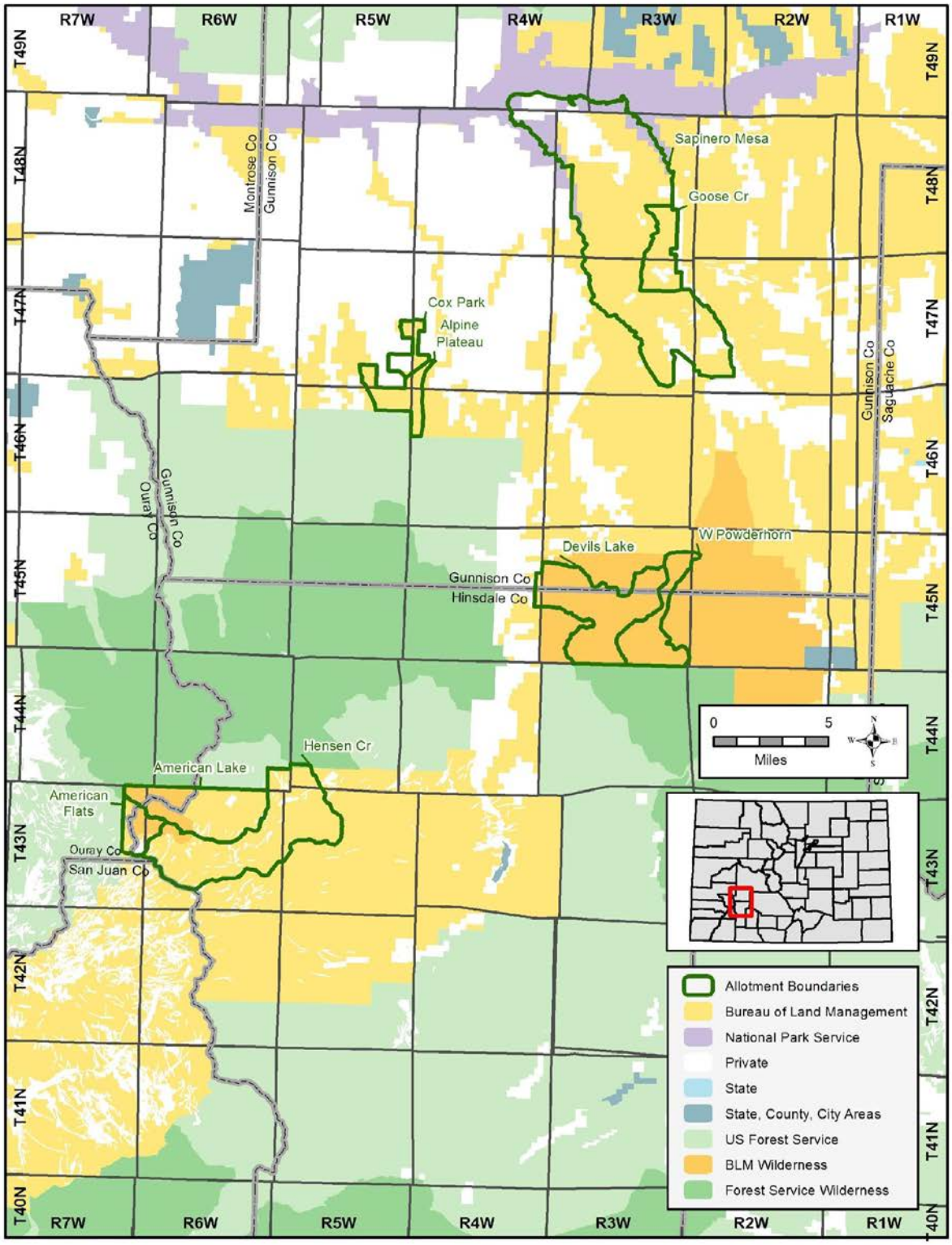
**PLANNING UNIT:**
Gunnison Resource Area Resource Management Plan (RMP) Management Unit(s) 1, 2, 4, 5, 12, 13 and 15.

**LEGAL DESCRIPTION:** New Mexico Principal Meridian, Colorado, parts of Tps T. 41 -49 N., R. 2 – 7 W.

**APPLICANT:** Juan Inda, and Poverty Mesa LLLP

## 1.0. PURPOSE AND NEED

*Figure 1-A: Project Area Map*



## 1.1. INTRODUCTION

This Environmental Impact Statement (EIS) is being prepared to analyze multiple grazing allotments, administered by the Bureau of Land Management (BLM) Gunnison Field Office, to determine the effects of authorizing or not authorizing domestic sheep or goat grazing within Rocky Mountain bighorn sheep range. The project area is located in Gunnison, Hinsdale, and Ouray Counties, Colorado, and includes nine grazing allotments, totaling approximately 65,710 acres of public land (Table 1.1-1). There are currently two active sheep permittees that utilize the allotments being analyzed and no known goat grazing.

*Table 1.1-1: Grazing Allotments Considered for Permit Renewal*

| Allotment Name and Identification Number | Percent Public Land | Allocated for Livestock Grazing in the RMP | AUMs Authorized in the RMP | Acres Authorized in the RMP | Current Status |
|---|---|---|---|---|---|
| American Lake 06509 | 100% | Yes | 550 | 6,675 | Active |
| Henson Creek 06504 | 100% | Yes | 400 | 11,933 | Active |
| American Flats 06507 | 100% | Yes | 236 | 1,643 | Active |
| West Powderhorn 06102 | 100% | Yes | 347 | 4,317 | Active |
| Devils Lake 06115 | 100% | Yes | 530 | 9,126 | Active |
| Cox Park 06053 | 51% | Yes | 102 | 865 | Active |
| Alpine Plateau 16031 | 100% | Yes | 190 | 2,657 | Active |
| Sapinero Mesa 06101 * | 100% | Yes | 2,071 | 25,604 | Active |
| Goose Creek 16001 | 100% | Yes | 280 | 2,890 | Active |
| Total | | | 5,110 | 65,710 | |

*Ten Mile Springs Allotment and Sapinero Mesa Allotment were combined through decision in 1999 (CO-036-99-026 EA).

Eighteen domestic sheep or goat grazing allotments were not considered for analysis in this EIS as part of the proposed action or alternatives. These allotments are considered in the cumulative impacts analysis. The BLM's rationale for not considering these allotments further are explained in Table 1.1-2.

*Table 1.1-2: Grazing Allotments Not Considered in this Analysis*

| Allotment | Rationale |
|---|---|
| Red Cloud, Upper Burrows, Lower Burrows, Mill Gulch, Grizzly Gulch, Blue Canyon, Highway | These seven allotments are vacant and the BLM did not receive applications for these allotments, therefore these allotments will not be considered in this analysis. |
| Rambouillet | The permit was not due for renewal when the BLM began this analysis. |
| Huntsman Mesa | The allotment was fully processed in 2011 (DOI-BLM-CO-S060-2010-0013-EA). This permit is not due for renewal at this time. |
| Cold Springs | These three allotments are far from the analysis area (18+ miles) and in a different watershed (Cochetopa Creek). Cold Springs and Dome Pasture are managed in conjunction with Forest Service allotments under a memorandum of understanding. All |
| Dome Pasture | |

| Allotment | Rationale |
|---|---|
| Texas Creek | three were fully processed in 2008. CO-160-2008-009 EA, CO-160-2008-10 CX, and CO-160-2008-008 |
| Maggie Gulch | The Gunnison Field Office acquired management of these allotments in the fall of 2016, after the current EIS effort was in progress. |
| Picayne-Mineral Pt | |
| Gladstone | |
| Eureka | |
| Elk Park | |
| Deer Park | |

Over the past 50 years, the Rocky Mountain bighorn sheep populations in the project area have fluctuated. Population levels have been impacted by several factors including all-age die-off events, suppressed lamb recruitment, and translocation efforts. Pathogen transmission between domestic sheep and Rocky Mountain bighorn sheep can pose a risk to the health of bighorn populations. Populations in the project area over the past 5 years are considered at a stable level; however, the potential for pathogen transmission and risk of disease is a particular concern where Rocky Mountain bighorn sheep may be present in habitat areas that are being grazed by domestic sheep at the same time of year.

Historically, domestic sheep were grazed on BLM lands in the project area from the time snow melted in the spring until snowfall the next season. In the mid-1900s, sheep numbers in each allotment were reduced to more sustainable numbers, and the season of use was decreased. In addition to sheep grazing, mining activities have been occurring in the project area since the 1800s. There are many acres of BLM lands adversely affected by abandoned mines throughout the allotments. Only one silver mine in the project area remains active.

Consistent with BLM's grazing regulations and policy, permittees meet annually with the BLM and United States Forest Service (USFS) to discuss the planned grazing system, to review any concerns or problems encountered, and to update a communication and response plan. This plan is in place to ensure the herders and permittees are able to contact BLM, USFS, and Colorado Parks and Wildlife (CPW) staff in case Rocky Mountain bighorn and domestic sheep come into contact or close proximity to one another. In these cases, CPW staff determines how to respond. If contact has occurred, Rocky Mountain bighorn sheep may be euthanized to prevent them from making contact with other Rocky Mountain bighorn sheep and potentially spreading pathogens within the herd.

In 2016, the BLM released manual MS–1730 Management of Domestic Sheep and Goats to Sustain Wild Sheep. The purpose of this manual is to provide policy guidance for the coordination and management of domestic sheep and goats to sustain wild sheep on the BLM-managed lands (BLM lands). The objectives of the manual are to (1) support multiple use and sustained yield management of BLM lands, (2) promote sound management of domestic sheep and goats to sustain wild sheep, and (3) provide bureau-wide consistency to reduce the potential

for contact between wild sheep and domestic sheep or goats that could result in disease transmission between the species. Under that policy, the BLM strives 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 (BLM 2016). Management practices will be considered during NEPA analyses for inclusion as terms and conditions in domestic sheep and goat grazing permits and leases, where applicable, along with additional site-specific or new practices that help to achieve effective separation and minimize the risk of contact, based on the best available science and information (BLM 2016).

## 1.2. PURPOSE AND NEED

The purpose of the action is to respond to grazing permit applications and to determine whether or not to authorize domestic sheep or goat grazing on 9 BLM allotments (see Table 1.1-1), such that domestic sheep or goat grazing is in compliance with the Gunnison Resource Area Resource Management Plan (RMP) as amended and BLM policies.

This action is needed to respond to permit applications for nine allotments in the project area. Domestic sheep grazing is part of the BLM's multiple use mission and currently livestock grazing on these allotments is authorized under the authority of Public Law 111-8 (Omnibus Appropriations Act, 2009).

## 1.3. DECISION TO BE MADE

The BLM will decide if domestic sheep or goat grazing will continue to be authorized in whole, in part, or discontinued and if domestic sheep or goat grazing continues, what terms and conditions would be included to meet applicable laws and policy guidance.

## 1.4. SCOPING AND PUBLIC INVOLVEMENT

The BLM conducted the following public involvement activities for the Domestic Sheep Grazing EIS project:

- Established the project website at https://go.usa.gov/xQTyQ to provide project information, public participation opportunities, and project documents.
- Published the Notice of Intent (NOI) in the *Federal Register* on February 13, 2015. The NOI notified the public of the BLM's intent to produce an Environmental Impact Statement for Domestic Sheep Grazing. A press release was released on February 13, 2015, announcing the publishing of the NOI in the *Federal Register* and requesting scoping comments.
- Sent letters to other government agencies to determine interest and eligibility in becoming a formal Cooperating Agency in the EIS process. See Chapter 4 for additional information on cooperating agency involvement.
- The Gunnison Field Office initiated consultation with three tribes identified as having interests or Traditional Cultural Properties in the planning area. Tribal Consultation with tribes is described in Chapter 4 of this EIS.
- Released a second notice to the press on March 11, 2015, announcing public meetings.
- Sent scoping letters to 79 interested parties on March 16, 2015, urging them to attend the public meetings or submit scoping comments.

- Held public scoping meetings Thursday, April 2, 2015, at the Lake City Visitor Center (800 Gunnison Ave) from 3:00 to 7:00 p.m.; Monday, April 6, 2015, at the BLM Gunnison Field Office (210 W. Spencer St.) from 3:00 to 7:00 p.m.; and Thursday, May 7, 2015, at the BLM Uncompahgre Field Office (2465 S. Townsend in Montrose) from 3:00 to 7:00 p.m.

Sixty-three unique written submissions were received from 21 different commenters during the public scoping period. The BLM has considered all comments received during preparation of this Environmental Impact Statement (EIS).

## 1.5. ISSUES AND CONCERNS

### 1.5.1. Issues to Be Analyzed

*1.5.1.1. How will domestic sheep grazing affect the health of Rocky Mountain bighorn sheep (a BLM Sensitive Species)?*

- Risk of contact and disease transmission between Rocky Mountain bighorn sheep and domestic sheep

*1.5.1.2. How will domestic sheep grazing affect Threatened and Endangered Species and BLM Sensitive Species?*

- Gunnison sage-grouse
- Uncompahgre fritillary butterfly
- Canada lynx
- North American wolverine
- Rollins bladderpod
- Gunnison milkvetch

*1.5.1.3. How does domestic sheep grazing affect local and regional socioeconomics?*

*1.5.1.4. What effect would the proposed action and alternatives have on cultural resources?*

*1.5.1.5. What effect would the proposed action and alternatives have on the ability of the public lands within the allotments to meet or begin making progress towards meeting the Standards for Public Land Health in Colorado? (Standard 4, Threatened and Endangered Species, is addressed in Issues 1.5.1.1 and 1.5.1.2)*

- Upland soils (Standard 1)
- Riparian systems (Standard 2)
- Plant communities (Standard 3 - animal communities are addressed in issues 1 and 2)
- Water quality (Standard 5)

### 1.5.2. Issues Not Analyzed

Table 1.5-1 summarizes the issues that are considered but not analyzed in detail. Additional information is provided on the scoping report, which is available on the project website.

*Table 1.5-1: Issues Eliminated from Detailed Analysis*

| Issue | Resource | Rationale for Elimination |
|---|---|---|
| Are there other factors that affect Rocky Mountain bighorn sheep die-offs? Other wildlife in the Caprinae sub-family, such as mountain goat, have been found to transfer disease to Rocky Mountain bighorn sheep. | Wildlife | The State of Colorado manages wildlife within the state, not BLM. The BLM's proposed action would not create or influence this issue, disease transmission to Rocky Mountain bighorn sheep from other wildlife. Moreover, in the project area, mountain goat may overlap/interact with Rocky Mountain bighorn sheep in San Juan's West Rocky Mountain bighorn sheep population (RBS-21). State wildlife managers do not believe that mountain goats are a significant issue in disease transmission to Rocky Mountain bighorn sheep in RBS-21 at this time. |
| How does domestic sheep grazing affect range conditions and forage competition for wild ungulates? | Wildlife | When analyzing population numbers for Rocky Mountain bighorn sheep, elk, mule deer, and pronghorn antelope, populations are at or near population objectives set by the State of Colorado. Other than some die-off during the winter of 2007/2008, researchers have observed minimal population changes. Since biologists have analyzed grazing and use levels have been in place to ensure habitat is still adequate for not only domestic, but wild ungulates, it is not expected that domestic grazing would cause population changes for wild ungulates based on habitat competition. Utilization levels analyzed in this area are well below the moderate (40-60%) utilization levels outlined in the RMP. |
| What are the economic and recreational values of Rocky Mountain bighorn sheep viewing? | Wildlife and Recreation | The Alpine Loop Backcountry Scenic Byway, which is in the project area, sees approximately 600,000 visitors annually. Visitors coming to the Alpine Loop experience spectacular scenery of the San Juan Mountains and the history of mining in this area. Although watchable wildlife is part of that experience, most people do not visit this area for the specific purpose of seeing a Rocky Mountain bighorn sheep. Recreational values for viewing and photographing Rocky Mountain bighorn sheep exist but economic outcomes of these activities are difficult to quantify. Analyzing this issue in detail would not assist the deciding official in making a reasonable choice between alternatives. The impacts of this decision on Rocky Mountain bighorn sheep populations and hunting will be discussed in the socioeconomic analysis. |
| How will domestic sheep grazing affect the spread of noxious and invasive weeds? Sheep have the potential to transport weeds (particularly cheatgrass) through seed carried on the sheep (in wool, in hooves, in stomach, etc.), most evident around corrals, loading and unloading areas, trails, and bedding areas. | Plant communities, range/grazing, and fire/fuels | To the extent the proposed action and alternatives implicate noxious and invasive weeds, the issue is addressed in analyses of land health standards and sensitive species. Even if BLM eliminates domestic sheep grazing, cheatgrass and other noxious weeds would continue to spread from wildlife, vehicles, pets, people, wind, fire, erosion, etc. Bedding grounds and corrals account for very low proportion of few acres within the analysis area. Roads and roadsides account for many more infested acres and disturbed areas susceptible to noxious weeds. The BLM will continue to treat noxious weeds on grazing allotments, including broad-scale aerial spraying and ground treatment. More emphasis would be given to treating weeds in corrals, loading and unloading areas, and bedding grounds. |
| How will physical infrastructure impact Forest Service livestock grazing permits? BLM Alternatives that do not authorize domestic sheep and goat grazing may prevent Forest Service livestock | Range management | All Forest Service lands will continue to be accessible to livestock, either by trucking on existing open roads or by trailing along county-maintained roadways. The BLM defers to the counties and does not designate where livestock trailing occurs, at what levels, and at what times of year, so long as trailing is limited to the right-of-way corridor on county-maintained roads. Livestock have, and will continue to have, access to all existing corrals |

| Issue | Resource | Rationale for Elimination |
|---|---|---|
| grazing permittees from accessing their Forest Service permits. | | that are needed to handle livestock when they are trailed or trucked to Forest Service lands |
| What effect would domestic sheep grazing have on fisheries? | Fisheries | Sheep graze near streams and drink water in these streams throughout the analysis area. However, with proper design criteria that focus on health of riparian/fisheries streams, grazing is not expected to impact fish at the population level. Within the Gunnison Field Office RMP, fishery streams and associated riparian habitat will be managed to improve or maintain the existing ecological status and in areas of concern. Inventory information will be used to determine site-specific management strategies. In this project area, one of the most important fisheries streams is Henson Creek from the North Fork of Henson Creek downstream to Lake City, Colorado. Along this section of Henson Creek, livestock grazing will continue to be not authorized in order to maintain stream and streamside conditions. See Table A-2 Action Alternatives Terms and Conditions to improve riparian/ Soil/ Hydrology/ Vegetation would minimize impacts to fisheries. |
| How will domestic sheep grazing affect Abandoned Mine Land (AML) reclamation projects? | Abandoned Mine Lands | Tractor-trailers hauling sheep and tractor trailers hauling supplies and equipment for AML reclamation projects can potentially cause traffic issues and accidents along narrow roads and blind corners. BLM will coordinate with grazing permit holders and AML reclamation contractors to avoid traffic safety issues. |
| Are sheep dogs necessary to assist with reducing the risk of pathogen and disease transmission between domestic sheep and Rocky Mountain bighorn sheep? How will safety of humans in the presence of livestock protection dogs be addressed? People recreating (hiking, biking, driving, camping, etc.) in areas being grazed by domestic sheep may encounter livestock protection dogs. If the dogs perceive the actions of these people as a threat to their sheep, they may become defensive or aggressive toward humans. Incidents of people being threatened by, and in some cases bitten by guard dogs are rare, but they do occur. | Recreation, Human Health and Safety | The BLM neither requires, nor restricts, the use of livestock protection or herding dogs. Operators that choose to use dogs in their operations are subject to the laws and regulations of the State of Colorado and the counties in which they are doing business.<br><br>For example, Colorado Revised Statute § 13-21-124, limits bodily injury claims against a dog owner if, among other things, dog is working as a farm, ranch, or herding dog. Similarly, Colorado Revised Statute § 30-15-101 exempts dogs training to or actually working livestock from county dog licensing and control restriction.<br><br>The BLM recognizes that livestock protection dogs are an effective, non-lethal deterrent to predation and can help reduce contact of domestic sheep with wildlife. As a result, the BLM allows permittees to use livestock protection dogs in their operations. In support of permittees using dogs, the BLM routinely seeks to reduce the likelihood of conflict between livestock herding/protection dogs and people by providing public education materials on websites, at visitor centers, and at trailheads. In addition, the BLM encourages sheep grazing permit holders to familiarize any dogs they plan to use on public lands with unfamiliar people, bicycles, and motorized vehicles. |

## 2.0. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

In addition to the No Action Alternative, there are four action alternatives analyzed in detail. The Council on Environmental Quality regulations at 40 CFR § 1502.14(e) direct that an EIS "…identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference." The BLM has not yet selected a preferred alternative for inclusion in this Draft EIS, but, per BLM regulations at 43 CFR § 46.425, the BLM will identify a preferred alternative in the Final EIS based on the range of alternatives and input from the public during the Draft EIS public comment period.

In all alternatives, except the No Grazing Alternative, the 1999 decision (CO-036-99-026 EA) to combine the 8,284-acre Sapinero Mesa Allotment with the 17,320-acre Ten Mile Springs Allotment (allotment #6100) would remain in effect. This decision did not change allotment boundaries but combined them together to administer and manage them as one allotment. The 1,791 Animal Unit Months (AUMs) for the Ten Mile Springs Allotment were not changed in the 1999 decision and remain available.

In all alternatives except the No Grazing Alternative, the 1996 decision (CO-036-96-026-DNA) to change class of livestock from cattle to sheep in the Alpine Plateau Allotment will remain in effect.

In all alternatives, except the No Grazing Alternative, all allotments would remain available to other types of livestock grazing if domestic sheep and goats are not authorized.

## 2.1. ALTERNATIVE A (PROPOSED ACTION) – PERMITTEE APPLICATIONS

Alternative A was generated from grazing permittee applications. The BLM received applications to graze domestic sheep in nine allotments.

Under Alternative A, the nine allotments for which applications were received would be available for domestic sheep or goat grazing. A total of 3,270 AUMs and 65,710 acres would be authorized for domestic sheep or goat grazing (Table 2.1-1). See Figure 2-A.

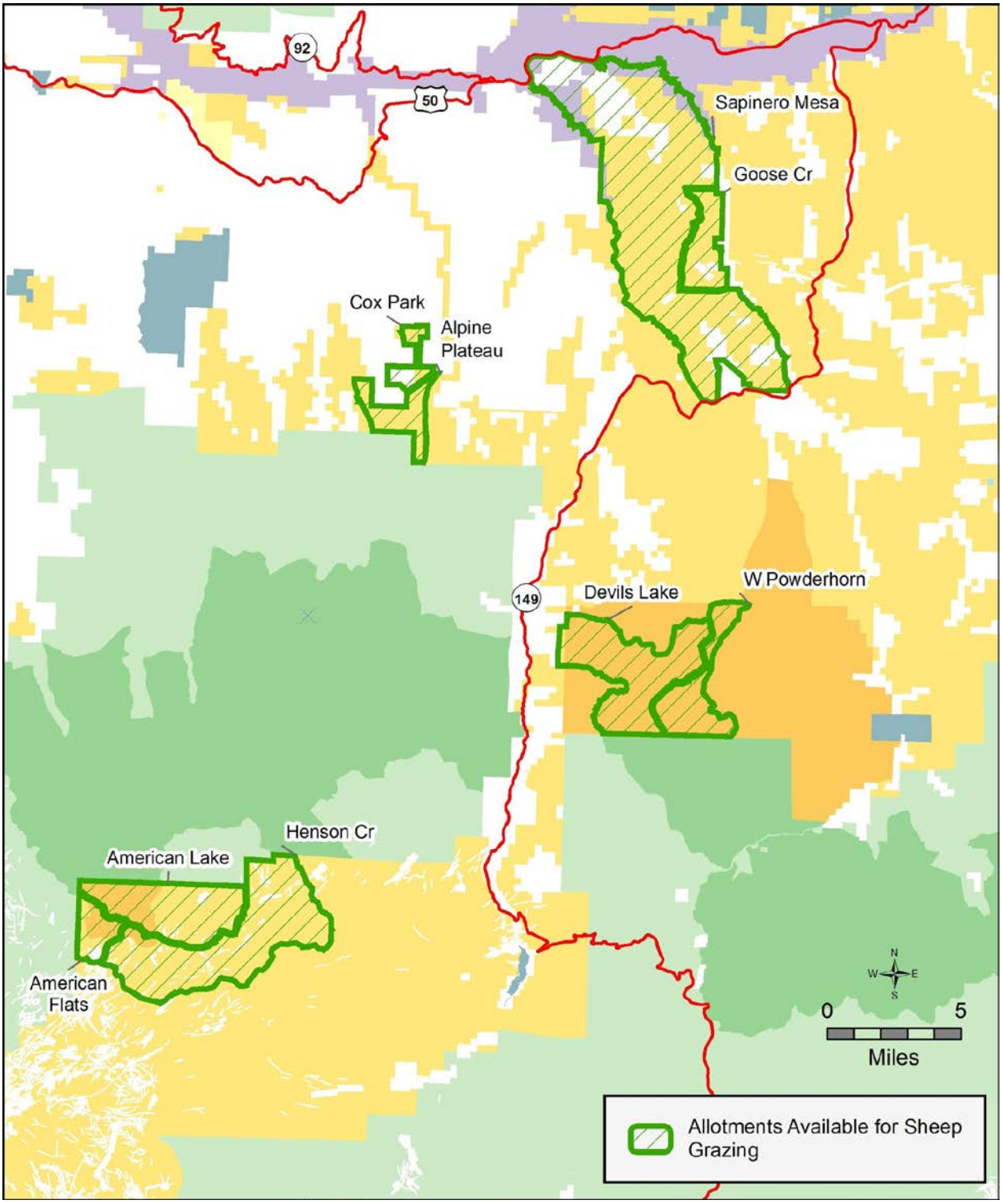
New terms and conditions (Appendix B, Table B-1) would be implemented to ensure compliance with applicable guidance and conservation agreements.

*Table 2.1-1: Proposed Action*

| Allotment Name and Identification Number | Kind of Livestock | Use Dates | AUMs | Allotment Acres |
|---|---|---|---|---|
| American Lake 06509 | sheep | 7/10 - 9/15 | 550 | 6,675 |
| Henson Creek 06504 | sheep | 7/10 - 9/9 | 400 | 11,933 |
| American Flats 06507 | sheep + 6 horses | 7/10 - 9/9 | 236 | 1,643 |
| West Powderhorn 06102 | sheep | 7/5 - 7/20<br>9/11 - 9/20 | 171 | 4,317 |

| Allotment Name and Identification Number | Kind of Livestock | Use Dates | AUMs | Allotment Acres |
|---|---|---|---|---|
| Devils Lake 06115 | sheep | 7/21 - 9/10 | 342 | 9,126 |
| Cox Park 06053 | sheep | 6/15 - 7/15<br>9/25 - 10/15 | 102 | 865 |
| Alpine Plateau 16031 | sheep | 7/1 - 9/30 | 190 | 2,657 |
| Sapinero Mesa 06101 | sheep | 5/16 - 6/20<br>9/28 - 10/31 | 999 | 25,604 |
| Goose Creek 16001 | sheep | 6/20 - 7/10<br>9/21 - 9/27 | 280 | 2,890 |
| Totals | | | 3270 | 65,710 |

*Figure 2-A: Map of Alternative A (Proposed Action) Permittee Application*



## 2.2. ALTERNATIVE B – NO ACTION ALTERNATIVE

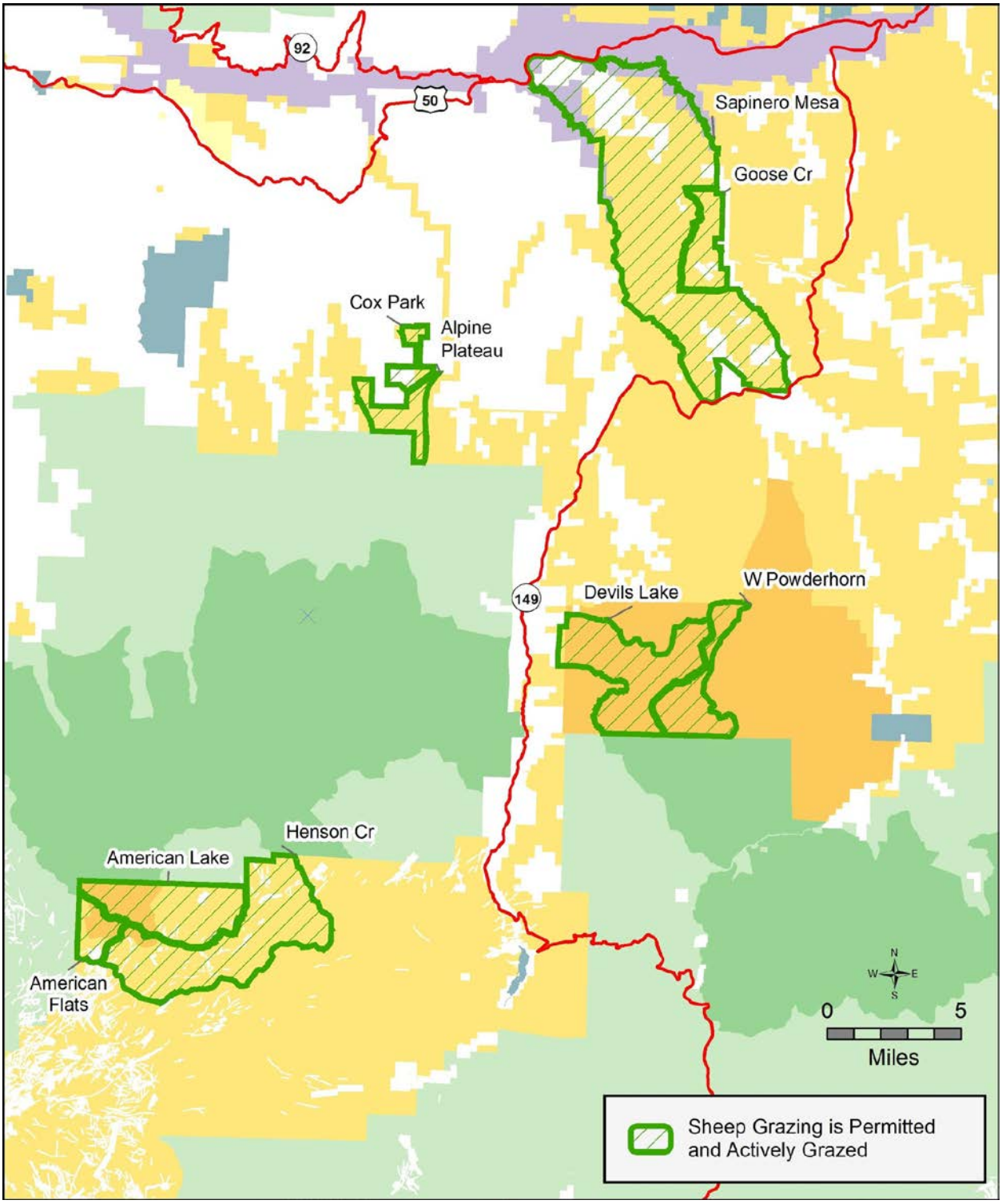
Alternative B is the No Action Alternative. Under the No Action alternative, livestock grazing allotments would continue to be permitted and managed as they have been over recent years (Table 2.2-1). Currently, domestic sheep grazing is permitted on the nine allotments. A total of 2,951 AUMs and 65,710 acres would be authorized (309 fewer AUMs on the Sapinero Mesa Allotment and 10 fewer AUMs on the Cox Park Allotment than Alternative A).

Current permit terms and conditions would apply to active permits (Appendix B, Table B-3, No Action Terms and Conditions). Stipulations for Gunnison sage-grouse, lynx, and Rocky Mountain bighorn sheep are not included in the current terms and conditions.

*Table 2.2-1: No Action Alternative*

| Allotment Name and Identification Number | Kind of Livestock | Use Dates | AUMs | Allotment Acres |
|---|---|---|---|---|
| American Lake 06509 | sheep | 7/10 - 9/15 | 550 | 6,675 |
| Henson Creek 06504 | sheep | 7/10 - 9/9 | 400 | 11,933 |
| American Flats 06507 | sheep + 6 horses | 7/10 - 9/9 | 236 | 1,643 |
| West Powderhorn 06102 | sheep | 7/5 - 7/20<br>9/11 - 9/20 | 171 | 4,317 |
| Devils Lake 06115 | sheep | 7/21 - 9/10 | 342 | 9,126 |
| Cox Park 06053 | sheep | 6/15 - 7/15<br>9/25 - 10/15 | 92 | 865 |
| Alpine Plateau 16031 | sheep | 7/1 - 9/30 | 190 | 2,657 |
| Sapinero Mesa 06101 | sheep | 5/16 - 6/20<br>9/28 - 10/31 | 690 | 25,604 |
| Goose Creek 16001 | sheep | 6/20 - 7/10<br>9/21 - 9/27 | 280 | 2,890 |
| Totals | | | 2951 | 65,710 |

*Figure 2-B: Map of Alternative B – No Action Alternative*



## 2.3. ALTERNATIVE C – DOMESTIC SHEEP AND GOAT GRAZING AUTHORIZED OUTSIDE OF BIGHORN SUMMER RANGE

Alternative C emphasizes a reduction in the risk of contact between domestic sheep and goats and Rocky Mountain bighorn sheep. This would be accomplished by authorizing domestic sheep or goat grazing outside of Rocky Mountain bighorn sheep summer range which is defined as the portion of the overall range where 90 percent of individual Rocky Mountain bighorn sheep are located between spring green-up and before the first heavy snowfall; see Appendix C, Core Herd Home Range, for more information regarding bighorn sheep range.

Under Alternative C, 3,270 AUMs and 56,789 acres would be authorized for domestic sheep or goat grazing on 9 allotments (Table 2.3-1, Figure 2-C). Domestic sheep grazing, under this permit cycle, would be authorized in 29 out of 34 pastures within the 9 allotments (Figures 2-C1 and 2-C2). To avoid overlap with Rocky Mountain bighorn sheep summer range, 8,921 acres in the 5 unavailable pastures would be removed from authorized grazing, to reduce the possibility of contact with Rocky Mountain bighorn sheep.

New terms and conditions (Appendix B, Table B-1) would be implemented to further reduce risk of contact between domestic sheep and Rocky Mountain bighorn sheep as well as minimize impacts to other resources. Allotments in Gunnison Sage-grouse habitat would comply with management guidelines discussed in the Candidate Conservation Agreement.

