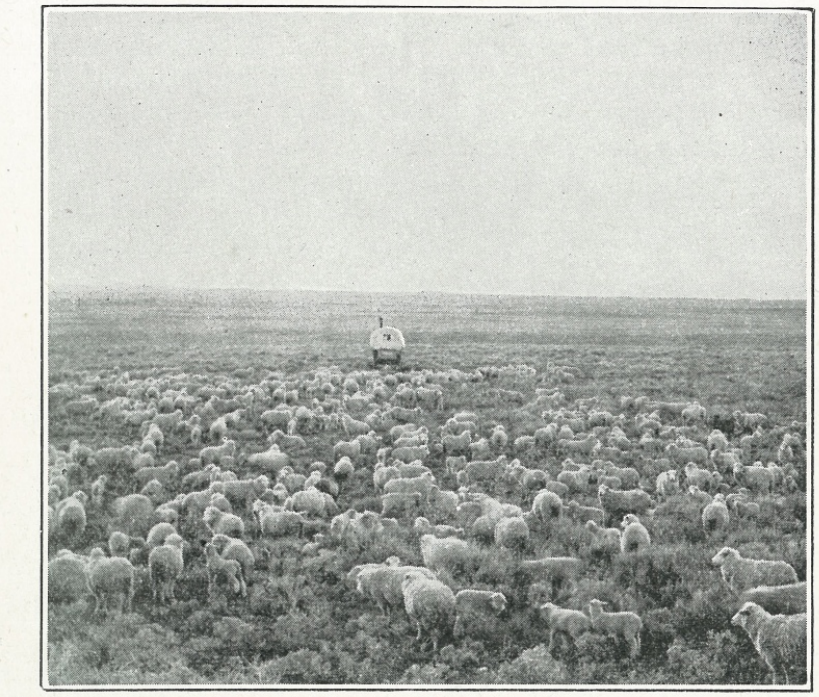
United States Department of Agriculture

U.S. Sheep Experiment Station Grazing and Associated Activities Project 2016

Revised Draft Environmental Impact Statement



Sheep on the range, United States Sheep Experiment Station, in Idaho

Horlacher, Levi J. and Hammonds, Carsie, 1936. Sheep. Published by The Commercial Printing Company, Lexington, KY. 305 pages. The photo appears on page 5.

Agricultural Research Service | **U.S. Sheep Experiment Station** | **Dubois, Clark County, Idaho**

March, 2016

Where is this project in the NEPA process?

NEPA is a decision-making process. An acronym for the National Environmental Policy Act of 1969, NEPA provides opportunities for interested parties to give their ideas and opinions about federal actions. The following explains the steps of the NEPA process, and where the attached proposal is in that process.

_____ *Step One - Need for a Project*

The Agricultural Research Service or some other entity may identify the need for a project.

_____ *Step Two - Develop Project Proposal*

The Agricultural Research Service or a project proponent develops detailed, site-specific proposal.

____ *Step Three - Scoping (Public Input)*

The Agricultural Research Service solicits public input on the site-specific proposal to define the scope of environmental analysis and range of alternatives to be considered.

_____ *Step Four - Develop Reasonable Range of Alternatives*

Agricultural Research Service develops alternatives that meet the purpose and need identified for the project.

Step Five – Information for Formal Public Comment Period

Agricultural Research Service performs analysis of environmental effects, identifies preferred alternative, and *may* solicit formal public comment.

_____ *Step Six – Environmental Analysis & Decision*

Agricultural Research Service finalizes the environmental analysis and makes decision to implement one of the alternatives.

_____ *Step Eight - Implementation*

Agricultural Research Service implements the project.

_____ *Step Nine - Monitor and Evaluate*

Agricultural Research Service monitors and evaluates project results.

U.S. Sheep Experiment Station Grazing and Associated Activities Project 2016

Revised Draft Environmental Impact Statement

Lead Agency:	**USDA Agricultural Research Service**
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Abstract: The Agricultural Research Service US Sheep Experiment Station, Dubois, ID, conducts research activities to develop integrated methods for increasing production efficiency of sheep and simultaneously to improve the sustainability of rangeland ecosystems. In order to achieve theses research goals and objectives the Sheep Station is considering the following alternatives:

- Modified Alternative 1 - Proposed Action – No New Federal Action: **Preferred Alternative**. This alternative proposes no new federal action, just a continuation of the historical and ongoing grazing and associated activities necessary to achieve the mission of the station. Grazing currently occurs on Headquarters pastures, Henninger and Humphrey Ranches, and East and West Summer Ranges. In addition, the following Forest Service allotments are utilized: Snakey-Kelly, East Beaver, and Meyers Creek.
- Alternative 2 – No Grazing Alternative: No grazing would occur on any of the current project lands, The University of Idaho would dispose of all sheep or seek alternative lands outside the scope of this project.
- Modified Alternative 3 – Grazing would not occur on the East Summer, West Summer, and Humphrey Pastures east of Beaver Creek, as well as on the following allotments: East Beaver and Meyers Creek.
- Modified Alternative 4 – Grazing would not occur on the East Summer Range as well as on the Meyers Creek Allotment.
- Modified Alternative 5 –Grazing would not occur on the Snakey-Kelly allotments.

It is important that reviewers provide their comments at such times and in such a way that they are useful to the Agency's preparation of the EIS. Therefore, comments should be provided prior to the close of the comment period and should clearly articulate the reviewer's concerns and contentions. The submission of timely and specific comments can affect a reviewer's ability to participate in subsequent administrative or judicial review.

Comments received in response to this solicitation, including names and addresses of those who comment, will be part of the public record for this proposed action. Comments submitted anonymously will be accepted and considered; however, anonymous comments will not provide the respondent with standing to participate in subsequent administrative or judicial review.

Submit Comments Electronically at:	**https://cara.ecosystem-management.org/Public/CommentInput?project=NP-392**
Subject Line:	**USSES 2016 Revised DEIS Public Comments**
Date by which Comments Must Be Received:	**45 days from the publication of the Notice of Availability in the Federal Register**

Summary

USDA, Agricultural Research Service, US Sheep Experiment Station (Sheep Station) in Dubois, Idaho proposes to continue historical and ongoing grazing and associated activities in order to achieve their mission of research goals and objectives (to develop integrated methods for increasing production efficiency of sheep and simultaneously to improve the sustainability of rangeland ecosystems). The sheep research station (Headquarters, Henninger and Humphrey Ranches) is located in the Upper Snake River Plain, approximately six miles north of Dubois, Idaho, which is the Clark County seat. The East and West Summer Ranges are in the Centennial Mountains of Montana (Beaverhead County). Through memoranda of understanding, the Sheep Station also utilizes the Mudlake Feedlot (Department of Energy) and four allotments in the Caribou-Targhee National Forest: Meyers Creek, East Beaver Creek, Snakey Canyon, and Kelly Canyon (Forest Service). The Sheep Station also previously utilized, but no longer utilizes, the Bernice allotment under the jurisdiction of the Bureau of Land Management (Department of Interior).

The project area includes:

- 27,930 acres of ARS property at Headquarters, which has office, laboratory, animal, equipment, and residential buildings, dry-lot facilities for research throughout the year, lambing facilities, and lands used for spring and autumn grazing and rangeland research;
- Approximately 16,600 acres of Agricultural Research Service property in the Centennial Mountains of Montana, which is used for summer grazing and rangeland research;
- 2,600 acres of ARS property at the Humphrey Ranch in Idaho, which is near Monida, Montana, has animal facilities and equipment buildings, and is used for spring, summer, and autumn grazing and rangeland research; and
- 1,200 acres of ARS property at the Henninger Ranch near Kilgore, Idaho, which has animal facilities and is used for summer grazing and rangeland research.

The lands range in elevation from approximately 4,800 feet to nearly 10,000 feet, with average annual precipitation that ranges from approximately 10 inches in the Snake River plain to greater than 21 inches in the Centennial Mountains. Because of its diverse geography, the Sheep Station has lands that contain subalpine meadow, foothill, sagebrush steppe, and desert shrubland ecosystems. This diversity provides unparalleled research opportunities within the Agricultural Research Service.

This project was undertaken to maintain compliance of operations at the Sheep Experiment Station with the National Environmental Policy Act. On November 28, 2008, Dr. Andrew Hammond, Agricultural Research Service, Pacific West Area Director, signed the *Decision Notice for the Interim U.S. Sheep Experiment Station Grazing and Associated Activities Project Environmental Assessment* (USDA 2008). This decision allowed the Sheep Station to continue historical and ongoing grazing operations through March 2010, the time estimated to prepare a longer term environmental assessment of our grazing and associated activities project.

On September 21, 2009, the Federal District Court in Missoula issued an order enjoining and vacating the delisting of the Greater Yellowstone Area grizzly population. Under this order, the Yellowstone grizzly population is once again a threatened population under the Endangered Species Act. At the time of the relisting of the grizzly, the Agricultural Research Service was in the process of preparing an environmental assessment for sheep grazing and associated activities that to be carried out on Agricultural Research Service Sheep Station properties in Idaho and Montana. To maintain compliance with the National Environmental Policy Act during the preparation of the Environmental Impact Statement, the

Agricultural Research Service issued a new interim decision (March 31, 2010) on sheep grazing based on the *Interim U.S. Sheep Experiment Station Grazing and Associated Activities Project Environmental Assessment* (2008) as amended by the *Supplemental Information Report* (March 2010). The *Supplemental Information Report* contains analysis and data gathered during the preparation of the *U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009* draft environmental assessment which was issued for public comment December 14, 2009 – January 25, 2010.

Following public comment on the draft environmental impact statement analysis, the Sheep Station lost the use of the DOI, BLM, Bernice Allotment. This revised draft environmental impact statement analysis includes the modifications to alternatives 1, 3, 4, and 5 necessitated by that change and updates the draft environmental impact statement with more current information.

Public involvement included Scoping and 30-day comment on the Interim EA and 2009 EA, as well as Scoping for this DEIS. Public concerns voiced during the preparation of the original Interim EA, and restated through subsequent public involvement, were used to develop the following alternatives to the proposed action (modified alternative 1) including:

- Modified Alternative 1 – Modified Proposed Action – No New Federal Action: **Preferred Alternative**. This alternative proposes no new federal action, just a continuation of the historical and ongoing grazing and associated activities necessary to achieve the mission of the station. Grazing currently occurs on Headquarters pastures, Henninger and Humphrey Ranches, and East and West Summer Ranges. In addition, the following Forest Service allotments are utilized: Snakey-Kelly, East Beaver, and Meyers Creek.
- Alternative 2 - No Grazing Alternative: Alternative 2 was developed in response to the public suggestion that sheep grazing be eliminated completely from the Sheep Station operation. Grazing would not occur on any of the ARS lands or allotments. The University of Idaho would dispose of the sheep or seek alternative lands outside of this project.
- Modified Alternative 3 - Developed in response to the public suggestion that grazing be eliminated in the Centennial Mountains. No grazing would occur on the East Summer Range, West Summer Range, and Humphrey Ranch east of Beaver Creek, as well as on the following allotments: East Beaver and Meyers Creek. Grazing would continue to occur on Headquarters, Henninger Ranch, Humphrey Ranch west of Beaver Creek, and the Snakey-Kelly allotments.
- Modified Alternative 4 – Developed in response to the public suggestion that grazing be eliminated adjacent and within in the grizzly bear primary conservation area. No grazing would occur on the East Summer Range as well as on the Meyers Creek Allotment. Grazing would continue to occur on Headquarters, Henninger Ranch, Humphrey Ranch, West Summer Range, and Snakey-Kelly and East Beaver allotments.
- Modified Alternative 5 –Developed in response to the public suggestion that grazing be eliminated to avoid areas that are near bighorn sheep range. No grazing would occur on the Snakey-Kelly Allotments. Grazing would continue to occur on Headquarters, Henninger Ranch, Humphrey Ranch, East and West Summer Range, Myers Creek allotment, and East Beaver allotment.

The Sheep Station is managed to meet Agriculture Research Service and USDA goals as defined in the National Programs (NP 101 and NP 215). While the proposed action is designed to continue to meet these objectives, the alternatives that reduce sheep herds or grazing areas, reduce the Sheep Station's ability to meet those goals and provide useful research. Alternatives 2 and 3 reduce sheep grazing to such an extent that the goals and objectives of the Sheep Station would not be met.

An interdisciplinary team of resource specialists reviewed project area resources and the proposed action and alternatives to identify environmental consequences of the proposed action. Overall, ongoing Sheep Station operations have had limited or no impact on range, soil, botany, and water resources due to the low utilization rates and sustainable grazing systems used. However, for a few species of sensitive wildlife, the project may cause some limited effects. Pursuant to the endangered species act, the analysis determined that for alternatives 1, 4, and 5 the project may affect, but is not likely to adversely affect the grizzly bear, while those alternative that do not use the summer range areas (alternatives 2 and 3) would have no effect. Effects to grizzly bear are reduced by the application of Conservation Measures. There are no direct effects to bighorn sheep expected as a result of any of the alternatives, however, the potential for the Snakey-Kelly allotments to serve as a vector for disease transmission is reduced under alternatives 2 and 5 (though an actual change is not measureable/observable). Finally, it is anticipated that there would be limited disturbance to sage-grouse, with alternative 3 having the most disturbance due to greater use of the Headquarters and Henninger Ranch. However, there also may be some habitat benefits for this species as a result of the alternatives. Finally, the alternatives would result in no change in project area income or economic conditions.

Dr. Andrew Hammond is the Agricultural Research Service official responsible for deciding whether or not to select this action as proposed, or select one of the alternatives described above. The decision to be made by Dr. Hammond is whether to continue the historical and ongoing grazing and associated activities at the U.S. Sheep Experiment Station in Dubois, Idaho, in support of their mission or whether to modify these activities in any way.