*Table 2.3-1: Alternative C*

| Allotment Name and Identification Number | Kind of Livestock | Use Dates | AUMs | Allotment Acres |
|---|---|---|---|---|
| American Lake 06509 | sheep | 7/10 - 9/15 | 550 | 6,675 |
| Henson Creek 06504 | sheep | 7/10 - 9/9 | 400 | 11,933 |
| American Flats 06507 | sheep + 6 horses | 7/10 - 9/9 | 236 | 1,643 |
| West Powderhorn 06102 | sheep | 7/5 - 7/20<br>9/11 - 9/20 | 171 | 4,317 |
| Devils Lake 06115 | sheep | 7/21 - 9/10 | 342 | 9,126 |
| Cox Park 06053 | sheep | 6/15 - 7/15<br>9/25 - 10/15 | 102 | 865 |
| Alpine Plateau 16031 | sheep | 7/1 - 9/30 | 190 | 2,657 |
| Sapinero Mesa 06101 | sheep | 5/16 - 6/20<br>9/28 - 10/31 | 999 | 25,604 |
| Goose Creek 16001 | sheep | 6/20 - 7/10<br>9/21 - 9/27 | 280 | 2,890 |
| Totals | | | 3270 | 65,710 |

*Figure 2-C: Map of Alternative C (Domestic Sheep/Goat Grazing Authorized outside of Bighorn Summer Range)*

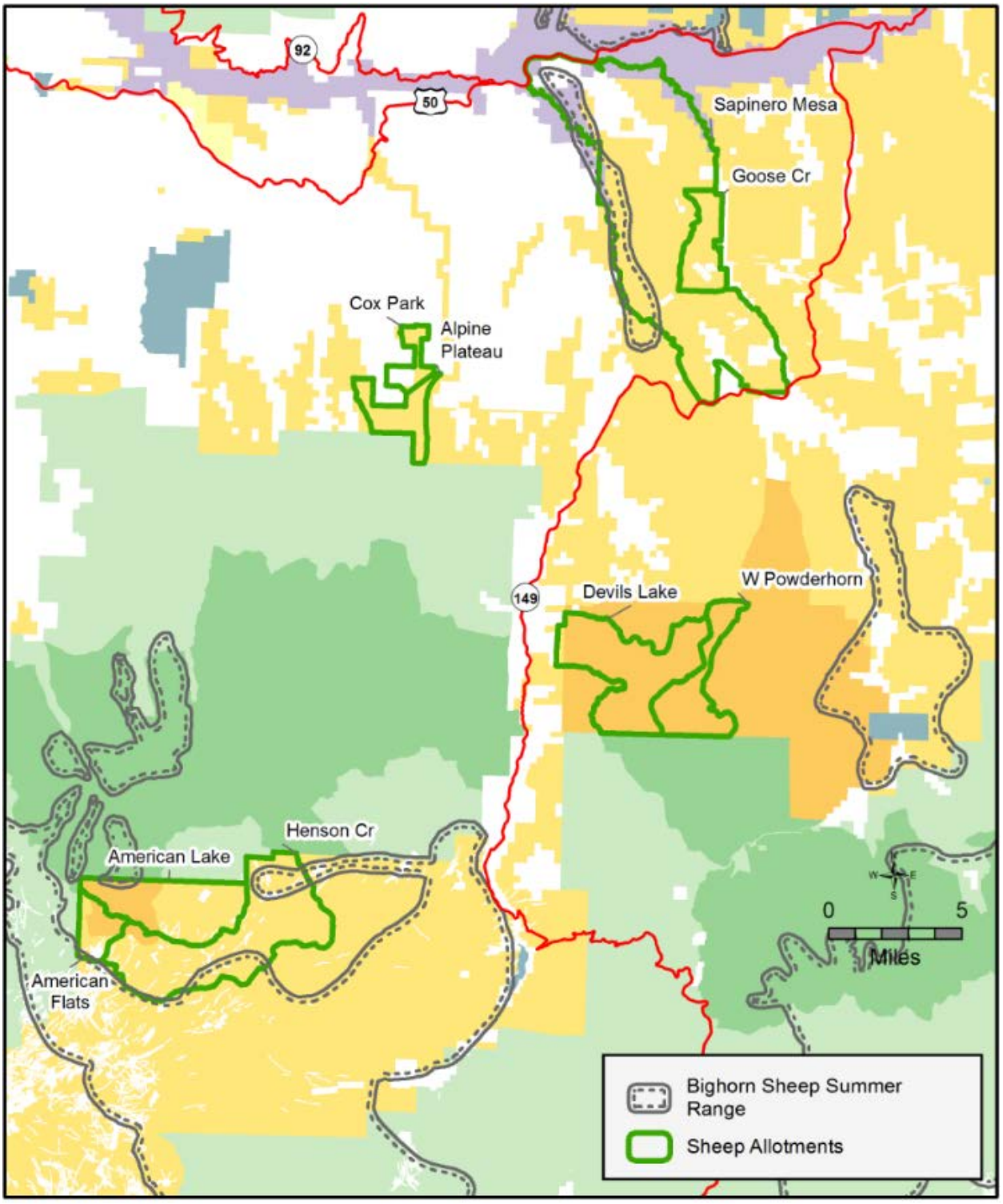


*Figure 2-C1: Alternative C New Allotment Configuration for American Lake, Henson Creek, and American Flats*

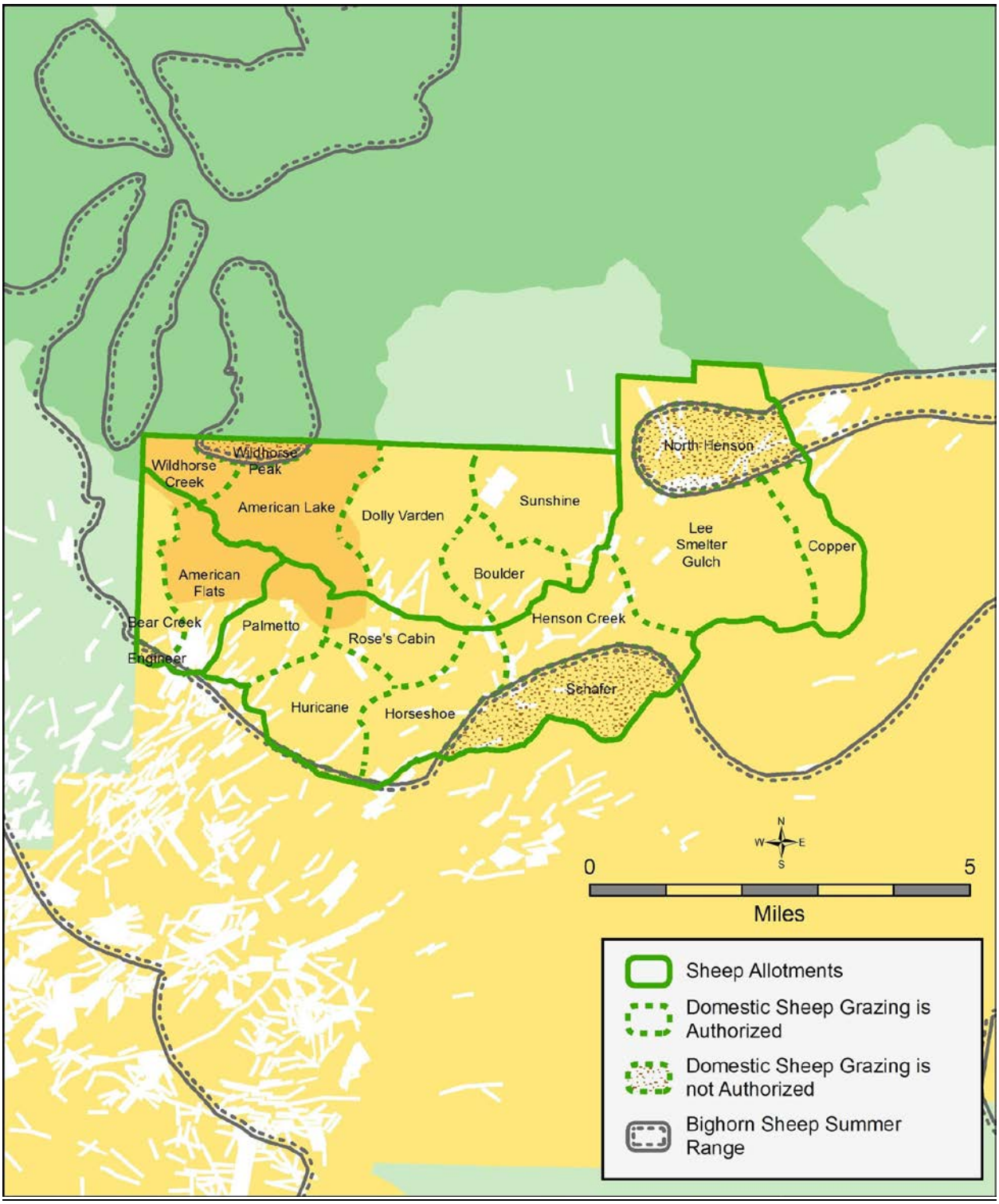
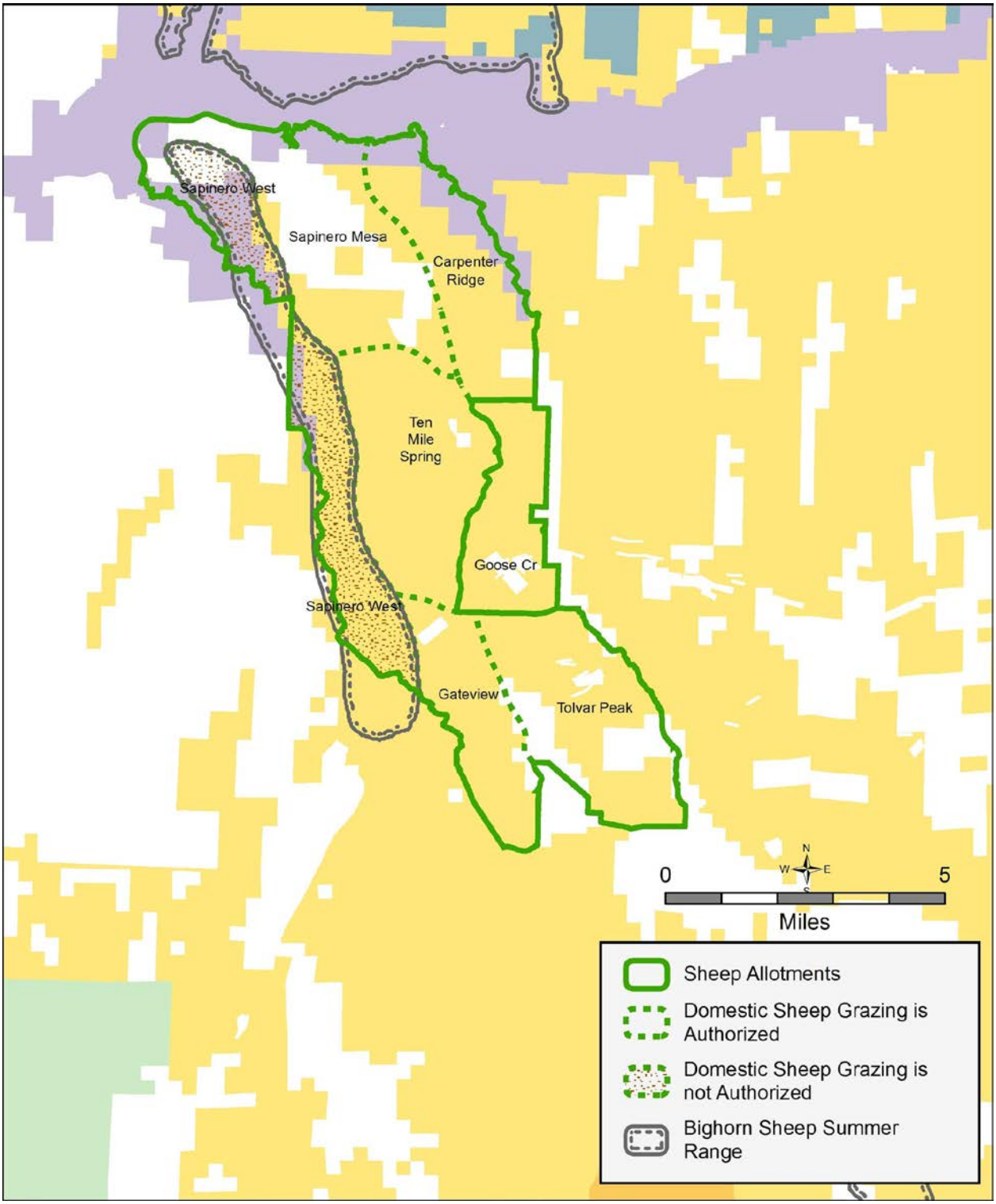


*Figure 2-C2: Alternative C New Allotment Configuration for Sapinero Mesa*



## 2.4. ALTERNATIVE D – DOMESTIC SHEEP AND GOAT GRAZING AUTHORIZED OUTSIDE OF BIGHORN OVERALL RANGE

Alternative D emphasizes a reduction in the risk of contact between domestic sheep or goats and Rocky Mountain bighorn sheep by only authorizing domestic sheep or goat grazing outside of Rocky Mountain bighorn sheep overall range (defined as the entire area where Rocky Mountain bighorn sheep are normally located at any time of the year; see Appendix C for more information regarding bighorn sheep range).

Under Alternative D, 1,900 AUMs and 34,652 acres would be authorized in 6 allotments for domestic sheep or goat grazing. (Figure 2-D and Table 2.4-1). Domestic sheep grazing would be authorized in 13 out of 16 pastures within the 6 allotments. To avoid overlap with Rocky Mountain bighorn sheep overall range, 10,807 acres in the 3 unavailable pastures would be removed from authorized grazing, to reduce the possibility of contact with Rocky Mountain bighorn sheep. As a result, AUMs would be reduced by 184 between the West Powderhorn and Devils Lake Allotments.

Of the 9 allotments included in the current action, domestic sheep/goat grazing would not be permitted in 3 allotments (American Flats, American Lake and Henson Creek) due to complete overlap with Rocky Mountain bighorn sheep overall range (see Figure 2-D). These allotments would remain available for other types of livestock grazing; additional analysis would need to be completed if a new application is received. New terms and conditions (Appendix B, Tables B-1 and B-2) would be implemented to further reduce risk of contact between domestic sheep or goats and Rocky Mountain bighorn sheep as well as minimize impacts to other resources. Allotments in Gunnison Sage-grouse habitat would comply with management guidelines discussed in the Candidate Conservation Agreement.

Domestic sheep would be authorized to trail across the pastures between West Powderhorn and Devils Lake Allotment (Figure 2-D3). Applicable terms and conditions are included in Appendix B, Table B-3.

*Table 2.4-1: Alternative D*

| Allotment Name and Identification Number | Kind of Livestock | Use Dates | AUMs | Allotment Acres |
|---|---|---|---|---|
| West Powderhorn 06102 | sheep | 7/5 - 7/20<br>9/11 - 9/20 | 171 | 4,317 |
| Devils Lake 06115 | sheep | 7/21 - 9/10 | 158 | 9,126 |
| Cox Park 06053 | sheep | 6/15 - 7/15<br>9/25 - 10/15 | 102 | 865 |
| Alpine Plateau 16031 | sheep | 7/1 - 9/30 | 190 | 2,657 |
| Sapinero Mesa 06101 | sheep | 5/16 - 6/20<br>9/28 - 10/31 | 999 | 25,604 |
| Goose Creek 16001 | sheep | 6/20 - 7/10<br>9/21 - 9/27 | 280 | 2,890 |
| Totals | | | 1900 | 45,459 |

*Figure 2-D: Alternative D Map - Domestic Sheep/Goat Grazing Authorized outside of Bighorn Overall Range*

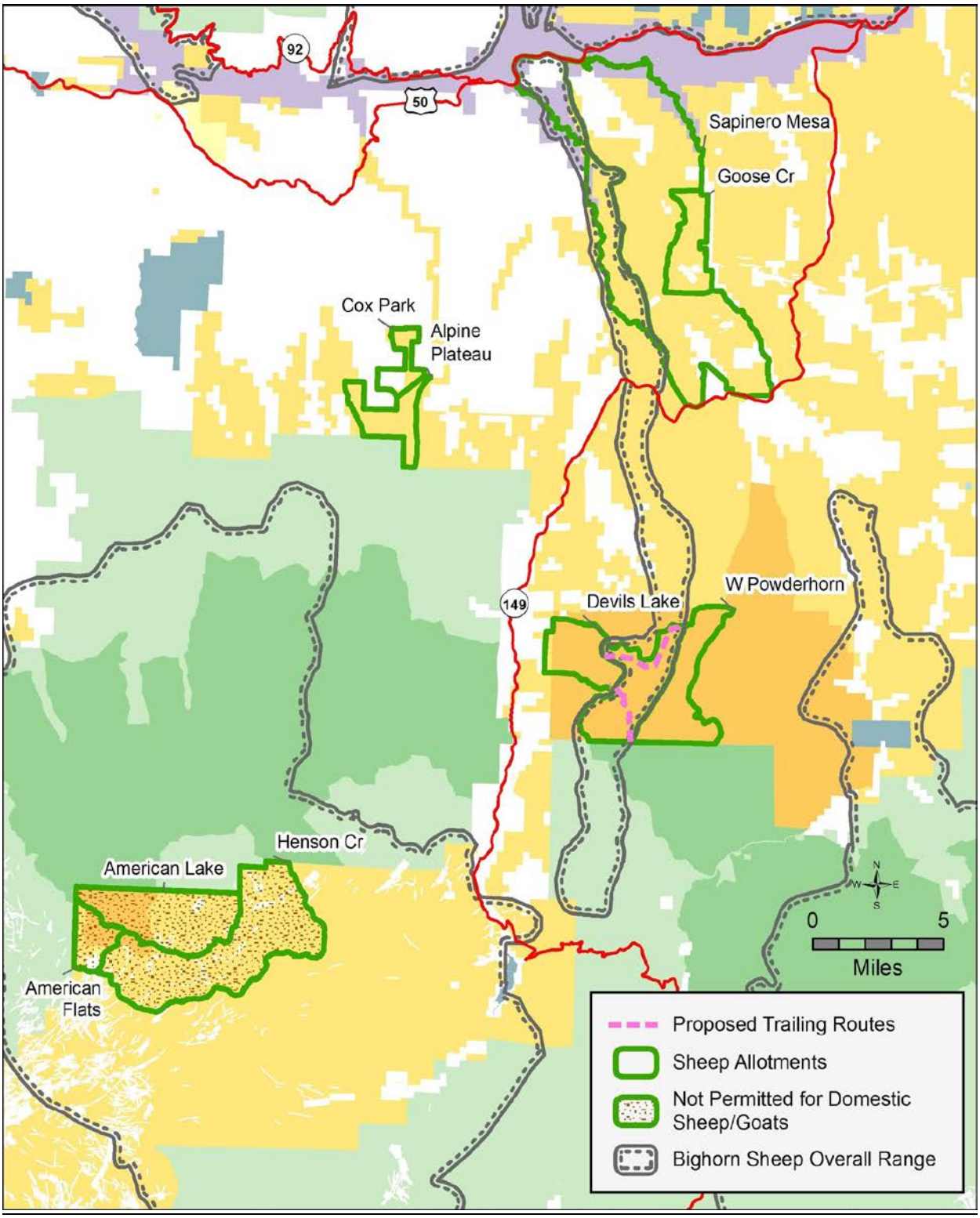


*Figure 2-D1: Alternative D New Allotment Configuration for West Powderhorn and Devils Lake*

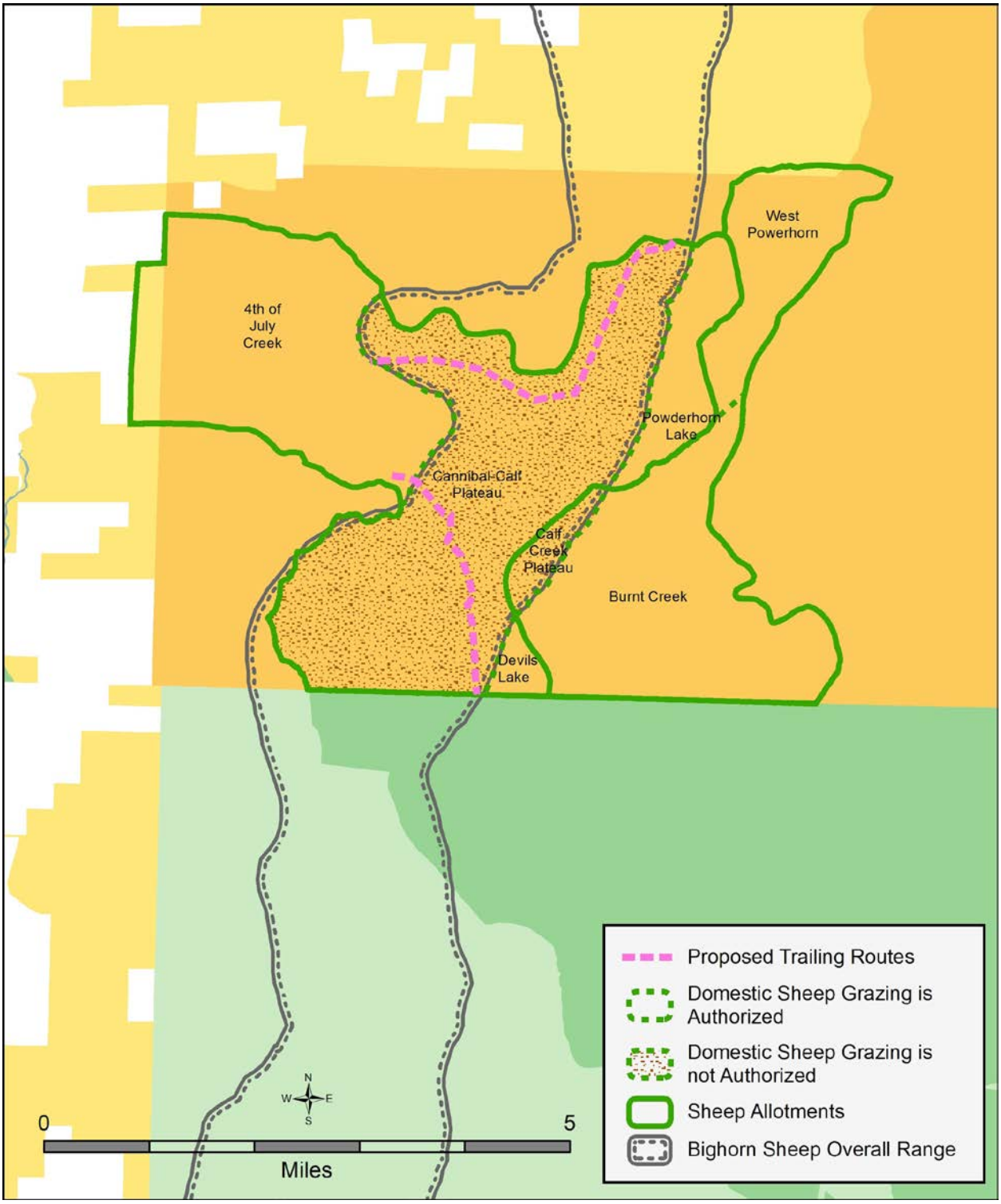
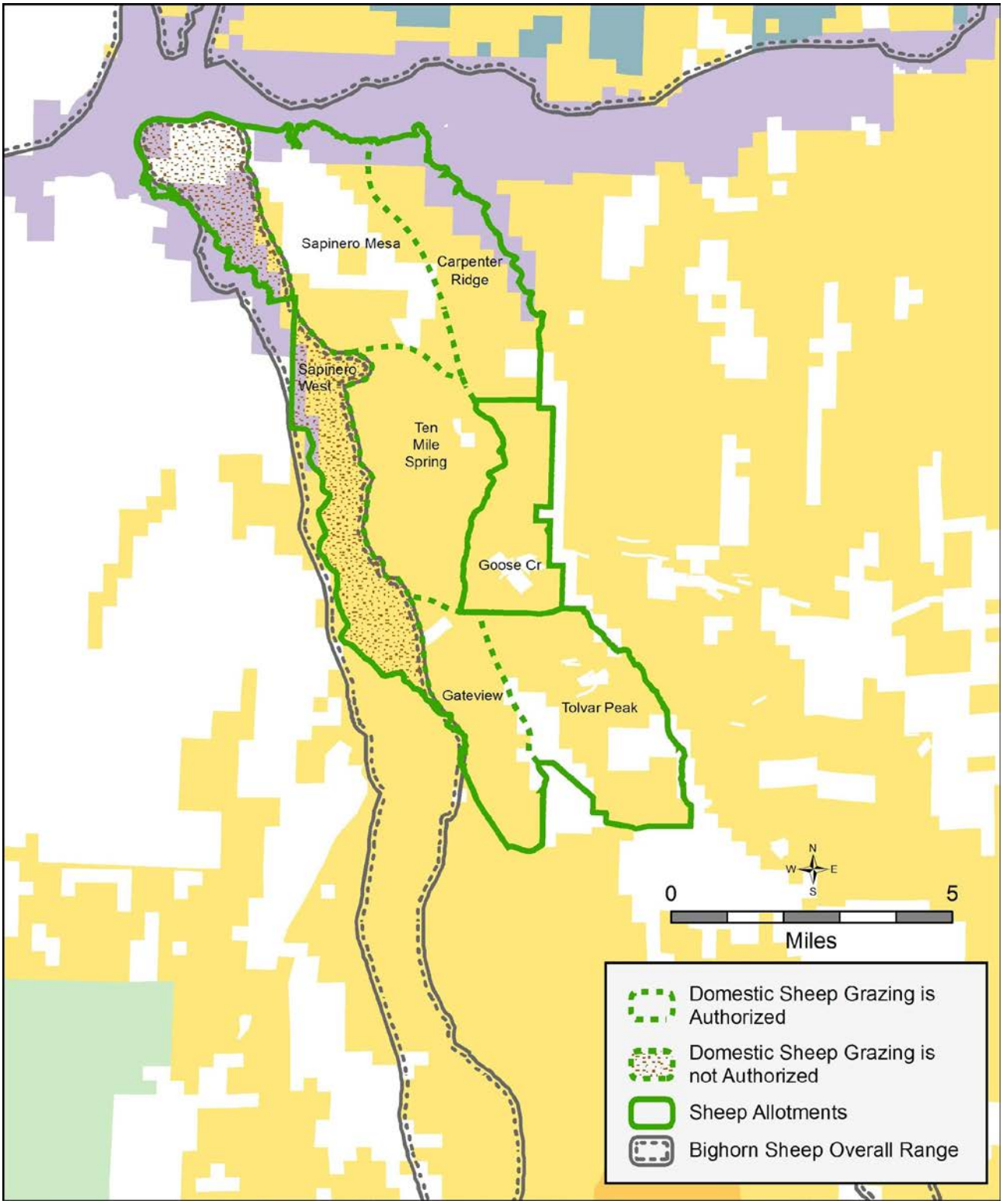


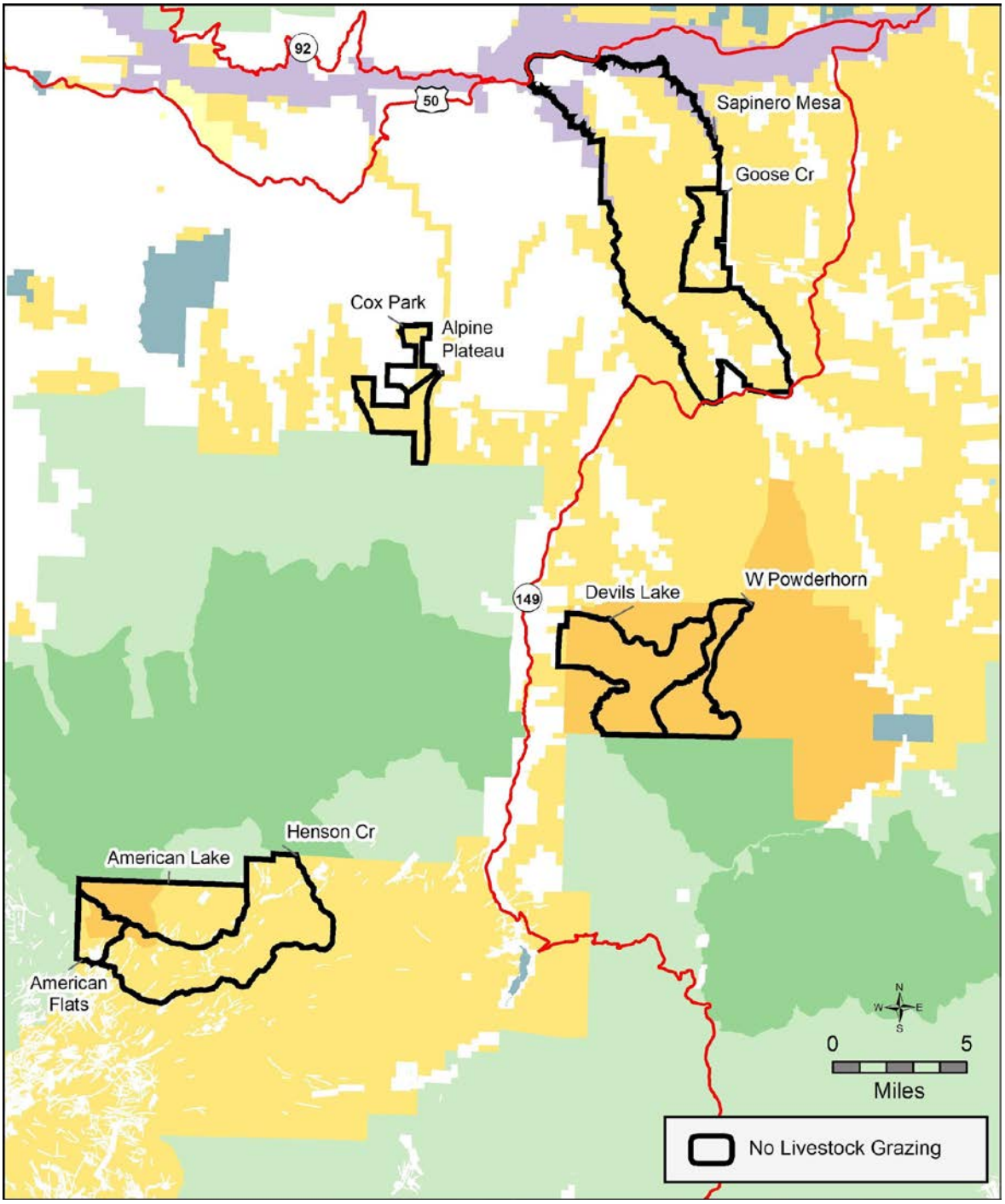
*Figure 2-D2: Alternative D New Allotment Configuration for Sapinero Mesa*



## 2.5. ALTERNATIVE E – NO LIVESTOCK GRAZING

Under Alternative E, domestic livestock grazing would not be authorized on the 9 allotments currently being grazed by domestic sheep (a total of 2,951 authorized AUMs). Under this alternative, all 9 allotments would be closed to all types of livestock grazing.

*Figure 2-E: Map of Alternative E (No Grazing)*



## 2.6. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

### 2.6.1. Switching Sheep Allotments to Cattle Allotments

An alternative to switch sheep grazing allotments to cattle grazing allotments was considered in Interdisciplinary Team (IDT) meetings to address the issue of potential pathogen and disease transmission from domestic sheep to Rocky Mountain bighorn sheep. This alternative was reviewed in terms of its potential for:

- Reducing risk of contact in six domestic sheep allotments with overall Rocky Mountain bighorn sheep habitat overlap (American Lake, Henson Creek, American Flats, West Powderhorn, Devils Lake, and Sapinero Mesa).
- Reducing foray risk in 3 allotments without mapped habitat overlap (Cox Park, Alpine Plateau, and Goose Creek)

Three of the 6 allotments that completely or partially overlap with bighorn range are at high elevation with alpine tundra vegetation, steep terrain, and/or narrow, steep riparian corridors. Generally, high-elevation areas are not suitable for cattle grazing. There are concerns with potential impacts to alpine tundra vegetation, including impacts to soil and vegetation from cattle hoof shear, as well as from vegetation removal from grazing. A permittee would be required to provide additional labor, which would likely be uneconomical, to keep cattle from spending too much time in riparian areas and on alpine tundra in order to graze cattle and still meet utilization standards. It would not be feasible to install fencing to control cattle use due to the annual damage to fencing from snow-loads and avalanches. However, some types of cattle are brisket resistant and can handle high-elevation grazing. The BLM has not received an application for high-elevation cattle grazing in this area.

The remaining allotment containing overall bighorn sheep habitat overlap (Sapinero Mesa Allotment) contains some areas that would be suitable for cattle grazing; however, the BLM has not received any applications for cattle grazing on the allotment. Until such an application is received, it would be difficult to adequately analyze the impacts of cattle grazing. Site-specific details, such as proposed season of use, numbers and class of livestock, and proposed infrastructure, such as fencing and water developments, would need to be known in order to fully analyze the impacts.

The three allotments without Rocky Mountain bighorn range overlap could also be suitable for cattle grazing. However, until a grazing permit application was submitted and a site-specific proposal developed, it would be difficult to adequately analyze the impacts of cattle grazing.

### 2.6.2. Authorizing Other Vacant Allotments for Domestic Sheep Grazing

The Interdisciplinary Team also considered an alternative authorizing currently vacant allotments that are not in the initial analysis area. This alternative would provide alternate grazing allotments for use by permittees who may lose all or part of their grazing permits under Alternatives D or E.

Should a permittee(s) lose grazing as a result of this BLM action these vacant allotments could potentially be made available for grazing. Application for vacant allotments would be considered and analyzed by the BLM in a subsequent site-specific analysis. This alternative is not considered here since the permittees applications are for the 9 allotments currently analyzed and it is unknown which vacant allotments would be considered in future analysis.

### 2.6.3. Not Authorizing Domestic Sheep Grazing within a Nine Mile Buffer Zone of Rocky Mountain Bighorn Sheep

Not authorizing domestic sheep grazing within a 9-mile buffer zone of Rocky Mountain bighorn sheep (WAFWA 2012) was considered as an alternative but eliminated from further analysis. All public land within eight allotments (American Lake, Henson Creek, American Flats, West Powderhorn, Devil's Lake, Cox Park, Sapinero Mesa and Goose Creek) are entirely within nine miles of Rocky Mountain bighorn sheep summer range, and over 50 percent of the Alpine Plateau allotment is within nine miles of Rocky Mountain bighorn sheep summer range. This would completely eliminate one operator from public lands, and effectively eliminate the other operator due to the necessity of using multiple allotments in a rotation in order to maintain an economically viable operation.

The effects of this alternative would be very similar to Alternative E, the No Grazing Alternative. For this reason, the alternative was eliminated from further detailed analysis.

## 2.7. CONFORMANCE REVIEW

Per 43 CFR 1610.5 and BLM 1617.3, the Proposed Action is subject to, has been reviewed for, and has been found to be in conformance with the plans listed below. The plan conformance review included consideration of Management Unit Prescriptions (pages. 2-19 to 2-39), Standards for Public Land Health (pages. 4-7), and Rangeland Management (pages. 3-1 to 3-20).

**Gunnison Resource Area Resource Management Plan** (including Adoption of Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado):

Date Approved: February 1993 (amended February 1997, August 2000, December 2008, January 2009, August 2011, October 2012, and October 2014)

Management Unit(s): 1 (Part of Alpine Triangle SRMA); 2 (Powderhorn Primitive Area, Special Recreation Management Area); 4 (American Basin ACEC); 12 (Deer and Elk Winter Range); 13 (Livestock Grazing); 15 (Riparian Areas); and 16 (General Resource)

Decision Number/Page: Standard Management Direction, Standards for Public Health (pages. 4-7), Standard Management and Standard Unit Prescriptions (2-1 to 2-39), and Rangeland Management (pages. 3-1 to 3-20).

The Proposed Action and Alternatives are in compliance with applicable laws, regulations, and policies, including the following:

- Migratory Bird Treaty Act and Executive Order 13186
- Endangered Species Act
- Clean Water Act

- Federal Noxious Weed Act and Executive Order 13112
- Executive Order 11990, Wetlands
- National Historic Preservation Act
- American Indian Religious Freedom Act
- Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act
- Native American Graves Protection and Repatriation Act
- Wilderness Act
- Archaeological Resources Protection Act
- Federal Lands Policy and Management Act
- Public Rangelands Improvement Act
- Taylor Grazing Act
- 43 CFR 4000 Range Management
- MS–1730 Management of Domestic Sheep and Goats to Sustain Wild Sheep

## 3.0. AFFECTED ENVIRONMENT / ENVIRONMENTAL EFFECTS

This chapter describes the potential environmental consequences to resources that may be affected by the proposed action and alternatives (presented in Chapter 2). Direct, indirect, and cumulative impacts are analyzed and disclosed in this chapter. The analysis focuses on the context and intensity of impacts with comparisons to the No Action Alternative and Proposed Action Alternative.

Cumulative impacts are disclosed in a subsection at the end of each impact analysis. Table 3-1 lists the past, present, and reasonably foreseeable future actions within the area that might be affected by the Proposed Action. The geographic scope used for analysis may vary for each cumulative effect issue and is described in the Affected Environment section for each resource.

*Table 3-1: Past, Present, and Reasonably Foreseeable Actions*

| Action Description | STATUS | | |
|---|---|---|---|
| | Past | Present | Future |
| Livestock Grazing and Trailing | X | X | X |
| Recreation | X | X | X |
| Travel Management | X | X | X |
| Vegetation Treatments | X | X | X |
| Mining | X | X | X |
| Mining Reclamation | X | X | X |

## 3.1. ISSUE #1. HOW WILL DOMESTIC SHEEP GRAZING AFFECT THE HEALTH OF ROCKY MOUNTAIN BIGHORN SHEEP?

### 3.1.1. Introduction

#### 3.1.1.1. Regulatory Background

The BLM manages wildlife habitat, which includes space, food, and shelter for wildlife. The space component is particularly critical in this case because the preponderance of current scientific literature establishes that Rocky Mountain bighorn sheep and domestic sheep should not share the same space at the same time due to potential for disease transmission.

The BLM's management objectives include achieving effective separation of BLM-authorized domestic sheep from wild sheep on BLM lands and minimizing the risk of contact between species. Effective separation is defined as the spatial or temporal separation between wild sheep and domestic sheep, 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 (WAFWA 2012; BLM 2016). Domestic sheep authorizations and other uses are implemented to ensure that effective separation results in a high degree of confidence that there will be low to no risk of contact with wild sheep (BLM 2016).

Rocky Mountain bighorn sheep are a BLM Colorado designated sensitive species (BLM 2015). In accordance with BLM Manual 6840 – Special Status Species (BLM 2008), the BLM will take conservation actions to improve the status of such species. Although habitat degradation from fire suppression, highways, livestock grazing, and human disturbance are of concern, the susceptibility of Rocky Mountain bighorn sheep herds to population declines or extirpation due to respiratory diseases, which can be transmitted by domestic sheep or goats (Besser et al. 2012b; Cassirer et al. 2013), is the greatest concern for Rocky Mountain bighorn sheep population persistence in the analysis area.

Secretarial Order 3362 – Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors supports the long-term sustainability of Rocky Mountain bighorn sheep populations in Colorado. Risk of disease is the greatest threat to bighorn sustainability. Forays (long-distance periodic movements among populations) by bighorn sheep maintain connectivity between populations (or between herds), so domestic sheep grazing within foray distances threatens to increase the risk of contact and disease transmission among bighorn sheep populations.