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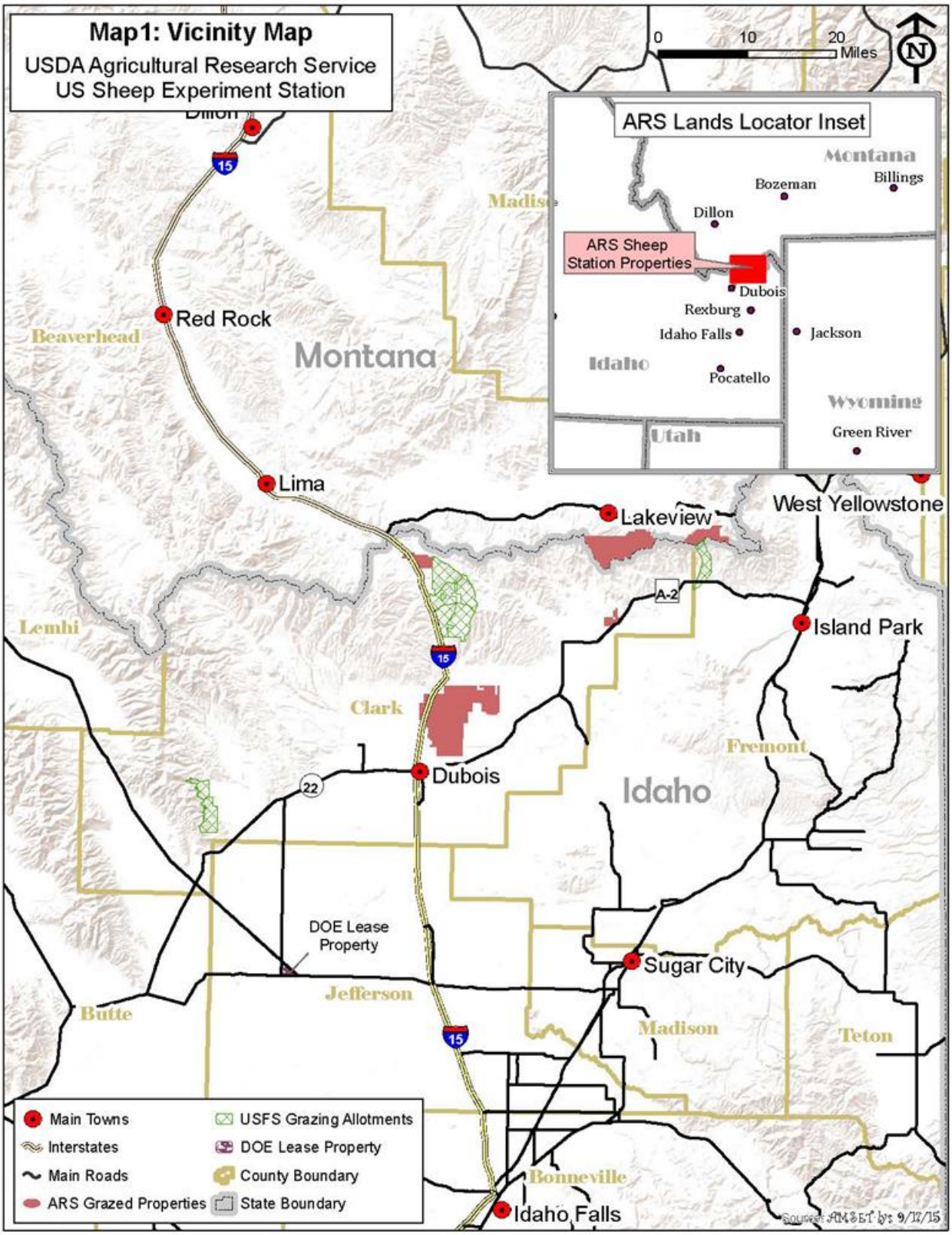

Figure 1. Vicinity Map

Chapter 1 – Purpose and Need for Action

The U.S. Department of Agriculture, Agricultural Research Service (ARS) has prepared this Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant federal laws and regulations. This Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

- *Chapter 1. Purpose of and Need for Action:* The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded. Finally this chapter describes the significant issues identified during scoping.
- *Chapter 2. Alternatives, including the Proposed Action:* This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Chapter 3. Affected Environment and Environmental Consequences:* This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resources of most concern from public comments (range, wildlife, and connectivity) followed by the other resources analyzed.
- *Chapter 4. Consultation and Coordination:* This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental impact statement.
- *Index:* The index provides page numbers by document topic.

Additional documentation, including more detailed analyses of project-area resources, may be found in the draft specialist reports posted to the ARS website (http://www.ars.usda.gov/News/docs.htm?docid=17878) along with this DEIS.

At a Glance: Proposed Project Activities Summary

Who: USDA, Agricultural Research Service, U.S. Sheep Experimental Station, DuBois, Idaho,

Why: The U.S. Sheep Experimental Station proposes certain activities to continue research and to implement its goals and objectives. This analysis compares the proposed action and alternatives and discloses the environmental consequences of these alternatives pursuant to the National Environmental Policy Act.

What: Continue Sheep Station activities or modify these activities. Activities include: sheep grazing, sheep trail and driveway use and maintenance, stock water operations, camp tending, maintenance and repair of existing permanent fence, maintenance and repair of existing roads and fire breaks, range improvement, cattle and horse grazing, predator avoidance and abatement, and integrated pest management. (See pages 13-33 for detailed descriptions)

Where: Agricultural Research Service lands in Idaho and Montana and lands of other ownership utilized for Station operations (USDA Forest Service allotments and Department of Energy lands) (See pages 5-4 for detailed descriptions).

When: A decision is expected in spring 2016 and implementation is scheduled to begin in the summer 2016

Who is proposing the project and why is the project being proposed?

This project is being proposed by the USDA, Agricultural Research Service (ARS), U.S. Sheep Experiment Station (Sheep Station), Dubois, Idaho. The purpose of the proposed action is to achieve the research goals and objectives of the Sheep Station described in the Purpose and Need section (page 7); which are to develop integrated methods for increasing production efficiency of sheep and simultaneously improve the sustainability of rangeland ecosystems. In pursuit of these goals and objectives, the Sheep Station staff has conducted sheep grazing operations on Sheep Station property and other permitted allotments for more than 90 years. The Sheep Station proposes to continue sheep grazing and associated activities currently occurring on Sheep Station properties, U.S. Forest Service allotments, and a feedlot on Department of Energy land (proposed action) (all document maps are located in Appendix A – Project Maps). Pursuant to the National Environmental Policy Act, this analysis is necessary to analyze and disclose the environmental impacts of the various action alternatives under consideration prior to making a decision about how to administer Agricultural Research Station lands and how to implement the mission of the Sheep Station.

What is the project history to date?

The project is being proposed to respond to the Settlement Agreement[1] (December, 2007) reached in the lawsuit Center For Biological Diversity, and Western Watersheds Project v. U.S. Sheep Experiment Station; U.S. Department Of Agriculture; Agricultural Research Service; and U.S. Forest Service.

1. The U.S. Agricultural Research Service agreed to prepare an “environmental assessment” (“EA”) or “environmental impact statement” (“EIS”), pursuant to the National Environmental Policy Act

[1] The settlement agreement was signed by plaintiffs on 020/4/08, signed by Department of Justice on 02/12/08, filed by stipulation on 02/13/08, and the court issued an order approving the stipulated settlement agreement on 02/19/08.

("NEPA"), regarding the grazing of sheep and related activities on U.S. Sheep Experiment Station lands in a settlement agreement.

2. The USDA, Agricultural Research Service agreed to consult with the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act regarding the grazing of sheep and related activities on U.S. Sheep Experiment Station lands. The USDA, Agricultural Research Service agreed to work with the U.S. Fish and Wildlife Service in a good faith effort to complete the consultation prior to issuance of a Decision Notice or Record of Decision

The Sheep Station used a two-phased approach to implement this agreement. The first phase included an environmental assessment for the *Interim USSES Grazing and Association Activities Project* that covered Sheep Station activities for the time necessary to complete the second phase. The second phase is an environmental analysis that looks at the long-term effects of sheep grazing and associated activities on the ARS lands that have historically occurred and are ongoing in support of research projects.

Phase 1 – Environmental Assessment and Interim Decision Notice (2008)

On November 28, 2008, Dr. Andrew Hammond, Agricultural Research Service, Pacific West Area Director, signed the *Decision Notice for the Interim U.S. Sheep Experiment Station Grazing and Associated Activities Project Environmental Assessment* (USDA 2008). This decision allowed us to continue historical and ongoing grazing operations through March 2010, the time estimated to prepare a longer term environmental assessment of our grazing and associated activities project.

Phase 2 – 2009 Environmental Assessment, Supplemental Information Report and Interim Decision Notice 2010

On September 21, 2009, the Federal District Court in Missoula issued an order enjoining and vacating the delisting of the Greater Yellowstone Area grizzly population. In compliance with this order, the Yellowstone grizzly population is once again a threatened population under the Endangered Species Act (US District Court 2009). At the time of the relisting of the grizzly, we were in the process of preparing the phase two environmental assessment for sheep grazing and associated activities that we carry out on Sheep Station properties in Idaho and Montana.

In January of 2010, informal discussions between Sheep Station personnel and the US Department of Interior Fish and Wildlife Service, Pocatello, led to a decision that, because of the changed legal status of the Greater Yellowstone Area grizzly population, we would need to enter into formal consultation for the grizzly bear. As a result, we stopped working on the draft environmental assessment and instead began to prepare a draft environmental impact statement (DEIS) to assess the effects of historical and ongoing grazing and associated activities at the Sheep Station.

To maintain our compliance with the National Environmental Policy Act during the preparation of the DEIS, we issued a new interim decision (March 31, 2010) on sheep grazing based on the *Interim U.S. Sheep Experiment Station Grazing and Associated Activities Project Environmental Assessment* (2008) as amended by the *Supplemental Information Report* (March 2010). The *Supplemental Information Report* contains analysis and data gathered during the preparation of the *U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009* draft environmental assessment which was issued for public comment December 14, 2009 – January 25, 2010. The new decision Notice and Supplemental Information Report as well as documents prepared for the U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009 can be viewed on the Agricultural Research Service, U.S. Sheep Experiment Station website - http://www.ars.usda.gov/News/docs.htm?docid=17878.

Phase 3 – Environmental Impact Statement

On November 19, 2010 we sent a notice of the availability of the Scoping document for the U.S. Sheep Experiment Station Grazing and Associated Activities Project 2010 to 154 individuals and organizations who had commented on or shown interest in previous iterations of this project. At that time we posted the Scoping document on the Agricultural Research Service website: http://www.ars.usda.gov/News/docs.htm?docid=17878.

The Agricultural Research Service published A Notice of Intent to Prepare an Environmental Impact Statement on Monday January 24, 2011 in the Federal Register. This began the Scoping Period for the U.S. Sheep Experiment Station Grazing and Associated Activities Project 2010 (DEIS 2011). The official Scoping period closed on March 11, 2011. We posted the Draft Environmental Impact Statement, U.S. Sheep Experiment Station Grazing and Associated Activities Project 2010 (hereafter referred to as the 2011 DEIS) document and appendices to the Agricultural Research Service, Dubois, Idaho, website (http://www.ars.usda.gov/News/docs.htm?docid=17878) on August 9, 2011. We published a notice of availability in the Federal Register on August 19, 2011. We extended the period for public comment 45 days, and posted one additional draft specialist report to the ARS website at that time. We posted the notice to extend the comment period in the Federal Register on November 7, 2011.

On June 11, 2012 we received a letter from the Upper Snake, Bureau of Land Management Field Office of the Idaho Falls District stating that the Memorandum of Understanding for the Bernice allotment, signed in 2007, would expire in December 2012 and would not be renewed. Since no suitable replacement allotment was identified, the Memorandum of Understanding was terminated by the Upper Snake Bureau of Land Management Field Office of the Idaho Falls District in December 2012 when the agreement expired.

In 2013 we began a supplemental DEIS to incorporate new information as a result of losing the Bureau of land Management Bernice allotment. Preparing the supplemental DEIS was delayed due to various factors. Because of the length of time elapsed since releasing the 2011 DEIS, we have decided to issue a revised DEIS that incorporates relevant information to date, rather than prepare a supplemental DEIS.

What has changed in the Revised DEIS?

This Revised DEIS includes minor refinements to the text, changes to terminology, and reorganization to clarify or update the purpose of the project and the proposal. Several changes have been made to the Proposed Action (i.e. description of ongoing Sheep Station operations) to adjust for the loss of Bernice Allotment and update to be consistent with current practices:

- Operations – changes to sheep numbers, utilization rates, and movements
- Range Improvement Activities – prescribed burning, invasive species management, and other associated activities have been amended to match current practices. In conjunction with the prescribed burning, new sagebrush management experimental activities are being proposed, including aerial application of herbicide in strips to serve as fuel breaks.

The Alternatives have also been modified to 1) exclude Bernice Allotment from all alternatives, 2) make adjustments to sheep numbers and pasture movements for alternatives 1, 3, 4, and 5) include the portion of Humphrey Ranch that is west of Beaver Creek in the grazed areas for modified alternative 3.

The Environmental Consequences and the supporting Specialist Reports have been updated to consider the adjustments in the Proposed Action and Alternatives and including any necessary additional new information.

What is the history of the Sheep Station at Dubois, ID?

Establishment of the U.S. Sheep Experiment Station at Dubois, ID

In the fall of 1915, the Bureau of Animal Industry (the predecessor entity to ARS) secured authorization to search for a tract of land in the west that could be used as a range for a western sheep breeding experiment station. Two exacting conditions governed the selection of the site: (1) the area must be unappropriated public domain land and, not intermingled with homesteads or other property, and (2) the location must be accessible by railroad.

The location at Dubois (Map 1, page 210), an area of approximately 28,000 acres, was selected because it was the only location with a solid block of public domain land of sufficient acreage and adjacent to a railroad (McWhorter, V. The Pacific Wool Grower, Vol. 4. Nos.10 & 11, 1952).

The U.S. Sheep Experiment Station was established as a sheep breeding and rangeland grazing research facility. To provide the natural resource base for sheep and grazing research, lands were withdrawn from the public domain in 1915, 1916, 1919, and 1922. Presidents Woodrow Wilson and Warren G. Harding withdrew the lands with Executive Orders 2268, 2491, 3141, 3165, and 3767. Public Law 97-98-Dec. 22, 1981, clarified administrative jurisdiction of U.S. Sheep Experiment Station lands, which rests solely with the Secretary of Agriculture and the purpose of U.S. Sheep Experiment Station lands, which are designated for "agricultural experiment purposes." Between 1940 and 1942, the Humphrey and Henninger Ranches (Map 2, page 211) were purchased from the private sector. Prior to purchase, the Humphrey and Henninger Ranches were used for farming, some crop land, hay, and mainly for livestock production.

Current work at the U.S. Sheep Experiment Station at Dubois, ID

Currently our research is focused on:

- developing new, or improving existing genetic lines for paternal and maternal traits that enhance lamb production (i.e., number of lambs born and weaned per ewe), lamb growth, lamb carcass merit, and yield of marketable product;
- improving nutrient management throughout the sheep production cycle;
- developing monitoring technologies for landscape-scale assessment of plant communities and for determining the effects of rangeland management activities, including grazing and fire, on vegetation, ground cover, and herbivore selectivity; and
- developing science-based grazing and prescribed burn management strategies and decision support systems that can be used to guide managers to maintain or improve the ecological function of western rangelands.

Where is the project located?

The Sheep Station is located in the sagebrush steppe of the Upper Snake River Plain, approximately six miles north of Dubois, Idaho, which is the Clark County seat. Clark County contains 1,765 square miles of land and has a population of approximately 980 persons, approximately 500 of whom live in Dubois. Our operation is a major employer in Clark County.

Agriculture Research Service Properties

The Sheep Station has research property in two states (Map 2, page 211). The properties range in elevation from approximately 4,800 feet to nearly 10,000 feet, with average annual precipitation that ranges from approximately 10 inches in the Snake River Plain greater than 21 inches in the Centennial

Mountains. Because of its diverse geography, we have lands that contain subalpine meadow, foothill, sagebrush steppe, and desert shrubland ecosystems. This diversity provides unparalleled research opportunities within the Agricultural Research Service[2].

In describing the East and West Summer Ranges and the Headquarters Property, the following terms are used:

- Grazing area – A grazing area is a subdivision of a property.
- Grazing unit – A grazing unit is a subdivision of a grazing area.
- Pasture - A pasture is a fenced area on any of the properties used for grazing. Pastures range in size from 40 to 7,000 acres. Pasture boundaries are independent of grazing areas and grazing units, and do not necessarily follow grazing area or grazing unit boundaries.

Exclosure – An exclosure is an area fenced to keep sheep and other domestic grazing animals out, in order to maintain the exclosure in an ungrazed condition. Exclosures are often used for research.

Headquarters Property:

Figure 2. Headquarters Property

The Well Field Pasture (eastern most pasture) and Crater Field Pasture (just west of the Well Field) are both divided into several grazing units. All other grazing units at Headquarters are pastures.

The Headquarters Property grazing units:

- Rim Rock
- Northwest Tank
- Bird Bath
- Northeast Tank
- Burning Bush
- Well
- Dipping Vat
- Last Camp

[2] http://www.ars.usda.gov/Main/site_main.htm?modecode=53-64-00-00 (01/05/08)

- Crater
- Rocky Bluff
- West Camp
- Northwest Reservoir
- Pole Line
- Wagon Wheel
- Rubber Tire
- Enclosure
- Bed Springs

- 27,930 acres of Sheep Station property at Headquarters, which has office, laboratory, animal, equipment, and residential buildings, dry-lot facilities for research throughout the year, lambing facilities, and lands used for spring and autumn grazing and rangeland research (Map 3 through Map 5, beginning on page 212) (Legal Description: 11N, R36E Sections: 1, 11, 12, 13, 14, 16, 22, 23, 24, 25, 26, 27, 34, 35, 36; Part of: 2, 9, 10, 15, 17, 20, 21, 28, 33. T11N, R37E Sections: 5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 19; Part of: 2, 3, 4, 11, 14, 20, 22, 23, 29, 30, 31. T10N, R36E Sections: 1, 2, 11, 12. T10N, R37E Sections: Part of: 6, 7).

Humphrey Ranch:

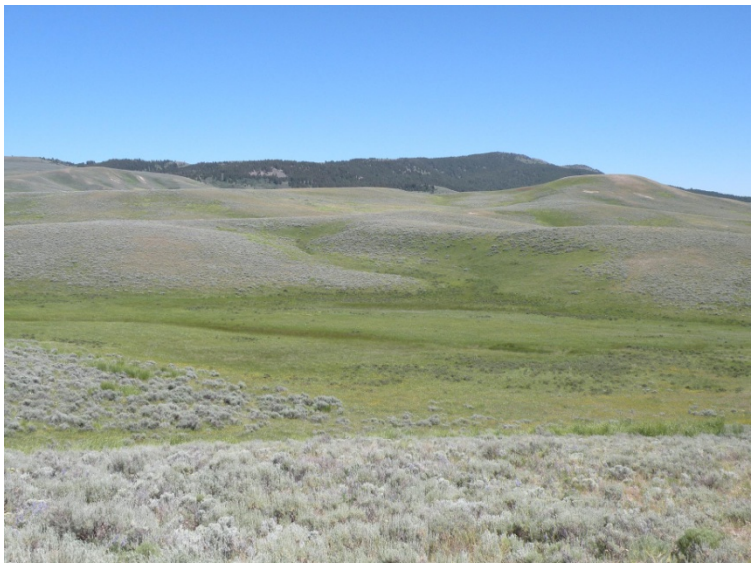

Figure 3. View of Lowlands, Humphrey Ranch

- 2,600 acres of ARS property at the Humphrey Ranch in Idaho, which is near Monida, Montana, has animal facilities and equipment buildings, and is used for spring, summer, and autumn grazing and rangeland research (Map 2, Map 7, and Map 8, starting on page 211) (Legal description T14N, R36E Sections: Part of 19, 20, 21, 22, 27, 28, 29).

Henninger Ranch:

Figure 4. Vegetation and perennial stream Henninger Ranch

- 1,200 acres of ARS property at the Henninger Ranch near Kilgore, Idaho, which has animal facilities and is used for summer grazing and rangeland research (Map 2 and Map 6 starting on page 211) (Legal Description: T13N, R39E Sections: 25; Part of: 24, 36. T13N, R40E Sections: 19, 30).

East and West Summer Range:

Figure 5. Odell Grazing Unit (West Summer Range) looking to the northeast

Figure 6. Views of Uplands in Toms Creek Grazing Area (East Summer Range)

Figure 7. Views of uplands, Big Mountain Grazing Unit (West Summer Range)

Figure 8. East Summer Range - variety and amount of broad-leafed plants (cj 08/09)

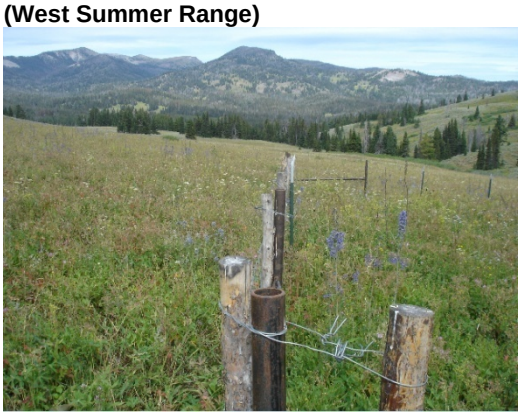

Figure 9. Exclosure fence, West Summer Range, Odell Unit (cj 08/09)

- Approximately 16,600 acres of Agricultural Research Service property in the Centennial Mountains of Montana, which is used for summer grazing and rangeland research (split into East Summer Range and West Summer Range - Map 2, Map 9, and Map 10) [unsurveyed].
    - East Summer Range (Map 9) (is a single grazing area referred to as Toms Creek): T14S, R1E: 34; Part of 25, 26, 27, 28, 32, 33, 35. T15S, R1E Sections: Part of 1, 2, 3, 4, 5, 6.
    - West Summer Range (Map 10) (broken into two grazing areas: West Odell Grazing Area and Big Mountain Grazing Area): T15S, R2W Sections: 1, 2, 3, 4; Part of: 5, 9, 10, 11, 12, 13, 14, 15, 16, 22, 23. T15S, R1W Sections: 4, 5, 6, 7; Part of 8, 9, 10, 18, 19. T14S, R1W Sections: Part of 31, 32, 33, 34.
- The summer range grazing areas are divided into grazing units and these are numbered.
    - Odell Creek: 1 to 9 (Figure 5),
    - Big Mountain: 1 to 5 (Figure 7), and
    - Toms Creek: 1 to 11 (Figure 8).

There are three inaccessible areas on summer range that are not numbered and are not grazed because of timber cover and steep slopes.

- West Summer Range has two pastures for horse grazing.

Non-Agricultural Research Service Lands Utilized

In addition to properties administered directly by the Sheep Station, we also have written agreements in place to use lands administered by other federal agencies. Throughout the year, sheep utilize National Forest System, and Department of Energy (Map 2) lands. These lands are included in this analysis as appropriate (as cumulative effects). However, our use of these allotments is covered under separate agreements with those agencies; which dictate when and how many animals we can graze; and are covered separately by the appropriate National Environmental Policy Act documentation. The alternatives analyzed in this project, where they include these non- Agricultural Research Service properties, are within the parameters of the agreements for these allotments.

USDA Forest Service - Grazing Allotments

Caribou-Targhee National Forest

Forest Service Agreement 07-IA-11041561-025 (2007): This agreement documents the coordination and authorization of the use of National Forest System land administered by the Caribou-Targhee National Forest by the U.S Sheep Experiment Station for research purposes. The agreement states that "the research and investigation work shall be for the benefit of the entire sheep and range industry in Idaho and adjacent states, and for the general benefit of the People of the United States (USDA Forest Service/ARS 2008)." This document authorizes the Sheep Station to graze sheep at no cost on National Forest System land administered by the Dubois and Island Park Ranger districts as follows (Table 1, Map 2):

Table 1. Sheep grazing authorized on Forest Service System lands

Number	Class	Period	Allotment
933	Ewe/Lamb	07/03 – 09/06[a]	Meyers Creek (Island Park Ranger District)
1,210	Dry	06/16 – 09/15	East Beaver Creek (Dubois Ranger District)
1,200		11/06 – 01/02	Snakey Canyon (Dubois Ranger District)
1,000		11/20 – 01/03	Kelly Canyon (Dubois Ranger District)

a - During this period the Station will use Meyer's Creek twice. Each event will not exceed 3 days for a cumulative seasonal use of less than 7 days

Forest Service Agreement 58-5364—6-142N (2006): The objectives of this cooperative project are 1) to determine the effects of the Continental Divide National Scenic Trail on ecosystem processes on Sheep Station properties in the Centennial Mountains of Montana and Idaho and 2) to create a mechanism for completing the construction and accomplishing the maintenance of the trail through the Centennial Mountains (USDA Forest Service/ARS 2006. The agreement coordinates trail condition and maintenance activities by the Forest Service on the portion of the trail on Sheep Station properties (see Map 9 and Map 10 starting on page 218, and Figure 10). The National Scenic Trails Act does not authorize the Agricultural Research Service to spend money on the Continental Divide National Scenic Trail, including signage. The Act authorizes the USDA Forest Service to construct and maintain the Trail across Sheep Station properties and to provide signage. See the Recreational Uses section on page 6 for additional information on management of the Continental Divide Trail.

United States Department of Energy - Mud Lake Feedlot

Nuclear Regulatory Commission - 1963 (Previously the Atomic Energy Commission)

Atomic Energy Commission Contract No. AT(10-1)-1154 (1963): The purpose of this MOU is for the US Atomic Energy Commission represented by its Idaho Operations Office to grant a license to the USDA, Agricultural Research Service to allow the Sheep Station to occupy, use and maintain a winter

feeding area for experimental sheep on its premises called the "Range" within the Commission's National Reactor Testing Station (see Map 2 and Map 11) (DOE/ARS 1963).

Department of Energy land used by the Sheep Station is developed into a feedlot. It is referred to as Mud Lake Feedlot.

Agricultural Research Properties in Context of Adjacent Lands and Uses

Agricultural Research Service Sheep Station properties within the project area are not contiguous (Map 1 and Map 2). Other ownerships in the area of the Sheep Station include:

- Private
- State of Montana
- U. S. Department of the Interior:
  - Bureau of Land Management:
    - Dillon Field Office, Dillon, Montana (http://www.blm.gov/mt/st/en/fo/dillon_field_office.html)
    - Upper Snake field Office, Idaho Falls, Idaho (http://www.fws.gov/refuges/profiles/index.cfm?id=61570) (ARS not displayed on BLM district map. (http://www.blm.gov/id/st/en/visit_and_play/places_to_see/upper_snake_field.html)
  - U.S. Fish and Wildlife Service:
    - Red Rocks Lake National Wildlife Refuge (http://www.fws.gov/refuges/profiles/index.cfm?id=61570)
    - Map - http://www.fws.gov/redrocks/images/rrlmap.gif
- U.S. Department of Agriculture, Forest Service:
  - Caribou-Targhee National Forest (http://www.fs.usda.gov/main/ctnf/home): Dubois and Ashton Ranger Districts (http://www.fs.fed.us/r4/caribou-targhee/maps/ashton_ip_2006.pdf)
  - Beaverhead-Deerlodge National Forest (http://fs.usda.gov/bdnf)

Map 1 through Map 11 display the location of Agricultural Research Service Sheep Station properties used by us for sheep research in Idaho and Montana.

The Headquarters property area is bordered by a patchwork of private, Idaho State, and Bureau of Land Management lands (see Map 3).

Henninger Ranch (Map 6) is bordered primarily by private lands to the west and state lands to the north, south, and east. The exception being small portions of Bureau of Land Management lands to the southeast and northwest.

Humphrey Ranch (Map 7 and Map 8) is bordered by private lands to the north, south, and west, and Caribou-Targhee National Forest System land to the east.

Both East and West Summer Ranges (Map 9 and Map 10) are bordered by National Forest system lands to the south, and west. Beaverhead-Deerlodge National Forest system lands are east of the East Summer Range. East and West Summer Ranges are bordered by Bureau of Land Management lands (BLM), Centennial Wilderness Study Area to the north. There is a partial section of Montana state lands directly

north of the West Summer Range pastures. Beaverhead-Deerlodge National Forest, Red Rocks Lakes National Wildlife Area and Montana Fish Wildlife and Parks land are north of the Agricultural Research Service Summer Range.

The Caribou-Targhee National Forest Summer Travel Maps (Dubois Ranger District: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3804833.pdf and the Ashton/Island Park Ranger District: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5357542.pdf, http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5357545.pdf maps clearly show Agricultural Research Service and other federal ownership land locations. Other agency and private maps may not delineate Agricultural Research Service properties.

Recreational Uses

Access to Agricultural Research Service properties is restricted, and public use is prohibited everywhere except on the Continental Divide Trail or where specifically authorized by a permit because there are potential adverse effects of public presence on research projects, lands, and infrastructure. Our primary concern is disturbing the research herds and their guard dogs, which may be aggressive. Two outfitter guides have permits to guide parties on to the Agricultural Research Service properties in the Centennial Mountains in Montana. The outfitting activity is coordinated with Sheep Station staff and follows permit terms and conditions to ensure disturbance of research activities does not occur.