#### 3.1.1.2. Disease in Rocky Mountain Bighorn Sheep

*Pathogen and Disease Transmission*

Rocky Mountain bighorn sheep were once abundant throughout Western North America. Bighorn sheep populations began to decline dramatically in most areas in the late 1800s. By 1900, many populations were eliminated (Buechner 1960; Hurley et al. 2015). Historic population declines are attributed to over hunting, parasites, disease, competition with domestic livestock for forage, and competition with humans for space (Honess and Frost 1942; Buechner 1960), but mortality resulting from epizootic pneumonia is thought to be the primary cause of the

historical decline and currently remains the primary factor limiting bighorn sheep recovery (TWS 2010; Wehausen et al. 2011; Miller et al. 2012; TWS & AAWV 2015). For decades, wildlife managers have attributed most pneumonia outbreaks in bighorn sheep to contact with domestic sheep (Goodson 1982; Callan et al. 1991; Foreyt et al. 1994; Monello et al. 2001; George et al. 2008). Forays are well documented in wild bighorn sheep. Biologically, these types of interactions enhance genetic diversity and augment populations through colonization, but pathogen and disease transmission can be a consequence of these interactions.

Mortality and depressed recruitment resulting from pathogens introduced by domestic sheep and goats are regarded as the primary limiting factors for Rocky Mountain bighorn sheep in Colorado (George et al. 2009). The primary disease agents are respiratory disease, to which domestic sheep are typically resistant or unaffected, but to which bighorn sheep have little resistance (George et al. 2008; Besser et al. 2012a, 2014; Wild Sheep Working Group 2012; Cassirer et al. 2013).

The transfer of pathogenic organisms from domestic sheep have been attributed to declines in bighorn sheep since the early part of the 20$^{th}$ century (as reviewed by Cassirer et al. 2018). The majority of scientific literature supports the potential for respiratory disease to be transmitted from domestic sheep and goats to bighorn sheep, frequently followed by bighorn mortality events (Martin et al. 1996; Schommer and Woolever 2001; Wehausen et al. 2011; Besser et al. 2012a, 2014; Wild Sheep Working Group 2012; Cassirer et al. 2013). Susceptibility of bighorn sheep to diseases carried by domestic sheep is not unexpected given the genetic similarity of the two species.

Disease-caused declines in bighorn sheep are often catastrophic, all-age mortality events (Clifford et al. 2009). Following recovery from a pneumonia outbreak, the herds continue to suffer poor lamb recruitment for several years (Cassirer and Sinclair 2007; Cassirer et al. 2013; Plowright et al. 2013). Survivors then become carriers of the disease and serve as a source of infection for lambs in the same herd or for adults and lambs in other herds and populations, through forays or dispersals. Chronic, sporadic, pneumonia-caused mortality in adults and lambs can also be a primary factor limiting population growth (Cassirer and Sinclair 2007).

Pneumonia in bighorn sheep is a microbiologically complex disease, and many diverse bacteria are detected in fatally affected animals, which has complicated efforts to establish an etiology of pneumonia outbreaks in wild bighorn (as reviewed by Besser et al. 2013 and Cassirer et al. 2018). A previously overlooked bacterium, *Mycoplasma ovipneumoniae* (MOVI), is currently believed to be a primary agent necessary for bighorn sheep respiratory disease (Besser et al. 2012b, 2012a, 2013, 2014) and predisposes bighorns to more severe secondary infections by interacting with other bacterial pathogens (Besser et al. 2008; Dassanayake et al. 2010), namely *Mannheimia haemolytica, Pasturella multocida,* and *Bibersteinia trehalosi*. Other diseases, such as sinus tumors (Fox et al. 2015) or viral infections (Dassanayake et al. 2013) also contribute to a higher risk of bighorn sheep developing pneumonia if they are also infected with pathogenic bacteria. Bacteria such as MOVI and *Pasturella* can be transmitted to bighorn sheep through direct or aerosol contact. Experiments where healthy bighorn are put in contact with or close proximity to healthy domestic sheep (co-mingling) have verified that contact can lead to the transmission of disease from domestic to bighorn sheep.

Twelve separate studies have shown that co-mingling domestic and bighorn sheep under experimental conditions clearly results in transmission of fatal pneumonia (Wehausen et al. 2011; Besser et al. 2012b), and die-offs and mortality events following a likely contact event between bighorn and domestic sheep are documented in North America (Martin et al. 1996; WAFWA 2010), Colorado (George et al. 2009), and within the project area (Spicer 1999). Bighorn sheep that survive the all-age epizootic become immune, but some individuals continue to carry MOVI in the upper respiratory tract, serving as a source of infection to lambs (Cassirer et al. 2013). As a result, annual lamb pneumonia epizootics may recur for many years after the initial all-age outbreak. Repeated spillover events of novel MOVI strains from newly introduced reservoir host individuals (such as domestic sheep and goats) can infect bighorn population members surviving initial MOVI contact, given a lack of cross-strain immunity (Cassirer et al. 2017).

Domestic sheep and goats that appear healthy often carry MOVI (Thirkell et al. 1990; Ionas et al. 1991a, 1991b; Parham et al. 2006). In a 2006 survey, a large majority (88 percent) of domestic sheep flocks tested (n = 453 flocks) across the United States were found to be carriers of MOVI in their upper respiratory tracts (USDA Aphis Veterinary Services 2015), with all flocks comprised of more than 500 adult females always being positive. Other surveys have found a prevalence of MOVI in 44 percent of hobby domestic sheep flocks tested (Heinse et al. 2015).

*Measures to Minimize Contact between Domestic Sheep Allotments and Rocky Mountain bighorn sheep*

Preventing contact between domestic sheep and goats with bighorn sheep is widely accepted as the only way of preventing disease in bighorn (Wild Sheep Working Group 2012; TWS & AAWV 2015). The development of natural immunity in Rocky Mountain bighorn sheep is undocumented and improbable at the population level (Cassirer et al. 2017; Miller 2001; Dubay et al. 2002), and it is currently not reasonable or practical for the BLM or state agencies to attempt to vaccinate wild bighorn or domestic sheep to protect from the cross-species disease transfer. Vaccines to reduce Pasteurellaceae and MOVI infection in bighorn sheep or domestic sheep have proven ineffective (Foreyt 1992; Foreyt et al. 1994; Foreyt and Silflow 1996; Cassirer et al. 2001; and Ziegler et al. 2014). Prior to the development of a Risk of Contact (ROC) model, the primary management recommendation used for interspecies separation was the use of a buffer distance to reduce potential for contact. Distance buffers have been defined as 14.5 km (9 miles) (WAFWA 2012) to 23 km (14.2 miles) (Singer et al. 2001). However, the minimum buffer used in Hells Canyon Rocky Mountain bighorn sheep was 25 miles and yet was not completely effective in separating the species (Schomer and Woolever 2001). It is recognized that the probabilities of bighorn foray into domestic sheep allotments decline as the separation distance increases (O'Brien et al. 2014).

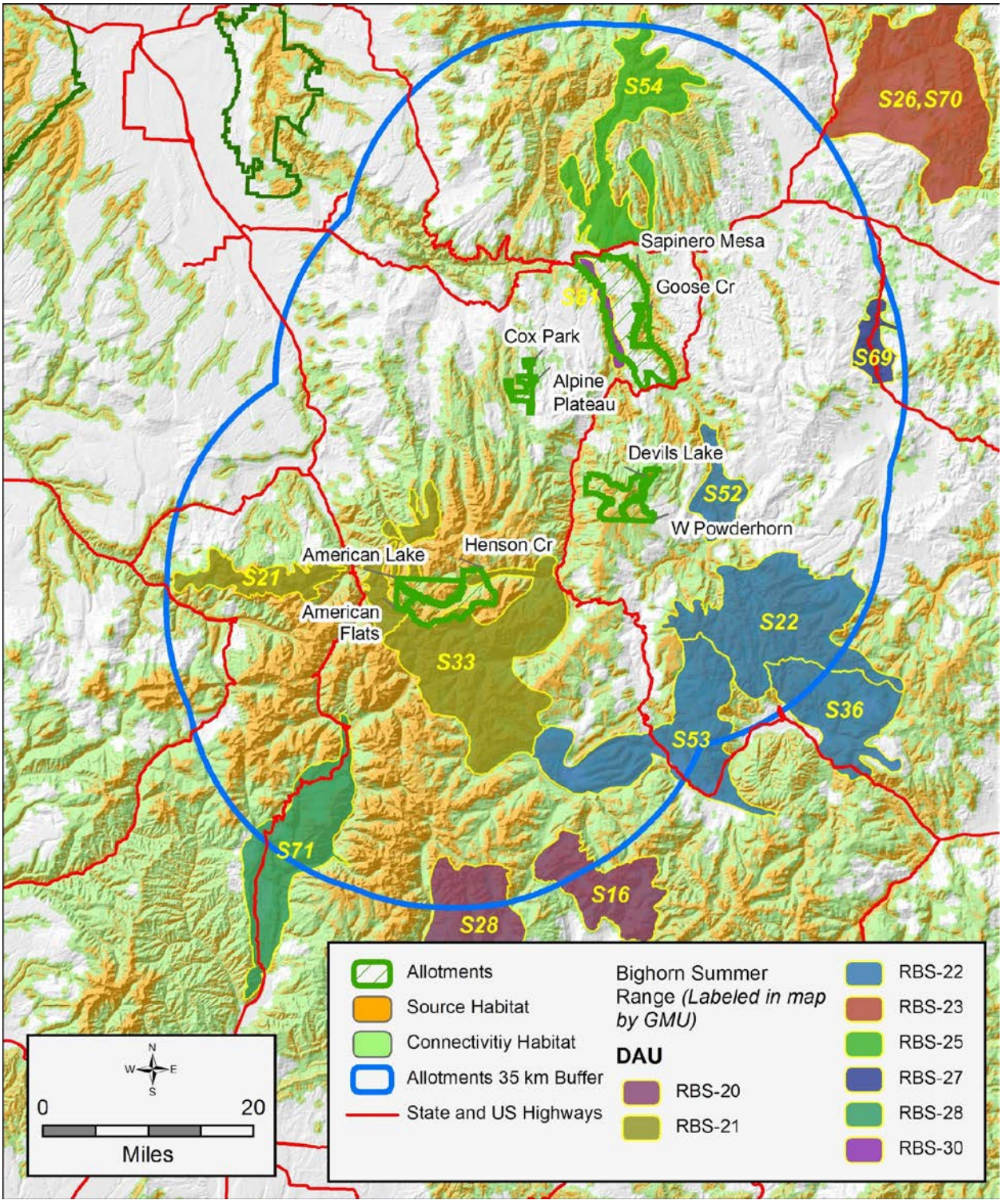
Currently, permittees are encouraged to remove any sick, injured, or lame sheep from the allotments to reduce the likelihood of sheep being left behind and away from the main herd. Permittees meet annually with the BLM and USFS to discuss the planned grazing system, to review any concerns/problems encountered, and to update a communication and response plan. This plan is in place to ensure the herders and permittees are able to contact BLM, USFS, and CPW staff in case bighorn and domestic sheep come into contact or close proximity.

Furthermore, CPW policy is to respond promptly to reports of bighorn sheep mingling with domestic sheep. Wild sheep that have made contact with domestic sheep will be destroyed in compliance with CPW policies and administrative directives (CPW Data Analysis Unit RBS-21). If the bighorn sheep contracted any pathogens or disease from the domestic sheep and the bighorn sheep are euthanized, those pathogens will not be spread to other Rocky Mountain bighorn sheep. Removal of wild sheep known, or suspected to have closely associated with domestic sheep is considered to be an effective management tool (WAFWA 2012).

Although there are no documented contacts between bighorn sheep and domestic sheep in the allotments in this analysis, contacts may have occurred that were unreported or undetected.

BLM management practices are designed to minimize the risk of contact with bighorn sheep and the spread of pathogens and disease in bighorn sheep herds. Terms and conditions added to grazing permits are assumed to be most effective for allotments in open, gentle habitat where domestic sheep can be easily controlled and monitored, with a large buffer between the two species (Wild Sheep Working Group 2012). A majority of the allotments are located in close proximity or overlap bighorn sheep summer range [alternatively referred to as core herd home range (CHHR) throughout this document], contain suitable connectivity habitat between allotments, and contain remote, rugged terrain where control of domestic sheep, locating strays, and monitoring Rocky Mountain bighorn sheep is difficult. (Figure 3.1-A).

*Figure 3.1-A: Rocky Mountain Bighorn Sheep Habitat, GMUs, and DAUs within the Analysis Area. Summer range limits, Core Herd Home Range, and GMU boundaries are the same delineation.*



## 3.1.2. Affected Environment

*Rocky Mountain Bighorn Sheep Populations*

The analysis area for direct and indirect effects on Rocky Mountain bighorn sheep includes eight Data Analysis Units (DAUs) and 14 Game Management Units (GMUs) that are within 35 km (21.7 miles) of the allotments proposed for domestic sheep grazing in this EIS (Table 3.1-2; Figure 3.1-A). The cumulative effects analysis area includes the summer range and the potential foray area (35 km) of the eight GMUs. The analysis area for cumulative effects considers all the potential sources of pathogen and disease transmission that bighorn in these populations may encounter whether on foray or within summer range, including domestic sheep allotments on USFS and BLM lands that are not being considered for authorization in this EIS. The foray analysis area is considered, because foraying bighorn that make contact with domestic sheep can acquire pathogens and contract disease, then return to the local range and infect others in the population.

For management purposes, CPW has divided Rocky Mountain bighorn sheep populations into uniquely numbered DAUs with the prefix of "RBS-" that represent larger interconnected herd complexes. DAUs are geographic areas that include all of the seasonal ranges of interacting bighorn herds and are managed collectively as populations. Each DAU is usually composed of one or more uniquely numbered GMUs with the prefix of "S-". GMUs define herds within a DAU and are primarily used for managing hunter distribution. Several sub-herds can comprise a GMU herd unit but are usually not formally named or defined. For this analysis, each GMU is considered a herd, and each DAU is considered a population. For this analysis, GMUs are defined and displayed by the summer activity range limits of the herd; GMUs and summer activity range are mapped using the same delineations.

Some bighorn herds are designated by CPW as a priority for conservation. There are two tiers of designation for core herds: Tier 1 and Tier 2. For a herd to be designated as Tier 1, it must be a large, established population (≥100 animals for ≥90 percent of the years since 1986), comprising one or more interconnected herds that have received few (≤50 total), if any, supplemental releases of Rocky Mountain bighorn sheep in the past. These populations likely have maintained the greatest genetic diversity, and their ranges are habitats where bighorn populations have best been able to persist in sizable numbers despite various adversities (George et al. 2009). Tier 1 herds are given the highest priority for inventory, habitat protection and improvement, disease prevention, and research (George et al. 2009). To be designated as Tier 2, the bighorn population must be an established medium-to-large population (≥75 animals for ≥80 percent of the years since 1986, or since becoming fully established) comprising one or more interconnected herds (George et al. 2009). Relative to Tier 1 herds, these herds have less genetic diversity and more limited ranges that may or may not be able to persist in sizable numbers in the face of various adversities. Tier 2 herds are given priority for inventory, habitat protection and improvement, and research over herds that are not considered primary core herds (George et al. 2009).

There are 14 Rocky Mountain bighorn sheep GMUs and 8 Rocky Mountain bighorn sheep DAUs within the analysis area (Figure 3.1-A; Table 3.1-1). Detailed historical demographic information on the populations in the San Juan region are available in DAU game management plans for RBS-20, RBS-21, and RBS-22 (Diamond and Banulis 2012; Weinmeister 2012; Diamond and Ferrero 2013). It should be noted that mapped GMUs are displayed throughout

this document by their respective summer activity range, but are also referenced as the Core Herd Home Range (see section 3.1.1.2, Core Herd Home Range).

Given the high dispersal characteristics of bighorn, the productivity of the habitat in the area, and the number of bighorn that occupied the area, it is likely that bighorn populations were connected historically at a much greater scale (Diamond and Banulis 2012). Based on telemetry, aerial survey, ground observation, and habitat modeling data, Rocky Mountain bighorn sheep in the analysis area show considerable or at least high potential for migratory, foray, and dispersal movements among populations (DAUs) (CPW, unpublished data). Thus, these populations are part of a single larger meta-population and have the ability to influence one another in terms of population characteristics (i.e., genetics and behavior) and disease status. For instance, summer ranges of RBS-22 and RBS-21 are currently mapped as connected (Figure 3.1-A), which was verified by telemetry data indicating bighorn movements between the two DAUs (K. Blecha, personal communication) and close proximity of bighorn aerial survey locations collected in the two DAUs.

*Table 3.1-1: Rocky Mountain Bighorn Sheep Populations within 35 Km of the Domestic Sheep Allotments Considered in This Analysis*

| DAU # | BS DAU | GMU # | GMU | Herd Size[1] | CPW Pop Objective | CPW Priority[2] |
|---|---|---|---|---|---|---|
| RBS-20 | Weminuche | S15* | Sheep Mountain* | 200 | 400-700 | Tier 1 |
| | | S16 | Cimarrona Peak | 135 | | |
| | | S28 | Vallecito | 70 | | |
| RBS-21 | San Juans West | S21 | Cow Creek / Wetterhorn Peak | 204 | 400 - 500 | Tier 1 |
| | | S33 | Lake Fork/Pole Mountain | 100 | | |
| RBS-22 | Central San Juans | S22 | San Luis Peak | 52 | 275 | Tier 2 |
| | | S36 | Bellow's Creek | 39 | | |
| | | S52 | Rock Creek | 20 | | |
| | | S53 | Bristol Head | 96 | | |
| RBS-23 | Taylor River / Fossil Ridge | S26 | Taylor River | 55 | NA | |
| | | S70 | Fossil Ridge | | | |
| RBS-25 | West Elks | S54 | Dillon Mesa | 90 | NA | |
| RBS-27 | Cochetopa Canyon | S69 | Cochetopa | 80 | NA | |
| RBS-28 | West Needles | S71 | West Needles | 60 | NA | |
| RBS-30 | Lower Lake Fork | S81 | Lower Lake Fork Gunnison River | 10 | NA | |

[1]Population estimation from post-hunt surveys 2015 (late 2015 to early 2016).
[2]Colorado Rocky Mountain bighorn sheep Management Plan (George et al. 2009).
*S15 Sheep Mountain population is not within the analysis area. It is presented in this table to compare current herd sizes of each GMU with the population objectives that are developed for RBS-20 DAU.

*RBS-21*

The San Juan's West Rocky Mountain bighorn sheep population (RBS-21) is the greatest concern for interactions with domestic sheep in the planning area. RBS-21 herds have ranges that either overlap, are in close proximity, or are within foray distance of the domestic sheep allotments examined in this EIS. RBS-21 is indigenous to the area with very few augmentations occurring historically, so it is considered a primary core population (Tier 1) by CPW (Diamond and Banulis 2012). RBS-21 is managed as two herds: the Cow Creek/Wetterhorn Peak herd (S-21) and the Lake Fork/Pole Mountain herd (S-33). The S-21 herd is one of the few remaining indigenous bighorn herds in Colorado (Diamond and Banulis 2012); S-33 bighorns are also indigenous but have received augmentation. Recent years have seen a decline from an estimated 400 bighorn in RBS-21 in 2013 to a 2015 estimate of 305 bighorn. There may have been an outbreak of disease in RBS-21, as blood samples from bighorn captured for a telemetry study showed high levels of *M. ovipneumoniae* in the winter of 2012–2013, and then lamb recruitment dropped to 13 per 100 ewes in the following season's survey (CPW, unpublished data). The RBS-21 plan assumes an expected population of 400 to 500 animals and assumes densities that do not exceed 2.0 bighorn/$km^2$ of modeled winter range.

The RBS-21 DAU is in a large, remote, mountainous geographic area, where the elevations range from approximately 6,400 to over 14,000 feet and average 11,001 feet. The unit includes several designated wilderness areas. Vast expanses of alpine and subalpine ecosystems juxtaposed with lower elevation winter ranges provide excellent year-round habitat for bighorn (Diamond and Banulis 2012).

*RBS-22*

The Central San Juan's Rocky Mountain bighorn sheep population (RBS-22) is between 3 and 17 miles from domestic sheep allotments analyzed in this EIS. RBS-22 is considered a regional priority by CPW and is designated a Tier 2 core population because it was historically one of the most prolific bighorn herds in Colorado and has never specifically been the focus of transplant efforts (Diamond and Ferrero 2013). RBS-22 is managed as four herds: S-22, S-36, S-52, and S-53 (see Table 3.1-2). The S-22 herd is relatively indigenous to the region. The S-52, S-36, and S-53 herds were nearly extirpated at one point in their histories. The current S-52, S-36, and S-53 herds are likely only present due to bighorn transplant efforts by CPW (Diamond and Ferrero 2013). Population estimates from RBS-22 have been inconsistently reported over the years but range from a high of 380 in 1988 to a low near 100 animals in 2001 (Diamond and Ferrero 2013). A disease outbreak was documented in this population in 1989 (S-22 and S-52 herds) and 1993 (S-36), due to presumed (S-52) and documented (S-36) contact with domestic sheep (Spicer 1999; Diamond and Ferraro 2013). RBS-22 currently has an estimated 207 bighorn. Recent surveys have shown that high lamb:ewe ratios are present in the population in June and July but are greatly diminished by late August (K. Blecha, personal communication). These low lamb-recruitment rates are typical of herds still experiencing impacts of past disease events. The RBS-22 population is managed for increasing population and distribution within the DAU. Management objectives for the RBS-22 populations will be re-evaluated if the population reaches 350 bighorn.

The RBS-22 DAU encompasses a very large geographic area with elevations ranging from approximately 8,000 feet near the towns of Powderhorn and South Fork to over 14,000 feet in the La Garita Mountains.

*RBS-20*

The Weminuche population (RBS-20) is located in isolated portions of the Weminuche Wilderness Area in the San Juan Mountains. These herds are some of the more distant from the domestic sheep allotments in this analysis (16–35 miles from allotments). GMUs S-15, S-16, and S-28 herds are within the RBS-20 DAU, but only S-16 and S-28 are within 35 km (about 21.7 miles) of the allotments being considered for domestic sheep grazing in this analysis. Increases in the population over the past 25 years likely reflect recovery from the extirpation of bighorn in the late 1800s and early 1900s, which was presumably caused by market hunting, competition with livestock, and disease-related die-offs. RBS-20 has an estimated 405 Rocky Mountain bighorn sheep, which is just at the population objectives set for the DAU.

Terrain in the RBS-20 DAU is rugged and remote, with elevations between 7,500 and over 13,000 feet. Habitat is in good to excellent condition (Weinmeister 2012).

*Other DAUs*

Other DAUs in the analysis area do not have published game management plans, thus there is little published information on these bighorn populations. The DAU RBS-23 populations (i.e., the Taylor River/Fossil Ridge populations) suffered from dramatic decline from a major disease-related all-age die-off in 2008 (George et al. 2009), and the populations have only just recently begun to recover (K. Blecha, personal communication). S-54 and S-81 received bighorn translocations in 1975 and 1976 (Singer et al. 2001).

### 3.1.3. Environmental Consequences

This section focuses on the effects of alternatives on the potential for pathogen and disease transmission from domestic sheep to Rocky Mountain bighorn sheep. A principal assumption from the published literature used for analysis is that direct contact between domestic and Rocky Mountain bighorn sheep results in a high likelihood of pathogen transmission to Rocky Mountain bighorn sheep and disease outbreaks in local Rocky Mountain bighorn sheep herds (Wehausen et al. 2011; Wild Sheep Working Group 2012). Risk factors include (1) distance between domestic sheep allotments and the nearest Rocky Mountain bighorn sheep populations; (2) the amount and distribution of Rocky Mountain bighorn sheep habitat within and between domestic sheep allotments; (3) stray domestic sheep and forays of Rocky Mountain bighorn sheep, particularly males during the rut; and (4) seasonal Rocky Mountain bighorn sheep distribution and movement near the allotments when grazed by domestic sheep.

Three models were used to better understand the potential for contact between Rocky Mountain bighorn sheep and domestic sheep allotments in this analysis: (1) Rocky Mountain bighorn sheep summer source habitat model, (2) core herd home range (CHHR), and (3) a risk-of-contact model (USFS 2013; Carpenter et al. 2014; O'Brien et al. 2014). Additional information about the models used for this analysis is in Appendix C and summarized below:

- Rocky Mountain bighorn sheep summer source habitat model is a broad-scale mapping model that assigns all areas to one of three habitat classes: 1) source (suitable) habitat; 2) connectivity areas, and; 3) non-habitat. Areas identified by the model as suitable for Rocky Mountain bighorn sheep are not assumed to be occupied, as suitability does not indicate presence.
- The CHHR is defined by the mapped summer activity range polygon of Rocky Mountain bighorn sheep in the analysis area. For this analysis and simplicity of display, GMU boundaries are depicted by the summer activity range (CHHR) boundary (Figure 3.1-A). Summer activity range polygons were used to define CHHR rather than overall activity range polygons, based on the following: 1) all of the domestic sheep would be grazed during the time period between May and October before bighorn move into their winter range; 2) mapped overall range in this analysis area encompasses sightings of foraying bighorns, and thus would not allow foray probability as defined by Singer et al. (2001) to be mapped as accurately. Allotment overlap with CHHR or distance from CHHR is 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 that a bighorn sheep will contact the allotment. 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 (RoC) uses Rocky Mountain bighorn sheep source habitat and CHHR to model the probability of *foray* by bighorn. A foray is defined as a Rocky Mountain bighorn sheep leaving its CHHR and then returning (Singer et al. 2001). The RoC tool models the probability of foray based on distance to CHHR and spatial configuration of source habitat on the landscape and generates a map of the probability of foray. The ROC model estimates the probability that a foraying Rocky Mountain bighorn sheep will contact a domestic sheep allotment.

Output from these models was used to describe current conditions on BLM allotments being considered for domestic sheep grazing in this EIS and to understand the risk of disease transmission for each herd (GMU) based on the proposed alternatives, as well as the risk of disease transmission based on the location of domestic sheep grazing in relation to bighorn CHHR. The number of potential disease outbreaks in a given time frame was calculated iteratively using a range of values that assumed a different number of contacts between a Rocky Mountain bighorn sheep and a domestic sheep grazing allotment is required for a disease outbreak. Values from 0.05 (1 in 20 contacts would result in disease outbreak) to 1.00 (every contact would result in disease outbreak) were used in the calculation, and the minimum and maximum are reported in the effects section for each alternative. Note that when there is overlap between bighorn sheep range and domestic sheep grazing, there is already a risk of contact without foray. The assumption is that one or more contacts per year may occur. For those allotments that overlap bighorn sheep range, the estimates for risks must be interpreted with caution because the risks of contact with the allotment are underestimated. Additionally, the ROC tool does not model the risk of stray domestic sheep outside the allotments or domestic sheep present during unauthorized periods, which may also pose a risk of disease transmission.

Important indicators for the risk of pathogen transmission and disease outbreak in Rocky Mountain bighorn sheep because of domestic sheep grazing are summarized in Table 3.1-2 below. Detailed tables are included in Appendix C.

*Table 3.1-2: Summary of Results from the Risk of Contact Analysis for All Alternatives except the No Grazing Alternative*

| Indicator | Alternative A (Proposed Action) and Alternative B (No Action) | Alternative C | Alternative D |
|---|---|---|---|
| Minimum and maximum distance between allotments and nearest CHHR (miles) | 0.0 - 7.2 | 0.0 - 10.7 | 0.9 - 10.7 |
| # Predicted contacts between BHS and domestic sheep allotments per year | 2.7* | 4.4 | 1.2 |
| # Predicted disease outbreaks / 50 years in RBS-21 (Tier 1) | 1.9 to 38.1[2] | 3.6 - 88.9 | 0.4 - 7.1 |
| # Predicted disease outbreaks / 50 years in RBS-22 (Tier 2) | 0.0 - 21.0[1] | 0.0 - 21.0 | 0.0 - 18.8 |
| # Predicted disease outbreaks / 50 years in RBS-20 (Tier 1) | 0 | 0 | 0 |
| # Domestic sheep allotments | 9 | 9 | 6 |
| Acres available for domestic sheep grazing | 65,710 | 56,879 | 34,652 |
| Acres Rocky Mountain bighorn sheep source habitat within Allotments | 30,504 | 25,072 | 8,256 |
| # Allotments that overlap CHHR | 4- American Lake (4 %), American Flats (3%) Henson Creek (21%), Sapinero Mesa (18%) | 0 | 0 |
| Acres CHHR within allotments | 8,831 | 0 | 0 |

[1] For allotments that overlap with CHHR, predicted bighorn sheep contacts with an allotment would be greater than values shown, and years between contacts would be less than the value shown, because allotments that overlap with CHHR may have one or more predicted annual contacts per year. Results are summarized from model output, which does not provide output when there is overlap. Allotments that overlap with CHHR are noted with an asterisk. Assuming at least one contact per year where there is overlap, the number of allotments that overlap should be considered as adding significant risk to the predicted number of contacts.

[2] The values modeled include 0.05 and 1.00 (see Model Analysis section in Appendix C). The low values for the potential disease events assume that 1 in 20 contacts with a domestic sheep allotment results in disease outbreak and the high values assume each contact with a domestic sheep allotment results in disease outbreak. Using a range of values captures the uncertainty regarding the number of contacts between bighorn and domestic sheep allotments that result in disease transmission.

### 3.1.3.1. Direct and Indirect Effects from Alternative A (Proposed Action) Permittee Applications

Under Alternative A, 9 allotments, totaling 65,710 acres, would be available for domestic sheep grazing (Figure 3.1-A). All Rocky Mountain bighorn sheep source habitat and CHHRs that occur within the allotments (30,504 and 8,831 acres, respectively) would be available for domestic sheep grazing. There would be overlap between CHHRs and four domestic sheep allotments. Rocky Mountain bighorn sheep contacts with a domestic sheep allotment under Alternative A are predicted to be 2.7 contacts per year (Table 3.1-2). As noted above, straying of domestic sheep would add an additional risk of contact between the species. Risk to specific DAUs and GMUs are described below.

New terms and condition or management practices would be implemented in Alternative A. Domestic sheep or goat grazing management practices are designed to minimize the risk of contact to reduce possible disease transmission to Rocky Mountain bighorn sheep. While these practices are unproven, there are indications that they may reduce risk. The terms and conditions listed in Appendix B-2 and B-3 are tools to minimize the following risk factors:

1) Bighorn foraying into domestic sheep herds and returning to the bighorn herd
2) Stray domestic sheep on the landscape
3) Attraction between domestic and bighorn
4) Diseased domestic sheep on the landscape

*Table 3.1-3 Management Practices for Alternatives A, C and D*

| Management Practice | How Does It Help Reduce Risk? |
|---|---|
| **RISK: Bighorn foray into domestic sheep herds** | |
| The permittee/lessee will immediately notify the local BLM authorized officer (i.e., Field Manager), or other primary point of contact designated by the authorized officer, of any observed or reported contact, or close proximity, between wild sheep and the permittee's/lessee's domestic sheep or goats. | The BLM, CPW and Permittee would work together prior to each grazing season to compile a calling tree and protocol if contact or close contact occurs. This would allow all parties to work on effective and efficient means of communication between permittees, herders, wildlife managers and the BLM.<br><br>This management practice allows CPW to remove bighorn sheep that have contacted domestic sheep. |
| The permittee/lessee will immediately report (as soon as feasible) to the authorized office (i.e., Field Manager) any wild sheep sightings in proximity to authorized domestic sheep or goat allotments or trailing routes. | Allows the BLM and the permittee to modify domestic sheep grazing to avoid areas with bighorn. |
| Sheep will be bedded on upland areas and as far away from adjacent canyon edges or rims as feasible. Applies to permits on American Flats, American Lake, Henson Creek, West Powderhorn, Devils Lake, Sapinero Mesa, and Goose Creek Allotments. | Reduces the chance that bighorn would foray out of habitat and contact domestic sheep late in the evening, at night and early in the morning when sheepherders are not able to see or prevent contact. |
| Prior to turnout on public lands, permittees will ensure herders can identify Rocky Mountain bighorn sheep and that they are familiar with bighorn habitat. | Ensures sheepherders know when they see bighorn so that they can take appropriate action to avoid contact. |
| **RISK: Stray domestic sheep contacting bighorn** | |
| The permittee/lessee will report their authorized domestic sheep or goat routing and distribution within an allotment, trailing between | Allows the BLM and the permittee to modify domestic sheep grazing to avoid areas with bighorn. |

| Management Practice | How Does It Help Reduce Risk? |
|---|---|
| allotments, strays and recovery efforts, according to the terms and conditions of their authorization(s) or permit(s)/lease(s). | |
| When trailing domestic sheep through areas where there is a potential for contact with wild sheep, the permittee/lessee will use the appropriate combination of close herding, multiple herders, and well-trained herd dogs to keep the sheep bunched and to minimize the risk of strays. Any strays will be gathered and moved back with the herd as soon as possible or removed from BLM lands as the trailing occurs. | Reduces the risk of stray domestic sheep coming into contact with bighorn sheep. |
| When trailing in areas where physical separation cannot be assured, use trucking instead of trailing. | Reduces the risk of stray domestic sheep coming into contact with bighorn sheep. |
| Maximum band size will be 1250 ewes (this number does not include lambs) on any allotment. | Increases the ability of the sheep herder to retain control of domestic sheep |
| At least one herder is required to be with the sheep. A herder will remain in the sheep camp during the night. Any bands of yearlings over 1000 will require two herders. | Increases the ability of the sheep herder to retain control of domestic sheep |
| No scheduled lambing of domestic sheep will occur on BLM lands. | Reduces the number of domestic sheep being separated from the herd during lambing. |
| The permittee/lessee will retrieve and remove sick or physically infirm domestic sheep or goats from the herd as soon as possible. Animals that are too far from roads to be removed will be terminated. Under no circumstances will injured or sick livestock be left behind. | Reduces the risk of stray domestic sheep coming into contact with bighorn sheep. |
| **RISK: Bighorn being unusually attracted to domestic sheep herds** | |
| The permittee/lessee will 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. | Grazing domestic ewes while in estrus heightens the possibility of contact between wild sheep and domestic sheep or goats. |
| Domestic sheep grazing on the Sapinero Mesa Allotment in the fall will stay on the east side of the allotment after October 1st to avoid bighorn habitat on the west side of the allotment during the bighorn rutting season. | Reduces the likelihood of rutting rams interacting with domestic ewes. |
| Salt supplements will be placed on rocky areas. Herders will place only as much salt as the sheep will consume in one night. | Reduces the attraction of domestic sheep bedding grounds to bighorn sheep seeking salt. |
| **RISK: Diseased domestic sheep on the landscape** | |
| The permittee/lessee will prevent the turnout of 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. | Reduces the likelihood of domestic sheep carrying diseases that could be transmitted to bighorn sheep. |

*Risk to RBS-21*

Bighorn risk of contact with domestic sheep allotments would be greater than compared to Alternatives C and D because overlap and proximity to S33 CHHR would occur in 21 percent of the area in the Henson Creek Allotment, and S21 CHHR would partially overlap with 3-4 percent of the American Lake and American Flats Allotments. Under Alternative A and B, based solely on predicted contact from foray movement, the number of potential disease outbreaks within RBS-21 over a 50-year period are predicted to range from 1.9 to 38.1 outbreaks (Table 3.1-2).

*Risk to RBS-20 & RBS-22*

Under Alternative A and based on predicted contact from foray movement, there are no predicted disease outbreaks for RBS-20, and 0 to 21 predicted outbreaks for RBS-22 over a 50-year period. The highest risk for disease outbreak would be in the Rock Creek population (Table 3.1-2).

*Risk to Other RBS DAU Populations*

The predicted number of potential disease outbreaks over a 50-year period as a result of contact from foray movement would be 0.1 to 16.4 (see Appendix C).

*Effects Determination*

The BLM sensitive species determination for Rocky Mountain bighorn sheep is that Alternative A *may impact individuals or habitat and may contribute locally towards need for federal listing*. The primary reasons for this determination are direct overlap of four allotments with CHHR, potential for Rocky Mountain bighorn sheep forays intersecting allotments, mountainous terrain that makes monitoring for effective separation difficult, and risk associated with straying sheep. However, grazing management practices that would be implemented in Alternative A are expected to reduce risk of contact and reduce possible disease transmission to Rocky Mountain bighorn sheep.

### 3.1.3.2. Direct and Indirect Effects from Alternative B (No Action)

Under Alternative B the effect to Rocky Mountain bighorn sheep in the ROC model are similar to Alternative A. (See section 3.1.3.1.) However, this alternative does not include new terms and conditions/management actions to reduce the risk of contact between domestic sheep and wild sheep. While these practices are unproven, there are indications that these actions may reduce risk. Therefore, Alternative B would be less effective than Alternative A at reducing risk of contact between domestic and wild sheep, resulting in possible disease transmission.