The Continental Divide National Scenic Trail, administered by the Caribou-Targhee National Forest, traverses small portions of the Summer East and West Ranges and essentially follows the southern border of both ranges. The National Scenic Trails Act does not authorize the Agricultural Research Service to spend money on the Continental Divide National Scenic Trail, including signs. The Act authorizes the Forest Service to construct and maintain the Trail across Agricultural Research Service properties and to provide signs. Signs (Figure 10) along the trail on the West Summer Range are posted to notify hikers the "Continental Divide National Scenic Trail is now entering the 16,600-acre summer range where Sheep Station sheep spend July and August." These signs contain information about the Sheep Station, its mission, a map of Agricultural Research Service properties in relation to the trail, and warnings concerning sheep and the presence of guard dogs.

Except for the Continental Divide National Scenic Trail, we restrict public access because hikers, motorized use, camping, other non-permitted dispersed recreation on Agricultural Research Service properties could interfere with our research projects. However, there are unofficial, user-defined trails in the area of the Agricultural Research Service properties in the Centennial Mountains that may show on maps produced by private organizations (ex. Continental Divide Trail Alliance). Because of these mapping errors and lack of information concerning Agricultural Research Service property locations in the Centennial Mountains, users may be unsure whether they are on Agricultural Research Service properties or on other land ownerships. Therefore, despite the fact that Agricultural Research Service properties are not managed for public entry, there may be occasional recreational use, resulting from incorrect trail information.

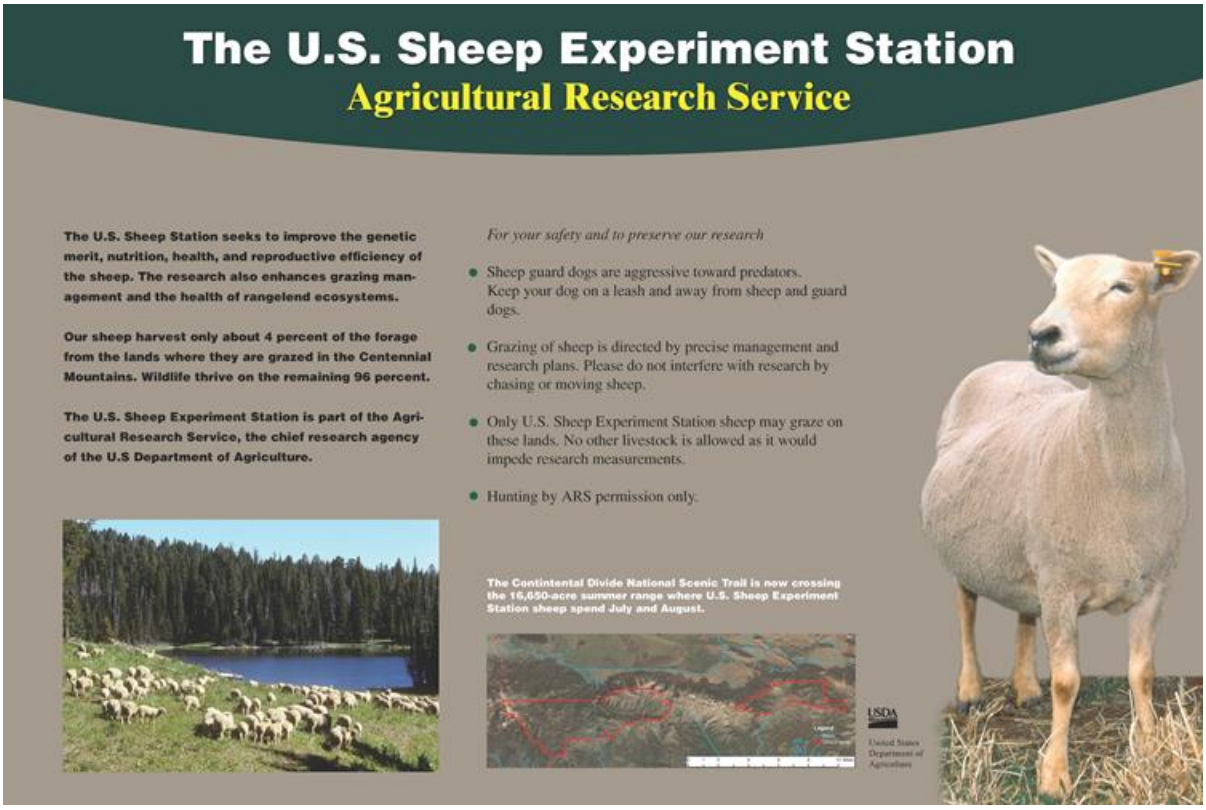

Figure 10. Sheep Station informational signs posted along the Continental Divide National Scenic Trail. (NOTE: Because of lack of funding, the Forest Service has not posted these signs along the CDNST.)

Why is the project being proposed?

As describe above, the project is being proposed to prepare documentation, pursuant to the National Environmental Policy Act, for Sheep Station activities and to identify the best course of action to achieve the research goals and objectives that will fulfill its mission[3].

What is the Agricultural Research Service (ARS)?

The Agricultural Research Service is the intramural research agency for the U.S. Department of Agriculture (USDA), and is one of four agencies that make up the research, education, and economics mission area of the department. The Agricultural Research Service was established on November 2, 1953, pursuant to authority vested in the Secretary of Agriculture by 5 U.S.C. 301 and Reorganization Plan No. 2 of 1953, and other authorities.

The Agricultural Research Service is the principal in-house research agency of the USDA. Congress first authorized federally supported agricultural research in the Organic Act of 1862, which established what is now the USDA. That statute directed the Commissioner of Agriculture "... To acquire and preserve in his Department all information he can obtain by means of books and correspondence, and by practical and scientific experiments..." The scope of USDA's agricultural research programs has been expanded and extended more than 60 times since the Department was created.

[3] To develop integrated methods for increasing production efficiency of sheep and simultaneously to improve the sustainability of rangeland ecosystems.

Agricultural Research Service research is authorized by the Department of Agriculture Organic Act of 1862 (7 U.S.C. 2201 note), Agricultural Research Act of 1935 (7 U.S.C. 427), Research and Marketing Act of 1946 (P.L. 79-733), as amended (7 U.S.C. 427, 1621 note), Food and Agriculture Act of 1977 (P.L. 95-113), as amended (7 U.S.C. 1281 note), Food Security Act of 1985 (P.L. 99-198) (7 U.S.C. 3101 note), Food, Agriculture, Conservation, and Trade Act of 1990 (P.L. 101-624) (7 U.S.C. 1421 note), Federal Agriculture Improvement and Reform Act of 1996 (P.L. 104-127), and Agricultural Research, Extension, and Education Reform Act of 1998 (P.L. 105-185). ARS derived most of its objectives from statutory language, specifically the "Purposes of Agricultural Research, Extension, and Education" set forth in Section 801 of FAIR.

The Agricultural Research Service mission is to conduct research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to: ensure high-quality safe food, and other agricultural products; assess the nutritional needs of Americans; sustain a competitive agricultural economy; enhance the natural resource base and the environment; and provide economic opportunities for rural citizens, communities, and society as a whole.

The Agricultural Research Service is committed to addressing the Department's priorities:

- Assist rural communities to create prosperity so they are self-sustaining, repopulating, and economically thriving.
- Ensure our national forests and private working lands are conserved, restored, and made more resilient to climate change, while managing our water resources.
- Help America promote agricultural production and biotechnology exports as America works to increase food security.
- Ensure that all of America's children have access to safe, nutritious, and balanced meals (ARS 2011).

The Agency's research focuses on achieving the goals identified in the USDA and Research, Education, and Economics mission area Strategic Plans. The Government Performance and Results Act mandates each agency to establish general goals that will contribute to achieving beneficial societal outcomes that shape and drive the work of the Agency during the five years covered by the plan.[4]The Agricultural Research Service budget is allocated to research conducted in 22 national program areas. Research is conducted in 108 laboratories by about 2,200 full-time scientists within a total workforce of about 8,000 Agricultural Research Service employees.

What is the mission of the U.S. Sheep Experiment Station, Dubois, Idaho?

The mission of the Sheep Station is to develop integrated methods for increasing production efficiency of sheep and to simultaneously improve the sustainability of rangeland ecosystems. To contribute to USDA, Agricultural Research Service National Programs and accomplish the Agricultural Research Service mission at the Sheep Station, Agricultural Research Service scientists address problems defined by the Office of National Program in National Programs (NP) 101 and 215 Action Plans. Because National Programs are integrated in the Agricultural Research Service Strategic Plan, experiments at the Sheep Station may contribute to multiple components of NP 101 and 215. This research strategy of the Office of National Program and Sheep Station will lead to an understanding of the interactions between sheep and the environments in which they are produced that can be used to improve sheep production systems and ensure the sustainability of grazing land ecosystems.

[4] For more information see the ARS website at: http://www.ars.usda.gov/

USDA, ARS, National Program 101 – Food Animal Production (USDA 2012a)[5]

The vision of NP 101 is to furnish the scientific community and the food animal industries with scientific information, biotechnologies, and best management practices that ensure consumers an abundant supply of competitively priced animal products which enhance human health, ensure domestic food security and enhance the efficiency, competitiveness and economic and environmental sustainability, of the food animal industries.

The mission for NP 101 is to foster an abundant, safe, wholesome and competitively priced supply of animal products produced in a viable, competitive, and sustainable animal agriculture sector of the U.S. economy. Specific to the mission, the purpose of NP 101 is to:

1. Safeguard and utilize animal genetic resources, associated genetic and genomic databases, and bioinformatic tools;
2. Develop a basic understanding of food animal physiology for food animal industry priority issues in animal production, animal well-being, and product quality and healthfulness; and
3. Develop information, best management practices, tools, and technologies that can be used to improve animal production systems, enhance human health and ensure domestic food security.

In order to accomplish the mission, NP 101 is divided into three component areas, with specific problem statements assigned to various Agricultural Research Service research laboratories throughout the agency. Components and problem statements assigned to the Sheep Station are:

Component 1: Improving Production and Production Efficiencies and Enhancing Animal Well-Being and Adaptation in Diverse Food Animal Production Systems

- **Problem Statement 1A:** Improving the efficiency of growth and nutrient utilization.
- **Problem Statement 1B:** Reducing reproductive losses.

Component 2: Genetic Improvement - Understanding, Improving, and Effectively Using Animal Genetic and Genomic Resources

- **Problem Statement 2B:** Identify functional genomic pathways and their interactions.
- **Problem Statement 2D:** Develop and implement genome-enabled genetic improvement programs.

Component 3: Measuring and Enhancing Product Quality and Enhancing the Healthfulness of Meat Animal Products

- **Problem Statement 3A:** Systems to improve product quality and reduce variation in meat animal products.

Genetic improvement programs are needed to enhance adaptability, productivity, and suitability of sheep that are produced on western U. S. rangelands. Research activities at the Sheep Station that are linked to NP 101 are conducted in and dependent upon Intermountain West grazing lands, specifically sub-alpine tall forb and sagebrush-dominated vegetation communities. Because the western US sheep industry relies primarily on producing sheep on rangelands, the design of the Sheep Station's research programs are structured to mimic these production systems in order to effectively contribute to Components 1, 2, and 3 of NP 101 as mandated by USDA, Agricultural Research Service.

[5] The National Program 101 Action Plan can be found at the following website: http://www.ars.usda.gov/SP2UserFiles/Program/101/NP%20101%20Action%20Plan%20-%20Updated%20May%202013.pdf

Production environment affects the expression of functional genes linked to important production traits of sheep. Therefore, in addition to the native vegetation communities, other environmental conditions, such as rangeland management activities (i.e., wildfire, prescribed burning, seeding for pasture improvement and restoration, and co-species grazing), the wildlife interface (e.g., wild ungulates, predators), climatic stressors (e.g., drought, temperature), and nutrient availability (e.g., vegetation composition, terrain), are critical factors that influence the production environment of sheep. Understanding the effects of environmental conditions on gene function and phenotypic expression facilitates genetic improvement of sheep that graze western U. S. rangelands. Stakeholder acceptance of genetic improvement programs depends on these programs being tested in production environments similar to theirs.

Specific Sheep Station research activities relating to NP 101 are:

- *Component 1:* Evaluating reproduction efficiency, end-product quality, health, and longevity of various paternal and maternal sheep breeds and composite lines that are important to the US and worldwide sheep industries. Evaluating the efficacy of various non-antibiotic strategies to reduce disease occurrence in neonatal and mature sheep.
- *Component 2:* Breeding-program application and lifetime evaluation of genetic markers associated with superior product quality, disease resistance, reproduction efficiency, and (or) production longevity. Contribution of germplasm to functional genome-based evaluation efforts.
- *Component 3:* Phenotypic- and generic marker-based evaluation of various paternal sheep breeds on meat end-product quality and consistency.

USDA, ARS, National Program 215 – Pasture, Forage and Rangeland Systems (USDA 2012b)[6]

The mission of NP 215 is to improve food and energy security, while enhancing the natural resources base by developing and transferring economically viable and environmentally protective technologies for sustainable range, pasture, forage and turf production systems. These systems are to be based on fundamental applications of ecological and agronomic processes; and flexible to mitigate and adapt to the uncertainties of changing climate and market conditions.

In order to accomplish the mission, NP 215 is divided into four component areas, with specific problem statements assigned to various Agricultural Research Service research laboratories throughout the agency. The component and problem statements assigned to the Sheep Station are:

Component 1: Improved Rangeland Management for Enhanced Livestock Production, Conservation, and Ecological Services

- **Problem Statement A:** Developing economic livestock grazing systems for rangelands that meet global food security objectives while being adaptable to changing climate and varying environmental conditions and preserve the integrity of natural resources.
- **Problem Statement B:** Need for management strategies and practices that enhance and conserve rangeland ecosystems to provide multiple ecosystem services including forages for livestock, soil conservation, water quality, control of invasive species, recreation, and wildlife habitat conservation; all under changing environmental conditions.

The western US sheep industry relies primarily on producing sheep on rangelands. The Sheep Station's research activities are conducted in and dependent upon Intermountain West grazing lands, specifically sub-alpine tall forb and sagebrush-dominated vegetation communities. Accordingly, the design of the

[6] The National Program 215 Action Plan can be found at the following website: http://www.ars.usda.gov/SP2UserFiles/Program/215/NP215%20Action%20plan%20Final%20May%202013.pdf

Sheep Station's research programs is structured to integrate NP 101 and 215 research activities, which best enables the Sheep Station to effectively contribute to component 1 as mandated by USDA, Agricultural Research Service.

Fire, climate, and grazing are integral components for sagebrush and sub-alpine communities. However, when rangeland is mismanaged, these factors can result in degraded vegetation communities that become susceptible to shifts in species composition, exotic invasive weeds, and erosion. For over 90 years, the Sheep Station has been investigating management strategies that maintain the health and productivity of native plant communities of the Intermountain West. Resulting recommendations, solutions, and management plans are transferred to federal land management agencies and the private sector. Stakeholder acceptance of rangeland management solutions and plans depends on these programs being tested in production environments similar to theirs.