### 3.1.3.3. Direct and Indirect Effects from Alternative C (Domestic Sheep/Goat Grazing Authorized Outside of Summer Bighorn Range)

Under Alternative C, 25,072 acres of source bighorn habitat within authorized pastures in the 9 allotments (totaling 56,879 acres) would be available for domestic sheep grazing (Table 3.1-2). There would be no overlap of Rocky Mountain bighorn sheep CHHR with any of the pastures available for grazing, because pastures that overlap CHHR of RBS-21 and RBS-80 in American Flats, American Lake, Henson Creek, and Sapinero Mesa would not be available for domestic sheep grazing (Figure 3.1-A and Section 2.3). This would provide some degree of physical separation of domestic sheep or goats from wild sheep; domestic sheep grazing could occur directly adjacent to CHHR boundaries (see Appendix C). Within five allotments, pastures available for domestic sheep grazing would be directly adjacent to CHHR. All nine allotments in this alternative would be within foray distance of bighorn CHHR. Under this alternative, Rocky Mountain bighorn sheep contacts with a domestic sheep allotment are predicted to be 4.4 contacts per year (Table 3.1-2).

Under Alternative C new terms/condition or management practices implemented under this alternative would be the same as Alternative A along with an additional term and condition specific to Alternative C. Domestic sheep/goat grazing management practices are designed to

minimize the risk of contact to reduce possible disease transmission to Rocky Mountain bighorn sheep. While these management practices are unproven, there are indications that they may reduce risk. Management practices specific to Alternative C are listed below in Table 3.1-4 and in Table 3.1-3.

*Table 3.1-4 Management Practices Specific to Alternative C*

| Management Practice | How Does It Help Reduce Risk? |
|---|---|
| Alternative C Only – Domestic sheep/goat grazing would not be authorized on the Wildhorse Peak Pasture in the American Lake Allotment; Engineer Pasture on the American Flats Allotment; Schafer and North Henson Pastures on the Henson Creek Allotment; or on the Sapinero West Pasture on the Sapinero Mesa Allotment. These pastures or use areas area not fenced areas and the permittee will be responsible for not grazing in these areas. | Prevents domestic sheep grazing in bighorn sheep summer range. |

*Risk to RBS-21*

With the elimination of domestic sheep grazing in pastures that overlap CHHR, the risk of contact with domestic sheep allotments would be reduced compared to Alternative A and B. However, grazing would be adjacent to CHHR, resulting in a risk of contact by foraying bighorn. S33 CHHR would be present at the boundary of domestic sheep grazing on the Henson Creek Allotment to the north and south and at the boundary of the American Flats Allotment on the south. (See Figure 3.1-A and Section 2.3). In addition, S21 CHHR would also be present at the boundary of the American Lake and American Flats Allotments. Habitat in the RBS-21 DAU is abundant and anecdotally in good condition (Diamond and Banulis 2012), and there is a high percentage (>75 percent) of source summer habitat within these three allotments. Under Alternative C and based on modeled allotment contact from foray movement outside of CHHR, the number of potential disease outbreaks over a 50-year period RBS-21 is predicted to range from 3.6 to 88.9 outbreaks (Table 3.1-2).

*Risk to RBS-20 and RBS-22*

The risk of contact with domestic sheep allotments by RBS-20 and RBS-22 Rocky Mountain bighorn sheep is reduced (0.23 to 0.21) compared to Alternative A and B. Under Alternative C and based on predicted contact from foray movement, there are no predicted disease outbreaks for RBS-20 and 0.0 to 21 predicted outbreaks for RBS-22 over a 50-year period. The highest risk for disease outbreak would be in the Rock Creek population (see Table 3.1-2 and Appendix C). This is the same risk range as under Alternatives A and B, but includes a slightly reduced risk for the Bristol Head population as a result of excluding domestic sheep grazing within CHHR in the Henson Creek Allotment.

*Risk to Other RBS DAU Populations*

The elimination of domestic sheep grazing within CHHR in the Henson Creek Allotment would reduce the potential for contact between domestic sheep and RBS-28 populations; the predicted number of potential disease outbreaks over a 50-year period as a result of contact from foray movement would be reduced to between 0.0 and 0.2 outbreaks.

There would be no domestic sheep grazing in the Sapinero Mesa Allotment where there is overlap with CHHR. This would provide some degree of physical separation of domestic sheep or goats from RBS-30 populations; however, the CHHR for S81 and pastures available for grazing in the Sapinero Mesa Allotment share the same boundary, resulting in a risk of contact by foraying bighorn. The S81 herd was most recently estimated to have only 10 Rocky Mountain bighorn sheep and is not prioritized by CPW as a Tier-1 or Tier-2 herd. Under Alternative C and based on predicted contact from foray movement outside of CHHR, the number of potential disease outbreaks over a 50-year period for the bighorn in S81 are predicted to range from 0.6 to 11.7 outbreaks (see Appendix C). This is higher than Alternative A, because the calculations for Alternative A do not include contacts within CHHR (which is outside of the allotment under this alternative).

Excluding domestic sheep grazing in CHHR in the Sapinero Mesa allotment would reduce the potential for contact between domestic sheep and RBS-28 and RBS-25 populations compared to Alternative A and B; the predicted number of potential disease outbreaks over a 50-year period as a result of contact from foray movement would be reduced to between 0.0 and 0.2 outbreaks in S71 (West Needles) and between 0.6 and 13.0 outbreaks in 54 (Dillon Mesa; see Appendix C). Impacts to RBS-27 and RBS-23 populations would be the same as under Alternative A and less than Alternative B due to new terms and conditions being implemented in Alternative A and C.

*Effects Determination*

The BLM sensitive species determination for Rocky Mountain bighorn sheep is that Alternative C *may impact individuals or habitat and may contribute locally towards need for federal listing.* The primary reasons for this determination are close proximity of allotments or pastures to CHHR, potential for Rocky Mountain bighorn sheep forays intersecting allotments or pastures, mountainous terrain that makes monitoring for effective separation extremely difficult, and the risk associated with straying sheep. This alternative would reduce risk of contact between domestic and wild sheep by eliminating direct overlap of permitted pastures with bighorn sheep CHHR, but it would not eliminate the risk associated with potential bighorn sheep foray movements as described above. However, grazing management practices that would be implemented in Alternative C are expected to reduce risk of contact that could result in disease transmission to Rocky Mountain bighorn sheep.

### 3.1.3.4. Direct and Indirect Effects from Alternative D (Domestic Sheep/Goat Grazing Authorized Outside of Overall Bighorn Range)

Under Alternative D, 6 allotments and 34,652 acres would be available for domestic sheep grazing. The overall range of Rocky Mountain bighorn sheep would not be available for domestic sheep grazing under Alternative D; however, there would still be 8,256 acres of source bighorn habitat within allotments that are available for grazing by domestic sheep (Figure 3.1-A).

There would be no overlap of CHHR with any of the allotments; pastures were defined to avoid the overall range of RBS-21 and RBS-80 in this alternative. However, domestic sheep would still need to be trailed through overall bighorn range when traveling between Devils Lake and West Powderhorn Allotments.

This would provide some degree of physical separation of domestic sheep or goats from wild sheep; however, the authorized pastures would be adjacent to overall Rocky Mountain bighorn sheep range. As with other Alternatives, all of the sheep allotments in this alternative would be within foray distance of bighorn CHHR, and there is mapped source Rocky Mountain bighorn sheep habitat in all of the allotments (see Appendix C and Figure 3.1-A). Additionally, trailing through the overall range may be permitted to allow for domestic sheep management (there is grazing on the west side of the Devils Lake Allotment and in the West Powderhorn Allotment, but there is no grazing in the pastures between Devils Lake and West Powderhorn Allotments, domestic sheep would need to be trailed through overall bighorn range).

Under Alternative D new terms/condition or management practices implemented under this alternative would be the same as Alternative A along with an additional term and condition specific to Alternative D. Domestic sheep/goat grazing management practices are designed to minimize the risk of contact to reduce possible disease transmission to Rocky Mountain bighorn sheep. While these management practices are unproven, there are indications that they may reduce risk. Management practices specific to Alternative D are listed below in Table 3.1-5 and in Table 3.1-3.

*Table 3.1-5 Management Practices Specific to Alternative D*

| Management Practice | How Does It Help Reduce Risk? |
|---|---|
| Alternative D Only - Domestic sheep/goat grazing would not be authorized on the Cannibal Calf Plateau in the Devils Lake Allotment; Calf Creek Plateau Pasture in the West Powderhorn Allotment; or on the Sapinero West Pasture on the Sapinero Mesa Allotment. These pastures or use areas area not fenced areas and the permittee will be responsible for not grazing in these areas. | Prevents domestic sheep grazing in bighorn overall range. |

Overall, the allotments available for domestic sheep grazing in the analysis area under Alternative D range from 0.0 to 10.7 miles from Rocky Mountain bighorn sheep CHHR (Table 3.1-2). Rocky Mountain bighorn sheep contacts with a domestic sheep allotment under Alternative D are predicted to be 1.2 contacts per year (Table 3.1-2). As noted above, straying of domestic sheep would add an additional risk of contact between the species. Under Alternative D, there would be greater separation between Tier-1 and Tier-2 herds and domestic sheep grazing than the other alternatives. Tier-1 and Tier-2 populations would be at least 6 to 7 miles from domestic sheep grazing under this alternative. There would be spatial proximity (<1 mile) of CHHR and two domestic sheep allotments; however, the herd occupying CHHR <1 mile from domestic sheep allotments is not a Tier-1 or Tier-2 herd. Risk to specific DAUs and GMUs are described in greater detail below.

*Risk to RBS-21*

There would be no overlap of allotments with bighorn CHHR under Alternative D, and RBS-21, the Tier 1 population, would be approximately 10 miles from the nearest domestic sheep grazing in the Devils Lake Allotment. This is within foray distance of the CHHR, but foray probabilities and contact rates are far lower for this population under this alternative (Appendix C, Table C-8). Under Alternative D, the number of potential disease outbreaks over a 50-year period for RBS-21 is predicted to range from 0.4 to 7.1 outbreaks (Appendix C, Table C-8). This is much lower

than for the other alternatives, but because of abundant connectivity and source habitat (Figure 3.1-A), and because RBS-21 would be within foray distance to domestic sheep grazing, there is still a risk of disease transmission to this Tier-1 population based on the domestic sheep grazing proposed in this alternative.

*Risk to RBS-20 & RBS-22*

Under Alternative D, there would be less risk of contact with domestic sheep allotments for Rocky Mountain bighorn sheep from RBS-20 and RBS-22, which are Tier 1 and Tier 2 populations, respectively. There would be no overlap between CHHR and domestic sheep allotments for any of these populations. Under Alternative D, no potential disease outbreaks are predicted over a 50-year period for RBS-20, and the number of potential disease outbreaks over a 50-year period for RBS-22 is predicted to range from 0.0 to 18.8 outbreaks. For RBS-22, the highest risk for disease outbreak is in the Rock Creek population (Appendix C, Table C-8), which has the greatest risk of contact and disease transmission to any population under this alternative.

*Risk to Other RBS DAU Populations*

Rocky Mountain bighorn sheep contact with domestic sheep allotments based on proximity of CHHR with domestic sheep allotments could potentially occur with the RBS-30 population. This DAU supports the S81 herd, which was most recently estimated to have only 10 Rocky Mountain bighorn sheep and is not designated by CPW as a Tier-1 or Tier-2 herd. The CHHR for S81 and the Sapinero Mesa Allotment would share the same boundary. Under Alternative D, the number of potential disease outbreaks over a 50-year period for the bighorn in S81 are predicted to range from 0.5 to 10.3 outbreaks.

Dillon Mesa (S54) has CHHR that is within 1 mile of domestic sheep grazing; however, Blue Mesa Reservoir may serve as a barrier to easy movement between CHHR and Sapinero Mesa Allotment. Under Alternative D, the number of potential disease outbreaks over a 50-year period for bighorn in S54 are predicted to range from 0.6 to 13.0 outbreaks. Risks for other populations that have a risk of contact with domestic sheep allotments proposed in Alternative D are listed in Appendix C, Table C-8.

*Effects Determination*

The BLM sensitive species determination for Rocky Mountain bighorn sheep is that Alternative D *may impact individuals or habitat and may contribute locally towards need for federal listing.* The primary reason for this determination is that all risks for foraying Rocky Mountain bighorn sheep or straying domestic sheep cannot be completely eliminated even if such risks are relatively low compared to other alternatives. One Rocky Mountain bighorn sheep population is in close proximity to domestic sheep grazing, but this herd was last estimated at 10 animals. Although the large Tier 1 and Tier 2 populations are at least 10 miles from any domestic sheep grazing in this alternative, the potential for Rocky Mountain bighorn sheep forays intersecting a domestic sheep allotment cannot be discounted. Although this alternative eliminates overlap of permitted domestic sheep grazing with known bighorn range, it does not eliminate risk associated with potential bighorn foray movements. However, grazing management practices that would be implemented in Alternative D are expected to reduce risk of contact that could result in disease transmission to Rocky Mountain bighorn sheep.

### 3.1.3.5. Direct and Indirect Effects of Alternative E (No Grazing)

None of the allotments being considered for domestic sheep grazing under this EIS would be available for domestic sheep grazing under the No Grazing Alternative. There would be no source habitat or CHHR available for use by domestic sheep. There would be no opportunity for straying of domestic sheep from these allotments or trailing associated with movement of domestic sheep from or to these allotments. Considering only the direct and indirect effects of this alternative, there would be no risk of Rocky Mountain bighorn sheep intersecting domestic sheep on these allotments.

No summary tables were produced for this alternative, because there is no risk of contact between bighorn and domestic sheep and no risk of disease outbreaks attributable to authorized domestic sheep grazing. Currently, there are BLM domestic sheep grazing allotments within the Gunnison Field Office in the analysis area that are not being considered for permit renewal in this analysis, and those allotments are discussed in the cumulative effects analysis section below.

*Effects Determination*

The BLM sensitive species determination for Rocky Mountain bighorn sheep under 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 these BLM allotments would eliminate the potential for disease outbreak in bighorn herds as a result of contact with domestic sheep under permit with the Gunnison Field Office.

### 3.1.3.6. Cumulative Effects Analysis

Outside of the domestic sheep grazing allotments under consideration in this proposal that are within the analysis area, domestic sheep grazing occurs on other BLM allotments, USFS allotments, and private lands. The analysis area for cumulative effects is defined as within foray distance (35 km) of the 10 bighorn sheep populations that may be affected by domestic sheep grazing considered for authorization in this proposal (Figure 3.1-A). As with the Direct and Indirect Effects, the Cumulative Effects section focuses on the likelihood of disease transmission to bighorn sheep from domestic sheep grazing.

As noted in Section 1.1, there are 11 active BLM allotments that were not considered for permit renewal in this EIS that are authorized for domestic sheep grazing. There are 22,824 acres of mapped bighorn source habitat in these allotments, and three allotments overlap CHHR. There is substantial overlap (>90 percent of the allotment) on one allotment with RBS-21, a Tier 1 population (Table 3.1-6).

*Table 3.1-6: Bighorn Sheep Habitat Summary for BLM Domestic Sheep Allotments That Were Not Considered for Permit Renewal in This EIS*

| Allotment | ADMIN | Acres | BHS Source Habitat (Acres) | BHS CHHR (Acres) | % BHS Source Habitat | % BHS CHHR | Permit Renewal Year |
|---|---|---|---|---|---|---|---|
| Eureka | BLM | 6,345 | 6,078 | 1,472 | 96 | 23 | 2020 |
| Picayne/Mineral Pt. | BLM | 3,083 | 2,786 | 2,947 | 90 | 96 | 2019 |
| Maggie Gulch | BLM | 3,734 | 3,253 | 6 | 87 | 0 | 2023 |
| Elk Creek | BLM | 1,135 | 955 | 0 | 84 | 0 | 2020 |
| Gladstone | BLM | 7,445 | 4,981 | 223 | 67 | 3 | 2020 |
| Deer Park | BLM | 5,518 | 3,432 | 0 | 62 | 0 | 2020 |
| Rambouillet | BLM | 1,277 | 569 | 0 | 45 | 0 | 2018 |
| Huntsman Mesa | BLM | 1,175 | 169 | 0 | 14 | 0 | 2021 |
| Dome Pasture | BLM | 3,133 | 296 | 0 | 9 | 0 | 2019 |
| Cold Springs | BLM | 5,246 | 299 | 0 | 6 | 0 | 2019 |
| Texas Creek | BLM | 1,582 | 6 | 0 | 0 | 0 | 2019 |

Domestic sheep grazing on lands not controlled by the BLM occurs within or in close proximity to bighorn sheep CHHR (Figure 3.1-A). There are 27 USFS allotments within the analysis area with active domestic sheep grazing on three national forests. The allotments considered for the cumulative effects analysis include those in a recent draft decision by the Rio Grande National Forest to create a new domestic sheep allotment, Wishbone, and vacate the Snow Mesa sheep allotment, reducing the risk of contact between domestic sheep and bighorn sheep by providing improved spatial and temporal separation between the two species (USDA RGNF 2017).

*Table 3.1-7: Domestic Sheep Grazing on National Forest Lands within the Analysis Area (within 35 Km of Bighorn Sheep Summer Range)*

| National Forest | # Domestic Sheep Allotments | Estimated Acres Available for Grazing* |
|---|---|---|
| Grand Mesa-Uncompaghre-Gunnison (GMUG) | 11 | 136,485 |
| Rio Grande (RGNF) | 5 | 47,795 |
| San Juan (SJNF) | 12 | 132,133 |

*Does not include some allotments that are authorized for domestic sheep grazing, but are currently vacant or are currently grazed by cattle and are unlikely to be grazed by domestic sheep without completion of a new analysis.

Predicted contacts between bighorn sheep and domestic sheep allotments on other federal allotments within the analysis area substantially add to the risk of contact for several bighorn populations (Table 3.1-8). Domestic sheep grazing allotments being considered in the alternatives in this EIS contribute to the risk of contact, particularly for RBS-21, -22, -25, -28, and -30. Allotments on BLM that are outside the analysis area and USFS allotments that are adjacent to the BLM allotments being considered also contribute substantially to the risk of contact for RBS-21, -22, -27, and -28.

*Table 3.1-8: Modeled Contact Rates between Bighorn Sheep and Domestic Sheep Allotments and Total Cumulative Effects from Federal Domestic Sheep Allotments within 35 Km of Bighorn Sheep CHHR*

| DAU | CPW Class | Predicted Contacts Per Year with Allotments Not Analyzed in the EIS[1] (# Allotments that Overlap CHHR) | | Total Predicted Contacts Per Year Because of Domestic Sheep Grazing on Federal Lands[1] (# Allotments That Overlap CHHR) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | NFS | BLM | A | B | C | D | No Grazing |
| RBS-20 | Tier-1 | 1.19 | 0.20 | 1.42 | 1.39 | 1.39 | 1.39 | 1.39 |
| RBS-21 | Tier-1 | 7.30 (2) | 1.79 (2) | 10.90 (8) | 10.61 (7) | 12.21 (4) | 9.39 (4) | 9.09 (4) |
| RBS-22 | Tier-2 | 1.27 (1) | 0.26 | 2.12 (1) | 2.20 (1) | 2.19 (1) | 2.02 (1) | 1.53 (1) |
| RBS-23 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RBS-25 | - | 0.01 | 0.01 | 0.35 | 0.35 | 0.32 | 0.32 | 0.02 |
| RBS-27 | - | 0.06 | 0.29 | 0.36 | 0.36 | 0.36 | 0.36 | 0.34 |
| RBS-28 | - | 0.69 (3) | 0.47 (1) | 1.31 (4) | 1.23 (4) | 0.08 (4) | 1.16 (4) | 1.16 (4) |
| RBS-30 | - | 0.03 | 0.00 | 0.14 | 0.14 | 0.26 | 0.25 | 0.03 |

[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. If there is overlap, the number of allotments that overlap with CHHR are in the parentheses following the predicted number of contacts. Results are summarized from model output, which does not provide output where there is overlap. Assuming at least one contact per year where there is overlap, the number of allotments that overlap should be considered as adding significant risk to the predicted number of contacts.

Cumulatively, the risk of contact with domestic sheep allotments is greatest for RBS-21 in the Cow Creek and Wetterhorn Peak herds, which are considered a Tier-1 population. Overlap for this population is considerable (Figure 3.1-A), having almost complete overlap with one NFS allotment and one BLM allotment, some overlap on another USFS and another BLM allotment, and overlap with four BLM Alternative A allotments and three Alternative B allotments.

The allotments on the north side of CHHR for RBS-21 are split only by administrative boundaries and are used by the same permittee, whose sheep cross USFS and BLM boundaries. Because the allotments are adjacent, and the domestic sheep are grazed across the boundaries, in some places with no topographic features to determine the location of the BLM-NFS boundary, a decision to implement Alternative D or the No Grazing Alternative would have serious implications for the adjacent USFS allotments. An interagency team did a qualitative risk assessment for the San Juan National Forest allotments in 2009 and recommended that the area around Wildhorse Peak, which is on the BLM-USFS border above American Lake, not be added to the permit because of risk of contact with bighorn sheep. The team also suggested that additional measures be taken to designate the BLM-USFS boundary and prevent domestic sheep grazing on the USFS as much as possible (SJNF Qualitative Risk Assessment 2009).

The risk associated with contact with domestic livestock on private lands is not well understood (Miller et al. 2012), mainly because data on locations of hobby and commercial farms are generally unavailable and would be highly dynamic and difficult to track. A greater percentage

of private land in and near areas used by herds of bighorn sheep was associated with increased risk of pneumonia epizootics by >1.5-fold per additional unit of private land (Sells et al. 2015). Much of the private land in and around the allotments in the higher elevations are small inholdings from historic mining and would be unlikely to have domestic animals grazing.

## 3.2. ISSUE #2. HOW WILL DOMESTIC SHEEP GRAZING AFFECT THREATENED AND ENDANGERED SPECIES?

- Gunnison sage-grouse
- Uncompahgre fritillary butterfly
- Canada lynx
- North American wolverine
- Rollins bladderpod
- Gunnison milkvetch

### 3.2.1. Affected Environment

A list of U.S. Fish and Wildlife Service (USFWS) threatened, endangered, candidate, and proposed wildlife species that have the potential to occur or be impacted by activities in the analysis area was obtained from the USFWS Information, Planning, and Conservation (IPaC) decision support system (USFWS 2018). Five species were determined to have potential to be affected by the proposed grazing: the threatened Canada lynx (*Lynx canadensis*), North American Wolverine (*Gulo gulo*), Gunnison sage-grouse (*Centrocercus minimus*), Uncompaghre fritillary butterfly (*Boloria acrocnema*), and Rollins bladderpod (*Physaria rollinsii*) (Table 3.2-1). Table 3.2-1 includes rationale for elimination of additional species.

*Table 3.2-1: Potential for Wildlife Species to Occur in Each Allotment*

| | Gunnison Sage-grouse | Uncompahgre Fritillary Butterfly | Canada Lynx | North American Wolverine | Rollins Bladderpod | Gunnison Milkvetch |
|---|---|---|---|---|---|---|
| American Lake | Not Present | Not Present | Habitat Present | Not Present | Not Present | Not Present |
| Henson Creek | Not Present | Habitat present, no breeding colonies | Habitat Present | Not Present | Not Present | Not Present |
| American Flats | Not Present | Habitat present, no breeding colonies | Habitat Present | Not Present | Not Present | Not Present |
| West Powderhorn | Not Present | Not Present | Habitat Present | Not Present | Not Present | Not Present |
| Devils Lake | Not Present | Not Present | Habitat Present | Not Present | Not Present | Not Present |
| Cox Park | Not Present | Not Present | Habitat Present | Not Present | Not Present | Not Present |
| Alpine Plateau | Not Present | Not Present | Habitat Present | Not Present | Not Present | Not Present |
| Sapinero Mesa | Present | Not Present | Not Present | Not Present | Present | Present |
| Goose Creek | Present | Not Present | Not Present | Not Present | Present | Present |

Five species of fish, bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), greenback cutthroat trout (*Oncorhynchus clarkii stomias*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) were not analyzed further because they do not occur in the Gunnison Basin, surface receiving waters would not be impacted, and there would be no new water depletions associated with the proposed grazing.

| | Gunnison Sage-grouse | Uncompahgre Fritillary Butterfly | Canada Lynx | North American Wolverine | Rollins Bladderpod | Gunnison Milkvetch |
|---|---|---|---|---|---|---|

Two species of birds were not analyzed further, including (1) the endangered Southwestern willow flycatcher (*Empidonax traillii extimus*) because the species does not occur in the project area; and (2) the threatened Western yellow-billed cuckoo (*Coccyzus americanus*) because although the species is potentially present in the Gunnison Basin, there are no known breeding populations in the analysis area and the only potential habitat that exists is riparian forests along the Gunnison River that is outside of the proposed domestic sheep grazing.

*Gunnison sage-grouse (Centrocercus minimus)*

Over 80 percent of the Sapinero Mesa Allotment and the entire Goose Creek Allotment are considered occupied habitat for the threatened Gunnison sage-grouse. Gunnison sage-grouse habitat in the allotments is classified as Critical Habitat by the U.S. Fish and Wildlife Service (USFWS 2018). There are three active leks and two inactive leks within the Sapinero Mesa Allotment. There are two other active leks and seven inactive additional leks within four miles of the boundaries of the Sapinero Mesa and Goose Creek Allotments. Big sagebrush communities within both of the allotments provide sage-grouse nesting/early brood-rearing habitat. Riparian areas within the allotments provide important sage-grouse brood-rearing habitat.

There is a relatively high spatial distribution of cheatgrass (*Bromus tectorum*) throughout the Sapinero Mesa and Goose Creek Allotments. Sapinero Mesa is an established location for cheatgrass in the Gunnison Basin, and cheatgrass invasion threatens Gunnison sage-grouse habitat in these allotments. Sheep bedding grounds have a particularly high concentration of cheatgrass and are located within sage-grouse productivity areas, where sage-grouse are found during the breeding season. Cheatgrass threatens sage-grouse habitat because it dominates the plant cover and reduces native plant diversity. A healthy, diverse understory of forbs and perennial grasses is a vital component of habitat for the sage-grouse during all stages of nesting and brood-rearing (Connelly et al. 2000; Holloran et al. 2005). Invasive plants also fragment existing habitat and can create long-term changes in ecosystem processes such as fire cycles.

*Uncompahgre fritillary butterfly (Boloria acrocnema)*

The Uncompahgre fritillary butterfly (*Boloria acrocnema*) (UFB) is a species endemic to the San Juan Mountains of southwestern Colorado and is listed as an endangered species. Currently, only 11 known colonies exist. Preferred habitat for the butterfly is moist alpine slopes above 12,000 feet with extensive snow willow (*Salix nivalis*) patches, which serve as the larval food plant (Alexander and Keck 2017). Adult butterflies fly mid-July into August, coincident with domestic sheep grazing in the high elevation domestic sheep allotments. Flight is possible only in warm, sunny weather.

There are no known colonies within the allotments proposed for domestic sheep grazing. There is, however, snow willow habitat within the Henson Creek and American Flats Allotments.

*Canada lynx (Lynx canadensis)*

Specific resources for this analysis include Revised Canada Lynx Conservation Assessment and Strategy (Interagency Lynx Biology Team 2013), Ecology and Conservation of Lynx in the United States (Ruggiero et al. 2000), and the Biological Opinion for the Southern Rockies Lynx

Amendment (USFWS 2008). The distribution and quantity of lynx habitat in the analysis area was estimated using a map of potential lynx habitat by Colorado Parks and Wildlife (SAMS 2012). Detailed habitat descriptions, species distribution, and population trend information can be found in the above publically available reference materials.

Lynx are associated with relatively high elevation, moist conifer forests that experience cold, snowy winters and provide a prey base of snowshoe hare (Interagency Lynx Biology Team 2013). Lynx in the San Juan Mountains primarily use high-elevation spruce-fir and aspen vegetation types as habitat (Theobald and Shenk 2011). In the summer, lynx select younger forests with high horizontal cover, abundant shrubs, small-diameter trees, and dense saplings (Squires et al. 2010).

American Lake, American Flats and Henson Creek mainly occur within the Whitecross Mountain Lynx Analysis Unit (LAU). Forested spruce-fir, aspen stands, and high-elevation willow riparian habitat provide suitable summer foraging for lynx. Among these allotments, Henson Creek has the greatest cover of potential lynx habitat, with approximately 36 percent of the allotment providing cover that could support lynx foraging. American Lake provides some potential lynx habitat, with approximately 17-21 percent of the area providing cover that could support lynx foraging. American Flats provides almost no cover that would support lynx, as much of the allotment is above tree line and is comprised of alpine tundra, fell-fields, scree, and wet meadows.

Sapinero Mesa, Goose Creek, Devils Lake, and West Powderhorn Allotments occur within the Lake Fork of the Gunnison River and/or the Cebolla Creek LAUs. Forested areas in the Devils Lake and West Powderhorn Allotments have a mixed age class of trees and provide suitable habitat for lynx life stages. Willow habitat in riparian areas within this mapped habitat is also potential summer foraging habitat for lynx. Most of the mapped habitat within allotments is in the Devils Lake and West Powderhorn Allotments, and this is less than 10 percent of the mapped lynx habitat in each LAU. Within Sapinero Mesa and Goose Creek, potential lynx habitat is marginal and consists of timber within the steep Lake Fork of the Gunnison River and Cebolla Creek drainages. These allotments have many roads, lack substantial prey species, and have exposed areas on all sides of the drainages, so the presence of lynx is highly unlikely.

Alpine Plateau and Cox Park Allotments occur within the Blue/Pine Creek LAU. Forested spruce-fir, aspen, and some willow riparian areas provide suitable summer foraging habitat for lynx. Alpine Plateau has spruce-fir and aspen cover, with approximately 45 percent of the allotment having cover that can support foraging for lynx. Cox Park also has aspen cover and willow riparian areas with approximately 33 percent of the allotment able to support lynx foraging.

*North American Wolverine (Gulo gulo)*

Wolverines inhabit alpine areas near tree-line basins and cirques and associated subalpine forests (Inman et al. 2012). There is suitable habitat in the high elevation allotments, American Flats, American Lake and Henson Creek that are proposed for domestic sheep grazing. The remote and inaccessible alpine bowls where domestic sheep would occur is the same terrain favored by wolverines for denning, movement, and foraging.

There are numerous historical records of North American wolverines from the Colorado Rocky Mountains; however, the species is believed to have been extirpated from the Southern Rocky Mountains in Colorado, New Mexico, and Wyoming by the early 1900s (Aubrey et al. 2007, cited in 78 FR 7890).

*Gunnison milkvetch (Astragalus anisus) and Rollins bladderpod (Physaria rollinsii)*
Within the project area there are known occurrences of two BLM sensitive plant species: Gunnison milkvetch and Rollin's bladderpod. Gunnison milkvetch and Rollins bladderpod are very small plants that grow close to the ground and are seldom grazed or trampled (Johnston 2002), but trampling may occur with larger numbers of livestock. Gunnison milkvetch is common throughout the Gunnison Basin but Rollin's bladderpod is more restricted to rocky and sunny locations with calcareous soils. The estimated 1.5 acres of Rollin's bladderpod habitat within the Sapinero Mesa and Goose Creek Allotments is 50 percent of the available Rollin's bladderpod habitat within the project area and an estimated 5 percent of the Rollin's bladderpod habitat in the Gunnison Field Office area. The estimated one acre of Gunnison milkvetch habitat in the Sapinero Mesa and Goose Creek Allotments is an estimated 30 percent of the available Gunnison milkvetch habitat in the project area and an estimated 1 percent of the Gunnison milkvetch habitat in the Gunnison Field Office area. No trampling or grazing evidence was seen on Gunnison milkvetch or Rollin's bladderpod the last two grazing seasons (BLM VEG 2015).

## 3.2.2. Environmental Consequences

### 3.2.2.1. Direct and Indirect Effects from All Alternatives

*Gunnison sage-grouse (Centrocercus minimus)*
There would be no difference between alternatives A, B, C, or D in terms of effects to Gunnison sage-grouse or Gunnison sage-grouse habitat. Sage-grouse habitat is only found within the Sapinero Mesa and Goose Creek Allotments. There would be minimal allotment boundary adjustments to Sapinero Mesa and Goose Creek Allotments to exclude bighorn range in Alternatives C and D. Sage-grouse occupied habitat does not occur within the area of adjustment, so there would be no difference in the degree of grazing in sage-grouse habitat in any of the allotments. Under Alternative E, the no grazing alternative, there would be no potential for direct or indirect effects to Gunnison sage-grouse by domestic sheep.

Domestic sheep grazing proposed under Alternatives A, B, C, and D has the potential to impact Gunnison sage-grouse over the long term because of increased invasion of cheatgrass and other noxious weeds. Weeds are identified as a moderate threat to Gunnison sage-grouse by the USFWS (79 FR 69191). As discussed in the Existing Conditions, Sapinero Mesa is already threatened by cheatgrass, and domestic sheep grazing has been a vector for the spread of cheatgrass on Sapinero Mesa. Tier-1 habitat is considered a higher value for conservation, and there are 93 acres of mapped cheatgrass within Tier-1 habitat in the Sapinero Mesa and Goose Creek Allotments. However, the number of acres is likely underestimated, as only prominent patches of cheatgrass in accessible areas have been mapped.

Weed prevention and management efforts are conducted annually by the BLM in Sapinero Mesa and Goose Creek Allotments to counter the spread of cheatgrass. Additionally, domestic sheep

grazing proposed under Alternatives A, B, C, or D has the potential to impact Gunnison sage-grouse over the long term, because there is a potential for a reduction in herbaceous cover due to early spring grazing by domestic sheep. Forb and perennial grass cover is important to Gunnison sage-grouse as hiding cover for chicks, for food, for nesting, and for insects. Retaining an adequate amount of standing herbaceous cover is critical for maintaining sage-grouse habitat. However, the terms and conditions of the proposed grazing require that grazing meet the habitat, management, and monitoring guidelines in the Candidate Conservation Agreement (CCA) and RMP. Meeting the CCA and RMP guidelines should result in moderate grazing, which may have localized impacts on Gunnison sage-grouse but should not result in a downward population trend in the analysis area.

Effects Determination - Invasion by noxious weeds is recognized as a threat to the Gunnison sage-grouse (79 FR 69191), and domestic sheep grazing in the proposed grazing allotments is believed to be contributing to a spread of cheatgrass in the area. A land health assessment for these allotments (BLM 2011) determined that they are not meeting desired conditions for Standard 3 (see Section 3.5 for Land Health Standards), which is specific to plant communities, because of the spread of noxious weeds. Although domestic sheep grazing increases the threat of weeds spreading in Gunnison sage-grouse habitat in the Sapinero Mesa and Goose Creek Allotments, weeds are not currently threatening the Gunnison sage-grouse population in the area. Currently, there is little direct evidence that grazing affects population levels of Gunnison sage-grouse (79 FR 69191). Land Health Assessment for these allotments determined that they are meeting desired conditions for Standard 4, which is specific to special status species (BLM 2011).

Weed control efforts by the BLM are conducted annually on Sapinero Mesa and Goose Creek. Allotments. The USFWS determined that invasive weeds are not a substantial, population-wide threat to Gunnison sage-grouse, due to their limited extent. At this time, they are listed as potential future threats (79 FR 69191).

Under Alternatives A, B, C, and D, domestic sheep grazing on Sapinero Mesa and Goose Creek Allotments would be in compliance with the Gunnison RMP and the CCA guidelines for Gunnison sage-grouse, which would limit direct and indirect effects to habitat quality. The terms and conditions of the proposed grazing in the Sapinero Mesa and Goose Creek Allotments require that grazing meet the habitat, management, and monitoring guidelines in the CCA and RMP. Meeting the CCA and RMP guidelines should result in moderate grazing, which may have localized impacts on Gunnison sage-grouse but should not result in a downward population trend in the analysis area. A Land Health Assessment for these allotments determined that the allotments are meeting desired conditions for Standard 4, which is specific to special status species (BLM 2011).

For the above reasons, the proposed grazing *May Affect, but is Not Likely to Adversely Affect* the Gunnison sage-grouse. Domestic sheep grazing under Alternative E will have *No Effect* on the Gunnison sage-grouse.

*Uncompahgre fritillary butterfly (Boloria acrocnema)*

Alternatives A, B, and C have the greatest potential for direct or indirect effects to Uncompaghre fritillary habitat because there is snow willow habitat present in the American Flats and Henson Creek Allotments that would be available to domestic sheep grazing.

There are no known Uncompaghre fritillary colonies within any of the allotments being considered for domestic sheep grazing, and the greatest threats to the Uncompaghre fritillary are when these activities occur at the colony sites. There is some risk of reduction in habitat quality because of livestock grazing in allotments that have snow willow. Based on preliminary genetic data, there is some indication that the population is functioning as a metapopulation (Monroe et al. 2015), which means there is some dispersal between colonies and it is possible that new sites could be colonized if they have suitable snow willow.

Alternative D and the No Grazing Alternative would be the same in terms of direct or indirect effects to Uncompaghre fritillary, because there is no proposed grazing in any allotment with snow willow cover. Under these alternatives, there will be no potential for direct or indirect effects to Uncompaghre fritillary from domestic sheep grazing.