Specific Sheep Station research activities relating to NP 215 are:

- *Component 1:* Evaluating the effects of fire (fire season, fire interval, and fire size) on post-fire recovery of sagebrush and other vegetation. Evaluating selective herbicide treatment as an alternative to fire to restore sagebrush in areas where fire has been suppressed and sagebrush is becoming decadent. Evaluating post-fire grazing strategies that are sustainable, complement healthy post-fire recovery of shrub communities, and provide suitable habitat for sage grouse and other wildlife. Evaluating the utility of various plant products in restoring mechanically degraded sites (e.g., barrow pits) and improving compromised, three-tip sage-dominated grazing pastures. Validating the utility of remote sensing for assessing vegetation (including exotic weeds) across extensive landscapes. Developing range management programs and solutions that result in sustainable livestock enterprises, which contribute to our nation's food security; while conserving and protecting critical ecosystem services derived from rangelands.

The Sheep Station as a Research Facility

Our Sheep Station was set aside by congressional designation as a research facility. The Agricultural Research Service is not a land management agency like the Forest Service and the Bureau of Land Management that manages its lands for multiple purposes and public uses. Instead, ARS manages its lands for a single purpose – research. ARS is not required to prepare a land management plan for its research lands, nor do the requirements of the Federal Land Management Policy Act or the Forest Service Organic Act apply to ARS lands.

Instead of a land management plan the Sheep Station has Action Plans with stated objectives that govern its research goals. Research conducted at the Sheep Station can contribute to developing thresholds for land management planning purposes in other agencies. It should be noted that while the Sheep Station is not bound to thresholds of resource effects, it must adhere to federal laws such as the Clean Water Act and the Endangered Species Act, like any other federal facility.

What research is conducted at the Sheep Station, Dubois, Idaho?

Since our research began, circa 1918, we are credited with developing three breeds of sheep (Columbia, Targhee, and Polypay) and have been providing breeding stock from these to sheep breeders in North America since the 1920s. Based on registration numbers, Columbia has been one of the 10 most popular breeds of sheep in the United States since 1965. Grazing and rangeland research at our Sheep Station has been ongoing since the 1920s, and our research has produced unmatched information on managing grazing on sagebrush steppe to preserve native ecosystems.

Our current research is aimed at:

- Studying infectious diseases of domestic sheep, including the prion disease scrapie, malignant catarrhal fever virus and *Anaplasma ovis*. Malignant catarrhal fever virus and *Anaplasma* species infections are found in wildlife and domestic animals. We are collaborating on research involving transmission of the respiratory pathogens, ovine progressive pneumonia virus (OPPV) and *Mannheimia haemolytica (Mh)*. Ovine progressive pneumonia virus is in the same genus as human immunodeficiency virus (HIV) and shares many pathological properties with HIV.
- Developing new, or improving existing genetic lines of sheep with paternal and maternal traits that enhance lamb production (i.e., number of lambs born and weaned per ewe), lamb growth, lamb carcass merit, and yield of marketable product;
- Improving nutrient management throughout the sheep production cycle;
- Developing monitoring technologies for landscape-scale assessment of plant communities and for determining the effects of rangeland management activities, including grazing and fire, on vegetation, ground cover, and herbivore selectivity; and
- Developing science-based grazing and prescribed burn management strategies and decision support systems that can be used to guide managers to maintain or improve the ecological function of western rangelands.

Our research involves at least 34 scientists at nine Agricultural Research Service locations and 10 universities in seven states, in addition to the scientists at the Sheep Station. Most of our research spans multiple years, and some of our long-term sheep genetics and rangeland research spans more than seven decades. In many cases, our Sheep Station has been the only location in North America with the land and animal resources to conduct the research, and it is the only location in North America able to establish direct linkages between new research and research conducted over the last 90 years, providing a clear understanding of the long-term consequences of various management strategies. Our research is published in peer-reviewed scientific journals, which are becoming more readily available to the general public as publishing companies develop open-access electronic archives, and is often rewritten for various trade magazines.

Our research is used to:

- Train new scientists;
- Write textbooks to educate university students in animal and rangeland sciences;
- Develop outreach programs that benefit farmers, ranchers, small business owners, agribusiness corporations, and land managers;
- Develop or improve sheep breeds that increase the efficiency of food and fiber production; and
- Preserve or improve rangeland ecosystems.

We are known worldwide for our research and sheep breeds. Scientists, sheep producers, students, and industry personnel from throughout the United States and other countries visit, and many more contact, us each year to learn more about the research or ask for comments on various issues associated with sheep production and rangeland management.

See appendix E for some examples of the research that is being conducted at our Sheep Station.

What is being proposed?

At a Glance: What are we proposing to do?

Operations: Sheep movement and pasture utilization (page 13)

Sheep trailing route use and maintenance: Use of roads and trails (page 19)

Stock water operations: water developments (page 20)

Camp Tending: sheep herding camps (page 24), summer range camps (page 24)

Maintenance and repair of existing permanent fence: fences (page 20), horse corrals (page 21), exclosures (page 21)

Maintenance and repair of existing roads and fire breaks: roads (page 21), permanent firelines (page 22)

Range Improvement: prescribed burning (page 25), wildfire mitigation (page 25), seeding (page 25), Integrated pest management (page 26)

Cattle and Horse Grazing (page 27)

Predator Avoidance and Abatement (page 28)

Design Features: Wildlife Conservation Measures (page 29), Heritage (page 32), and Best Management Practices, etc. (page 32)

In order to meet Agricultural Research Service strategic plan goals and national program objectives, we are proposing to continue ongoing operations, as described in the following section. In addition, to the overview of ongoing operations – we describe several site-specific actions related to research activities which would occur in upcoming years. This proposed action has been modified from that detailed in the 2011 DEIS, to account for losing the BLM Bernice allotment and to provide more current information about proposed activities.

Operations

The Sheep Station operations include grazing and range management activities associated with ongoing rangeland research and sheep genetics/production research. To accomplish rangeland and sheep research objectives, the Sheep Station uses a variety of lands, which includes Agricultural Research Service, Forest Service allotment leases, and a Department of Energy lease. Agricultural Research Service lands are used for rangeland research and sheep research. Rangeland research is not conducted on National Forest System lands; National Forest System lands provide necessary grazing in support of sheep research objectives. The Department of Energy property (Mud Lake) is used as a feedlot for sheep.

Rangeland research grazing objectives are accomplished using co-species grazing management with sheep and cattle. Sheep research objectives are primarily focused on improving sheep genetics (production, quality, and health). The Sheep Station maintains a complete infrastructure for all phases of sheep production. The University of Idaho owns the Station sheep flock (referred to hereafter as flock), but the flock is managed and maintained (e.g., husbandry, retention and selection) by the Agricultural Research Service to accomplish unit-specific research objectives. Depending on sheep and rangeland research objectives, the flock may range from 1,500 to 3,000 mature sheep. During spring and summer grazing periods, most mature ewes are attending lambs (generally 1 to 2 lambs per ewe). The flock grazes rangelands 8 to 9 months each year (~May thru January) and is housed in feedlots 3 to 4 months each year (~January thru April); when in feedlots, sheep are fed harvested feeds.

Cattle and limited horse grazing are only used as a rangeland management tool to accomplish research or grazing objectives when there is excess forage on Agricultural Research Service lands. Such grazing is accomplished with privately-owned cattle and horses (University of Idaho owns some horses) through on-going Agricultural Research Service agreements. The Sheep Station does not currently have cattle production or genetic research objectives.

When grazing Agricultural Research Service lands, livestock numbers are kept well below range carrying capacity to maintain favorable range conditions. For example, on neighboring federal lands, Forest Service and BLM allow other grazing permittees to remove up to 55 percent of annual forage production. The Agricultural Research Service removes less than 10 percent of the annual forage produced with sheep grazing on most properties and up to but not exceeding 25 percent on other properties. Likewise, the Sheep Station uses less one half of the allowed animal unit months (AUMs) when grazing Forest Service allotments. All Agricultural Research Service grazing lands are grazed annually in a rest rotation fashion. Depending on range condition, rest rotations are generally two years of grazing and one year of grazing rest.

Figure 11 through Figure 13 demonstrate movement of sheep across Agricultural Research Service grazing lands (Headquarters, Humphrey Ranch, Henninger Ranch, Summer East Range, and Summer West Range) and Forest Service allotments (Beaver Creek, Meyers Creek, Snakey-Kelly) throughout a typical season. Table 2 displays annual sheep utilization of forage on Agricultural Research Service and National Forest System lands. Grazing periods are approximated and relate to the approximate time of the month (early, mid, late), which reflects variations from year to year due to weather and forage conditions (i.e., range readiness). In the figures and Table 2, mature sheep numbers are an approximated maximum of 3,000; sheep numbers may range from 0.5 to 1.1 times the approximate maximum in support of rangeland research and sheep research objectives. A mature sheep is a ewe or ram that is sexually mature and retained as a part of the core breeding flock.

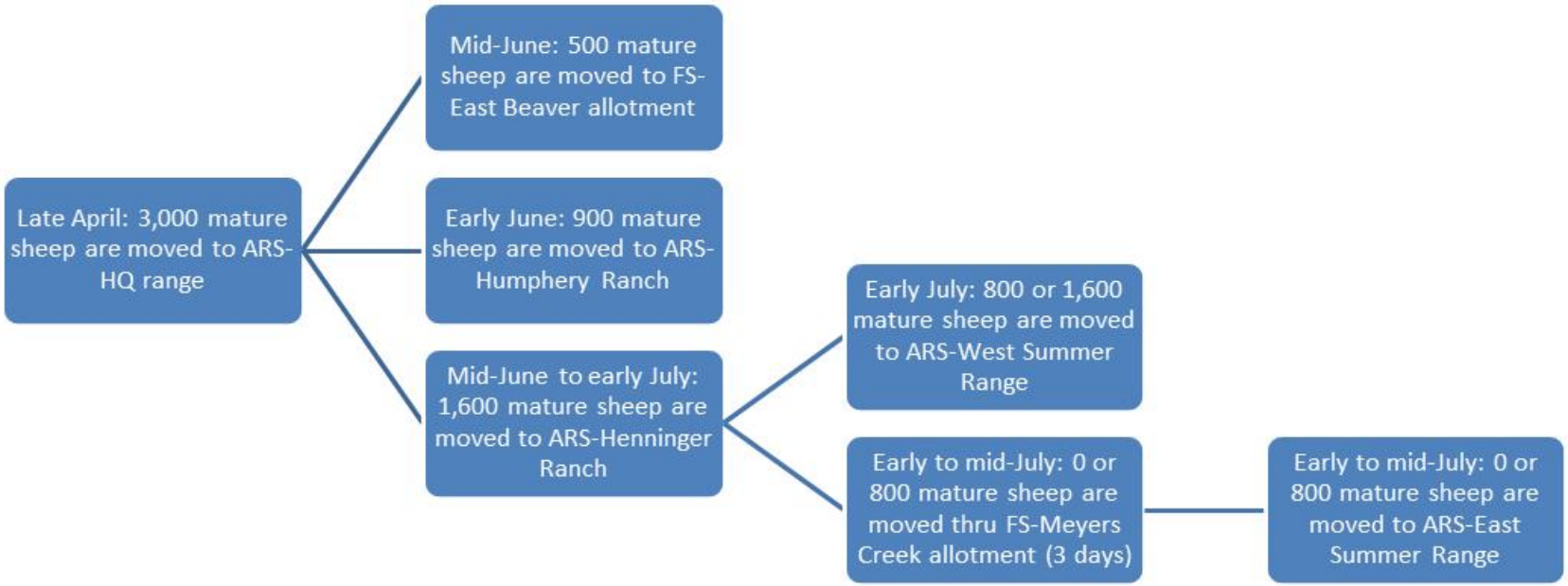

Figure 11. Proposed action for sheep movement out to spring and summer range. Mature sheep numbers are the approximate maximum, which may vary 0.5 to 1.1 times the approximate maximum.

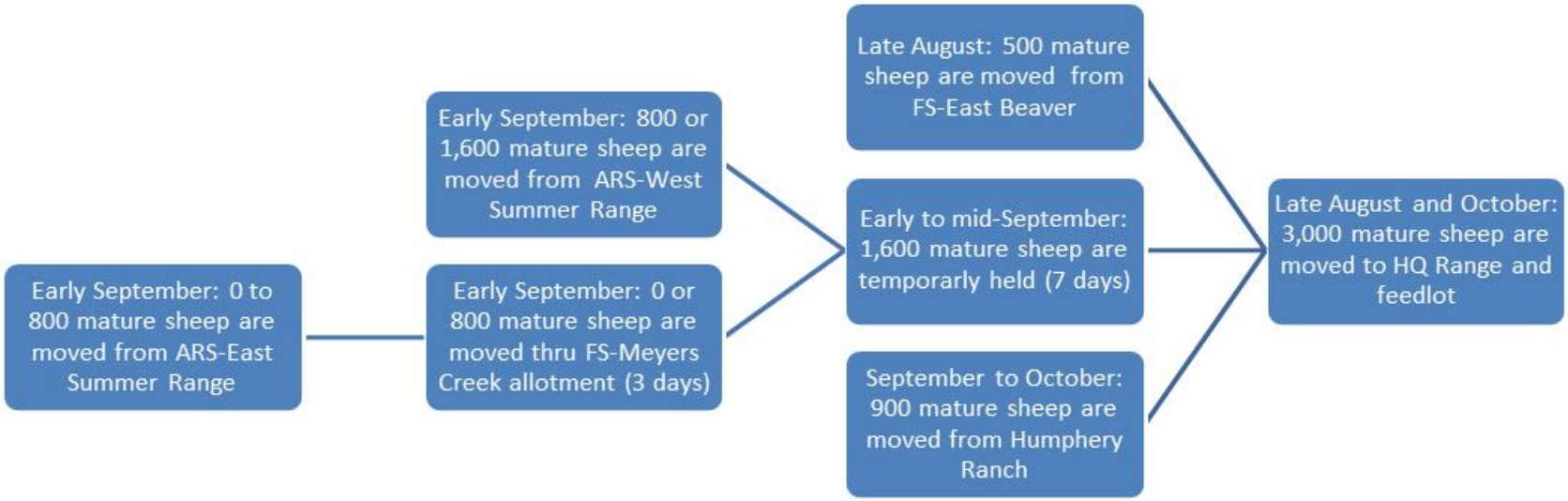

Figure 12. Proposed action for sheep movement from summer ranges to fall range. Mature sheep numbers are the approximate maximum, which may vary 0.5 to 1.1 times the approximate maximum.