Effects Determination - For Alternatives A, B and C, the proposed grazing *May Affect, but is Not Likely to Adversely Affect* the Uncompaghre fritillary butterfly. The greatest threats to the Uncompaghre fritillary are when threats occur at the colony sites. Domestic sheep grazing under Alternatives A, B, and C do not occur within Uncompaghre fritillary colonies. Suitable habitat exists within allotments that are within dispersal distance of known colonies, so there is some threat of trampling of snow willow potential habitat, but habitat is not occupied. Domestic sheep grazing under Alternative D and the No Grazing Alternative will have *No Effect* on the Uncompaghre fritillary butterfly.

*Canada lynx (Lynx canadensis)*

The potential impacts of domestic sheep grazing on lynx and/or lynx habitat for Alternatives A, B, C, and D are similar. In terms of effects to lynx and lynx habitat, there is no difference between Alternatives B and C. Alternative A would have the greatest amount of mapped lynx habitat available for domestic sheep grazing compared to the other alternatives (Table 3.2-1), but impacts would be similar. Under these alternatives, there is only a small chance of direct or indirect effects on lynx and/or lynx habitat.

*Table 3.2-2: Lynx Mapped Habitat Affected by Grazing*

| LAU | LAU | Lynx Habitat in LAU | Lynx Habitat w/in Allotments (Acres) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Alt A | | Alt B | | Alt C | | Alt D | |
| | (Acres) | (Acres) | (Acres) | % | (Acres) | % | (Acres) | % | (Acres) | % |
| Whitecross Mountain | 91,496 | 42,493 | 13,852 | 33 | 13,852 | 33 | 13,852 | 33 | 7,090 | 17 |
| Blue/Pine Creek | 66,185 | 31,825 | 3,253 | 10 | 7,505 | 24 | 7,505 | 24 | 7,505 | 24 |
| Lake Fork Gunnison | 120,217 | 49,187 | 4,234 | 9 | 4,234 | 9 | 3,280 | 7 | 3,240 | 7 |
| Cebolla Creek | 155,060 | 65,059 | 4,331 | 7 | 4,331 | 7 | 4,331 | 7 | 4,331 | 7 |

| LAU | LAU (Acres) | Lynx Habitat in LAU (Acres) | Lynx Habitat w/in Allotments (Acres) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Alt A | | Alt B | | Alt C | | Alt D | |
| | | | (Acres) | % | (Acres) | % | (Acres) | % | (Acres) | % |
| Silverton | 69,305 | 14,073 | 90 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

Under Alternatives A, B, C and D, domestic sheep would be grazed in lynx foraging habitat. A high proportion (33-40 percent) of the potential lynx habitat in Whitecross Mountain LAU falls within the allotments proposed in these alternatives. However, except for aspen and high elevation riparian willow stands, on these allotments, domestic sheep tend to be grazed above timberline and in open areas, which do not have the multidimensional forest structure that supports lynx foraging. Between 7 and 10 percent of the habitat in the Blue/Pine Creek, Lake Fork Gunnison, and Cebolla Creek LAUs fall within allotments. Lands grazed by domestic sheep in these allotments can support lynx foraging, as grazing does occur in the forested areas.

The potential impacts of domestic sheep grazing where there is mapped lynx habitat would mostly likely be from (a) disturbance from human activities associated with sheep herding and the associated potential for displacing lynx in the short-term, or (b) reduction in foraging habitat quality because grazing can reduce the ability of aspen stands to regenerate or degrade willow stands.

Under Alternative E, there will be no potential for direct or indirect effects to Canada lynx by domestic sheep grazing.

Effect Determination - Overall, grazing or browsing by domestic livestock is unlikely to reduce lynx habitat or have a substantial effect on lynx (Interagency Lynx Biology Team 2013).

Effect Determination - Domestic sheep grazing under Alternatives A, B, C and D *May Affect, but is Not Likely to Adversely Affect* lynx or lynx habitat. Domestic sheep grazing under Alternative E will have *No Effect* on lynx or lynx habitat.

*North American wolverine (Gulo gulo)*
There is currently no wolverine population in the State of Colorado; therefore, the domestic sheep grazing in the proposed alternatives is not considered a threat to the wolverine.

Effect Determination – No effect. There is currently no wolverine population in the State of Colorado.

*Gunnison milkvetch (Astragalus anisus) and Rollins bladderpod (Physaria rollinsii)*
There would be minimal impact from grazing in Sapinero Mesa and Goose Creek Allotments from Alternatives A, B, C and D on Gunnison milkvetch and Rollins bladderpod, as these two plants are generally avoided by livestock. Indirect effects of sheep grazing on the two plants would be from introduction of cheatgrass into the habitat that could cause plant competition for nutrients and water and result in subsequent loss of plants. Under Alternative E, there would be no potential for direct or indirect effects to Gunnison milkvetch and Rollins bladderpod by domestic sheep grazing, as no grazing would occur on these allotments.

Effect Determination - Domestic sheep grazing under Alternatives A, B, C and D will have *No Effect* on Gunnison milkvetch and Rollins bladderpod.

### 3.2.2.2. Cumulative Effects

*Gunnison sage-grouse (Centrocercus minimus)*
Potential sources of cumulative effects on Gunnison sage-grouse and its habitat in the proposed allotments under all of the grazing alternatives include varying long-term weather patterns, travel and recreation management, and restoration activities on Sapinero Mesa. Domestic sheep grazing has already had an impact on the spread of invasive cheatgrass in sage-grouse habitat in the analysis area, and cheatgrass is predicted to spread more easily with the potential for a longer growing season. Domestic sheep are a vector for spreading cheatgrass seeds both from outside the area and within the allotments. Domestic sheep grazing could exacerbate the threat of cheatgrass invasion to sage-grouse habitat.

As Gunnison becomes more populated and recreation in the area continues to develop, road traffic and human use in the allotment are likely to increase. Nest site selection by Gunnison sage-grouse is shown to be strongly correlated with reduced road disturbance (Aldridge et al. 2012), so road use would have a negative impact on breeding. Increased recreation and human use will also increase the spread of invasive weeds. The proposed grazing would cumulatively increase human use because of the need to keep roads open for sheep herding in the area. Keeping roads open makes them available to sheepherders but also may increase illegal use by the public of officially closed roads.

In 2017, the BLM implemented a large riparian/wetland restoration project designed to restore and enhance resilience of priority brood-rearing habitat using structural improvements to the floodplain (Zeedyk and Clothier 2012). This project is expected to have beneficial effects to sage-grouse habitat and may offset negative cumulative impacts to habitat in the Sapinero Mesa allotment.

*Uncompahgre fritillary butterfly (Boloria acrocnema)*
Potential sources of cumulative effects to Uncompaghre fritillary and its habitat in the proposed allotments include increased recreational traffic (including off-trail use), other domestic sheep or cattle grazing on other BLM and Forest Service allotments, grazing by wild ungulates, and effects of fluctuating weather patterns. Cumulative effects would not be measurably dissimilar between any of the proposed grazing alternatives and the No Grazing Alternative, because no colonies occur within any of the allotments being proposed for grazing.

The greatest threats to the Uncompaghre fritillary are when these activities occur at the colony sites. In recognition of this potential threat of livestock grazing to Uncompaghre fritillary, the Forest Service avoids sheep grazing within Uncompaghre fritillary colonies altogether, and there are no known colonies in any active BLM allotments. Sheep trailing does occur through one Uncompaghre fritillary colony on Forest Service land.

Weather fluctuation is a concern due to relatively limited habitat distribution, high elevation of the species, and phenology shifts that disrupt synchrony in emergence (Roy et al. 2015).

*Canada lynx (Lynx canadensis)*

Potential sources of cumulative effects to Canada lynx and its habitat in the proposed allotments include forest dynamics because of widespread beetle kill and Sudden Aspen Decline (SAD), and travel and recreation management. Overall, cumulative effects are likely to have a greater impact on lynx and lynx habitat than the proposed domestic sheep grazing. Cumulative effects would not be measurably dissimilar between any of the proposed grazing alternatives and the No Grazing Alternative.

Naturally occurring changes to forest stands in southwest Colorado have potential to cause widespread impacts on lynx habitat. A spruce-beetle epidemic in Colorado forests has already affected over 1,715,000 acres in Colorado. This is expanding most rapidly in southern Colorado forests and impacts many thousands of acres of spruce-fir forests throughout southwestern Colorado (USDA 2017). As a result, there are vast areas with dead trees in lynx habitat. John Squires (research wildlife biologist with the USDA Rocky Mountain Research Station) and collaborators investigated how these changes might impact lynx by tracking lynx in areas affected by widespread mortality in southwest Colorado. Preliminary results from the study showed that lynx are preferentially choosing areas that have suffered widespread mortality, likely because of increased shrub and sapling growth after canopy reduction, thus creating habitat for snowshoe hare (Learn 2016). SAD has widespread impacts on aspen stands in southwest Colorado. One of the characteristics of SAD is very low aspen regeneration and stand decadence. As the canopy declines, it dries out, and small-stemmed mesic aspen community shrubs decline. Lower cover of mesic shrubs and aspen saplings because of low regeneration would mean a reduction in habitat for the lynx's main prey, the snowshoe hare.

Travel and recreation management could have impacts on lynx. There is a rapidly expanding population in southwest Colorado and an increasing demand for recreation opportunities by outdoor recreationalists. There is little empirical information regarding the responses by lynx to recreational activities. Preliminary information from ongoing studies suggests that some recreation use may be compatible, but that lynx may avoid some areas with concentrated recreational use (Interagency Lynx Biology Team 2013). Outdoor recreation and the increasing use of roads can reduce habitat connectivity and increase disturbance, and there may be direct habitat clearing and degradation with road and trail development.

*North American Wolverine (Gulo gulo)*

Because there is no wolverine population in the analysis area, there is no potential for effects to wolverine.

*Gunnison milkvetch (Astragalus anisus) and Rollins bladderpod (Physaria rollinsii)*

The area inside all of the allotments in the project is the analysis area for the Cumulative Effects analysis. The alternatives are not expected to create any additional cumulative effects on past, present, or foreseeable actions of ongoing mining, livestock grazing and trailing, elk wallowing, timber harvesting, vehicle use on roads, weather fluctuation, recreational hiking, ATV and jeep use, and hunting in the project area. The authorized grazing and terms and conditions described in Alternative A would ensure that the standards would continue to be achieved or that progress toward achieving the standards would continue.

*Table 3.2-3: Effects table for threatened and endangered species.*

| Alternatives | Gunnison Sage-grouse | Uncompahgre Fritillary Butterfly | Canada Lynx | North American Wolverine | Gunnison Milkvetch | Rollins Bladderpod |
|---|---|---|---|---|---|---|
| Alternative A (Proposed Action) | May Affect, but is Not Likely to Adversely Affect | May Affect, but is Not Likely to Adversely Affect | May Affect, but is Not Likely to Adversely Affect | No Effect | No Effect | No Effect |
| Alternative B (No Action) | May Affect, but is Not Likely to Adversely Affect | May Affect, but is Not Likely to Adversely Affect | May Affect, but is Not Likely to Adversely Affect | No Effect | No Effect | No Effect |
| Alternative C | May Affect, but is Not Likely to Adversely Affect | May Affect, but is Not Likely to Adversely Affect | May Affect, but is Not Likely to Adversely Affect | No Effect | No Effect | No Effect |
| Alternative D | May Affect, but is Not Likely to Adversely Affect | No Effect | May Affect, but is Not Likely to Adversely Affect | No Effect | No Effect | No Effect |
| Alternative E (No Grazing) | No Effect | No Effect | No Effect | No Effect | No Effect | No Effect |

## 3.3. ISSUE #3. HOW WILL DOMESTIC SHEEP GRAZING AFFECT LOCAL AND REGIONAL SOCIOECONOMICS?

### 3.3.1. Affected Environment:

While potentially affected grazing allotments are in Gunnison, Hinsdale, and Ouray Counties, the socioeconomic analysis area also includes Montrose County due to the economic ties between grazing on these allotments and the services and supplies available in Montrose County. Although these allotments account for only a small portion of Gunnison, Hinsdale and Ouray Counties, the natural amenities associated with these areas contribute to the rural aesthetics of the valley and provide important seasonal forage and habitat for wildlife and domestic livestock. The multiple uses for which these public lands are managed highlights the diverse relationships that exist between people and these public lands. Since these relationships extend well beyond allotment boundaries, and are an integral part of the social and economic fabric of surrounding communities, including Montrose County the analysis area for socioeconomics has been expanded to include the entirety of these four counties. Detailed assessments of the social, economic, and cultural conditions in these counties were recently conducted by the U.S. Forest Service as part of the Forest Plan revision process for the Rio Grande and Grand Mesa Uncompahgre and Gunnison National Forests (USFS 2014; USFS 2017). Since historical data and trends in socioeconomic conditions within the project area are discussed in detail in these publicly released reports, this section will focus on current demographic and economic conditions and local industries directly impacted by changes in authorized sheep grazing on federal lands and potential bighorn sheep die-off events resulting from disease transmission through contact with domestic sheep.

*Demographics*

This region of Colorado is rural with a population less racially and ethnically diverse than the state's general population. In 2016, there were approximately 64,000 residents (the majority of which were non-minority whites), approximately 65 percent of which live in Montrose County. The only community in Montrose County in proximity to the potentially affected grazing allotments is the small, unincorporated community of Cimarron. The majority of potentially

affected allotments are located in Hinsdale and Southern Gunnison Counties. Communities with the closest proximity to affected grazing allotments include the towns of Lake City and Ouray, and the unincorporated communities of Cimarron, Henson and Powderhorn.

*Economic Conditions*

As illustrated in Table 3.3-1, economies within the socioeconomic analysis area vary with regard to their size, and the presence and concentration of industrial sectors. The majority of employment opportunities exist within Gunnison and Montrose Counties, which contain larger cities that serve as regional service centers for the more rural communities that surround them. Considerably fewer employment opportunities exist within Hinsdale and Ouray Counties, and the majority of those that do are in service-related sectors that support local tourism and outdoor recreation (e.g., Accommodation and Food Service; Arts, Entertainment, & Recreation; Retail Trade). Employment within the Agriculture, Forestry, Fishing, & Hunting sector comprises 5 percent of total employment within the analysis area, of which almost 75 percent is located within Montrose County.

*Table 3.3-1: 2016 County Employment by Industry*

| **Total Employment (number of jobs)** | **Gunnison** | **Hinsdale** | **Montrose** | **Ouray** |
|---|---|---|---|---|
| | **13,014** | **615** | **22,901** | **3,440** |
| | Jobs by Industrial Sector | | | |
| Agriculture, Forestry, Fishing, & Hunting | 364 | >31 | 1,549 | >137 |
| Mining (including fossil fuels) | 788 | 10 | 273 | 76 |
| Construction | 1,137 | 62 | 1,943 | 343 |
| Manufacturing | 204 | 26 | 1,478 | 124 |
| Utilities | 66 | 5 | 224 | na |
| Wholesale trade | 124 | 5 | 599 | 33 |
| Retail trade | 1,263 | na | 2,702 | 266 |
| Transportation and warehousing | 150 | 5 | 665 | 39 |
| Information | 138 | 11 | 225 | 22 |
| Finance and insurance | 366 | na | 705 | 153 |
| Real estate and rental and leasing | 1,146 | na | 1,486 | 374 |
| Professional and technical services | 793 | 27 | 1,082 | 300 |
| Management of companies and enterprises | 51 | 1 | 164 | 40 |
| Administrative and waste services | 415 | 25 | 854 | 88 |
| Educational services | 164 | 0 | 148 | 36 |
| Health care and social assistance | 452 | na | 2,355 | 126 |
| Arts, entertainment, and recreation | 1,080 | 18 | 404 | 148 |
| Accommodation and food services | 1,703 | 64 | 1,387 | 536 |
| Other services, except public administration | 783 | 30 | 1,465 | 175 |
| Government Sector (federal, state, and local) | 2,168 | 96 | 3,193 | 399 |

*BEA suppresses data to prevent the disclosure of information associated with any individual company. Thus, employment counts by industry may not sum to total jobs in Hinsdale Country (U.S. Department of Commerce 2017).

While employment statistics provide a snapshot of the structure of a regional economy, unemployment rates, labor earnings, household income, and poverty rates can provide greater insight into the material well-being of local households. Since labor earnings often make up only a portion of households' total annual income, looking at average earnings per job alongside

county unemployment rates, median household income, and poverty rates can provide greater insight into local affluence and the role of non-labor income in supporting economic well-being.

*Table 3.3-2: 2016 Unemployment, Average Earnings per Job, Median Household Income, and Poverty Rates*

| Area | Unemployment Rate[1] | Average Earnings per Job[2] | Median Household Income[3] | Poverty Rate[3] |
|---|---|---|---|---|
| Colorado | 3.3 | $ 57,623 | $ 65,718 | 11.0 |
| Gunnison County | 2.3 | $ 36,209 | $ 53,753 | 13.8 |
| Hinsdale County | 2.3 | $ 23,260 | $ 51,717 | 10.0 |
| Montrose County | 4.2 | $ 37,195 | $ 43,285 | 16.4 |
| Ouray County | 3.8 | $ 34,479 | $ 61,676 | 8.8 |

[1] Bureau of Labor Statistics 2017
[2] Bureau of Economic Analysis 2017b
[3] U.S. Census Bureau 2017b

*Potentially Affected Industries*

Although mining was the initial economic engine of southwest Colorado, the economic base of the region has transitioned. Today, its open and undeveloped lands support agriculture and ranching, and its abundance of scenic and recreational resources have given rise to a growing tourism and outdoor recreation industry.

*Agriculture*

Every five years, USDA National Agricultural Statistics Service (NASS) conducts the Census of Agriculture, providing the only source of uniform, comprehensive agricultural data for every county in the nation. The most recent Census of Agriculture reported that farm acreage in these counties ranged from 1 percent in Hinsdale County to 23 percent of total land area in Montrose and Ouray Counties in 2012. In Hinsdale County, where 95 percent of the land area is federal public lands, roughly 10,000 acres (or 1 percent of total land area) are associated with farms (Table 3.3-3). The majority of farms in this region are small, with median farm size ranging from 44 acres in Montrose County to 162 acres in Hinsdale County. Approximately 5 percent of the farms within the four-county analysis area raise sheep and lambs (Table 3.3-3). The majority of these operations, including those currently authorized to graze domestic sheep in the allotments analyzed within this EIS, are based in Montrose County (Table 3.3-3).

*Table 3.3-3: 2012 Farm Statistics*

| 2012 Farm Statistics | Gunnison County | Hinsdale County | Montrose County | Ouray County |
|---|---|---|---|---|
| Approximate Land Area (Acres) | 2,086,164 | 718,815 | 1,435,422 | 347,015 |
| Land in Farms (Acres) | 190,243 | 10,234 | 329,653 | 81,321 |
| % of Total Land Area in Farms | 9% | 1% | 23% | 23% |
| Number of Farms | 244 | 26 | 1,128 | 108 |
| Median Farm Size* | 120 | 162 | 44 | 105 |
| Number of Sheep and Lamb Farms | 6 | 0 | 64 | 0 |
| Sheep and Lamb Inventory | (D) | 0 | 15,433 | 0 |

(USDA NASS 2013)
* Median farm size represents a midpoint in which half of all farms are either larger or smaller
(D) indicates where data have been suppressed to protect the confidentiality of individual operations

The BLM currently administers permits to graze domestic sheep or goats by two operators on 65,710 acres of federal land in 9 allotments. Current permits authorize these operators to utilize up to 2,951 AUMs (combined) during the grazing season, their actual forage use in any given year fluctuates based on uncertainty about weather, forage availability, and adjustments to the annual operating instructions associated with their adjacent Forest Service allotments. At the end of the grazing season, permittees' utilization of authorized forage is determined, and they are billed at the current federal grazing fee rate for the AUMs their livestock consumed. Billed use within these allotments has generally ranged between 75 percent and 100 percent of forage authorized under their grazing permits (Personal Communication – de Valois, 3/2018). Based on the 2018 federal grazing fee of $1.41 per AUM, billed use by these permittees is likely to range between $3,121 and $4,161 in the coming grazing season. Since all of these allotments are within a grazing district, 12.5 percent of these receipts will be distributed back to the State of Colorado, 37.5 percent will be deposited in the U.S. Treasury, and the remaining 50 percent will go into a federal range betterment fund 43 U.S.C. §1751(b)(1) and 43 C.F.R. §4120.3-8.

Based on the latest state-level grazing response coefficients developed by USFS and BLM staff, the direct economic output based upon the value of sheep production supported by federal forage grazing in these allotments is estimated to range between $650,000 and $867,000 on annual average. Although these response coefficients are derived using IMPLAN, the Input-Output model's agricultural sector was adjusted to factor in proprietors and unpaid farm workers based on information from the 2012 Census of Agricultural (see Larson 2012 for general methods for constructing these coefficients). These adjustments provide a more comprehensive accounting of employment on any given ranching operation. When contributions of unpaid family workers are factored in, sheep and lamb production associated with grazing on BLM-administered lands within these 9 allotments is estimated to directly support 18 to 24 jobs on annual average. This standard metric for reporting IMPLAN employment results means that 1 job lasting 12 months = 2 jobs lasting 6 months each = 3 jobs lasting 4 months each. Direct labor earnings associated with these jobs is estimated to range between $61,000 and $82,000 on annual average.

The current utilization of federal forage for domestic sheep on these allotments also has a secondary impact on industries that sell goods and services to ranch operators (indirect), and local businesses where ranching households spend their money (induced). This results in an additional 8–10 jobs and between $307,000 and $409,000 in local wages and income on annual average. Total economic output contributed by the current utilization of these allotments ranges from $1.5 million to $2.0 million on annual average.

Farming and ranching is often less about the money and more about the lifestyle and social fulfillment experienced by families (Rimbey et. al 2007). In rural communities, farming and ranching continues to be an integral part of their social fabric and cultural identity. Although Agriculture, combined with Forestry, Fishing, and Hunting, only accounted for 5 percent of total employment within the analysis area in 2016 (Table 3.3-1), traditional labor statistics do not fully capture the social and economic importance of these industries, because they do not include unpaid family workers. The vast majority of unpaid family workers have historically been in the agricultural sector, where many farming and ranching households earn a significant portion of their income from off-farm sources and reallocate various family members' time to tasks on the farm throughout the year. A previous study estimated that unpaid family labor accounts for

nearly two-thirds of total labor inputs used in the agricultural sector (Kandel 2008). When the contributions of the region's unpaid family workers are considered alongside traditional employment statistics, farming and ranching are revealed to play a significantly larger role in the region's economy, culture, and rural way of life.

*Tourism and Outdoor Recreation*

Tourism and outdoor recreation have become a significant economic driver for the region. Public lands within the project area attract visitors and locals who enjoy hiking, fishing, birding, ATV and UTV use, jeeping, horseback riding, backpacking, snowmobiling, and hunting. Although many of the area's recreational users may enjoy seeing sheep (both domestic and bighorn) while participating in another recreational activity, it is the bighorn sheep that makes this area well known among hunters.

Public hunting of Rocky Mountain bighorn sheep is permitted by CPW in several of the allotments being analyzed (Table 3.3-4).

*Table 3.3-4: Rocky Mountain Bighorn Sheep Hunting License Allocation in 2017*

| GMU | DAU | Ram | Ewe | # Allotments | Allotments within GMU |
|---|---|---|---|---|---|
| S21 | RBS-21 | 7 | 13 | 2 | American Flats, American Lake |
| S33 | RBS-21 | 5 | 6 | 4 | American Flats, American Lake, Henson Creek, |
| Not within bighorn sheep hunting unit, no authorized hunting | | | | 7 | West Powderhorn, Devils Lake, Cox Park, Alpine Plateau, Goose Creek, Sapinero Mesa |

In 2017, CPW received 17,739 applications for bighorn sheep hunting licenses. More than 1,800 of these applicants had applied for 15 or more years without successfully drawing a tag. Of the 296 public draw licenses issued last year (269 resident tags and 27 Nonresident tags), 10 percent were in GMUs within the project area. Tags issued within the project area included 24 resident tags and five Nonresident tags, and accounted for 9 percent of all Colorado resident tags and 19 percent of all Nonresident tags issued in 2017 (CPW 2018). Ram tags in these units are highly sought after; 43 applicants in S21 and 20 applicants in S33 have applied for these licenses for 19 years and still have not been successful in drawing a tag. Bighorn Sheep tags are $251 for Colorado Residents and $2,211 for Non-Residents (CPW 2018).

In addition to the public draw tags, CPW issues two special statewide licenses to the Rocky Mountain Bighorn Society (RMBS) each year in exchange for at least 75 percent of the proceeds from their sale (CPW 2018b). Due to relatively high trophy potential in S21, 33, 81, previous winners of RMBS's statewide tags have chosen to hunt in GMUs within the project area. Over the last three years, RMBS's auction tag has sold for $110,000 on average, while their raffle tag has averaged $97,000 (Personal Communication – Andy Holland, 3/13/2018). On annual average, proceeds generated from the sale of these leases have generated more than $155,000 for ongoing efforts to manage bighorn sheep populations in Colorado. Combined with revenues from the public draw, bighorn sheep hunting in these units may have generated up to $172,000 for wildlife management and conservation across the state.

Some hunters that obtain bighorn sheep tags hire local guides. Guided hunting services in this region generally include lodging or camp accommodations, meals, transportation, scouting, and game retrieval, and run between $5K and $10K for a 7-day hunt. The Gunnison Field Office currently permits three outfitters to provide outfitting/guiding to big game hunters on BLM lands within the project area; however, only one of these permittees has been hired for a guided bighorn sheep hunt in the past three years. While sheep hunters account for a small share of local outfitter/guides' clientele, local spending by hunters traveling to the area for its hunting opportunities help sustain the livelihoods of many local residents. Though the economic value of Rocky Mountain bighorn sheep hunting has not been studied or quantified, the large amounts of time and money hunters dedicate to these recreational experiences reflects the high value people place on Rocky Mountain bighorn sheep and the economic importance of these animals to rural communities.

*Environmental Justice*

Neither individual nor collective minority populations in any of the four counties met the criteria to constitute environmental justice populations. Poverty rates in Montrose County meet the criteria constituting an environmental justice population. However, continued authorized sheep grazing in the nine allotments and potential bighorn sheep die-off events resulting from disease transmission through contact with domestic sheep would not result in disproportionately high and adverse impacts to low-income residents in Montrose County. Section 1.4 Scoping and Public Involvement indicates the opportunities provided to the public, including any environmental justice populations, to participate in this NEPA process

### 3.3.2. Environmental Consequences

#### 3.3.2.1. Direct and Indirect Effects from Alternative A (Proposed Action) Permittee Applications

Under Alternative A, BLM would administer 65,710 federal acres in 9 allotments for domestic sheep/ goat grazing. Approximately 3,270 AUMs would be authorized for use by domestic sheep/ goats during the grazing season. Relative to Alternative B, this alternative would increase authorized domestic sheep use by 319 AUMs. These additional AUMs would be added to the authorized use of an operator who is already permitted to graze multiple bands of sheep in these allotments

Increases in authorized federal forage levels under this alternative are anticipated to translate into increased billed use by the affected permittees. As with any of the alternatives, annual grazing fee receipts would fluctuate from year to year based on how many authorized AUMs permittees utilized in a grazing season, and changes in the federal grazing fee rate. Assuming utilization of forage would continue to range between 75 percent and 100 percent of their authorized AUMs, the proposed increase of 319 AUMs for domestic sheep grazing would be expected to increase annual federal grazing fee receipts by 11 percent. Based on the 2018 federal grazing fee of $1.41, forage available for domestic sheep grazing could generate a total of $3,500 to $4,600 in federal revenues. As discussed in Section 3.3.1, a portion of these monies would be reinvested locally to enhance rangeland health and grazing infrastructure.

The direct economic output based upon the value of sheep and lamb production associated with these 319 additional AUMs would range between $70,000 and $93,000 on annual average. After

adjusting for unpaid family workers, increases in federal forage permitted for domestic sheep grazing under this alternative would support an additional 2 to 3 direct jobs and $6,600 to $8,800 in labor earnings in the local sheep and lamb industry. Increased domestic sheep grazing in these allotments would also stimulate between $ 162,700 and $216,900 in total economic output within the regional economy. Secondary employment and income impacts would be stimulated in industries that sell goods and services to ranch operators, and local businesses where ranching households spend their money, resulting in an additional job and between $39,800and $53,000 in local wages and income on annual average.

While additional terms and conditions may be associated with the permits authorized under this alternative, the compliance with the proposed changes would not be anticipated to have a financial burden on affected permittees. Additional costs may be incurred from closer monitoring of the health of livestock on allotments, more regular movement of bands through an allotment, and from not turning out sick livestock or ewes in estrus during the grazing season. Additional feed and labor costs associated with implementing these Terms and Conditions would be relatively small and unlikely to have a significant impact on individual operating costs or profit margins. Since economic impacts associated with this alternative would be relatively small, implementation of this alternative is not anticipated to increase in-or-out migration by local workers, which could affect the size or demographics of the region's population. Without information on individual permittees' operator practices, costs, and profit margins, BLM cannot determine exactly how changes in the terms and conditions of grazing permits would affect these operators. Because the proposed terms and conditions are not anticipated to drastically change permittees' operating practices, these terms and conditions are anticipated to have minimal costs associated with their implementation.

If bighorn sheep populations in the planning area decline, opportunities to hunt them in these GMUs may become more limited until the populations recover. Without these hunting opportunities, it may become even harder for big game hunters to obtain public draw sheep hunting licenses in Colorado. This would translate into fewer hunting fees collected by CPW and reduced spending by sheep hunters in the rural communities that surround these GMUs. Since spending associated with sheep hunting accounts for only a small portion of recreation-related spending in this region, changes in local economic activity as a result of increases or decreases in the number of sheep hunting tags would be minimal.

#### 3.3.2.2. Direct and Indirect Effects from Alternative B (No Action) Current Condition

This alternative would not have direct or indirect effects on sheep and lamb operations authorized to graze in allotments within the planning area, nor would it affect local employment or income. Direct and indirect effects would be similar to those discussed in the affected environment. Since spending associated with sheep hunting accounts for only a small portion of recreation-related spending in this region, changes in local economic activity as a result of increases or decreases in the number of sheep hunting tags would be minimal.

### 3.3.2.3. Direct and Indirect Effects from Alternative C (Domestic Sheep/Goat Grazing Authorized Outside of Summer Bighorn Habitat)

This alternative would authorize approximately 3,270 AUMs for use by domestic sheep/ goats during the grazing season. The terms and conditions associated with this alternative would be similar to Alternative A, and associated impacts such as local employment or income would be similar to those discussed under Alternative A. Since spending associated with sheep hunting accounts for only a small portion of recreation-related spending in this region, changes in local economic activity as a result of increases or decreases in the number of sheep hunting tags would be minimal.

### 3.3.2.4. Direct and Indirect Effects from Alternative D (Domestic Sheep/Goat Grazing Authorized Outside of Overall Bighorn Habitat)

Under Alternative D, the No Grazing in Overall Bighorn Sheep Range Alternative, 38,042 acres in 6 allotments would be available for domestic sheep grazing. While BLM would still make 1900 AUMs of forage available for use by domestic sheep (1051 fewer AUMs than under Alternative B), forage authorizations would completely eliminate authorized use under two permits (-101 AUMs for one permit and -950 AUMs for another).

Since fewer AUMs would be authorized, grazing fee receipts would be anticipated to decrease relative to those under Alternative B. Even if the permittee who would continue to graze sheep in these allotments utilized 100 percent of forage authorized under the permit, BLM receipts from sheep grazing in these allotments would decrease by 36 percent (assuming a constant federal grazing rate). Federal grazing fees could decrease between $1,100 and $1,500 under Alternative D. This means that fewer dollars would be reinvested locally to enhance rangeland health, wildlife habitat, and livestock grazing infrastructure.

Proposed changes in federal forage authorizations under this alternative would negatively impact the production capabilities of operators as well as regional economic conditions. The reduction of 1,051 permitted AUMs would decrease direct economic output between $232,000 and $309,000 on annual average as compared to alternative B. After adjusting for unpaid family workers, decreases in federal forage permitted for domestic sheep grazing under this alternative would support 7 to 9 fewer direct jobs and $22,000 to $29,000 less in labor earnings in the local sheep and lamb industry. Decreased domestic sheep grazing in these allotments would also reduce total economic output between $536,000 and $715,000 on annual average when compared to Alternative B. Impacts to economic activity would include the loss of 9-12 total jobs and between $131,000 and $175,000 in total labor income on annual average.

Depending on these operator’s individual profit margins, and whether they have access to forage in other allotments, these operators may be able to mitigate forage losses in these allotments under this alternative. Operators with access to other federal forage in these allotments may be able to shift their grazing to other allotments not in the planning area, or lease private pastures to graze their animals until they can move them into other allotments where their authorizations for federal forage have not changed. These changes could increase operating costs from having to truck animals farther or more frequently, and increase feed costs associated with private grazing leases. If operators are unable to mitigate forage losses under this alternative, operators may have to reassess the size and viability of their livestock operations. If operators are unable to maintain

viable operations and close their operations altogether, adverse economic impacts under this alternative could be even greater than those discussed above.

Impacts associated with the terms and conditions associated with this alternative would be similar to Alternative A.

Since spending associated with sheep hunting accounts for only a small portion of recreation-related spending in this region, changes in local economic activity as a result of increases or decreases in the number of sheep hunting tags would be minimal.

#### 3.3.2.5. Direct and Indirect Effects from Alternative E (No Grazing)

Under this alternative, none of the nine allotments would be open for domestic sheep grazing, and BLM would authorize no AUMs for domestic sheep within the planning area. As a result, BLM would not collect any grazing fee receipts from domestic sheep grazing in these allotments, and money reinvested locally for rangeland health, wildlife habitat, and livestock grazing infrastructure would slightly decrease. Federal grazing fees under Alternative E could decrease between $3,000 and $4,000 lower than Alternative B. The operators currently authorized to graze sheep in these allotments would have to reassess the size and viability of their livestock operations without access to federal forage in these allotments. Depending on their access to federal forage in other areas, operators may be able to shift their grazing to other federal allotments not in the planning area, or lease private pastures for grazing until they can move their sheep into other allotments where their authorizations for forage have not changed. These changes could increase operating costs from having to truck animals farther or more frequently, and increased feed costs associated with private grazing leases.

If operators are unable to mitigate the federal forage losses proposed under this alternative, the direct economic output based upon the value of regional sheep and lamb production may fall between $650,000 and $867,000 on annual average. After adjusting for unpaid family workers, decreases in federal forage permitted for domestic sheep grazing under this alternative would support 18 to 24 fewer direct jobs and $61,000 to $82,000 less in direct labor earnings in the local sheep and lamb industry when compared to Alternative B. Decreased domestic sheep grazing in these allotments would also reduce economic activity in other sectors of the regional economy including a loss of between 26 to 35 total jobs and between $368,000 and $491,000 less in total labor income when compared to Alternative B. If operators are unable to maintain viable operations and close their operations altogether, adverse economic impacts under this alternative could be even greater than those discussed above.

By reducing the risk of disease transmission and mortality events, this alternative could improve bighorn sheep recreational opportunities in the area. In the future, healthy and abundant bighorn sheep herds may enhance and/or increase opportunities for bighorn sheep watching and hunting in the region. If populations decline elsewhere, this area could potentially attract additional visitors who are interested in viewing and hunting Rocky Mountain bighorn sheep. Additional recreation-related spending in the surrounding rural communities would result from increased bighorn sheep-related visitation. This could stimulate additional economic opportunities for local residents in service industries that cater to tourists and out-of-town visitors.

### 3.3.2.6. Cumulative Effects

Domestic sheep grazing occurs on 11 other BLM allotments and 27 USFS allotments adjacent to the allotments analyzed in this EIS. All of these allotments are within foray distance of Rocky Mountain bighorn sheep, so the risk of disease transmission between domestic and bighorn sheep under these alternatives becomes even greater when they are considered alongside the risks associated with the other federal allotments. Even under Alternative E, the No Grazing alternative, high value populations of bighorn sheep would still be at risk of disease transmission and mortality events. Thus, bighorn sheep populations may trend downwards, putting future opportunities for bighorn hunting in this area at risk. While the local economic impacts of reducing or eliminating bighorn sheep hunting in this area may be relatively small, the loss of these opportunities would adversely affect resident and non-resident big game hunters who devote considerable time, effort, and money to trying to obtain bighorn hunting licenses.

Changes in authorized forage under these alternatives could have cumulative impacts on permittees if forage authorizations associated with their other federal allotments change in the future. As grazing permits for the adjacent allotments come up for review, BLM and USFS staff will have to assess the risks of contact and disease transmission between domestic and bighorn sheep during grazing seasons. If authorizations are reduced under other management decisions, forage authorized under Alternatives A, B and C could partially offset losses in other federal allotments, potentially enabling operators to incur forage losses in other allotments without significantly altering their production practices. Cumulative forage reductions could occur under Alternatives D and E if forage authorizations on adjacent allotments are reduced in future management decisions. Significant reductions in AUMs across permitted allotments may make it difficult to shift use within allotments without reducing permittees' reliance on federal forage to meet the feed requirements of their herds. If operators have to start relying on a larger share of private forage or supplemental grains to meet feed requirements, operators may have to reassess the viability of their operations. If these operators' profit margins are unable to absorb increased feed costs, they may have to cease production and either shift their farm resources to the production of other agricultural products or stop production altogether. If operators are unable to continue making a living off their lands, this may make it difficult for ranching households to maintain their rural way of life, and increase the likelihood of agricultural lands being sold.

## 3.4. ISSUE #4. WHAT EFFECT WOULD THE PROPOSED ACTION AND ALTERNATIVES HAVE ON CULTURAL RESOURCES AND NATIVE AMERICAN RELIGIOUS CONCERNS?

### 3.4.1. Affected Environment

The analysis area for this study is the 9 allotments included in this EIS (65,710 public land acres). A literature search of the Colorado Office of Archaeology and Historic Preservation COMPASS database, the BLM Gunnison Field Office cultural resource files and GIS database, and the General Land Office Records database revealed that occupation and use of the analysis area began approximately 10,500 years ago and continues to the present. Prehistoric site types dating from the Paleoindian, Archaic, and into the Protohistoric time periods include lithic scatters and open campsites. Activities occurring during these time periods are mainly associated with lithic procurement and tool making, and food gathering and processing. Historic site types include those related to the transportation, mining, logging, agricultural, and ranching

industries. A large part of the analysis area (20,251 acres, three allotments) is located in the Alpine Loop region of the San Juan Mountains west of Lake City. This area played a significant role in the precious metal mining industry of Colorado, and 71 percent of all historic sites in the analysis area occur in this region.

Fifty-eight archaeological surveys have been completed in the analysis area over the past forty years, resulting in 4,304 acres being intensively inventoried. Approximately 500 acres of new inventory were completed specifically for this undertaking. Within these acres, archaeologists documented and evaluated 159 cultural resources for listing on the National Register of Historic Places (NRHP). Of these, 57 percent are historic sites, and the remaining are prehistoric. Thirty-nine sites are recommended as eligible for listing on the NRHP, 10 fall within the Needs Data category and are considered potentially eligible, and five sites are listed on the NRHP.

In a separate BLM action completed in 2013, the trailing routes used to access the allotments were analyzed (DOI-BLM-CO-S060-2013-0001-EA). The analysis area consisted of the trail and a 50-foot buffer on either side of its centerline. An additional 300 acres (25 miles) were analyzed for the presence of cultural resources along the trailing routes. Seven archaeological inventories were completed in the trailing analysis area, resulting in the documentation of 12 cultural resources. Four of these are related to the historic use of the trailing routes themselves, and the remaining are prehistoric, isolated resources.

*Existing Conditions*

Cultural resources within the analysis area have impacts from 1) mining (including reclamation projects), 2) livestock grazing, and 3) recreation activities. In particular, the historic mining sites in the Alpine Loop region are being impacted by heavy visitation and recreation use. Heritage tourism along the Alpine Loop Scenic Byway occurs during the summer and fall months when the roads are cleared of snow. The resources are most vulnerable during spring and early summer, when the structures are wet and heavy from snowfall and are less stable than when they are dry. Deterioration of the sites is a natural process, but during the early season when the sites are particularly vulnerable, visitation can lead to accelerated deterioration. Twenty-six percent of sites in the Alpine Loop region area are either heavily damaged or entirely destroyed.

Outside of the Alpine Loop area, the condition of cultural resources within the analysis area ranges from undisturbed to heavily disturbed. Sites located in remote areas are minimally disturbed, with impacts caused by natural erosion processes and livestock trailing. Impacts on resources increase the nearer their location to access roads. Sites within 200m of roads are receiving the heaviest impacts caused by off-road driving, road maintenance activities, illegal dumping, and camping.

*Applicable Laws*

Range permit renewals are federal undertakings that fall under Section 106 of the National Historic Preservation Act. The 2014 Colorado Protocol between the Colorado BLM and Colorado State Historic Preservation Office provides guidance in meeting BLM's responsibilities under the National Historic Preservation Act (NHPA). Additional guidance specific to the effects of rangeland management activities on historic properties is present in BLM guidance (IM-WO-99-039 and IM-CO-2002-029).

*Native American Religious Concerns*

Native American religious concerns are legislatively considered under the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act, and Executive Order 13007 (Indian Sacred Sites). These require, in concert with other provisions such as those found in the NHPA and Archaeological Resources Protection Act (ARPA), that the federal government carefully and proactively take into consideration traditional and religious Native American culture to ensure that access to sacred sites, the treatment of human remains, the possession of sacred items, the conduct of traditional religious practices, and the preservation of important cultural properties are considered and not unduly infringed upon. Concerns may be directly related to historic properties and archaeological resources, but elements of the landscape without archaeological remains may also be involved. Identification of these concerns is normally completed during land use planning efforts, reference to existing studies, or via direct consultation. The Ute Indian Tribe of the Ouray and Uintah Reservation, the Southern Ute Indian Tribe, and the Ute Mountain Ute Tribe were notified of the undertaking via written and face-to-face consultation efforts held between October 2014 and April 2016 (see Chapter 4 for more details). The BLM Gunnison Field Office did not receive any comments or concerns from the Tribes. As a result, there are currently no known areas of Native American Religious Concern located within these allotments. If, during the term of the grazing permit, cultural sites or landscapes that are being impacted by livestock grazing and that may have special meaning to the Tribes are discovered, tribal consultation will resume regarding these sites.

## 3.4.2. Environmental Consequences

### 3.4.2.1. Direct and Indirect Effects Common to the Alternative A (Proposed Action), Alternative B (No Action), and Alternatives C and D

The direct impacts that occur where domestic sheep concentrate and bed include trampling, chiseling, and churning of site soils, cultural features, and cultural artifacts. Artifact breakage and impacts from leaning and rubbing against historic structures, exposed cultural features, and rock art can occur. Cultural resources also have the potential to be directly affected and impacted by domestic sheep grazing improvements and activities, such as pipeline construction, water trough placement, location of salt/mineral blocks, and sheepherder camps. Indirect impacts include accelerated soil erosion, which causes deflation of buried features and artifacts, artifact displacement, gullying, and the increased potential for unlawful collection and vandalism from possible upgrades to roads and trails that access the allotments.

The Area of Potential Effects (APE) as defined in 36 CFR 800.16(d) is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. The APE for the proposed action and alternatives comprises those allotments that would be actively grazed. Table 2.4-1 offers a comparison of the APE and other key metrics for Alternatives A, B, C and D.

*Table 2.4-1. Impacts to Cultural Resources for All Alternatives except the No Grazing Alternative*

| | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Area of Potential Effect (acres) | 65,710 acres | 65,710 acres | 56,879 acres | 34,652 acres |
| Area surveyed (acres [% APE]) | 4,034 (6%) | 4,034 (6%) | 4,034 (7%) | 3,816 (11%) |
| Documented sites | 159: 49 eligible or potentially eligible for listing on the NRHP, 5 listed on the NRHP. | Same as Alternative A | Same as Alternative A | 92: 21 eligible or potentially eligible for listing on the NRHP. |
| Historic properties in areas where sheep concentrate or trail | 2 known historic properties, 1 prehistoric lithic scatter impacted by trampling and bedding; and a segment of the Ridge Stock Driveway being impacted by trailing and trampling. | Same as Alternative A | 1 known prehistoric lithic scatter impacted by trampling and bedding. | Same as Alternative C |

### 3.4.2.2. Direct and Indirect Effects from the Proposed Action (Permittee Applications)

Under Alternative A, the potential for domestic sheep grazing to have direct and indirect impacts to eligible, potentially eligible, and listed sites will increase over Alternative B. Alternative A would increase the AUMs available to grazing by 10 percent over Alternative B. As noted in Table 2.4-1, previous surveys have occurred in 5 percent of the APE, resulting in the documentation of 159 sites, of which 49 are eligible or potentially eligible for listing on the NRHP and five are listed on the NRHP. Two known historic properties are located in areas where sheep concentrate and would be monitored throughout the duration of the permit.

Alternative A would include additional terms and conditions to protect historic structures and grazing management practices that will benefit cultural resources. This includes minimizing grazing impacts along streams, springs, and lakes where archaeological sites are often found, and excludes camping and campfires within 150 feet of historic structures within the Alpine Triangle Recreation Area and 50 feet in all other areas (see Appendix B, Table B-1).

### 3.4.2.3. Direct and Indirect Effects from Alternative B (No Action)

Under the Alternative B, the potential for domestic sheep grazing to have direct and indirect impacts to eligible and potentially eligible sites would be the same as under existing conditions. The acreage permitted for grazing would remain the same as Alternative A but the AUMs would decrease by 10 percent, which would slightly reduce impacts to eligible, potentially eligible and listed sites. However, existing terms and conditions would be applied to the permits, which do not include additional measures for the protection of historic structures within the Alpine Triangle Recreation Area, or measures to minimize grazing impacts along streams, springs, and lakes where archaeological sites are often found. As a result, the potential for damage or loss of historic structures within the Alpine Triangle Recreation Area and sites located near streams, springs, and lakes may still be greater than under the Alternative A.

#### 3.4.2.4. Direct and Indirect Effects from Alternative C (Domestic Sheep Grazing Authorized Outside of Summer Bighorn Range)

Under Alternative C, the potential for domestic sheep grazing to have direct and indirect impacts on eligible, potentially eligible, and listed sites would decrease compared to both Alternatives A and B. There would be 13 percent fewer acres authorized for grazing than under Alternatives A and B. The APE would include 19 (12 percent) fewer documented sites. A 10 percent increase in AUMs over Alternative B would be permitted under Alternative C, which would increase the impacts to eligible, potentially eligible, and listed sites. Alternative C would also have the same additional measures as Alternative A to protect historic structures and grazing management practices. This would further benefit cultural resources compared to the Alternative B.

#### 3.4.2.5. Direct and Indirect Effects from Alternative D (Domestic Sheep Grazing Authorized Outside of Overall Bighorn Range)

Under Alternative D, the potential for domestic sheep grazing to have direct and indirect impacts to eligible, potentially eligible, and listed sites would decrease compared to both the Proposed Action and No Action. There would be 52 percent fewer acres authorized for grazing than under Alternative A and B, and the APE would include 67 (57 percent) fewer documented sites. Alternative D would also use the same additional measures as Alternative A to protect historic structures and grazing management practices. This would further benefit cultural resources compared to the No Action.

#### 3.4.2.6. Direct and Indirect Effects from Alternative E (No Livestock Grazing)

Under Alternative E, all cultural sites regardless of eligibility would not be directly or indirectly affected by domestic sheep grazing, because no grazing would be permitted.

#### 3.4.2.7. Protective and Mitigation Measures Applicable to all Alternatives

Monitoring for grazing impacts is recommended for historic properties being affected by this action. If newly discovered historic properties are identified as a result of future surveys, the BLM will evaluate the sites for impacts caused by domestic sheep grazing. If it is determined that grazing activities are adversely impacting historic properties, mitigation options will be implemented in consultation with the Colorado SHPO and Native American Tribes.

#### 3.4.2.8. Cumulative Effects

The Cumulative Effects Study Area is the nine allotments included in this EIS. Cumulative impacts to cultural resources within the analysis area occur as a result of past, present, and future undertakings and activities.

Past and present actions and activities that have affected cultural resources in the study area include domestic sheep grazing and trailing, the implementation of grazing improvements, mining and mining reclamation projects, personal firewood gathering (potentially removing culturally scarred trees and aspen trees with inscriptions), recreation and heritage tourism, vegetation treatments, and unregulated activities such as off-road driving, illegal dumping, and artifact collection. Many of these activities occurred prior to regulations requiring the inventory and protection of cultural resources, and therefore impacts to cultural resources continued unchecked until the implementation of the National Historic Preservation Act in 1966. However, the unregulated activities continue to occur and affect cultural resources.

Under Alternatives A, C and D, the cumulative effects of continued grazing combined with a continuation of the past and present activities described above may cause concentrated ground disturbance and cause cumulative, long term, irreversible, adverse effects to known and unrecorded historic properties. However, the added terms and conditions, and Gunnison Sage Grouse Best Management Practices and Adaptive Management could help minimize the degree of cumulative effects by grazing at a lower intensity. The proposed methods for improving habitat could increase soil stability, thereby decreasing potential effects to cultural resources.

Under the Alternative B, continued grazing as previously permitted on the nine allotments combined with a continuation of the past and present activities described above may cause concentrated ground disturbance from domestic sheep and cause cumulative, long term, irreversible, adverse effects to known and unrecorded historic properties.

Alternative E would result in no direct or indirect impacts and would, by definition, not result in any cumulative effects.

## 3.5. ISSUE #5. WHAT EFFECT WOULD THE PROPOSED ACTION AND ALTERNATIVES HAVE ON THE ABILITY OF THE PUBLIC LANDS WITHIN THE ALLOTMENTS TO MEET OR BEGIN MAKING PROGRESS TOWARDS MEETING THE STANDARDS FOR PUBLIC LAND HEALTH IN COLORADO?

The Gunnison Field Office Resource Management Plan (1993) follows Colorado Standards for Public Land Health, which includes Standard 1 (upland soils), Standard 2 (riparian & wetlands), Standard 3 (plant & animal communities), Standard 4 (threatened, endangered, and sensitive species), and Standard 5 (water quality).

- Upland soils - Land Health Standard 1

Indicator 1: Are Land Health Standards being met?
Indicator 2: If not, to what degree and why? (Acres of bare ground; acres of erosion)

- Riparian systems Land Health Standard 2

Indicator 1: Are Land Health Standards being met?
Indicator 2: If not, to what degree and why? (Acres or numbers of hydrologically modified wetlands/fens; Proper Functioning Condition (PFC) assessment for other riparian areas)

- Plant communities - Part of Land Health Standard 3 (animal communities are addressed in Issues 1 and 2)

Indicator 1: Are Land Health Standards being met?
Indicator 2: If not, to what degree and why? (Percent of foliar cover of vegetation versus bare soil; presence (acres) of noxious weeds; insect and/or disease mortality in forested ecosystems.

- Water quality - Land Health Standard 5

Indicator 1: Are Land Health Standards being met?
Indicator 2: If not, to what degree and why? (Streams – presence of heavy metals and sediment; springs – algae blooms, sedimentation, and low PH)

For the purposes of this EIS, impacts associated with Standard 3, animal communities, is addressed in Section 3.1 (Issue 1) and impacts associated with Standard 4, (threatened, endangered and sensitive species) is addressed in Section 3.2 (Issue 2).

### 3.5.1. Affected Environment

Land Health Determinations were completed on all nine allotments in 2012. Areas can fail to meet Land Health Standards due to a variety of contributing factors, including excessive or inappropriate current or historic livestock grazing, excessive wildlife use, poorly designed roads and trails, human disturbance, habitat conversion, exotic plants, insect infestations, abnormal fire, and abnormal weather patterns.

Table 3.5-1 summarizes the results of the completed Land Health Determinations and the contributing factors that were identified in the Land Health Determinations that have resulted in portions of the analysis area not meeting land health standards. Additional field data were collected in the analysis area in the years following these land health determinations and were used to further inform this analysis (BLM SWA 2015a; BLM VEG 2015a). Table 3.5-2 summarizes additional areas that were found to be altered from natural conditions.

*Table 3.5-1: Land Health Determinations (LHD)*

| Allotment Date LHD Completed | | Standard 1. Upland Soils | Standard 2. Riparian and Wetlands | Standard 3. Plant and Animal Communities | Standard 4. Threatened, Endangered, & Sensitive Spp | Standard 5. Water Quality | Contributing Factors |
|---|---|---|---|---|---|---|---|
| American Lake 4/2/12 | | Achieving | Achieving | Achieving | Achieving | Moving Towards Achieving | Standard #5 – Henson Creek due to mineralization in the water from mining and due to channel incisement/sediment from unknown factors. |
| Henson Creek 4/2/12 | | Achieving | Moving Towards Achieving | Achieving | Achieving | Moving Towards Achieving | Standard #2 – Areas of Palmetto Gulch and Horseshoe Gulch due to altered streambank vegetation from historic mining, roads, sheep trailing and avalanches. Standard #5 – Henson Creek due to elevated levels of minerals in the water from mining and due to channel incisement/sediment from unknown factors. |
| American Flats 4/2/12 | | Achieving | Achieving | Moving Towards Achieving | Achieving | Moving Towards Achieving | Standard #2 – Portions of the Horsethief Recreation Trail due to soil loss from trail braiding in wetland soils. Standard #5 – Henson Creek due to mineralization in the water from mining and due to channel incisement/sediment from unknown factors. |
| West Powderhorn 4/2/12 | | Achieving | Achieving | Achieving | Achieving | Achieving | meeting all standards |
| Devils Lake 4/2/12 | | Achieving | Achieving | Achieving | Achieving | Achieving | meeting all standards |
| Cox Park 4/2/12 | | Achieving | Achieving | Achieving | Achieving | Achieving | meeting all standards |
| Alpine Plateau 4/2/12 | | Achieving | Not Achieving | Achieving | Achieving | Achieving | Standard #2 – East Fork Middle Blue Creek due to hydrologic modification and interrupted spring runoff due to a livestock reservoir in the creek and a road. |
| Sapinero Mesa 4/2/12 | | Moving Towards Achieving | Not Achieving | Moving Towards Achieving | Moving Towards Achieving | Achieving | Standard #1 – Due to reduced plant diversity and increased bare ground on some upland communities from unidentified factors. Standard #2 – Due to actively moving headcuts in some riparian areas as a result of heavy historic livestock grazing and water development, and due to non-native vegetation encroachment (musk thistle, |

| Allotment Date LHD Completed | | Standard 1. Upland Soils | Standard 2. Riparian and Wetlands | Standard 3. Plant and Animal Communities | Standard 4. Threatened, Endangered, & Sensitive Spp | Standard 5. Water Quality | Contributing Factors |
|---|---|---|---|---|---|---|---|
| | | | | | | | black henbane, and Canada thistle). Standard #3 – Due to reduction of native vegetation due to encroachment by non-native vegetation, particularly cheatgrass on sheep bed grounds. Standard #4 – Due to reduction of native vegetation due to encroachment by non-native vegetation (cheatgrass). |
| Goose Creek 4/2/12 | | Moving Towards Achieving | Not Achieving | Moving Towards Achieving | Moving Towards Achieving | Achieving | Standard #1 – Due to reduced plant diversity and increased bare ground on some upland communities from unidentified factors. Standard #2 – Due to non-native vegetation encroachment (musk thistle, black henbane, and Canada thistle) in riparian areas. Standard #3 – Due to reduction of native vegetation due to encroachment by non-native vegetation, particularly cheatgrass on sheep bed grounds. Standard #4 – Due to reduction of native vegetation due to encroachment by non-native vegetation (cheatgrass). |

*Table 3.5-2: Areas Altered from Natural Conditions*

| Allotment | Upland Soils Acres (Total Acres Examined) | Riparian and Wetlands | | Plant Communities (Acres) | Water Quality | |
|---|---|---|---|---|---|---|
| | | Acres of Fens (Total Acres in Allotment) (Bultema 2015) | Wetlands (Number) | | | |
| American Lake | N | 5.9 (13.5) | - | 392 | | Soils – 0.2 acres along the Horsethief Trail are impacted by livestock and human trailing<br>Riparian/Wetland – 5.9 acres of fens (44%) are impacted by erosion and trampling<br>Upland Plant Communities – 372 acres of conifer and 20 acres of aspen communities are impacted by insects and Sudden Aspen Decline (SAD) |
| Henson Creek | 0 (600) | 10.7 (14.8) | - | 970 | | Riparian/Wetland – 10.7 acres of fens (72%) are impacted by mining deposition, trampling and erosion. |

| Allotment | Upland Soils Acres (Total Acres Examined) | Riparian and Wetlands | | Plant Communities (Acres) | Water Quality | |
|---|---|---|---|---|---|---|
| | | Acres of Fens (Total Acres in Allotment) (Bultema 2015) | Wetlands (Number) | | | |
| | | | | | | Upland Plant Communities – 786 acres of conifer and 184 acres of aspen communities are impacted by insects and SAD<br>Water Quality – Palmetto Gulch due to elevated levels of metals in the water from mining |
| American Flats | 0.3 (405) | 15.1 (29.6) | - | 0 | | Soils - 0.3 acres along the Horsethief Trail are impacted by livestock and human trailing<br>Riparian/Wetland – 15.1 acres of fens along the Horsethief Trail are impacted by grazing and upslope trail use.<br>Water Quality – Palmetto Gulch due to elevated levels of metals in the water from mining |
| West Powderhorn | 0 (0) | - | - | 947 | | Upland Plant Communities – 843 acres of conifer and 104 acres of aspen communities are impacted by insects and SAD |
| Devils Lake | 0 (0) | 4.4 (10.8) | - | 937 | | Riparian/Wetland – 4.4 acres of fens (41%) are impacted by trampling<br>Upland Plant Communities – 890 acres of conifer and 47 acres of aspen communities are impacted by insects and SAD |
| Cox Park | 0 (200) | - | - | - | | N/A |
| Alpine Plateau | 0 (200) | 0.9 (0.9) | 3 HM | 0.4 | | Riparian/Wetland – 0.9 acres of fens (100%) are impacted by trampling and 3 wetlands are hydrologically modified<br>Upland Plant Communities – 0.4 acres of yellow toadflax, musk thistle, and Canada thistle |
| Sapinero Mesa | 1500 (2200) | - | 20 FAR | 232.5 est | 3 springs | Soils - 1,500 acres are impacted by low ground cover, erosion, and bare ground from unknown factors<br>Riparian/Wetland – 20 of 23 wetlands monitored are Functional at Risk due to erosion<br>Upland Plant Communities – 94 acres of aspen communities are impacted by SAD and 138.5 acres are dominated by cheatgrass and other non-native species<br>Water Quality – 3 springs are impacted by elevated levels of algae |
| Goose Creek | 100 (100) | - | 1 FAR | 19.3 | | Soils - 100 acres are impacted by low ground cover from unknown factors<br>Riparian/Wetland – 1 wetland is Functional at Risk for unknown factors<br>Upland Plant Communities – 3 acres of aspen communities are impacted by SAD and 16.3 acres are dominated by noxious weeds |

| Allotment | Upland Soils Acres (Total Acres Examined) | Riparian and Wetlands | | Plant Communities (Acres) | Water Quality | |
|---|---|---|---|---|---|---|
| | | Acres of Fens (Total Acres in Allotment) (Bultema 2015) | Wetlands (Number) | | | |
| Total | 1,600.5 (4,615) | 37 (69.6) | 3 HM 21 FAR | 3,498.2 | | |

HM= hydrologically modified wetlands (USFWS 1979)
FAR = wetlands that are Functional at Risk (BLM VEG 2015a and b)

### 3.5.1.1. Soils

There are 15 major soil map units within the project area, which have varying soil quality properties, such as soil hydrologic group, soil erosion hazard rating, or soil texture. Sites vary by aspect, slope, and precipitation (timing, quantity, and type). Variability of soil productivity in the project area is influenced by these factors and the types of current and past uses across the landscape. Two of these soil map units, tundra and fell fields, are unusually sensitive to disturbance (Brown et al. 1978 and Urbanska et al. 2000) and weather variation over time (Neely et al. 2011). Brown and Johnson (1978) cite overgrazing as having the highest potential for disturbance on tundra communities, followed by recreation, mining, and roads. Tundra areas have short growing seasons, and loss of protective ground cover takes longer to recover than other ecosystems at lower elevations. Five allotments (American Lake, Henson Creek, American Flats, West Powderhorn, and Devils Lake) contain alpine tundra and alpine fell-fields covering 18,386 acres.

*Table 3.5-3: Tundra Fell Fields*

| Allotment | Tundra and Fell Field (Acres) | Allotment (Acres) | Area of Tundra and Fell-field within Allotment (%) |
|---|---|---|---|
| American Flats | 1,210 | 1,643 | 74 |
| American Lake | 3,676 | 6,675 | 55 |
| Devils Lake | 3,554 | 9,126 | 39 |
| Henson Creek | 2,199 | 11,933 | 18 |
| West Powderhorn | 1,745 | 4,317 | 40 |
| Cumulative | 12,384 | 33,694 | 36 |

Soil health is measured in terms of soil erosion, percentage of bare ground, litter movement, pedestals, and terracettes (Pellant et al. 2005). In 2015, field soil inventories also collected data on the presence/absence of lichens, which can be used to determine the ecological condition of ecosystem function, as soil biological crusts provide cover for protection against erosion (Belnap 2001). Sixty-one upland soil sites were assessed in 2015; 2000.5 acres (approximately 1 percent of the analysis area) were found to be altered from natural conditions, primarily due to erosion from roads and trails, elevated bare ground in low elevation areas, and cheatgrass encroachment.

### 3.5.1.2. Riparian/Wetland

Approximately 1 percent of the analysis area are wetlands and riparian areas. Despite the small area, these communities are critical for wildlife, livelihoods, livestock, and land health. Of the nearly 70 acres of fens examined, 37 (53 percent) are known to be hydrologically modified from natural conditions. This means they have headcuts, channel incisions, gullies, and/or other erosion (USFWS 1979; Bultema 2015). Riparian/wetland areas are susceptible to damage and have been impacted by a wide variety of land uses in the analysis area, including high historic levels of livestock and wildlife grazing. Shifting climate conditions are expected to disproportionately impact these communities, particularly low elevation riparian ecosystems and montane groundwater-dependent wetlands (The Nature Conservancy et al. 2011).

### 3.5.1.3. Upland Plant Communities

There is a wide variety of ecosystems in the project area due to the diversity in elevations, geology, landforms, slope, aspect, precipitation, climatic conditions, and soil moisture. Communities include alpine, sagebrush parks, sedimentary mid-elevation forests, semi-arid benchlands and canyonlands, volcanic mid-elevation forests, and volcanic subalpine forests (USGS National Gap Analysis Program 2004).

Alpine ecosystems grow in extreme cold environments with short growing seasons, are sensitive to damage, and are slow to recover after disturbance (Willard & Marr 1971; Johnson 1979; St. Clair et al. 2007). The lowest elevation sagebrush parks support Wyoming sagebrush plant communities. These plant communities generally grow on the driest, most xeric sites with low water-holding capacity. They generally have low production of forbs and grasses, do not recover quickly from disturbance, and are highly susceptible to cheatgrass invasions (Hernandez & Ramsey 2013; Winward 2004).

Forested communities in the analysis area have an important role in wildlife habitat, economics, and land health. These communities were assessed in 2016. Spruce beetle, western spruce budworm, western balsam bark beetle, and Douglas fir beetle are currently spreading and causing die-off of conifer stands throughout the project area. In addition, Sudden Aspen Decline (SAD) is killing aspen in the project area. There are 3,343 acres of forested communities experiencing levels of mortality between 32 percent and 81 percent. Regeneration of tree seedlings in these communities will be important for continued maintenance of tree stands and wildlife habitat in the analysis area. Domestic sheep and goat grazing could prevent new trees from establishing in areas with high levels of mortality in conifer and aspen stands. All the higher elevation aspen stands in the analysis area are in lynx habitat areas. All alternatives except Alternative B the No Action, would be subject to new terms and conditions that would reduce impact on regenerating aspens and conifer stands (See Appendix B, Tables B-1 and B-3, Terms and Conditions to conserve habitat for Threatened, Endangered or Listed Species). Regardless of the levels of sheep, goat, and wildlife browsing, the lower elevation aspen stands are within the “lost habitat” classification based on future climatic modeling, indicating that they are unlikely to persist on the landscape (Worrall et al. 2013).

There are 159 acres of known noxious weeds in the analysis area, including five List B species (Canada thistle, musk thistle, bull thistle, yellow toadflax, and spotted knapweed) and two List C species (cheatgrass and field bindweed). Cheatgrass is by far the most common noxious weed in the analysis area, occurring on 155 acres, primarily in the low elevation Wyoming big sagebrush communities on the Sapinero Mesa and Goose Creek Allotments. None of the alternatives will change the amount of cheatgrass that already exists on the Sapinero Mesa and Goose Creek Allotments, nor will they stop the spread of cheatgrass.

### 3.5.1.4. Water Quality

There are six perennial streams in the analysis area. Each of the allotments, except Alpine Plateau, Cox Park, Sapinero Mesa, and Goose Creek, contain perennial streams. Between 1999 and 2015, Bureau of Land Management, United States Geological Survey (USGS), Colorado Division of Reclamation and Mining Safety (DRMS), and Lake Fork Valley Conservancy (LFVC) collected water quality samples at 15 streams and 1 lake. These organizations collected

over 136 samples at 30 distinct sites. Water quality sampling in Blue Creek, Henson Creek, North Henson Creek, Palmetto Gulch, Lake Fork of the Gunnison River, Copper Creek, Silver Creek, and Cottonwood Creek tested for metals and other constituents. Sampling in Henson Creek and Lake Fork of the Gunnison River focused on the primary water quality concern, heavy metals from abandoned mine lands. Colorado Department of Public Health and Environment (CDPHE) used data from those sampling events for listing water bodies on the state's 303d list of impaired water bodies (CDPHE, 2015). Sampling of other streams by BLM only included water quality parameters: pH, Dissolved oxygen (DO), stream temperature, specific conductance (SPC), and TDS (total dissolved solids). BLM did not collect bacteria, sediment samples, and quantitative data for these constituents. SPC and TDS measure the amount of dissolved metals and dissolved solids in the water, while pH measures acidity. Portions of three perennial streams are altered from natural conditions, including Palmetto Gulch (Henson Creek tributary), Cottonwood Creek, and Lake Fork of the Gunnison River.

Between 2011 and 2015, the Gunnison Field Office inventoried 138 springs in the analysis area. Of these, water quality from four of the springs is altered from natural conditions (an additional four springs have unusually low pH, but this is likely natural). None of the perennial streams or springs provides water for domestic use or municipal use. Hikers and backpackers may filter water from these streams and springs, but waters within the project area primarily provide water for wildlife, fish habitat, and livestock watering. Within the Lake Fork of the Gunnison River and Henson Creek watersheds, the primary pollutants of concern are heavy metals from abandoned mines, and sediment from mines, camping areas, roads, and trails.

Water quality of streams and springs can be impaired by grazing animals from bacteria found in fecal matter and sediment from upland and in-channel sources. Sheep and goats tend to graze the uplands, and consequently it is unlikely that direct defecation by sheep and goats in streams and springs would occur (Buckhouse 2000). However, fecal matter and soil contaminated by fecal matter from sheep and other ungulates can be transported into streams and springs by precipitation events. The amount of transport depends on intensity of precipitation events, slope, ground cover and proximity to streams and springs. Water contamination throughout the project area from sediment and fecal matter are of concern; however, the degree and extent of fecal matter from wildlife, livestock, and humans is unknown. Therefore, analyzing the differences between the alternatives based on fecal bacteria in water is not possible.

### 3.5.2. Environmental Consequences

General effects, from domestic sheep grazing, to upland soils and wetland riparian systems that would be common to all action alternatives are as follows:

Direct and indirect effects to soil are primarily discussed in relation to the risk of erosion, although this is not the only measure of soil productivity. Where domestic sheep or goat grazing is permitted, some degree of soil compaction, reduced vegetative and litter cover, decreased water infiltration, and soil erosion will continue (Belsky and Blumenthal 1997 and Fleischner 1993). In addition, where grazing is permitted, there will be some disturbance to soil biological crusts (Belnap 2001). Loss of vegetative and litter cover results in less water infiltrating and more water running off the landscape, which can lead to more erosion. Proximity to surface water bodies and upland soil cover within stream influence zones control whether soil erosion

result in sedimentation of the water bodies. Soil compaction and loss of soil porosity decrease the amount of water infiltrating and increase the amount of water running off the landscape.

Direct effects of domestic sheep or goat grazing include trampling, hoof punch through peat or hydric soils, and hoof shear of streambanks and edges of wetlands. Riparian vegetation can protect areas from impacts from grazing if it is well established and healthy. Grazing riparian vegetation to heights below 4 inches does not allow maintenance of wetland plants and their root systems (Clary & Leininger 2001). Indirect effects would be loss of wetland plants, erosion, channel incision, gully formation and possible lowering of the water table and reduced base flows.

#### 3.5.2.1. Direct and Indirect Effects from Alternative A (Proposed Action)

Alternative A (Proposed Action) is the same as Alternative B (No Action) in AUMs, season, numbers, and acres, with the following exceptions:

- An additional 309 AUMs would be authorized on the Sapinero Mesa Allotment
- An additional 10 AUMs would be authorized on the Cox Park Allotment
- New terms and conditions would be implemented to reduce grazing impacts on soil productivity, riparian systems, plant communities, and water quality (Appendix B, Table B-1).

*What effect would Alternative A (Proposed Action) have on the ability of the public lands within the analysis area to meet the land health standard for upland soils?*

See Table 3.5-1, Standard #1 descriptions, and Table 3.5-2, Soil descriptions, for areas of upland soils that are altered from natural conditions.

Under the Alternative A, 65,710 acres would be available for domestic sheep and goat grazing. Soils in grazed areas would be more susceptible to soil erosion than similar ungrazed areas. However, under Alternative A, terms and conditions would be applied to all grazed allotments that would protect and maintain soil health (see Appendix B).

There would be 12,384 acres of tundra and fell fields available for livestock grazing, and these would therefore be more susceptible to loss of tundra habitat than similar ungrazed areas. Domestic sheep and goat grazing would continue to impact the 0.5 acres of tundra soils along the Horsethief Trail in the American Lake and American Flats Allotments that were impacted by high levels of historic domestic sheep use and ongoing recreational trail use.

Domestic sheep and goat grazing would have an unknown impact on the 1,600 acres of soils in the Sapinero Mesa and Goose Creek Allotments, with low ground cover, erosion and bare ground. It is unclear why these soils have been altered from natural conditions; therefore, it is not known if continued or increased domestic sheep grazing (under this alternative, an additional 309 AUMs would be authorized on the Sapinero Mesa Allotment) would contribute to the problems.

*What effect would Alternative A (Proposed Action) have on the ability of the public lands within the analysis area to meet the land health standard for riparian systems?*
See Table 3.5-1, Standard #2 descriptions, and Table 3.5-2, riparian/wetland descriptions, for riparian/wetland areas that are altered from natural conditions.

Under the Alternative A, three new permit terms would be applied to reduce grazing impacts to riparian areas: one that would prohibit bedding within 300 feet, if feasible, of any running stream, spring, wetland, or lake; a second term that would require open herding, particularly along riparian corridors and water influence zones; and a third term that would require campsites to be at least 200 feet from live water and wetlands. In addition, a 4-inch stubble height would be required in riparian areas in Gunnison sage-grouse habitat and on fishery streams. This term would apply to all riparian areas in the Sapinero Mesa and Goose Creek Allotments and to Henson Creek in the Henson Creek Allotment.

Trampling and wallowing impacts would continue at similar levels on 37 acres of fens that are being impacted by elk wallowing and by domestic sheep and elk trampling in five allotments that are currently being grazed (American Lake, Henson Creek, American Flats, Devils Lake, and Alpine Plateau). In particular, domestic sheep trampling, elk wallowing and trampling, and human trampling would continue to impact the fen/wetland habitat along the Horsethief Trail in the American Flats Allotment; the combined use is expected to prevent these acres from meeting land health standards.

Historic levels of livestock grazing contributed to headcuts in the Sapinero Mesa Allotment. However, current levels of domestic sheep grazing are not impacting these systems. The proposed addition of 309 AUMs of domestic sheep use on the Sapinero Mesa Allotment (45 percent increase) would result in a total of 999 AUMs. This would be well below the historic levels of 2,475 AUMs (40 percent) and is also not expected to prevent these systems from moving towards meeting land health standards.

The Proposed Action would continue to allow domestic sheep and goat grazing (in conjunction with big game grazing) to continue until 2 ½-inch stubble heights are reached in streams (except fishery streams) and wetlands on seven allotments (American Lake, Henson Creek, American Flats, West Powderhorn, Devils Lake, Cox Park, and Alpine Plateau). Stubble heights below 4 inches do not allow maintenance of wetland plants and their root systems. However, the Proposed Action continues current levels of livestock use. While there is no requirement to maintain stubble heights on riparian areas of 4 inches or more, few riparian areas are currently being grazed below this height on any of the allotments. Therefore, under Alternative A, conditions of riparian areas in the analysis area would likely stay the same as under current conditions. Overall, the existing condition of the riparian areas and wetlands would be maintained, with a potential for improvement due to the application of the two additional permit terms described above.

*What effect would Alternative A (Proposed Action) have on the ability of the public lands within the analysis area to meet the land health standard for upland plant communities?*
See Table 3.5-1, Standard #3 descriptions, and Table 3.5-2, upland plant community descriptions for upland plant communities that are altered from natural conditions.

Overall, the existing condition and trend of the plant communities that were described in the Affected Environment section would be maintained. Areas meeting land health standards would continue to do so.