Figure 13. Proposed action for sheep movement to winter grazing and from winter range to feedlots. Mature sheep numbers are the approximate maximum, which may vary 0.5 to 1.1 times the approximate maximum.

Sheep grazing periods and AUM[7], for a typical year, are shown in Table 2, which is based on plant productivity estimates from the last 15 years of sheep grazing data (Taylor 2015, personal communication) and demonstrates the expected distribution of sheep AUM utilization. Animal unit months are based on approximate grazing dates; actual grazing dates vary from year to year depending on weather and plant conditions.

Table 2. Proposed action: Annual AUM[a] utilized per property within the grazing periods that are specified. The calculations are based on maximum of 3,000 sheep [b] (Taylor 2015, personal communication).

Properties	AUM Available	AUM Utilized	Utilization Percent	Approximate Grazing Periods
Agricultural Research Service properties	**48,667**	**3,625**	**8 percent**	
Headquarters	28,353	1,750	6 percent	late April to early July; late August to early December
Humphrey Ranch	4,476	800	18 percent	early June to late October
Henninger Ranch	1,914	350	18 percent	mid-June to mid-July; late August to mid-September
East Summer Range (Toms Creek) [c]	4,043	225	6 percent	mid-July to early September
West Summer Range (Odell Creek/ Big Mountain) [c]	9,881	500	5 percent	early July to early September
Allotments on FS lands	**22,709**	**712**	**3 percent**	
Snakey-Kelly	1,756	440	25 percent	early November to late December
East Beaver	17,877	250	1 percent	mid-June to late August
Meyers Creek [c]	3,076	22	1 percent	mid-July; early September

a - Animal Unit Month. By definition, one (1) AUM represents 790 lbs. of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. Five (5) mature sheep (see footnote b immediately below) are equivalent to one (1) AUM.

b - A mature sheep is any sexually-mature ewe or ram that that is retained as a part of the core breeding flock.

c - Unlike all other grazing properties, where rest rotations are conducted within property grazing subunits, rest rotation is applied to the whole grazing units of West Summer Range (Odell and Big Mountain) and East Summer Range (Toms Creek). Rotations are two years of grazing and one year rest (no grazing); therefore, annual AUM utilized are calculated as an annual average over three years, with one of the three years having a value of zero (the rest year). Grazing on FS-Meyers Creek allotment is always in conjunction with ARS-Toms Creek.

On Agricultural Research Service properties, sheep are limited so they remove less than 10 percent on Headquarters, East Summer Range, and West Summer Ranges; and less than 20 percent on Humphrey Ranch and Henninger Ranch. For comparison, note that on neighboring National Forest System and BLM properties, BLM and Forest Service allow other permittees that are grazing cattle to remove up to 55 percent of annual forage growth. This means that Sheep Station grazing is at levels well below generally accepted grazing practices on other federal lands.

[7] Animal Unit Month. By definition, one (1) AUM represents 790 lbs of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. Five (5) mature sheep (see footnote b immediately below) are equivalent to one (1) AUM.

Infrastructure

Sheep Transportation by Truck

The sheep are trucked between grazing locations that are not contiguous or are not within trailing distance. Sheep are trucked from Headquarters to the Mud Lake Feedlot, Humphrey Ranch, and to Forest Service and Bureau of Land Management allotments (Table 3).

Table 3. The number of sheep trucked in and out each year for each range area and allotment

Property	Sheep
Humphrey	650 rams and ewes
Winter Range (USDA FS Allotments)	2,100 ewes (± 100 depending on year)
	10 rams
Mud Lake (DOE)	3,000 animals (± 1.1-fold at shearing and breeding time)

There are permanent corrals and loading chutes at Headquarters, Mud Lake feedlot, Humphrey, and Henninger. At the Snakey-Kelly Forest Service allotments, sheep are unloaded on Forest Service Road 202. Suitable roads and semi-truck and trailer access are available at the loading sites. Trucking occurs on State Highways, County Roads, and National Forest system roads.

Headquarters and Mud Lake feedlot truck loading sites are similar in size and ground cover condition. Both truck loading sites have permanent corrals with bare soil similar to sheep pens. The Headquarters loading pen is 0.6 acre. The Mud Lake feedlot loading pen is 0.4 acre. The Humphrey and Henninger Ranch sites are similar. The loading corral at Humphrey is 0.4 acre and Henninger loading corral is 0.8 acre. The Humphrey and Henninger loading sites have low vegetation ground cover.

Sheep Trailing Route Use and Maintenance

Trails are used to move sheep between and within grazing areas. These routes may be on roads (primitive, gravel, paved) or historical livestock trails. Table 4 displays the annual trailing routes on roads that are used by Sheep Station personnel (see also Map 2).

Table 4. Annual sheep trails

Trail	Description
Headquarters to Henninger Ranch (21 miles; 2 days)	Sheep are trailed on an unnamed two-track road (2.5 miles), Clark County Road Spencer-Idmon (9.7 miles), and Clark County Road A2 (8.7 miles).
Henninger Ranch to FS-Meyers Creek allotment (11 miles)	Sheep are trailed on Clark County A2.
To/from Henninger Ranch and West Summer Range (9.4 miles)	Sheep are trailed on Clark County A2 (3.9 miles) and FS 327 (5.5 miles)
From East Summer Range to Henninger Ranch	Sheep are trailed on FS 042 (6.4 miles) and Clark County A2 (11 miles)
To/from FS-Snakey-Kelly allotments (10 miles)	Sheep are trailed on FS 202, and along FS 184, 279 or 202.

Figure 14. Sheep Driveway, Odell Creek

In timbered areas on East Summer Range and West Summer Range, sheep are moved along historical livestock trails (Figure 14). Herders on horseback move sheep from one grazing location to another. There are about four miles of maintained sheep trails through timbered areas on the East Summer Range and West Summer Range, which are utilized as shown in Table 5. Trail locations are shown on Map 9 and Map 10.

Trails through timber patches are short, generally less than 0.5 miles long. Annual trail maintenance is conducted through the timbered areas. Trees that fall across driveways are moved off the driveways, and some low-hanging limbs are removed. If adverse effects to soil or water occur, mitigation measures (e.g., cross drains with woody debris to divert overland flow) are implemented or a trail segment may be rerouted to avoid sensitive areas. Unneeded or unused old driveways are closed and rehabilitated by seeding with native species covering the trail with woody debris. Sheep are kept off these restoration areas.

Table 5. Typical annual [a] numbers of sheep trailed on summer ranges based on a 3-yr average

Unit	Length (approx. miles)	Use Time (approx. hr.)	Horse	Average count of ewes with lambs [a]
West Summer Range [a]				
Odell-Skyline Unit - used twice a year	1	2	2	533
Odell-Unit 6 - usually used once a year	0.13	1	2	533
Odell-Unit 4 - usually used twice a year	0.13	0.5	1	533
Odell-Little Odell - used once a year	0.25	1	1	533
Odell-Big Mountain -- used once a year	0.25	1	1	533
Big Mountain - generally used only once a year	0.25	1.5	2	533
Big Mountain-Corrals to Top - usually used 4 times a year	0.5	1.5	2	533
Big Mountain-Canyon Unit – used once or twice a year	1.4	0.8	2	533
East Summer Range [a]				
Toms Creek-Units 5 & 6 – used once or twice a year	0.5	1.5	1	533
Toms Creek-Units 6 & 7 - used once or less a year	0.5	2	1	533

a - Rest rotation is applied to the whole grazing units of West (Odell and Big Mountain) Summer Range and East (Toms Creek) Summer Range. Rotations are two years of grazing and one year rest (no grazing); therefore, annual AUM utilized are calculated as an annual average over three years, with one of the three years having a value of zero (the rest year). Grazing on FS-Meyers Creek allotment is always in conjunction with ARS-Toms Creek.

Maintenance and Repair of Fences

Pasture Fences

There are about 180 miles of pasture fence on Headquarters Range, Humphrey Ranch, and Henninger Ranch. Fence locations, including exclosures, are shown on each pasture area (see Map 3 through Map 8). Most fences are constructed with woven wire on the bottom and barbed-wire strands above.

All fences are inspected and repaired annually, which includes replacing decaying posts and wire and removing non-functional fences and related materials.

Horse Corral Fence

A horse corral on the West Summer Range (Odell) pasture was constructed and is maintained to confine horses used for sheep trailing, camp tending, and other sheep grazing management and research activities. The corral is a drop fence, with all sides constructed with four strands barbed wire. The drop fence is let down each year after grazing operations are complete.

Exclosure Fences

Exclosures on the Headquarters Range are sheep-proof fence, maintained to keep sheep from grazing excluded areas. The West Summer Range exclosures are drop fences, put up to exclude sheep when sheep grazing is being conducted. These drop fences are let down after sheep are removed from the pasture. At this time, routine work that must be done to keep fences safe and fully functional will be conducted, which includes replacing posts and wire.

Maintenance and repair of existing roads and fire lines

Roads

The Agricultural Research Service properties include a few miles of paved and gravel road and numerous primitive roads (Table 6). Most secondary primitive roads are two-track with grass, forbs and low shrubs between tracks (Figure 15 and Figure 16). No new roads have been developed in at least 15 years.

Table 6. Miles of road on Agricultural Research Service property

Property	Miles of paved road	Miles of gravel road	Miles of primitive road	Notes
Headquarters	2	21	119	
Humphrey Ranch	-	-	2.7	
Henninger Ranch	-	-	1.5	
East Summer Range	-	-	1 (closed)	Closed and rehabilitated
West Summer Range	-	-	0.8	Two-track used to access horse corrals
Total	2	21	125	

In the 1950s, the BLM authorized a private company to construct 7.8 miles of road on Summer West Range to access a phosphate mine. Since then, the entire road has been closed, culverts pulled, fill in the draw crossing excavated and drainage features restored. The road bed has grass, forb, shrub vegetation, and conifer cover and is now used as a horse-riding and hiking trail. About one mile of primitive two-track road to Blair Lake on East Summer Range is closed to motorized use and cross drains have been constructed. Local roads (National Forest System; County) leading to property borders at Headquarters,

Humphrey Ranch, Henninger Ranch, and West Summer Range are locked and gated to prohibit unauthorized entry to these areas, where public motorized travel is prohibited. No new road construction is planned.

Figure 15. Headquarters property displaying the firebreak and associated roads – See Map 4 appendix A

Figure 16. Example of road on Headquarters (sw 05/08)

Annual road maintenance and repair is conducted on main roads as needed. Each year approximately 20 miles of road needs maintenance. Road maintenance includes ongoing upkeep necessary to retain or restore the road to approved management standards. Maintenance activities could involve cross drain construction or surface drain installation, spot surfacing, minor culvert installation and replacement, catch basin reshaping, road side brushing, cleaning and repair of existing cattle guards, and surface grading. All replacement gravel is weed free and is hauled in from State of Idaho gravel pits. Road maintenance is confined to the road right-of-way.

Permanent Firelines

A permanent firebreak (approximately, 14,000 feet) around the headquarters office and housing area is maintained annually with a motor grader to provide a mineral soil break about 30 feet wide. Herbicides may be used to control noxious weeds on the Headquarters firebreak. Weed management is described in the pest control section below.

Figure 17. Cleared firebreak –fy 2008

Stock Water Operations

In areas where water is not readily accessible on Headquarters Range, water is trucked to the sheep and unloaded into portable water troughs (e.g., metal, fiberglass, or plastic) that generally accommodate up to 12 mature sheep at one time. Troughs are equipped with ladders for birds to escape. Troughs are moved as grazing progresses across the pastures; 80 watering sites are used on Headquarters Range. To reduce hoof action around watering sites, they are generally used for four or less days and then moved. Watering sites are

approximately 0.25 acre and are dominated by bluebunch wheatgrass or crested wheatgrass. Henninger Ranch, Humphrey Ranch, West Summer Range and East Summer Range have natural and developed surface water available.

Water Developments

Humphrey and Henninger Ranches

Irrigation was in place and ongoing before the Agricultural Research Service purchased the properties from the private sector. Previous owners constructed ditches to divert creek water at registered (Idaho Department of Water Resources) points-of-diversion onto grazing pastures. Currently, canvas dams are placed in diversion ditches to flood pastures at the time sheep graze in the area, from Modoc Creek at Humphrey Ranch and from West Dry Creek at Henninger Ranch. In accordance with the water district, water may be diverted annually. The days and amount of water that is diverted varies annually and is based on water availability as regulated by the water district. Approximately two miles of maintained irrigation ditch exist at each ranch. Diversion ditches are inspected and maintained annually. Maintenance includes cleaning with a tractor-drawn ditching implement or backhoe and improving points-of–diversion (2 on Modoc Creek and 2 on Long Creek). In addition, site-specific planned improvements to water developments at Humphrey Ranch may include:

- installing two new weir boxes on Modoc Creek,
- installing catch basins at 2 points-of-diversion along Long Creek, and
- installing a temporary water storage tank.

West Summer Range

Figure 18. Upland water trough (jf – 07/160/8)

There are five water developments on Big Mountain Unit of West Summer Range. Springs are developed with permanent troughs to collect water in low-flow areas needed to water up to 900 ewes with lambs (Figure 18). Water developments are also used by wildlife. Four developments are flume type, with metal troughs and metal (3) or wood (1) support structures. Flumes are 80 to 90 feet in length, approximately 20 to 24 inches in width, and 14 to 16 inches deep. The fifth development is a series of round rubber troughs, with about 10 gallons capacity each, installed at springs. Troughs remain empty (plugs removed) when not in use. When in use, troughs are equipped with ladders for birds to escape.

Developed water site locations include:

- Short Canyon = SENE 1/4 Section 6, T15S, T1W (Round rubber troughs).
- Lower Unit 3 = SENE Section 5, T15S, R1W (Flume trough).
- Unit 2 = SWNWNW Section 5, T15S, R1W (Flume trough).
- Upper Unit 3 = SESW Section 33, T14S, R1W (Flume trough).

- Unit 4 = NENESE Section 4, T15S, R1W (Flume trough).

Maintenance of water sites includes annual spring cleanings. Troughs are repaired when needed.

Camp Tending

Headquarters Range, Humphrey Ranch, and Henninger Ranch

Headquarters Range, Humphrey Ranch and Henninger Ranch are administered from existing roads. Herder camp trailers are 12-feet long by 7-feet wide (Figure 19). A tow-behind camp commissary is attached to securely store dog food, oats, saddles, and other gear. These camps are located near existing roads and are moved with pickups as sheep graze through the pastures. Camp activities affect less than 0.25 acre. Camp site equipment and activities include a horse trough, a horse picketed on a 20 to 30 foot chain, and a dog feeding area. Camps at Headquarters Range, Humphrey Ranch, and Henninger Ranch are visited by a camp tender every two or three days. Crested wheatgrass and bluebunch wheatgrass provides the primary ground cover at camp sites. Total area affected by camp sites is a negligible percentage of the total pasture area. Trash from herders' camps is transported back to the Headquarters office area for proper disposal.