Under the Alternative A, domestic sheep and goat grazing would occur on 2,891 acres of conifer 355 acres of high elevation aspen, and 97 acres of low elevation aspen that are experiencing high levels of mortality due to insects and sudden aspen decline. Sheep and goat grazing at the proposed levels would not impact conifer regeneration. With implementation of a term and condition for lynx habitat, sheep and goat grazing would be managed at levels that would not prevent regeneration in the higher elevation aspen stands. Regardless of the level of sheep, goat, or big game browsing, the 97 acres of low elevation aspen stands in the Sapinero Mesa and Goose Creek Allotments that are experiencing high mortality are not likely to successfully regenerate due to Sudden Aspen Decline (SAD) and these stands will probably be lost in the long term.

Alternative A would permit an additional 309 AUMs than is currently permitted on the Sapinero Mesa Allotment (see Alternative B, No Action). This would still maintain the low stocking rate that has been in place since the 1999 decision to triple the acres for the Sapinero Mesa Allotment with no increase in AUMs.

A new grazing permit term would be applied that would limit use of bed grounds to no more than three consecutive nights. This would limit the amount of time sheep spend grazing in any one area. This term would ensure that sheep move frequently, reducing the chance of re-grazing already grazed plant material. This would assist in maintaining healthy native plant communities.

*What effect would Alternative A (Proposed Action) have on the ability of the public lands within the analysis area to meet the land health standard for water quality?*
See Table 3.5-1, Standard #5 descriptions, and Table 3.5-3, water quality descriptions, for areas where water quality is altered from natural conditions.

Under Alternative A, there are 138 springs and 6 perennial streams in the areas that would be permitted for domestic sheep and goat grazing.

The American Lake, Henson Creek, and American Flat Allotments are not achieving land health standards for water quality due to historic mining. Domestic sheep and goat grazing would have little effect on water quality in these allotments.

Land Health Standards for water quality are being met in the West Powderhorn, Devils Lake, Cox Park, Alpine Plateau, Sapinero Mesa, and Goose Creek Allotments. Continued livestock grazing at the proposed levels would allow land health standards to continue to be met in these allotments.

To reduce the chances of water contamination from human waste and sheep and goat fecal matter, three new terms and conditions would be implemented: 1) herders will not bed sheep

closer than 300 feet from water, if feasible; 2) herders will avoid excessive herding and bunching of sheep and goats, particularly along riparian corridors and water influence zones; and 3) herder campsites will be located at least 200 feet from live water.

### 3.5.2.2. Direct and Indirect Effects from Alternative B (No Action)

Under Alternative B, livestock grazing allotments would continue to be permitted and allotments would continue to be managed as they have been over recent years. Nine grazing allotments would be permitted for grazing. Current permit terms and conditions apply to active permits (Appendix B, Table B-2). Under this alternative, a total of 65,710 acres would be utilized for sheep and goat grazing, and 2,951 AUMs would be authorized.

*What effect would Alternative B (No Action) have on the ability of the public lands within the analysis area to meet the land health standard for upland soils?*

Under Alternative B, the existing condition and trend of the upland soils that were described in the Affected Environment section would be maintained.

There would be 65,710 acres available for domestic sheep and goat grazing. Soils in grazed areas would be more susceptible to soil erosion than similar ungrazed areas.

There would be 12,384 acres of tundra and fell fields available for livestock grazing, and these would therefore be more susceptible to loss of tundra habitat than similar ungrazed areas. Domestic sheep grazing would continue to impact the 0.5 acres of tundra soils along the Horsethief Trail in the American Lake and American Flats Allotments that were impacted by high levels of historic domestic sheep use and ongoing recreational trail use.

Domestic sheep and goat grazing would have an unknown impact on the 1,600 acres of soils in the Sapinero Mesa and Goose Creek Allotments with low ground cover, erosion, and bare ground. It is unclear why these soils have been altered from natural conditions; therefore, it is not known if continued domestic sheep grazing would contribute to the problems.

*What effect would Alternative B (No Action) have on the ability of the public lands within the analysis area to meet the land health standard for riparian systems?*

Under Alternative B, the existing condition and trend of the riparian and wetland areas that were described in the Affected Environment section would be maintained.

AUMs, season of use, numbers of livestock, and acres available for domestic sheep/goat grazing in the American Lake, Henson Creek, American Flats, West Powderhorn, Devils Lake, Cox Park, Alpine Plateau, and Goose Creek Allotments would be the same as under Alternative A. There would be 309 fewer AUMs available for sheep and goat grazing on the Sapinero Mesa Allotment.

The Alternative B would continue to allow domestic sheep and goat grazing (in conjunction with big game grazing) to continue until 2 ½-inch stubble heights are reached in streams (except fishery streams) and wetlands on seven allotments (American Lake, Henson Creek, American Flats, West Powderhorn, Devils Lake, Cox Park, and Alpine Plateau). Stubble heights below 4

inches do not allow maintenance of wetland plants and their root systems. However, the No Action continues current levels of livestock grazing. While there is no requirement to maintain stubble heights on riparian areas of 4 inches or more, few riparian areas are currently being grazed below this height on any of the allotments. Therefore, under Alternative B, conditions of riparian areas in the analysis area would likely stay the same as current conditions. In accordance with the RMP, a 4-inch stubble height would be required on fishery streams, including Henson Creek in the Henson Creek Allotment. Overall, the existing condition of the riparian areas and wetlands would be maintained.

*What effect would Alternative B (No Action) have on the ability of the public lands within the analysis area to meet the land health standard for plant communities?*
Overall, the existing condition and trend of the plant communities that were described in the Affected Environment section would be maintained. Those allotments meeting land health standards would continue to do so. Under Alternative B, domestic sheep and goat grazing would occur on 2,891 acres of conifer, 355 acres of high elevation aspen, and 97 acres of low elevation aspen that are experiencing high levels of mortality due to insects and sudden aspen decline. Sheep and goat grazing at the proposed levels would not impact conifer regeneration. With implementation of a term and condition for lynx habitat, sheep and goat grazing would be managed at levels that would allow successful regeneration in the higher elevation aspen stands. Regardless of the level of sheep, goat, or big game browsing, the 97 acres of low elevation aspen stands in the Sapinero Mesa and Goose Creek Allotments that are experiencing high mortality are not likely to successfully regenerate due to Sudden Aspen decline (SAD) and these stands will probably be lost in the long term.

*What effect would Alternative B (No Action) have on the ability of the public lands within the analysis area to meet the land health standard for Water Quality?*
Under the No Action (Alternative B), there are 138 springs and 6 perennial streams would be located within the permitted area for domestic sheep and goat grazing.

The No Action (Alternative B) would have a higher risk of contamination of streams and springs from grazing than the other alternatives, because no protection measures would be implemented to protect water quality. Sheep bedding grounds, which are sources of sediment and fecal matter, and sheepherder camps, which are a source of human waste and fecal matter, could be located near streams and springs.

Sheep and goat grazing could result in sedimentation of West Powderhorn Creek, Palmetto Gulch, Blue Creek and unnamed tributaries to Henson Creek in American Flats and American Lake Allotments due to channel widening and overuse of riparian vegetation (Fleischner 1994 and Armour et al. 1990). The banks of these streams are protected by vegetation. Removal of the riparian vegetation on these stream banks by sheep or goats could expose bare soil, which would be mobilized into the streams during storm events.

Fourth of July Creek, Henson Creek and North Henson Creek are well armored with woody riparian vegetation and rock and are less susceptible to channel widening from sheep and goat. Hence, it is less likely that sheep and goat grazing would result in sedimentation from in-channel

sources of sediment. Loss of vegetation and exposure of bare ground at the crossings would be the primary source of sediment in addition to bedding grounds.

### 3.5.2.3. Direct and Indirect Effects from Alternative C (Domestic Sheep/Goat Grazing Authorized Outside of Summer Bighorn Range)

Compared to Alternative B, Alternative C has an increase of 319 AUMs and a reduction of 8,921 acres.

- 248 fewer pasture acres in the American Lake Allotment, 3,368 fewer pasture acres in the Henson Creek Allotment, 51 fewer pasture acres in the American Flats Allotment, and 5,164 fewer pasture acres in the Sapinero Mesa Allotment would be available for domestic sheep/goat grazing.
- Most of the acres that would be unavailable for sheep and goat grazing in the Henson Creek and Sapinero Mesa Allotments would be in areas that are currently not being grazed. In the Henson Creek Allotment, these acres are mostly on the east side of the allotment, and the permittee grazes mostly on the west side of the allotment in the Palmeto, Hurricane, and Horseshoe Pastures. Use on the east side of the allotment is primarily related to loading and unloading sheep at the Capitol City corrals and trailing along the North Henson Creek Road. In the Sapinero Mesa Allotment, the permittee has been herding sheep away from the western edge of the allotment and has not been grazing most of these acres since the late 1990s.
- New terms and conditions would be implemented to reduce grazing impacts on soil productivity, riparian systems, plant communities, and water quality. (See Appendix B, Table B-1).

*What effect would Alternative C (Domestic Sheep/Goat Grazing Authorized Outside of Bighorn Summer Range) have on the ability of the public lands within the analysis area to meet the land health standard for upland soils?*

Under Alternative C, 56,879 acres would be available for domestic sheep and goat grazing with 8,831 pasture acres not available on 4 allotments. (American Lake, Henson Creek, American Flats, and Sapinero Mesa). Soils in grazed areas would be more susceptible to soil erosion than similar ungrazed areas. However, under Alternative C, terms and conditions would be applied to all grazed allotments that would protect and maintain soil health (Appendix B, Table B-1).

There would be 11,697 acres of tundra and fell fields available for livestock grazing, and these would therefore be more susceptible to loss of tundra habitat than similar ungrazed areas. This is 687 fewer tundra fell field acres than under the No Action and Proposed Action Alternatives. Domestic sheep and goat grazing would continue to impact the 0.5 acres of tundra soils along the Horsethief Trail in the American Lake and American Flats Allotments that were impacted by high levels of historic domestic sheep use and ongoing recreational trail use.

Domestic sheep and goat grazing would have an unknown impact on the 1,600 acres of soils in the Sapinero Mesa and Goose Creek Allotments with low ground cover, erosion and bare ground. It is unclear why these soils have been altered from natural conditions; therefore, it is not known if continued domestic sheep grazing in this allotment would contribute to the problem; however, it should be noted that 5,164 fewer acres in the Sapinero Mesa Allotment

would be available for grazing under this alternative as opposed to the No Action and Proposed Action.

Terms and conditions would be applied to all grazed allotments that would protect and maintain soil health.

*What effect would Alternative C (Domestic Sheep/Goat Grazing Authorized Outside of Bighorn Summer Range) have on the ability of the public lands within the analysis area to meet the land health standard for riparian systems?*

Under Alternative C, AUMs, season of use, numbers of livestock, and acres available for domestic sheep/goat grazing in the West Powderhorn, Devils Lake, Cox Park Alpine Plateau, and Goose Creek Allotments would be the same as under Alternative A and Alternative B (No Action). There would be fewer acres available for grazing use in the American Lake, Henson Creek, American Flats, and Sapinero Mesa Allotments; however, there would be no substantial difference in the number of acres that are actually being grazed currently. Therefore, Alternative C would have similar effects as Alternative A and Alternative B (No Action) on riparian systems in these allotments.

*What effect would Alternative C (Domestic Sheep/Goat Grazing Authorized Outside of Bighorn Summer Range) have on the ability of the public lands within the analysis area to meet the land health standard for plant communities?*

Alternative C would have similar effects as Alternative A on plant communities. Overall, the existing condition and trend of the plant communities that were described in the Affected Environment section would be maintained. Those allotments meeting land health standards would continue to do so.

Under Alternative C, domestic sheep and goat grazing would occur on 2,891 acres of conifer, 355 acres of high elevation aspen, and 97 acres of low elevation aspen that are experiencing high levels of mortality due to insects and sudden aspen decline. Sheep and goat grazing at the proposed levels would not impact conifer regeneration. As discussed in Alternative A, with implementation of a term and condition for lynx habitat, sheep and goat grazing would be managed at levels that would allow successful regeneration in the higher elevation aspen stands; however, the 97 acres of low elevation aspen stands in the Sapinero Mesa and Goose Creek Allotments will probably be lost in the long term.

Grazing on the Sapinero Mesa Allotment would be the same as under Alternative A, but there would be 5,441 fewer acres available for domestic sheep grazing. This would still maintain a low stocking rate that has been in place since the 1999 decision to triple the acres for the Sapinero Mesa Allotment with no increase in AUMs. The unavailable acres are on the steep canyons and rims above the Lake Fork of the Gunnison River. Most are too steep for domestic sheep and goat grazing, and the permittee has been herding sheep away from the tops of the canyons since 1999 to reduce the chance of contacting bighorn sheep.

*What effect would Alternative C (Domestic Sheep/Goat Grazing Authorized Outside of Bighorn Summer Range) have on the ability of the public lands within the analysis area to meet the land health standard for water quality?*

Under Alternative C, there are 138 springs and 6 perennial streams in the areas that would be permitted for domestic sheep and goat grazing.

Alternative C would have similar effects as Alternative A on water quality. Overall, the existing condition and trend of water quality would be maintained. Those allotments meeting land health standards would continue to do so. New terms and conditions would reduce potential impacts to water resources from fecal matter on the American Lake, Henson Creek, American Flats, West Powderhorn, Devils Lake, Cox Park and Alpine Plateau Allotments.

#### 3.5.2.4. Direct and Indirect Effects from Alternative D (Domestic Sheep/Goat Grazing Authorized Outside of Overall Bighorn Range)

Compared to Alternative B, Alternative D has a reduction of 1,051 AUMs and 31,058acres:

- Domestic sheep/goat grazing would not be permitted on the American Lake, Henson Creek, and American Flats.
- 5,153 fewer pasture acres on the West Powderhorn and Devils Lake Allotments, and 5,654 fewer pasture acres on the Sapinero Mesa Allotment would be available for domestic sheep/goat grazing. New terms would be implemented to reduce grazing impacts on soil productivity, riparian systems, plant communities, and water quality (see Appendix B).
- In addition, new terms and conditions would apply.

*What effect would Alternative D (Domestic Sheep/Goat Grazing Authorized Outside of Overall Bighorn Range) have on the ability of the public lands within the American Lake Allotment to meet the land health standard for upland soils?*

Under Alternative D, 34,652 acres would be available for domestic sheep and goat grazing. The area available for domestic sheep and goat grazing would be reduced by 31,058 acres on six allotments (American Lake, Henson Creek, American Flats, West Powderhorn, Devils Lake, and Sapinero Mesa). Soils in grazed areas would be more susceptible to soil erosion than similar ungrazed areas; however, terms and conditions outlined under Alternative A would be applied to all grazed allotments that would protect and maintain soil health (see Appendix B).

There would be 5,299 acres of tundra and fell fields available for livestock grazing, and these would therefore be more susceptible to loss of tundra habitat than similar ungrazed areas. This is 7,085 acres less tundra habitat than are available for sheep and goat grazing under the No Action (Alternative B).

Domestic sheep and goat grazing would have an unknown impact on the 1,600 acres of soils in the Sapinero Mesa and Goose Creek Allotments with low ground cover, erosion and bare ground. It is unclear why these soils have been altered from natural conditions; therefore, it is not known if domestic sheep grazing is contributing to the problems; however, it should be noted that 5,654 fewer acres in the Sapinero Mesa Allotment would be available for grazing under this alternative as opposed to the No Action and Proposed Action.

Under Alternative D, there would be no domestic sheep and goat grazing permitted in the American Lake or American Flats Allotments. Therefore, there would be no impact from

domestic sheep and goat grazing on the eroded soils along the Horsethief Trail. Terms and conditions would be applied to all grazed allotments that would protect and maintain soil health.

*What effect would Alternative D (Domestic Sheep and Goat Grazing Authorized outside of Overall Bighorn Range) have on the ability of the public lands within the American Lake Allotment to meet the land health standard for riparian systems?*
Under Alternative D, AUMs, season of use, numbers of livestock, and acres available for domestic sheep/goat grazing in the Cox Park, Alpine Plateau, and Goose Creek Allotments would be the same as under Alternative C.

There would be fewer acres available for domestic sheep and goat grazing in the West Powderhorn and Devils Lake Allotments. There would also be slightly fewer acres available for domestic sheep/goat grazing on the Sapinero Mesa Allotment; however, this would have little impact on riparian habitat in the allotment.

Domestic sheep and goat grazing would not be permitted in the American Lake, Henson Creek or American Flats allotments. Therefore, there would be no impact from domestic sheep and goat grazing on riparian systems in these allotments. The 31.7 acres of fen habitat on the American Lake, Henson Creek, and American Flats Allotments, including the fens along the Horsethief Trail, would no longer be impacted by domestic sheep grazing, though they would continue to be impacted by wildlife and recreational trail use.

*What effect would Alternative D (Domestic Sheep/Goat Grazing Authorized Outside of Overall Bighorn Habitat) have on the ability of the public lands within the American Lake Allotment to meet the land health standard for plant communities?*
Alternative D would have similar effects as Alternative A on plant communities. Overall, the existing condition and trend of the plant communities that were described in the Affected Environment section would be maintained. Those allotments meeting land health standards would continue to do so.

Under Alternative D, domestic sheep and goat grazing would occur on 1,733 acres of conifer, 151 acres of high elevation aspen, and 97 acres of low elevation aspen that are experiencing high levels of mortality due to insects and sudden aspen decline. Sheep and goat grazing at the proposed levels would not impact conifer regeneration. With implementation of a term and condition for lynx habitat, sheep and goat grazing would be managed at levels that would allow successful regeneration in the higher elevation aspen stands. Regardless of the level of sheep, goat, or big game browsing, the 97 acres of low elevation aspen stands in the Sapinero Mesa and Goose Creek Allotments that are experiencing high mortality are not likely to successfully regenerate due to Sudden Aspen Decline (SAD) and these stands will probably be lost in the long term.

The area and AUMs available for domestic sheep and goat grazing in the Devils Lake Allotment would be reduced by approximately half. The acres that remain available for sheep and goat grazing would be grazed at the same level, and they would continue to meet land health standards for plant communities.

Under Alternative D, there would be no domestic sheep or goat grazing permitted in the American Lake, Henson Creek or American Flats Allotments. Therefore, there would be no impacts from domestic sheep or goat grazing on plant communities in these allotments.

*What effect would Alternative D (Domestic Sheep/Goat Grazing Authorized Outside of Overall Bighorn Habitat) have on the ability of the public lands within the American Lake Allotment to meet the land health standard for water quality?*
Under Alternative D, there are 52 springs and 3 perennial streams in the areas that would be permitted for domestic sheep and goat grazing.

Alternative D would have similar effects as Alternative A on water quality. Overall, the existing condition and trend of water quality would be maintained. Those allotments meeting land health standards would continue to do so. New terms and conditions would reduce potential impacts to water resources from fecal matter on the West Powderhorn, Devils Lake, Cox Park and Alpine Plateau Allotments.

There would be no domestic sheep or goat grazing permitted on the American Lake, Henson Creek or American Flats Allotments. Therefore, there would be no effect from domestic sheep or goat grazing on these allotments

### 3.5.2.6. Direct and Indirect Effects from Alternative E (No Livestock Grazing)

*What effect would Alternative E (No Livestock Grazing) have on the ability of the public lands within the analysis area to meet the land health standard for upland soils?*
Under Alternative E, there would be no sheep or goat grazing permitted within the analysis area. For those allotments that are currently permitted for grazing, impacts from livestock grazing that were described under Alternative B would no longer occur. Consequently, there would be no impacts to soil productivity from grazing. There would be no change in effects for the allotments that are not currently permitted for grazing.

*What effect would Alternative E (No Livestock Grazing) have on the ability of the public lands within the analysis area to meet the land health standard for riparian systems?*
Under Alternative E, there would be no sheep or goat grazing permitted within the analysis area. For those allotments that are currently permitted for grazing, impacts from livestock grazing that were described under Alternative B would no longer occur. There would be less large herbivore impacts to riparian areas and wetlands. Where livestock grazing was a factor for riparian areas not meeting land health standards, the ability of those riparian areas to meet standards would be improved. Where lands health standards were being met or an upward trend was identified, those conditions would be maintained. There would be no change in effects for the allotments that are not currently permitted for grazing.

*What effect would Alternative E (No Livestock Grazing) have on the ability of the public lands within the analysis area to meet the land health standard for plant communities?*
Under Alternative E, there would be no sheep or goat grazing permitted within the analysis area. Overall, the existing condition and trend of the plant communities that were described in the Affected Environment section would be maintained. In areas with high mortality in forested communities, there would be no impacts from sheep and goat grazing on the regeneration of

aspen stands. Removing sheep grazing from areas with cheatgrass would not change the amount of cheatgrass already existing and spreading on the allotments. Therefore, Alternative E would not impact the ability of the Sapinero Mesa and Goose Creek Allotments to meet or not meet Land Health Standard 3 for plant communities. There would be no change in effects for the allotments that are not currently permitted for grazing, as described under Alternative B, No Action.

*What effect would Alternative E (No Livestock Grazing) have on the ability of the public lands within the analysis area to meet the land health standard for water quality?*
Under Alternative E, there would be no livestock grazing permitted within the analysis area. There would be no water quality impacts from domestic sheep or goat grazing to 189 springs or to Blue Creek, West Powderhorn Creek, 4th of July Creek, headwater streams within American Lake and American Flat, Henson Creek, North Henson Creek, Palmetto Gulch, Silver Creek, Cooper Creek, Cottonwood Creek, Lake Fork of the Gunnison River, Mill Creek, Bent Creek, or Williams Creek.

### 3.5.2.7. Cumulative Effects

The project area is the boundary for this Cumulative Effects analysis. There would be no cumulative impacts to soils, riparian areas and vegetation communities or water quality in allotments in which domestic sheep or goat grazing is not permitted:
Under Alternative E, there would be no livestock grazing on any of the allotments in the analysis area. Therefore, alternative E would not result in any cumulative impacts.

*Soils*
Under Alternatives A (Proposed Action), B, C and D, the 0.5 acres of tundra soils that are eroding along the Horsethief Trail in the American Lake and American Flats Allotments would continue to be impacted by wildlife and human use of the trail in conjunction with sheep and goat grazing and trailing along the trail route. It is not known what is causing 1,600 acres in the Sapinero Mesa and Goose Creek Allotments to have low ground cover, erosion, and elevated levels of bare ground. Therefore, it is not known if domestic sheep and goat grazing or other uses would contribute to these areas having increased risk of soil erosion.

*Riparian Systems and Plant Communities*
Historic and ongoing impacts on riparian systems and plant communities include sheep and big game grazing and trailing, roads, mining, recreational trails, and water development. Noxious weeds are present and expanding into new areas. Riparian restoration work for the Sapinero Mesa Allotment was completed in 2018.

The cumulative effects of Alternative A (Proposed Action), C and D, which all include terms and conditions and minimum 4-inch stubble heights, and future planned riparian restoration activities would increase the potential for improving many riparian areas, wetlands, fens, and riparian systems. The cumulative effects of Alternative B (No Action) would result in riparian systems and plant communities remaining in current condition.

*Water Quality*

Cumulative impacts to water quality relate to stream crossings. Citations for this section come from the summary of impacts from Williams (1999). Stream crossings of native surface roads and [trails] are sources of sediment to stream channels (Eaglin and Hubert 1993; Furniss et al. 1991), which can impact aquatic habitat by filling in pools (Sedell and Everest 1991 and McIntosh et al. 1994) and reduce or eliminate populations of aquatic macroinvertebrates (Chutter 1969; Hynes 1970). In addition, upstream and downstream of such crossings, streams can become over-widened (Heede 1980). The primary literature does not contain information regarding water quality impacts that indirectly result from the placement of fences across streams. Anecdotal observations have documented erosion and sedimentation of streams due to wildlife trailing along fence lines, causing bank erosion and sedimentation to Monson Gulch (BLM 2015).

The cumulative effects of Alternatives A (Proposed Action) B, C and D are unknown, as it is not known when and where sheepherders cross streams with their flocks. Stream crossings are the main points where sediment and fecal matter from sheep and goat grazing can reach streams. Fecal matter and sediment are the two primary constituents associated with water quality impacts from sheep and goat grazing.

## 4.0. TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

### Cooperating Agencies

The BLM invited the following agencies and tribes to participate in the Domestic Sheep Grazing EIS planning process including:

- Colorado Parks and Wildlife (accepted)
- Colorado Department of Agriculture (accepted)
- Gunnison County
- Montrose County (accepted)
- Hinsdale County (accepted)
- National Park Service (accepted)
- Ouray County
- San Juan County
- USFS Gunnison Ranger District
- USFS Uncompahgre Ranger District
- Colorado Office of Archaeology and Historic Preservation
- Ute Mountain Ute Tribe
- Ute Indian Tribe of the Ouray and Uintah Reservation
- Southern Ute Indian Tribe

Interactions with the cooperating agencies included comment review, identifying significant issues, and alternative development. The BLM conducted periodic briefings and reviews of preliminary internal draft sections of text with the cooperating agencies. The BLM continued to engage the cooperating agencies throughout the preparation of the EIS.

## Resource Advisory Council

A resource advisory council (RAC) is a committee established by the Secretary of the Interior to provide advice or recommendations to BLM management (BLM Land Use Planning Handbook H-1601-1 [BLM 2005]). A RAC is typically composed of 15 members of the public representing different areas of expertise. The Colorado Southwest RAC includes members appointed to represent constituent public land users and provides input on public management issues to the BLM's Southwest RAC Designated Federal Officers and Western Slope Center Manager. Domestic sheep grazing issues in the Gunnison Field Office were discussed at the February 2013 Southwest District RAC meeting.

## Tribal Collaboration and Consultation

The Gunnison Field Office initiated consultation with tribes that are identified as having interests or traditional cultural properties in the planning area. Consultation is that required by the National Historic Preservation Act and the American Indian Religious Freedom Act. The identified tribes are the Ute Indian Tribe of the Ouray and Uintah Reservation, the Southern Ute Indian Tribe, and the Ute Mountain Ute Tribe.

On October 14, 2014, the GFO gave a verbal presentation to the three Tribes in Montrose that included a brief summary of the Sheep EIS. No reply regarding this proposed project was received.

Certified-return receipt letters were also sent to all three Tribes on January 14, 2015, explaining the Domestic Sheep EIS. No replies were received.

On April 7, 2015, BLM attended the tribal consultation meeting in Grand Junction and presented information to the Ute Indian Tribe of the Ouray and Uintah Reservation, and Southern Ute Indian Tribe, that included a summary of the sheep EIS. A packet of information was also given to the Tribes at this meeting, and it included a written document and the same document on a CD. There were no questions posed nor written comments sent to the BLM regarding this project by these Tribes.

On April 8, 2015, the Gunnison Field Office (GFO) sent a letter by certified mail with project information to the Ute Mountain Ute Tribe. There were no replies regarding this project.

## 5.0. LIST OF PREPARERS

| Name | Title | Area(s) of Responsibility |
|---|---|---|
| Gay Austin | Natural Resource Specialist | Wetlands and Riparian Areas<br>Aquatic Wildlife<br>Threatened, Endangered and Sensitive Plant Species |
| Andrew Breibart | Hydrologist | Floodplains<br>Water Quality<br>Hydrology and Water Rights<br>Soils<br>Air Quality |
| Katherine Brodhead | Wildlife Biologist | Migratory Birds<br>Threatened, Endangered and Sensitive Species<br>Terrestrial Wildlife |
| Brian Brown | Forester | Forest Vegetation/Management |
| Rebecca Bruno | Surveyor | Cadastral Surveys |
| Tara de Valois | Rangeland Management Specialist | Invasive, Non-Native Species<br>Upland Vegetation<br>Rangeland Management |
| Elizabeth Francisco | Archaeologist | Cultural Resources<br>Native American Religious Concerns |
| Russell Japuntich | Wildlife and Fisheries Biologist | Migratory Birds<br>Threatened, Endangered and Sensitive Species<br>Terrestrial Wildlife<br>Aquatic Wildlife |
| David Lazorchak | Geologist | Geology and Minerals<br>Abandoned Mine Lands<br>Hazardous Materials<br>Paleontology |
| Marnie Medina | Realty Specialist/NEPA Coordinator | Land Authorizations<br>NEPA |
| Jessica Montag | Socioeconomics Specialist | Environmental Justice<br>Socioeconomics |
| Kristi Murphy | Recreation Planner | Wild and Scenic Rivers<br>Wilderness<br>Lands with Wilderness Characteristics<br>Access and Transportation<br>Recreation<br>Visual Resources |
| Brian Stevens | Fire Use Specialist (Fuels) | Fire and Fuels Management |

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# APPENDIX B. TERMS AND CONDITIONS APPLICABLE TO ALLOTMENTS

*Table B-1: Terms and Conditions Common to Action Alternatives A, C, and D*

| **General Rangeland Management Terms and Conditions** | |
|---|---|
| 1 | Permit holders are required to attend an annual spring meeting to develop the annual operating plan, review project maintenance needs, update the Communication and Response Plan (CRP), and set driveway schedules. Permit holders will comply with the CRP and with the annual operating developed at this meeting. |
| 2 | Permittees will ensure herders are familiar with the Communication and Response Plan and with the Annual Operating Plan, including pasture rotations, and all recommended livestock husbandry and Leave No Trace camping practices. |
| 3 | Grazing use will be paid for and any pertinent livestock and/or base property leases will be submitted prior to turnout. |
| 4 | Grazing use will be in compliance with the Gunnison Resource Area RMP, which was amended to adopt the Colorado Standards for Public Land Health and Guidelines for Livestock in Colorado, and with the Gunnison Sage-grouse CCA. |
| 5 | The permittee shall provide the BLM with reasonable administrative access across private and leased lands for the orderly management and protection of the public lands. |
| 6 | All range improvements for which the permittee has maintenance responsibility, including fences, troughs, corrals, and reservoirs will be properly maintained prior to livestock trailing or grazing. The permittee will obtain permission from the BLM prior to beginning any maintenance activities that require the use of heavy equipment, such as tractors, backhoes, or graders. Allotment boundary fences for which the permittee has maintenance responsibility will be maintained every year, even if the pasture is being rested. |
| 7 | Temporary water hauling site locations will be coordinated with and approved by the BLM. Troughs associated with these sites will have a wildlife escape ramp. To prevent wildlife deaths, these troughs will be removed or turned over each year when they are no longer needed for livestock grazing use. |
| 8 | The terms and conditions of this permit may be modified if additional information indicates that revision is necessary to conform with 43 CFR 4180. |
| 9 | Working dogs may be used at the discretion of the livestock owner under appropriate State and County laws and regulations. |
| 10 | All fires built for any purpose by the permittee and/or herder will not be left unattended and will be completely extinguished following use. Each camp will be equipped with a serviceable shovel and ax. |
| 11 | Camps will be kept clean and all garbage packed out. |
| 12 | Krummholz (dwarf spruce trees at timberline) will not be cut or used for firewood. |
| 13 | Move 95% of all livestock from one pasture to the next within three days of scheduled move, with 100% moved within one week from scheduled move. |

| **Terms and Conditions to Create Effective Separation and Reduce Disease Transmission between Bighorn and Domestic Sheep (from BLM Policy (1730 – Management of Domestic Sheep and Goats to Sustain Wild Sheep 3/2/16)** | |
|---|---|
| 1 | The permittee/lessee will immediately notify the local BLM authorized officer (i.e., Field Manager), or other primary point of contact designated by the authorized officer, of any observed or reported contact, or close proximity, between wild sheep and the permittee's/lessee's domestic sheep or goats. |
| 2 | The permittee/lessee will prevent the turnout of 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. |
| 3 | The permittee/lessee will retrieve and remove sick or physically infirm domestic sheep or goats from the herd as soon as possible. Animals that are too far from roads to be removed will be terminated. Under no circumstances will injured or sick livestock be left behind. |
| 4 | The permittee/lessee will report their authorized domestic sheep or goat routing and distribution within an allotment, trailing between allotments, strays and recovery efforts, according to the terms and conditions of their authorization(s) or permit(s)/lease(s). |
| 5 | The permittee/lessee will immediately report (as soon as feasible) to the authorized office (i.e., Field Manager) any wild sheep sightings in proximity to authorized domestic sheep or goat allotments or trailing routes. |

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|---|---|
| 6 | Grazing domestic ewes while in estrus heightens the possibility of contact between wild sheep and domestic sheep or goats. The permittee/lessee will 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. |
| 7 | When trailing domestic sheep through areas where there is a potential for contact with wild sheep, the permittee/lessee will use the appropriate combination of close herding, multiple herders, and well-trained herd dogs to keep the sheep bunched and to minimize the risk of strays. Any strays will be gathered and moved back with the herd as soon as possible or removed from BLM lands as the trailing occurs. |
| 8 | When trailing in areas where physical separation cannot be assured, use trucking instead of trailing. |
| | ***Additional Terms and Conditions*** |
| 9 | Domestic sheep grazing on the Sapinero Mesa Allotment in the fall will stay on the east side of the allotment after October 1st to avoid bighorn habitat on the west side of the allotment during the bighorn rutting season. |
| 10 | No scheduled lambing of domestic sheep will occur on BLM lands. |
| 11 | Maximum band size will be 1250 ewes (this number does not include lambs) on any allotment. |
| 12 | At least one herder is required to be with the sheep. A herder will remain in the sheep camp during the night. Any bands of yearlings over 1000 will require two herders. |
| 13 | Salt supplements will be placed on rocky areas. Herders will place only as much salt as the sheep will consume in one night. |
| 14 | Sheep will be bedded on upland areas and as far away from adjacent canyon edges or rims as feasible. Applies to permits on American Flats, American Lake, Henson Creek, West Powderhorn, Devils Lake, Sapinero Mesa, and Goose Creek Allotments. |
| 15 | Prior to turnout on public lands, permittees will ensure herders can identify Rocky Mountain bighorn sheep and that they are familiar with bighorn habitat. |
| 16 | Alternative C Only – Domestic sheep/goat grazing would not be authorized on the Wildhorse Peak Pasture in the American Lake Allotment; Engineer Pasture on the American Flats Allotment; Schafer and North Henson Pastures on the Henson Creek Allotment; or on the Sapinero West Pasture on the Sapinero Mesa Allotment. These pastures or use areas area not fenced areas and the permittee will be responsible for not grazing in these areas. |
| 17 | Alternative D Only - Domestic sheep/goat grazing would not be authorized on the Cannibal Calf Plateau in the Devils Lake Allotment; Calf Creek Plateau Pasture in the West Powderhorn Allotment; or on the Sapinero West Pasture on the Sapinero Mesa Allotment. These pastures or use areas area not fenced areas and the permittee will be responsible for not grazing in these areas. |

| **Riparian/Soil/Hydrology/Vegetation** | |
|---|---|
| 1 | When grazing an allotment, sheep will be open herded. Excessive herding and bunching of sheep will be avoided, particularly along riparian corridors and water influence zones. |
| 2 | To minimize grazing impacts, sheep will not be bedded within 300 feet, if feasible, of any running stream, spring, wetland or lake. There may be some exceptions due to topography on the allotment, but these will be approved in advance by the BLM. In the rare circumstance when advanced approval is not possible, the herder should be able to communicate their rationale for bedding closer than 300 feet. Bed grounds will not be used for more than three consecutive nights. (Leonard, S. et al. 1997) |
| 3 | When possible, campsites will be reused annually and they will be placed at least 200 feet from live water, wetlands, and trails. |
| 4 | Place salt, minerals, and supplements at least 1/4 mile away from riparian areas, to the extent feasible within existing pasture boundaries. |
| 5 | The maximum use level in uplands will be 40-60% of the current year's production by weight on key forage species during the period of use on "I" category allotments. |
| 6 | Utilization of key herbaceous forage species within all riparian zones on "I" category allotments will not exceed 40-60% of the current year's production, with a 2 ½"minimum stubble height maintained throughout the period of use. (This applies to allotments outside of Gunnison Sage-grouse habitat.) |
| 7 | A 4" stubble height would be required for riparian areas along important fisheries in RMP unit 15 (Along Henson Creek in the Henson Creek Allotment along and Sapinero Mesa Allotments). |
| 8 | When utilization rates are reached, livestock will be moved out of the use area/pasture or off the allotment. In situations where residual vegetation is not meeting the use objectives during/following livestock grazing, the potential of the area to achieve the resource and livestock use objectives will be determined prior to taking any permanent adverse actions against the livestock-grazing permit. |

| | |
|---|---|
| **Terms and Conditions to Conserve Habitat for Threatened, Endangered or Listed Species** | |
| | **Lynx - Grazing use will be in conformance with Canada lynx habitat standards.** |
| 1 | Do not allow livestock use in openings created by fire or timber harvest that would delay successful regeneration of the shrub and tree components. |
| 2 | Manage grazing in aspen stands to ensure sprouting and sprout survival sufficient to perpetuate the long-term viability of the clones. |
| 3 | Within the elevation ranges that encompass forested lynx habitat, shrub-steppe habitats should be considered as integral to the lynx habitat matrix and should be managed to maintain or achieve mid-seral or higher condition. |
| 4 | Within lynx habitat, manage livestock grazing in riparian areas and willow carrs to maintain or achieve mid-seral or higher condition to provide cover and forage for prey species. |
| | **Uncompahgre Fritillary Butterfly** |
| 5 | Prior to turnout on public lands, permittees will ensure herders can identify Uncompahgre Fritillary Butterfly habitat avoidance areas (as applicable). |
| | **Gunnison Sage-grouse – Applies to permits on the Sapinero Mesa and Goose Creek Allotments** |
| 6 | Maintain at least 4" of stubble height (residual material) on hydrophytic plant species (wide-leaved sedges such as beaked sedge, water sedge, rushes, tufted hairgrass, and spikerush) in riparian areas throughout the growing season. |
| 7 | In upland areas that can support GUSG habitat objectives, maintain a grass droop height of at least 4-6" between March 15 and September 28 within four miles of a lek. |
| 8 | If monitoring shows that herbaceous heights are not meeting the terms and conditions of the permit, adaptive monitoring/management in compliance with the framework of actions described on pages 30-33 of the Gunnison Sage-grouse CCA would be implemented. |
| | |
| | **Terms and Conditions to Protect Cultural and Paleontological Resources** |
| 1 | The operator is responsible for informing all persons who are associated with the allotment operations that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. If historic or archaeological materials are uncovered during any allotment activities and grazing activities, the operator is to immediately stop activities in the immediate area of the find that might further disturb such materials, and immediately contact the authorized officer (AO). Within five working days, the AO will inform the operator as to: whether the materials appear eligible for the National Register of Historic Places, and whether there are mitigation measures the operator will likely have to undertake before the identified area can be used for grazing activities again.<br><br>Pursuant to 43 CFR 10.4(g), the holder of this authorization must notify the authorized officer, by telephone, or with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, 18 pursuant to 43 CFR 10.4(c) and (d), anyone must stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the authorized officer.<br><br>If paleontological materials (fossils) are uncovered during allotment activities, the operator is to immediately stop activities that might further disturb such materials, and contact the authorized officer (AO). The operator and the authorized officer will consult and determine the best option for avoiding or mitigating paleontological site damage. |
| 2 | There will be no camps or campfires within 150 feet of historic structures within the Alpine Triangle Recreation Area and 50 feet in all other areas. |
| 3 | Campsites will not be excavated for any reason. |

*Table B-2. Alternative D Additional Terms and Conditions*

| | |
|---|---|
| **Domestic sheep would be allowed to trail across the avoidance area between the Wester Powderhorn and Devils Lake Allotment to access grazing permits on the Forest Service Cannibal Allotment. In addition to the action alternative terms and conditions (Table B-1), the following terms and conditions would be required for this trailing use** | |
| 1 | Any objects or sites of cultural or paleontological value, such as historic or prehistoric resources, graves or grave markers, human remains, ruins, cabins, rock art, fossils, or artifacts shall not be damaged or disturbed. If any such resources are encountered, the permittee shall notify BLM immediately. |
| 2 | There will be no motorized vehicle use. |
| 3 | There will be no overnight stops along the trailing route. |
| 4 | Trailing permit holders will not allow livestock to stray or be left behind in the Cannibal Allotment. |
| 5 | Livestock must be kept moving and not be allowed to stop along the route, particularly in riparian areas and swales. |
| 6 | When moving livestock off existing roads in non-forested areas, trailing will not be authorized until cross-country portions of the route are dry to a depth of two inches below the surface over at least 90% of the route. Cease use of the route or trail if hoof shear up to one inch occurs on 10% or more of the route. |

*Table B-3. No Action Alternative Terms and Conditions*

| | |
|---|---|
| 1 | Grazing use (on the Henson Creek and American Lake Allotments) will be in accordance with the Henson Creek and American Lake AMP's. Grazing use on the American Flats Allotment will be in accordance with an Annual Operating Plan, which will be developed in coordination with the permittee at the annual BLM/USFS sheep permittee coordination meeting. This includes grazing management strategies and trucking and trailing instructions. |
| 2 | Permit holders are required to attend an annual spring driveway meeting to review permits, review project maintenance needs, and set driveway schedules. |
| 3 | Any deviation in livestock numbers or season of use must be approved prior to the grazing period. |
| 4 | Trailing and trucking dates will be set approximately seven days prior to turnout of livestock. |
| 5 | Livestock use for the Henson Creek permit will require that sheep be trucked into and out of Capitol City. Livestock use for the American Lake Permit will require that sheep be trailed into and out of the allotment via the Ridge Stock Driveway. Livestock use on the BLM American Flats and USFS Bear Creek Allotments require that sheep be trailed both to and from the allotments on the Middle Fork Trail. |
| 6 | Off road vehicle use is prohibited on all public lands on the alpine tundra. Vehicles may be used on designated roads as shown on the Gunnison Area Map. |
| 7 | Maintenance of all range facilities on BLM and USFS Allotments is a requirement for holding a permit. |
| 8 | Grazing use will be in compliance with the Gunnison Resource Area RMP. |
| 9 | Actual use must be submitted within 15 days after grazing ends. |
| 10 | All range improvements must be maintained prior to trailing and grazing. |
| 11 | The terms and conditions of your permit may be modified if additional information indicates that revision is necessary to conform with 43 CFR 4180. |
| 12 | Any objects or sites of cultural or paleontological value, such as historic or prehistoric resources, graves or grave markers, human remains, ruins, cabins, rock art, fossils or artifacts shall not be damaged or disturbed. If any such resources are encountered, the permittee must notify the BLM immediately. |
| 13 | Vehicles may be used on designated roads as shown on the Gunnison Resource Area Map. |

# APPENDIX C. ISSUE #1 TECHNICAL SUPPORT DOCUMENT

This technical support document contains additional information about the risk of contact model and detailed analysis tables to support each alternative.

*Model Analysis*

Three models were used to better understand the potential for contact between Rocky Mountain bighorn sheep and domestic sheep allotments in this analysis: (1) Rocky Mountain bighorn sheep source habitat model, (2) core herd home range (CHHR), and (3) a risk-of-contact model (USFS 2013, Carpenter et al. 2014, O'Brien et al. 2014). The risk-of-contact model (RoC) uses Rocky Mountain bighorn sheep source habitat and CHHR to model the probability of foray by bighorn. From that, the risk of a bighorn contacting an allotment is estimated to infer the risk of contact with domestic sheep. The configuration of source habitats, the Rocky Mountain bighorn sheep use of these habitats, and the geographical proximity of Rocky Mountain bighorn sheep to domestic sheep allotments are significant factors in evaluating the potential for contact.

Output from these models were used to describe current conditions on BLM allotments being considered for domestic sheep grazing in this EIS and to understand the risk of disease transmission for each herd (GMU) based on the proposed alternatives, as well as the risk of disease transmission based on the location of domestic sheep grazing in relation to bighorn CHHR. As described in the Contact Section below, the risk of contact and disease transmission depend on the frequency and distance of foray. When there is overlap between bighorn sheep range and domestic sheep grazing, there is already a risk of contact without foray. For those allotments that overlap bighorn sheep range, the estimates for risks must be interpreted with caution because the risks of contact and disease transmission are underestimated (see Contact Section below (Section 3.1.1.2))

The following sections provide an overview of the models including assumptions and limitations. Assumptions were made in making inferences regarding disease transmission and potential outbreaks of disease in bighorn populations in the analysis area. A detailed description of these models can also be found in Rocky Mountain bighorn sheep Risk of Contact Tool User's Guide (USFS 2013) and Appendix L of the Payette National Forest FSEIS (USFS 2010).

*Source Habitat Model*

The summer source habitat model used by the Risk of Contact Tool was primarily developed and tested by Colorado Parks and Wildlife personnel using their extensive statewide Rocky Mountain bighorn sheep telemetry dataset. Source habitats are areas that have key characteristics that contribute to maintenance or growth of a population. The quality and quantity of source habitat ultimately limits the number of bighorn that an area can support. Although source habitat (or alternatively, potential habitat) has key characteristics that comprise Rocky Mountain bighorn sheep habitat, source habitat is not necessarily occupied by Rocky Mountain bighorn sheep.

The summer source habitat model assigns all areas to one of three habitat classes: (1) source (suitable) habitat, (2) connectivity areas, and (3) non-habitat. Connectivity areas do not meet source habitat criteria but are located within 350-meters of source habitat, or 525-meters if it is between two areas of source habitat. Areas of non-habitat do not meet these criteria and are

located more than 350-meters away from source habitat. It is assumed that Rocky Mountain bighorn sheep spend less than 1 percent of their time in these non-habitat areas.

Broad-scale mapping efforts use models to estimate where potential habitat for a species are located. The output is a generalization of where there are key features on the landscape that have been documented to support survival (food, cover, etc.) for that species. Inputs to broad-scale models include remotely acquired spatial data that represent key characteristics of that species' habitat such as vegetation cover-type, elevation, and terrain. Broad-scale habitat mapping process includes assessment for accuracy with location data for that species. It must be recognized that there are significant location-specific details that cannot be incorporated in broad-scale mapping efforts, so there are always discrepancies and potential errors. Areas identified by the model as suitable for Rocky Mountain bighorn sheep are not assumed to be occupied, as suitability does not indicate presence.

*Core Herd Home Range*

The CHHR is defined by the mapped summer activity range polygon of Rocky Mountain bighorn sheep in the analysis area. As provided by CPW (CPW GIS Unit) summer activity range is the portion of the overall range where 90 percent of individual Rocky Mountain bighorn sheep are located between spring green-up and before the first heavy snowfall. Overall range, also utilized in this analysis, encompasses all known seasonal activity areas within the observed range of a bighorn sheep population (CPW GIS Unit). The summer and overall range polygons for these populations were produced through professional knowledge, verified sightings, and surveys from Colorado Parks and Wildlife personnel. Recent telemetry location data collected in RBS-21 are approximating the summer range boundary in S-33 (K. Blecha, personal communication). For this analysis and simplicity of display, GMU boundaries are depicted by the summer activity range (CHHR) boundary (Figure 3.1-A). Summer activity range polygons were used to define CHHR, rather than overall activity range polygons, based on 1) all of the domestic sheep would be grazed during the time period between May and October before bighorn move into their winter range, 2) mapped overall range in this analysis area encompass sightings of foraying bighorns, and thus would not allow foray probability, as defined by Singer et al. (2001), to be mapped as accurately.

There is an important distinction between activity range and habitat: activity range delineates where a population is present during a given time period or season, and habitat is suitable for occupation because there are key characteristics present that support survival and productivity of that species. Within an activity range, population members are most likely to be present within their habitat, but the activity range may contain areas that are not suitable and would be considered non-habitat. Likewise, habitat can be present outside of a population's activity range but the species does not presently occupy that habitat consistently from year to year.

Allotment overlap with CHHR or distance 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.

*Risk of Contact Model*

For analysis of the risk of contact, the BLM used the Risk of Contact (RoC) Tool (USFS 2013, Carpenter et al. 2014, O'Brien et al. 2014), which estimates the probability that a foraying Rocky Mountain bighorn sheep will contact a domestic sheep allotment. The RoC Tool estimates the probability that a foraying Rocky Mountain bighorn sheep will contact a domestic sheep allotment and does not estimate the probability of interspecies contact. The RoC Tool utilizes Rocky Mountain bighorn sheep CHHR, demographic information about each herd, ram and ewe foray rates, summer source habitat model, and domestic sheep allotment boundaries to calculate probabilities that rams and ewes may leave a CHHR, undertake a foray, and subsequently contact a specific domestic sheep allotment. Output from the tool can also be used to calculate the rate of contact between individual bighorns from specific bighorn herds with the domestic sheep allotments.

Stray domestic sheep have been implicated in several die-offs for Rocky Mountain bighorn sheep and in many rangeland settings, strays may pose a risk of disease transmission as large as or greater than from foraying Rocky Mountain bighorn sheep. However, the RoC tool uses the spatial location of the domestic sheep allotments and assumes domestic sheep will be within the allotments. For this reason, the risk of contact tool does not model the risk of stray domestic sheep outside the allotments and the subsequent potential for contact with Rocky Mountain bighorn sheep.

*Foray*

A foray is defined as a Rocky Mountain bighorn sheep leaving its CHHR and then returning (Singer et al. 2001). Forays can occur at any time of the year but movement patterns differ between seasons and are different for rams and ewes. Foray probabilities for rams and ewes used in this analysis were the default probabilities provided by the RoC tool, which were derived from a study of 444 radio-collared Rocky Mountain bighorn sheep during the summer season (May to October) (O'Brien et al. 2014). Foray probabilities used in this analysis represent the probability of foray during the time period that domestic sheep would be grazed and the foray probabilities in the analysis are not the probability of foray during the rut. The frequency and distance of foray movements by rams are much greater during the rut in November/December. The foray frequency used in this analysis is consistent with reports from other areas using similar field techniques (O'Brien et al. 2014).

The RoC tool models the probability of foray based on distance to CHHR and spatial configuration of source habitat on the landscape and outputs a map of the probability of foray. The foray analysis is input to the next step in the RoC tool, the probability of contact between bighorn and domestic sheep allotment.

*Contact*

The risk of contact between foraying Rocky Mountain bighorn sheep and domestic sheep allotments is related to the distance and frequency of Rocky Mountain bighorn sheep forays outside CHHR. This step is the contact analysis using the RoC tool. Contact analysis is affected by (a) the number of Rocky Mountain bighorn sheep in a herd and ram to ewe ratios, (b) foray probability for rams and ewes, and (c) the proximity of a domestic sheep allotment.

When there is overlap between CHHR and a domestic sheep allotment, the risk of contact is not output by the RoC tool because output depends on foray probability, which is not meaningful when contact can occur without foray. Therefore, the results for the risk of contact are assumed to be greatest when there is overlap between CHHR and a domestic sheep allotment but the tool does not provide numerical results. Where there is overlap, it must be recognized the risks are underestimated because there is no output from the model and so a comparison of the risk of contact when there is overlap are not meaningful. For this reason, the number of allotments that overlap with CHHR is presented in the subsequent analyses along with the risk of contact and disease transmission.

The probability of foray increases with an increase in the number of individuals in a herd. We used the default foray probabilities for rams and ewes as defined in the RoC Tool (USFS 2013) (14.1 percent for rams and 1.5 percent for ewes). Herd size and sex ratio were estimated during annual surveys conducted by Colorado Parks and Wildlife in the post-hunt period in 2015 and were input in the RoC tool (Table 3.1-2). Thirty-five kilometers is the maximum observed ram foray distance used in the RoC tool and was the limit of the analysis area (O'Brien et al. 2014). This distance is consistent with recent forays by two separate GPS collared bighorn rams in the analysis area who forayed approximately 20 straight-line miles before returning to their respective home ranges (K. Blecha Pers. Comm.). The RoC model does not account for the number of domestic sheep utilizing the allotment, nor does it account for the amount of time domestic sheep are in any allotment.

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 of a chance of contact with Rocky Mountain bighorn sheep, while others may have a higher probability of occurrence (e.g., source habitats). Because of this uncertainty, potential interspecies contact was modeled using the RoC tool and output was interpreted with the assumption that contact with an allotment may result 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.

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

There is a high degree of uncertainty inferring that contact of a Rocky Mountain bighorn sheep with an allotment will lead to disease outbreak within a herd (USFS 2010, 2013, Carpenter et al. 2014, O'Brien et al. 2014). Quantification of disease transmission and outbreaks in Rocky Mountain bighorn sheep following contact with domestic sheep and the subsequent ability of a population to recover are key to interpreting the results from the models. However, as discussed in section 3.1.1.1, Disease Summary, the mechanisms of disease transmission and resulting disease outbreaks in Rocky Mountain bighorn sheep are complicated and are not fully understood.

The RoC model follows well-documented, peer-reviewed protocols and a logical process. 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 bighorns sheep herds and the science based on the

understanding of disease outbreaks potentially occurring from contact of a Rocky Mountain bighorn sheep within an allotment.

There is uncertainty regarding how many contacts between domestic sheep and Rocky Mountain bighorn sheep result in disease transmission. For this reason, the number of potential disease outbreaks in a given time frame are calculated iteratively using a range of values that assume a different number of contacts between a Rocky Mountain bighorn sheep and a domestic sheep grazing allotment is required for a disease outbreak. Values from 0.05 (1 in 20 contacts would result in disease outbreak) to 1.00 (every contact would result in disease outbreak) are used in the calculation and the minimum and maximum are reported in the effects section for each Alternative.

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

*Straying of Domestic Sheep*

This analysis focuses on interspecies contact resulting from foraying Rocky Mountain bighorn sheep contacting a domestic sheep allotment. However, another concern is the straying of domestic sheep from grazing allotments or while trailing, and potential contact with Rocky Mountain bighorn sheep (USFS 2010, Cahn et al. 2011, Wild Sheep Working Group 2012). The bighorn sheep risk of contact is analyzed using the Risk-of-Contact tool, which uses spatially delineated allotments and probability of bighorn foray based on season of grazing. For this reason, the Risk-of-Contact tool does not model the risk of stray domestic sheep outside the allotments or domestic sheep present during unauthorized periods even though stray domestic sheep may pose a risk of disease transmission.

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

Rocky Mountain bighorn sheep and domestic sheep have a gregarious behavior that increases the potential for interspecies contact and disease transmission. This gregarious behavior may be exacerbated during the rut or breeding period. During the breeding period (the rut) in November/December, the frequency and distance of foray movements by rams in search of

female Rocky Mountain bighorn sheep in estrus are much greater than in other times of the year. In addition, grazing estrous domestic female sheep heightens the attraction and probability of association between Rocky Mountain bighorn sheep and domestic sheep (Wild Sheep Working Group 2012).

## ALTERNATIVES A and B

*Table C-1: Domestic Sheep Grazing Allotments under Alternative B. This table lists the acres and percent of allotment area that is mapped as Rocky Mountain bighorn sheep source habitat and the acres and percent of each allotment that overlaps with Core Herd Home Range (CHHR). See discussion under Model Analysis for distinction between Source Habitat and CHHR.*

| Allotment | Distance (Miles) to Nearest CHHR | Allotment (Acres) | Source BHS Habitat (Acres) | BHS CHHR (Acres) | % Source Habitat | % CHHR |
|---|---|---|---|---|---|---|
| American Lake | 0.0 | 6,675 | 5450 | 248 | 82 | 4 |
| American Flats | 0.0 | 1,643 | 1,333 | 51 | 81 | 3 |
| Henson Creek | 0.0 | 11,933 | 9,315 | 2,476 | 78 | 21 |
| Devils Lake | 4.3 | 9,126 | 5,429 | 0 | 59 | 0 |
| Goose Cr | 0.9 | 2,890 | 1,586 | 0 | 55 | 0 |
| W Powderhorn | 3.1 | 4,317 | 1,898 | 0 | 44 | 0 |
| Sapinero Mesa | 0.0 | 25,604 | 5,333 | 4,613 | 21 | 18 |
| Alpine Plateau | 7.1 | 2,657 | 142 | 0 | 5 | 0 |
| Cox Park | 7.2 | 865 | 18 | 0 | 2 | 0 |

*Table C-2: Modeled Contact Rates between Rocky Mountain Bighorn Sheep and Domestic Sheep Allotments for Alternative B. Results are listed by allotment in order of shortest to longest time between contact between Rocky Mountain bighorn sheep and the allotment. See Section 3.1.1.2 – Contact for more information about interpreting contact rates and predicted disease outbreaks when there is overlap between allotments and CHHR. See Section 3.1.1.2 – Contact for more information about interpreting contact rates and predicted disease outbreaks when there is overlap between allotments and CHHR.*

| Allotment | Annual Rate of Herd Contact w/ Allotment[1] | Years Between Contact (between BHS and the Allotment)[1] | Years between Potential Disease Events[1,2] |
|---|---|---|---|
| Henson Creek* | 0.73 | 1.4 | 1 - 28 |
| American Lake* | 0.44 | 2.3 | 2 - 45 |
| Sapinero Mesa* | 0.33 | 3.0 | 3 - 60 |
| American Flats* | 0.18 | 5.5 | 5 - 109 |
| Devils Lake | 0.43 | 2.3 | 2 - 47 |
| W Powderhorn | 0.35 | 2.9 | 3 - 57 |
| Goose Cr | 0.19 | 5.4 | 5 - 108 |
| Alpine Plateau | 0.05 | 21.2 | 21 - 423 |

| Allotment | Annual Rate of Herd Contact w/ Allotment[1] | Years Between Contact (between BHS and the Allotment)[1] | Years between Potential Disease Events[1,2] |
|---|---|---|---|
| Cox Park | 0.01 | 119.7 | 120 – 2,393 |

[1]For allotments that overlap with CHHR, predicted bighorn sheep contacts with an allotment would be greater than values shown, and years between contacts would be less than the value shown, because allotments that overlap with CHHR may have one or more predicted annual contacts per year. Allotments that overlap with CHHR are noted with an asterix. Results are summarized from model output, which does not provide output where there is overlap. Assuming at least one contact per year where there is overlap, the number of allotments that overlap should be considered as adding significant risk to the predicted number of contacts.

[2]The values modeled include 0.05 and 1.00 (see Model Analysis section). The low values for the potential disease events assume that 1 in 20 contacts with a domestic sheep allotment results in disease outbreak and the high values assume each contact with a domestic sheep allotment results in disease outbreak. Using a range of values captures the uncertainty regarding the number of contacts between bighorn and domestic sheep allotments that result in disease transmission.

*Table C-3: Model Results and Predicted Effects on Rocky Mountain Bighorn Sheep Herds in the Planning Area from Alternative B. Results are sorted by risk based on total herd contact rates where herds that are at the highest risk are listed at the top of the table. See Section 3.1.1.2 – Contact for more information about interpreting contact rates and predicted disease outbreaks when there is overlap between allotments and CHHR.*

| DAU | GMU | Herd | Distance (Miles) from Nearest Domestic Sheep Allotment | Nearest Allotment | Total Herd Contact Rate[1] (# Allotments Overlap CHHR)[1] | Predicted Disease Outbreaks / 50-years[1,2] |
|---|---|---|---|---|---|---|
| RBS-21 | S21 | Cow Creek / Wetterhorn Peak | 0.0 | American Lake, American Flats | 0.76 (2) | 1.9 - 38.1 |
| RBS-21 | S33 | Lake Fork / Pole Mountain | 0.0 | Henson Creek | 0.76 (1) | 1.9 - 37.8 |
| RBS-30 | S81 | Lower Lake Fork Gunnison River | 0.0 | Sapinero Mesa | 0.11 (1) | 0.3 - 5.6 |
| RBS-22 | S52 | Rock Creek | 3.1 | W. Powderhorn | 0.42 | 1.1 – 21.0 |
| RBS-25 | S54 | Dillon Mesa | 0.3 | Sapinero Mesa | 0.33 | 0.8 - 16.4 |
| RBS-22 | S53 | Bristol Head | 11.5 | Henson Creek | 0.12 | 0.3 - 5.8 |
| RBS-22 | S22 | San Luis Peak | 7.4 | W. Powderhorn | 0.11 | 0.3 - 5.4 |
| RBS-28 | S71 | West Needles | 11.1 | Henson Creek | 0.07 | 0.2 - 3.5 |
| RBS-27 | S69 | Cochetopa | 16.7 | Sapinero Mesa | 0.02 | 0.1 - 1.1 |
| RBS-22 | S36 | Bellow's Creek | 17.1 | W. Powderhorn | 0.00 | 0.0 - 0.2 |
| RBS-23 | S2670 | Taylor River / Fossil Ridge | 21.4 | Sapinero Mesa | 0.00 | 0 - 0 |
| RBS-20 | S16 | Cimarron Peak | 22.1 | Henson Creek | 0.00 | 0 - 0 |
| RBS-20 | S28 | Vallecito | 21.9 | Henson Creek | 0.00 | 0 - 0 |
| | Total | | | | 2.70 | |

[1]Total Herd Contact Rate is the number of adult bighorn sheep (rams plus ewes) expected to foray from the CHHR and contact a domestic sheep allotment in a year. Predicted contacts and disease outbreaks would be greater than the output when there is CHHR overlap because the allotments may have one or more predicted annual contacts per year. Results are summarized from model output, which does not provide output where there is overlap. Assuming at least one contact per year where there is overlap, the number of allotments that overlap

| DAU | GMU | Herd | Distance (Miles) from Nearest Domestic Sheep Allotment | Nearest Allotment | Total Herd Contact Rate[1] (# Allotments Overlap CHHR)[1] | Predicted Disease Outbreaks / 50-years[1,2] |
|---|---|---|---|---|---|---|

should be considered as adding significant risk to the predicted number of contacts. Where there is overlap with a population, the number of allotments that overlap are provided in parentheses.

[2]The values modeled include 0.05 and 1.00 (see Model Analysis section). The low values for the predicted disease outbreaks assume that 1 in 20 contacts with a domestic sheep allotment results in disease outbreak and the high values assume each contact with a domestic sheep allotment results in disease outbreak. Using a range of values captures the uncertainty regarding the number of contacts between bighorn and a domestic sheep allotment that result in disease transmission.

## ALTERNATIVE C

*Table C-4: Domestic Sheep Grazing Allotments under Alternative C. This table lists the acres and percent of allotment area that is mapped as Rocky Mountain bighorn sheep source habitat and the acres and percent of each allotment that overlaps with Core Herd Home Range (CHHR). See discussion under Model Analysis for distinction between Source Habitat and CHHR.*

| Allotment | Distance (Miles) to Nearest CHHR | Pasture (Acres) | Source BHS Habitat (Acres) | BHS CHHR (Acres) | % Source Habitat | % CHHR |
|---|---|---|---|---|---|---|
| American Lake | 0.0 | 6,427 | 5,223 | 0 | 81 | 0 |
| American Flats | 0.0 | 1,592 | 1,281 | 0 | 80 | 0 |
| Henson Creek | 0.0 | 8,565 | 6,489 | 0 | 76 | 0 |
| Devils Lake | 4.4 | 9,126 | 5,429 | 0 | 57 | 0 |
| Goose Cr | 0.9 | 2,890 | 1,586 | 0 | 55 | 0 |
| W Powderhorn | 3.1 | 4,317 | 1,898 | 0 | 44 | 0 |
| Sapinero Mesa | 0.0 | 20,440 | 3,006 | 0 | 15 | 0 |
| Alpine Plateau | 7.1 | 2,657 | 142 | 0 | 5 | 0 |
| Cox Park | 7.2 | 865 | 18 | 0 | 2 | 0 |

*Table C-5: Modeled Contact Rates between Rocky Mountain Bighorn Sheep and Domestic Sheep Allotments for Alternative C. Results are listed by allotment in order of shortest to longest time between contact between Rocky Mountain bighorn sheep and the allotment.*

| Allotment | Annual Rate of Herd Contact w/ Allotment | Years between Contact (between BHS and the Allotment) | Years between Potential Disease Events[1] |
|---|---|---|---|
| Henson Creek | 1.41 | 0.7 | 1 - 14 |
| American Lake | 0.93 | 1.1 | 1 - 22 |
| American Flats | 0.64 | 1.6 | 2 - 31 |
| Devils Lake | 0.42 | 2.4 | 2 - 47 |
| Sapinero Mesa | 0.37 | 2.7 | 3 - 54 |
| W Powderhorn | 0.35 | 2.9 | 3 - 58 |
| Goose Cr | 0.19 | 5.4 | 5 - 108 |
| Alpine Plateau | 0.05 | 21.2 | 21 - 423 |
| Cox Park | 0.01 | 119.7 | 120 – 2,393 |

[1]The values modeled include 0.05 and 1.00 (see Model Analysis section). The low values for the potential disease events assume that 1 in 20 contacts with a domestic sheep allotment results in disease outbreak and the high values assume each contact with a domestic sheep allotment results in disease outbreak. Using a range of values captures the uncertainty regarding the number of contacts between bighorn and domestic sheep allotments that result in disease transmission.

*Table C-6: Modeled Contact Rates between Rocky Mountain Bighorn Sheep and Domestic Sheep Allotments for Alternative C. Results are sorted by risk based on total herd contact rates where herds that are at the highest risk are listed at the top of the table.*

| DAU | GMU | Herd | Distance (Miles) from Nearest Domestic Sheep Allotment | Nearest Allotment | Total Herd Contact Rate[1] | Predicted Disease Outbreaks / 50-years[2] |
|---|---|---|---|---|---|---|
| RBS-21 | S21 | Cow Creek / Wetterhorn Peak | 0.0 | American Flats, American Lake | 1.78 | 4.6 - 91.84<br>4 - 88.9 |
| RBS-21 | S33 | Lake Fork / Pole Mountain | 0.0 | Henson Creek | 1.45 | 3.6 - 72.3 |
| RBS-22 | S52 | Rock Creek | 3.1 | W. Powderhorn | 0.42 | 1.0 – 21.0 |
| RBS-25 | S54 | Dillon Mesa | 0.3 | Sapinero Mesa | 0.26 | 0.6 - 11.0 |
| RBS-30 | S81 | Lower Lake Fork Gunnison River | 0.0 | Sapinero Mesa | 0.22 | 0.6 - 11.7 |
| RBS-22 | S22 | San Luis Peak | 7.4 | W. Powderhorn | 0.11 | 0.3 - 5.4 |
| RBS-22 | S53 | Bristol Head | 11.5 | Henson Creek | 0.10 | 0.3 - 5.2 |
| RBS-27 | S69 | Cochetopa | 16.7 | Sapinero Mesa | 0.02 | 0.1 - 1.1 |
| RBS-28 | S71 | West Needles | 11.1 | Henson Creek | 0.00 | 0 - 0.2 |
| RBS-22 | S36 | Bellow's Creek | 17.1 | W. Powderhorn | 0.00 | 0 - 0.2 |
| RBS-23 | S2670 | Taylor River / Fossil Ridge | 21.4 | Sapinero Mesa | 0.00 | 0 - 0 |
| RBS-20 | S16 | Cimarrona Peak | 22.3 | Henson Creek | 0.00 | 0 - 0 |
| RBS-20 | S28 | Vallecito | 21.9 | Henson Creek | 0.00 | 0 - 0 |
| | Total | | | | 4.37 | |

[1]Total Herd Contact Rate is the number of adult Rocky Mountain bighorn sheep (rams plus ewes) expected to foray from the CHHR and contact a domestic sheep allotment in a year.

[2]The values modeled include 0.05 and 1.00 (see Model Analysis section). The low values for the predicted disease outbreaks assume that 1 in 20 contacts with a domestic sheep allotment results in disease outbreak and the high values assume each contact with a domestic sheep allotment results in disease outbreak. Using a range of values captures the uncertainty regarding the number of contacts between bighorn and a domestic sheep allotment that result in disease transmission.

## ALTERNATIVE D

*Table C-7: Domestic Sheep Grazing Allotments under Alternative D. This table lists the acres and percent of allotment area that is mapped as Rocky Mountain bighorn sheep source habitat and the acres and percent of each allotment that overlaps with Core Herd Home Range. See discussion under Model Analysis for distinction between Source Habitat and CHHR.*

| Allotment | Distance (Miles) to Nearest CHHR | Pasture (Acres) | Source BHS Habitat (Acres) | BHS CHHR (Acres) | % Source Habitat | % CHHR |
|---|---|---|---|---|---|---|
| Goose Cr | 0.9 | 2,890 | 1,586 | 0 | 55 | 0 |
| W Powderhorn | 3.1 | 4,076 | 2,000 | 0 | 49 | 0 |
| Devils Lake | 6.7 | 4,214 | 1,639 | 0 | 39 | 0 |
| Sapinero Mesa | 0.0 | 19,946 | 2,871 | 0 | 14 | 0 |
| Alpine Plateau | 7.1 | 2,657 | 142 | 0 | 5 | 0 |
| Cox Park | 7.2 | 865 | 18 | 0 | 2 | 0 |

*Table C-8: Modeled Contact Rates between Rocky Mountain Bighorn Sheep and Domestic Sheep Allotments for Alternative D. Results are listed by allotment in order of shortest to longest time between contact between Rocky Mountain bighorn sheep and the allotment.*

| Allotment | Annual Rate of Herd Contact with Allotment | Years between Contact (between BHS and the Allotment) | Years between Potential Disease Events[1] |
|---|---|---|---|
| W Powderhorn | 0.39 | 2.6 | 3 - 51 |
| Sapinero Mesa | 0.36 | 2.8 | 3 - 55 |
| Devils Lake | 0.19 | 5.3 | 5 - 105 |
| Goose Cr | 0.19 | 5.4 | 5 - 108 |
| Alpine Plateau | 0.05 | 21.2 | 21 - 423 |
| Cox Park | 0.01 | 119.9 | 120 – 2,399 |

[1]The values modeled include 0.05 and 1.00 (see Model Analysis section). The low values for the potential disease events assume that 1 in 20 contacts with a domestic sheep allotment results in disease outbreak and the high values assume each contact with a domestic sheep allotment results in disease outbreak. Using a range of values captures the uncertainty regarding the number of contacts between bighorn and domestic sheep allotments that result in disease transmission.

*Table C-9: Modeled Contact Rates between Rocky Mountain Bighorn Sheep and Domestic Sheep Allotments for Alternative D. Results are sorted by risk based on total herd contact rates where herds that are at the highest risk are listed at the top of the table.*

| DAU | GMU | Herd | Distance (Miles) from Nearest Domestic Sheep Allotment | Nearest Allotment | Total Herd Contact Rate[1] | Predicted Disease Outbreaks / 50-years[2] |
|---|---|---|---|---|---|---|
| RBS-22 | S52 | Rock Creek | 3.1 | W. Powderhorn | 0.4 | 0.9 - 18.8 |
| RBS-25 | S54 | Dillon Mesa | 0.3 | Sapinero Mesa | 0.3 | 0.6 - 13.0 |
| RBS-30 | S81 | Lower Lake Fork Gunnison River | 0.0 | Sapinero Mesa | 0.2 | 0.5 – 10.3 |
| RBS-21 | S21 | Cow Creek / Wetterhorn Peak | 10.7 | Alpine Plateau | 0.1 | 0.2-4.5 |
| RBS-21 | S33 | Lake Fork / Pole Mountain | 6.6 | W. Powderhorn | 0.1 | 0.4 - 7.1 |
| RBS-22 | S22 | San Luis Peak | 7.4 | W. Powderhorn | 0.1 | 0.1 - 2.8 |
| RBS-22 | S53 | Bristol Head | 11.5 | W. Powderhorn | 0.0 | 0.1 - 1.5 |
| RBS-27 | S69 | Cochetopa | 16.7 | Sapinero Mesa | 0.0 | 0.1 - 1.1 |
| RBS-22 | S36 | Bellow's Creek | 17.1 | W. Powderhorn | 0.0 | 0 - 0.1 |
| RB-23 | S2670 | Taylor River / Fossil Ridge | 21.4 | Sapinero Mesa | 0.0 | 0 - 0 |
| RBS-20 | S16 | Cimarron Peak | 29.8 | W. Powderhorn | 0.0 | 0 - 0 |
| RBS-20 | S28 | Vallecito | 34.6 | W. Powderhorn | 0.0 | 0 - 0 |
| RBS-28 | S71 | West Needles | 30.9 | W. Powderhorn | 0.0 | 0 - 0 |
| | Total | | | | 1.2 | |

[1]Total Herd Contact Rate is the number of adult Rocky Mountain bighorn sheep (rams plus ewes) expected to foray from the CHHR and contact a domestic sheep allotment in a year.

[2]The values modeled include 0.05 and 1.00 (see Model Analysis section). The low values for the predicted disease outbreaks assume that 1 in 20 contacts with a domestic sheep allotment results in disease outbreak and the high values assume each contact with a domestic sheep allotment results in disease outbreak. Using a range of values captures the uncertainty regarding the number of contacts between bighorn and a domestic sheep allotment that result in disease transmission.

# APPENDIX D. COMPARISON OF ALTERNATIVES

*Table D-1: Comparison of Alternatives*

| Alternative Comparison Table<br>Gunnison Field Office Domestic Sheep Grazing EIS | | | | | |
|---|---|---|---|---|---|
| | **Alternative A** | **Alternative B** | **Alternative C** | **Alternative D** | **Alternative E** |
| | **(Proposed Action) Permittee Applications** | **(No Action) Current Permitted Use** ***Baseline*** | **Domestic Sheep/Goat Grazing Authorized Outside Bighorn Summer Range** | **Domestic Sheep And Goat Grazing Authorized Outside Overall Range** | **No Livestock Grazing** |
| **Allotments Authorized for Domestic Sheep Grazing** | **9** | **9** | **9** | **6** | **0** |
| ****Pastures Authorized** | **34** | **34** | **29** | **13** | **0** |
| **AUMs Authorized for Domestic Sheep and Goat Grazing** | **3,270** | **2,951** | **3,270** | **1,900** | **0** |
| **Bighorn sheep summer range overlap acres** | **8,831** | **8,831** | **0** | **0** | **0** |
| **Bighorn sheep overall range overlap acres** | **31,058** | **31,058** | **22,227** | **0** | **0** |
| **Jobs Lost (-) or Gained (+)** | **+2 to +3 jobs** | **N/A** | **+2 to +3 jobs** | **-7 to -9 jobs** | **-18 to -24 jobs** |

** For the purpose of comparison between alternatives, pasture locations and names for Alternatives A and B would be the same as Alternatives C and D.