Figure 19. Camp herder trailer

Summer Range

Summer camps include a 7 foot by 7 foot teepee tent. Horses are watered at natural water sites or developments where sheep are watered; generally one horse is picketed, and one horse is loose. Camp areas affect about a 50-foot radius area. Camps are moved every three to four days as grazing progresses. Camps follow the sheep closely and, with frequent moves, have little effect on vegetation at the sites. Trash from herders' camps is transported back to the Headquarters office area for proper disposal. Table 7 shows the number of camps in each summer range and season of use.

Table 7. Camps per pasture and season used on Summer Ranges

Range	Pasture	Camps per Pasture	Season Used
West Summer Range	Odell	9	early July to early September
	Big Mountain	7	
East Summer Range	Toms Creek	6	

Range Improvement

Wildfire Mitigation

To stop wildfires that threaten research study sites, sage grouse nesting and brooding habitat, and research infrastructure, some fire lines are maintained for quick access and fire suppression. Fire lines that may be used are those that were developed for prescribed fires. Once fire lines recover from initial development and a stable vegetation community is established, a combination of brush beating and herbicides may be used to suppress excessive woody species growth. These fire lines are not used as roads and are only accessed for maintenance (approximately once every 5 years) or fire suppression.

Prescribed Burning

As part of ongoing research activities, the Sheep Station burns portions of the Headquarters Range that are required to test research hypotheses. The actual burned area over the past 30 years was 6,054 acres: 10 prescribed burns totaling 4,616 acres and 4 wildfires totaling 1,437 acres. Past prescribed burns ranged from 226 to 758 acres in size (see Map 4).

Over the next five years, several small experimental prescribed burns are planned on the Headquarters Range. Generalized locations for each burn unit are shown in Map 5 and they include:

- Three burns would occur with largest being 275 acres and totaling a maximum of approximately 700 acres over five years (Map 5). These prescribed fires will be in conjunction with a shrub management study, described further below. The prescribed fires serve two objectives: (1) to validate post-fire vegetation recovery models, and (2) to reduce woody fuel loads on small strips of land to mitigate catastrophic wildfire that threaten large, intact areas of sage grouse habitat.
- Prescribed burns in pastures 6, 7, and 8, to be followed by revegetation (see below).
- 30 meter by 30 meter plots in Headquarters exclosures would be burned, treated with biochar, and re-seeded (see below).

Prior to burning, a burn plan is prepared. For experimental prescribed burns, temporary graded fire lines (approximately 15 feet wide) are constructed around prescribed burn areas. Temporary fire lines are constructed with a dozer and motor grader. Fire lines are used for vehicle and equipment access during burn operations and for research during and after the areas are burned. Once the fire line is no longer needed, shrub and grass debris are pulled back and spread over the cleared area, which generally occurs within one year of the burn.

Fire lines around prescribed burn areas are allowed to recover. Some fire lines may be managed to mitigate wildfire risk, which involves brush beating or herbicide treatment (see Range Improvement, Wildfire Mitigation). Generally, fire lines revegetate with native species within one or two seasons after the burn. Invasive noxious weeds have not been a problem on the cleared firebreaks. *Bromus tectorum* L., present since 1930s, is an incidental species on the Headquarters Range, but is not persistent at this elevation or in this environment.

Shrub Management Using Herbicides

As part of experimental practices on the Headquarters property, herbicides may be used to manage vegetation for both fuel reduction and wildlife habitat purposes. In particular, these treatments would be used to protect and enhance healthy sagebrush ecosystems. Over the next five years, three experimental applications of herbicide treatments are planned on the Headquarters property (see Map 5). These herbicide treatments will be in conjunction with a prescribed burn study, which is described in the section above, “Prescribed Burning.” The herbicide treatments serve four objectives:

(1) Investigate post-herbicide vegetation recovery,

(2) evaluate effectiveness of herbicide treated strips of rangeland to curtail wildfire advancement,

(3) reduce volatile woody fuel loads on small strips of land to mitigate catastrophic wildfire that threaten large, intact areas of sage grouse habitat, and

(4) determine the effectiveness of various test herbicides to reduce *P. tridentata* presence in old sagebrush stands where sagebrush is decreasing and *P. tridentata* is increasing.

The treatments would include primarily aerial application of herbicides to reduce shrub density (i.e., volatile fuel loads) along long narrow strips through shrub-dense areas. In addition, strategic spot treatments may be used in these areas to further curtail bitterbrush domination stands that were formerly dominated by sagebrush stands. The treatments will be followed by the prescribed burning described above. It is anticipated that these narrow strips will reduce the likelihood that wildfires would advance at an uncontrolled and destructive rate through contiguous shrub-dense habitats for sage grouse. Herbicide treatments would target the following species sagebrush and bitterbrush species: *Artemisia tridentata Nutt. subsp. vaseyana (Rydb.) Beetle; Artemisia tripartita Rydb. subsp. tripartita; Purshia tridentata* (Pursh) DC. The herbicide that would be recommended for use is tebuthiuron (a granular formula). All application would occur according to label specifications and would be conducted consistent with the herbicide application protocols in Appendix C. Generalized locations for each treated unit are presented in Map 5. Six herbicide applications would occur with largest being 73 acres and totaling a maximum of about 375 acres over five years

Seeding

Range improvement activities also include seeding of test plant products for experimental evaluation. In some cases, if sites are infested with invasive species, they would be treated with herbicide application prior to seeding. All herbicide application would occur according to label specifications and would be conducted consistent with the herbicide application protocols in Appendix C. The following specific seeding activities are proposed for the Headquarters Range and Humphrey Ranch within the next five years:

- Revegetate historical gravel pit in Pasture 4U/1U - Entire area (~52 acres) would be seeded to a mix of *Purshia tridentata* (Pursh) DC., *Bassia prostrata* (L.) A.J. Scott, and *Agropyron cristatum* (L.) Gaertn. to evaluate site stabilization and rehabilitation of an abandoned barrow pit.
- Revegetation after fire in pastures 6, 7, and 8 - A portion of the burned area would be seeded to novel varieties of *B. prostrata* to evaluate performance in sagebrush-steppe conditions.
- Revegetation after fire and biochar application in Headquarters exclosures.
- Renovate improved pastures at Humphrey – Portion of the area (~10 acres per year; see Map 8) is periodically reseeded to restore to former vegetative composition. Common plants that are seeded include *Dactylis glomerata* L., *Phleum* L., and *Bromus biebersteinii* Roem. & Schult., *Medicago* L., and *Trifolium pratense* L.

Integrated Pest Management

There are some invasive plant populations on Agricultural Research Service properties. These species become established along roads, where seeds are transported by vehicles, and populations persist where there is no sheep grazing. Sheep grazing tends to prevent many weeds from becoming established. Some weed species have spread over time on to Agricultural Research Service properties from adjacent lands

where cattle graze. Weed locations are recorded on maps as they are found. Invasive plant species infestations are GPS (Global Positioning System) mapped and are targeted for treatment.

An adaptive management/integrated pest management approach is used to control and eradicate exotic, invasive weeds. This integrated approach is coupled with research on ecosystem functions and native plant communities. As primary weed control, this integrated approach includes the use of strategic sheep grazing as a biocontrol method to reduce the production of weed seed and spread of weeds and utilizes targeted herbicide treatments where sheep grazing is ineffective. In addition, specific beetle species are used for biocontrol, alone or in combination with grazing.

Strategic Sheep Grazing

We take precautions to minimize weed spread by sheep grazing. Areas with weeds are grazed in spring when there is little or no risk of spreading weed seeds. Noxious weeds are not grazed when weed seeds are developed and there is risk of spreading viable seeds to other areas. If necessary, animals are quarantined for six days before moving sheep from weed infested areas or from feed with potential weed seeds to other grazing units.

We graze to control *Euphorbia esula* (L.) and *Centaurea stoebe* (L.) in spring or early summer when there is no or little risk of spreading weed seeds. Sometimes we use herbicides on invasive weed species that are not consumed by sheep.

Herbicide Application

Herbicides are sprayed semiannually along some roads and in sheep pens where invasive weeds are present. Herbicides have been used to control weeds along roadsides, in feedlots and corrals, small pastures (less than 25 acres), and near building structures for about 30 years. In small confined infestations, herbicide use is more effective on weeds than sheep grazing. For noxious weed management, herbicides application methods include:

- Spot treatment and handwand application control weeds along roadsides, in feedlots and corrals, and near building structures.
- Four-wheeler-mounted and tractor-mounted boom-sprayer application is conducted to control weeds in small pastures and in large feedlots.

Approximately 90 percent of the application is along roadsides.

We also use herbicides to control *E. esula, C. stoebe, B. tectorum, Cardaria draba* (L.) Desv., *Chenopodium album* L., *Bassia scoparia* (L.) A.J. Scott, *Cirsium* spp. Occasional herbicide control is conducted for rare sightings of *Hyoscyamus niger* L., *Arctium lappa* L., *Isatis tinctoria* L., *Hieracium cynoglossoides* (Arv.-Touv) P.

Herbicides used to control weeds include, but are not limited to: clopyralid, triclopyr amine, imazapyr, diuron, picloram, bromacil, non-aquatic glyphosate, 2,4-D amine, and imazapic. Historically, herbicides are applied to less than 60 acres annually. All application would occur according to label specifications and would be conducted consistent with the herbicide application protocols in Appendix C.

Cattle and Horse Grazing

We periodically use cattle and limited horse grazing with cooperative research to achieve research grazing objectives in years when the sheep do not remove enough forage. Cattle and horses consume vegetation that sheep typically do not harvest, create more uniform pastures for grazing research, reduce residual on-site forage for other rangeland research, and reduce fuel loads and fire risk. Cattle and horse grazing is

used mainly on the Headquarters Range and Humphrey Ranch, with less frequent cattle and horse grazing at Henninger Ranch. The number of animals we use varies from year to year depending on research needs and vegetation conditions. Cattle or horse numbers (AUMs used) are based on the area (acres) and amount of dormant forage needed to be removed. Excess forage removed includes fine fuels and standing dead plants, primarily grasses. Our goals for removing excess forage are to manage fine-fuel loads to reduce potential for catastrophic wildfire and to remove standing dead plants to stimulate new growth. Generally, cattle and horse grazing starts in late fall or early winter after forage plants have stopped growing for the year and when plants are dormant. Some light cattle grazing may occur in the spring. On some pastures we graze longer than 30 days and some years grazing starts in October and ends early January.

We evaluate pastures for forage removal needs and map them to determine livestock stocking. We solicit grazing bids from private livestock owners. We track number of animals, number of days, and areas grazed with detailed yearly records at the Dubois Sheep Experiment Station. Table 8 displays average AUMs from 2008 to 2014 for each property (Taylor 2015, personal communication).

Table 8. Average cattle and horse AUMs used from 2008 to 2014

Attribute	Cattle and Horse AUMs Used by Property		
	Headquarters	Humphrey	Henninger
Average	2,010	984	0
Minimum	786	723	0
Maximum	2,947	1,541	0

Predator Avoidance and Abatement

Our records indicate that conflicts between large predators (bears, wolves, mountain lions) and sheep grazing have not been a substantial or recurring problem on Agricultural Research Service properties, even though those species have inhabited Agricultural Research Service properties since the inception of the Station in 1915. We expect that a limited number of encounters with predators would continue to occur. The primary methods of limiting encounters with predators include:

- Avoidance due to a large land base grazed with relatively few livestock;
- presence of full time sheep herders, guard dogs, and herd dogs; and
- removal of associated trash and/or carcasses that might attract predators.

To date, these practices have proven effective in keeping the number of conflicts with predators to a minimum. When encounters or conflicts do occur, they are addressed differently depending on the species present, and the level of threat to the livestock or herder. Most encounters end without lethal removal.

For black bears and gray wolves, we instruct herders to haze depredating black bears or wolves by shooting a rifle in a non-lethal and safe direction. If problems persist, we contact USDA Animal and Plant Health Inspection Service Wildlife Services to investigate and follow up with control actions if warranted.

Grizzly bears are present on Summer West and Summer East Ranges. However, herders have not encountered grizzly bears on these lands. In the event of a grizzly bear encounter, measures are described in the section Design Features, Best Management Practices, Monitoring.

Design Features, Best Management Practices, Monitoring

Wildlife Conservation Measures

Sheep Station personnel, including herders, implement a number of conservation measures to reduce the likelihood of potential conflicts between predators, such as grizzly bears and domestic sheep/livestock. The following conservation measures were extracted from the US Fish and Wildlife Service Biological Opinion (01EIFW00-2015-F-0275; February 25, 2015) for US Sheep Experiment Station Grazing Program Agricultural Research Services:

> "The proposed action includes nondiscretionary avoidance and minimization measures that we will implement to reduce potential adverse effects to grizzly bears. The US Fish and Wildlife Service and the Agricultural Research Service worked closely to develop these measures. Additional best practices and more details on the below are described in the Assessment (p. 11-13) and are incorporated here by reference. The Agricultural Research Service and its employees will implement the following measures during grazing operations:
>
> - When creating research plans that include sheep grazing, the Agricultural Research Service will consider the history of livestock-bear conflicts on Agricultural Research Service lands. If recurring conflicts develop, the Sheep Station will modify the grazing schedule and/or sheep movements to avoid additional conflicts.
>
> - The Sheep Station will use good husbandry practices so that sheep are as healthy as possible, are suitable for research, and the number sick or stray animals is kept to a minimum. An institutional animal care and use committee will evaluate research protocols and livestock management practices to ensure they are consistent with good animal husbandry, and comply with federal laws that govern the use of agricultural animals in research. Protocols and practices that do not comply are not approved.
>
> - Sheepherders, working dogs, and guard dogs will be kept with the sheep full-time when on rangelands to reduce the likelihood of conflicts or encounters with grizzly bears, and to assist in efficient and prompt movement of animals when necessary. In the Summer Range, sheep are accompanied by a minimum of two guard dogs, two herd dogs, and a full time sheepherder.
>
> - Sheep will be bedded in the evenings on an approximately 1 acre area. On moonlit nights, when sheep have the tendency to get up and graze, sheepherders will exercise extra vigilance.
>
> - Lame livestock, which may occur occasionally, will be watched closely. When lame animals do not recover, they will be removed from the herd within a short period of time (approximately every 3 days when the camp tender brings supplies), and transported back to the Headquarters property.
>
> - All unnatural attractants to bears will be minimized. This includes treatment or removal of livestock carcasses, and proper storage of human foods, garbage, and dog food. Approved bear-proof containers will be used. Damaged containers will be repaired or replaced promptly so that they work as designed. Camp tenders and managers will make periodic visits (approximately every three days) to remove trash and animal carcasses in order to eliminate potential bear attractants.

- At least two formal training-orientation meetings will be conducted annually with Sheep Station employees and herders to review identification of grizzly bear and other wildlife. Sanitation and garbage removal practices, nonlethal procedures to address livestock-wildlife encounters, and who to contact should encounters occur will be discussed at these meetings.

- Herders will be instructed to avoid encounters with grizzly bears. Herders may move sheep to other areas of the pasture to avoid an immediate threat. Moving sheep to other pastures or locations will occur if encounters persist. For the purposes of this Opinion, grizzly bear-human encounters encompass any interaction between a grizzly bear and a human, from sightings to altercations that result in the death or injury of either the bear or the human.

- Herders will report all bear sightings to their supervisor. When on Agricultural Research Service land, all existing and suspected bear activity and (or) conflicts will be reported directly to Animal and Plant Health Inspection Service (APHIS), Wildlife Services. APHIS Wildlife Services would then contact state and federal agencies as necessary to conduct damage investigations. When on National Forest System lands, all existing and suspected bear activity and (or) conflicts will be reported directly to US Forest Service contacts as well as APHIS Wildlife Services. Department of Energy-administered land is outside of the current range of grizzly bears and outside of suitable grizzly bear habitat, so a reporting protocol for grizzly bears is not proposed for these lands.

- All sightings that are confirmed grizzly bears, or positive evidence of grizzly bear in the vicinity of livestock, will be reported by the Sheep Station to the Interagency Grizzly Bear Study Team within one week.

- In an interagency agreement with the USDA Forest Service (USDA Forest Service 2007), the Sheep Station agrees to comply with grizzly bear management goals on the Meyers Creek and East Beaver Allotments (as described in USDA Forest Service 2004, p.6) including notifying appropriate personnel of grizzly bear conflicts or encounters, and temporarily stopping or modifying grazing as necessary, should bear encounters arise with humans or livestock. This agreement may be updated based on future consultation between the USDA Forest Service and the US Fish and Wildlife Service regarding livestock use of the Meyers Creek Allotment."

Grizzly bear trapping, transportation, or lethal removal is not part of the proposed action. Thus, if needed, it would require additional consultation with the US Fish and Wildlife Service. Other reasonable and prudent measures may be developed as formal consultation with the US Fish and Wildlife Service proceeds.

Road to Blair Lake

Mitigation to reduce and prevent erosion are needed on this road from where it crosses on to Agricultural Research Service property to where the road ends, near Blair Lake. Mitigation measures are as follows:

Figure 20. Road Ruts on Road to Blair Lake

- Blair Lake M1: Increase signage and off-trail deterrents (dropped trees) to discourage trespass on the historically closed road.

- Blair Lake M2: From crest of hill down to first meadows (Figure 20): Rills and gullies are starting to develop on the compacted road surface. Install water bars at the first gradient breaks to get the water off the road. Install subsequent water bars at gradient breaks until the open meadows are reached. Extend water bar at least six feet into adjacent hillside along contour or at a slight angle to the slopes gradient. Hand crews would be used to implement the recommended measures. Knock rut edges down, and fill in ruts. Place small diameter (four inches or less) brush consistently over the length of the ruts to slow any surface runoff and encourage deposition of fine grained sediment. Deposition of fine-grained sediment would provide the opportunity for revegetation from adjacent sources. If vegetation is not established within three years consider reseeding.

- Blair Lake M3: From first meadows to major slope break above where road ends: Install water bars at noticeable gradient breaks on ruts and road. Extend water bars at least six feet into adjacent hillside along contour or at a slight angle to the slope gradient. Place small diameter (four inches or less) brush consistently over the length of the ruts to slow any surface runoff and encourage deposition of fine-grained sediment. Deposition of fine-grained sediment would provide the opportunity for revegetation from adjacent sources. If vegetation is not established within three years consider reseeding.

- Blair Lake M4: From major slope break to where road ends: Install water bars at noticeable gradient breaks on ruts and road to eliminate surface runoff from road. Extend water bars at least 6 feet into adjacent hillside along contour or at a slight angle to the slope gradient. Place small diameter (4 inches or less) brush consistently over the length of the ruts to slow any surface runoff and encourage deposition of fine grained sediment. Deposition of fine grained sediment would provide the opportunity for re-vegetation from adjacent sources. If vegetation is not established within three years consider re-seeding.

- Blair Lake M5: At road end: Harden the sheep driveway across the stream (to minimize sediment input into stream) with gravel and small cobbles from surrounding area. In addition, harden the last 30 to 50 feet of the road and place a water bar at the road end to divert surface runoff. This would minimize or eliminate surface runoff and sediment from entering the creek at the road end.

Sheep Crossings

We recommend mitigation at sheep crossings at points OD 4 and OD 5, on the North and South Forks of Odell Creek. At the North Fork Creek (OD 4 T15S, R2W, Section 11, SW ¼) these mitigations apply to the main and secondary crossings.

- North Fork of Odell Creek M6: At both crossings place water bars at key gradient breaks or embed 12-inch logs at this gradient breaks about 4-5 inches deep, and at an angle of 20-45 degrees across the driveway to ensure water is diverted off this area into undisturbed vegetated forest floor, which would function as a sediment filter strip.

- North Fork of Odell Creek M7: At the secondary and smaller crossing, harden the stream banks with rock , small logs, pole sized timber, or other locally obtained native material (that can harden stream banks) to prevent further degradation due to sheep crossing the stream.
- South Fork of Odell Creek (OD 5 T15S, R2W, Section 14, SW ¼) M8: The far side of the crossing comes out on to a steep slope, which is largely bare of vegetation. Currently, there are no signs of rilling or gullying, but mitigation will prevent further degradation due to sheep crossing the stream.
- South Fork of Odell Creek M9: Harden the far bank with small rock to provide soil cover or consider developing an alternative crossing nearby where the entry and exit would not lend its self to slope issues.

Heritage

To ensure protection for cultural resources:

- A Heritage Management Plan outline (appendix D) has been compiled to ensure the protection of cultural resources. The foundation of this outline is three fold: to comply with Section 106 of the National Historic Preservation act, record and provide management guidelines for U.S. Sheep Experimental Station historic properties, and develop and implement a survey strategy for the Agricultural Research Service, U.S. Sheep Experimental Station, Dubois, Idaho, properties.
- If unanticipated discoveries are found during project activities, cease all operations in the vicinity of the discovery until assessed by a professional archaeologist or historian.

Best Management Practices

Best management practices would be implemented for herbicide application, grazing and stream crossings. Best management practices have been proven effective across the country in managing non-point sources of pollution, and their implementation is required in both Idaho and Montana as part of the Clean Water Act (Seyedbagheri 1996, Schuler and Briggs 2000, USDA Forest Service 2002)

Best Management Practices for Herbicides

- A contingency plan, or emergency spill plan, identifies notification requirements, time requirements for notification, spill management, and parties responsible for cleanup. Factors to be considered during spill cleanup are the substance spilled, the quantity, and toxicity, proximity to waters and hazard to life, property, and environment, including aquatic organisms.
- During pesticide application, an untreated buffer will be left alongside surface waters, wetlands and riparian areas. In determining buffer width, the following factors may be taken into consideration: beneficial water uses, adjacent land use, rainfall, temperature, wind speed and direction, terrain, soils, vegetative type and aquatic life. Other considerations are: the type of application, persistence on-site, foliage, spray pattern and droplets and carrier. Table 9 displays the buffer widths used during the application of herbicide.

Table 9. Summary of buffer widths by herbicide

Herbicide	Recommended Buffer Width	Comment
2, 4 D	25 feet [a]	Most formulations of 2,4-D do not bind tightly with soils and, therefore, have the potential to leach down into the soil column and to move off-site in surface or subsurface water flows[b.] .
Imazapyr	Up to Edge[b]	Low toxicity to fish and algae; Mobility pH dependent;
Picloram	25 feet[a] 164 feet	Known surface and groundwater contaminant; 25 foot buffer applies to surface water drainages; 164 foot buffer applies if herbicide applied near Station groundwater wells
Bromacil	25 feet[a] 164 feet	Known groundwater contaminant; 25 foot buffer applies to surface water drainages; 164 foot buffer applies if herbicide applied near Station groundwater wells
Clopyralid	25 feet[a] 164 feet	Considered moderately toxic to fish; 25 foot buffer applies to surface water drainages; 164 foot buffer applies if herbicide applied near Station groundwater wells
Triclopyr	Up to Edge[b]	The water-soluble salt is degraded in the water column through photolysis and hydrolysis[b]
Diuron	25 feet[a] 164 feet	Known groundwater contaminant; Moderately toxic to fish and highly toxic to aquatic plants; 25 foot buffer applies to surface water drainages; 164 foot buffer applies if herbicide applied near Station groundwater wells
Non-aquatic glyphosate	100 feet	Relatively low toxicity to birds, mammals and fish.
Aminopyralid	0 feet [c]	Given its high mobility, and moderate persistence in soil, aminopyralid is likely to leach to ground water irrespective of soil type; slightly non-toxic (or a low potential for adverse effects) to fish and aquatic organisms [d]
Tebuthiuron	100 feet[e]	A minimum buffer zone of 100 feet wide will be provided for aerial application.

a - Bonneville Power Administration, Date Unknown, Transmission System Management Program (DOE/EIS-0285)-Final EIS, Chapter 5;

b - Tu et al, Nature Conservancy Weed Management Handbook

c - Durkin, 2007 Risk Assessment for U.S. Forest Service

d - Thornton, 2011e Bureau of Land Management 2010

Monitoring

Ongoing range management and research includes monitoring conditions on lands used by the Sheep Station. To help inform our management activities the following monitoring occurs:

- Monitoring vegetation and soil on lands and research sites using modern remote-sensing and historical on-the-ground measurements.
- Identifying and assessing invasive and noxious weeds and trespass-traffic.
- Assessing AUM availability and harvest.
- Monitoring sage grouse use of historical and newly established lek sites.
- Monitoring other wildlife.

Monitoring of design criteria

In addition to ongoing research-related monitoring, we will monitor the effectiveness of design criteria at the sheep crossings and road to Blair Lake. We will inspect these areas after high precipitation events and

at the beginning of each season of use. We will conduct maintenance work as needed, based on inspections. We recommend establishing key photo points for annual monitoring and writing a short description of recovery conditions. If monitoring indicates, we will do additional work to enhance restoration.

We will conduct water quality monitoring for herbicides located on the Headquarters property for both primary auxiliary domestic water wells. We will develop a long-term monitoring plan only if water quality concerns are identified during the screening phase of monitoring.

Decisions to Be Made

Dr. Andrew Hammond is the Agricultural Research Service responsible official. The decision to be made by Dr. Hammond is whether to continue the historical and ongoing grazing and associated activities at the U.S. Sheep Experiment Station in Dubois, Idaho, in support of their mission or whether to modify these activities in any way.

This revised DEIS evaluates site-specific concerns raised by the public It also includes consideration of alternatives to the proposed action, and an analysis of effects for the proposed action and alternatives on the environment.

This environmental impact statement will provide Dr. Hammond with the information necessary to make the following decisions with regard to the Interim US Sheep Experiment Station Grazing and Associated Activities Project:

- Which actions, if any, will be approved, and
- What additional mitigation measures and monitoring requirements are needed.

Public Involvement

See “What is the project history to date?” on page 2) for details of the public involvement leading up to preparation of this 2015 DEIS.

Because the purpose and need has not changed substantially, we have considered all public comments associated with either scoping or public comment periods for the *Interim U.S. Sheep Experiment Station Grazing and Associated Activities Project Environmental Assessment* (USDA 2008), the *U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009* draft environmental assessment, and the *U.S. Sheep Experiment Station Grazing and Associated Activities Project 2010* draft environmental impact statement scoping in developing alternatives for this 2015 DEIS. Those comments can be found in the project record.

Observers

Field surveys were conducted by USDA Forest Service, TEAMS Enterprise specialists throughout the summer of 2009. Observers on the various trips included representatives from Western Watersheds Project and Defenders of Wildlife.

2011 Field Tour

On August 16, 2011 we invited interested parties and the general public to a field tour on the Sheep Station. The tour included presentations of various research activities ongoing at the Sheep Station, including: plant recovery after fires, remote sensing and rangeland monitoring, biodiversity and ecosystem integrity, climate change and plant populations, soils and rangeland management, grazing and

rangeland management, and environmentally-adapted livestock. Participants included ARS staff, area livestock producers, researchers, the state Senator's office, county commissioners, members of the public and representatives various non-governmental organizations, including: Western Watersheds Project, Sierra Club, economic development region, Natural Resources Defense Council, Greater Yellowstone Coalition, and National Wildlife Federation.

Draft Environmental Impact Statement 2011 Comment Period

In response to the 2011 DEIS, the Agricultural Research Station received 56 unique comment letters and over 15,000 form letters from individuals, organizations, agencies, and business owners. Commenter perspectives varied, but in general, raised similar concerns as those received on the 2009 Environmental Assessment and in the scoping period for the DEIS. Commenters expressed concerns about potential impacts of the project, including impacts to wildlife (grizzly bears, big horn sheep, wolves, aquatic species, and wildlife corridors), native plants and non-native invasive species, range, soils and water resources, recreation, cultural resources, public access, and concerns about the impacts from and to climate change. Many comments included recommendations or preferences for selecting alternatives or eliminating alternatives. Other comments focused more on process issues such as NEPA compliance, interagency consultation, and the overall purpose or mission of the Sheep Station.

ARS began reviewing these comments and responding to the comments in early 2012. However, soon after the comment period, we received notification that use of the Bernice allotment, would expire in December 2012 and would not be renewed. Due to this changed circumstance, in 2013 we began a supplemental DEIS to incorporate new information as a result of losing the Bureau of land Management Bernice allotment. Preparing the supplemental DEIS was delayed due to various factors and we ultimately decided to issue this Revised DEIS that incorporates relevant information to date. We considered the public comments associated with the 2011 comment period in developing the 2015 DEIS. The information, alternatives, and analysis presented address many of concerns expressed in the comments. However, a detailed response to comments has not been prepared at this time. Pursuant to 40 CFR 1503.4 (a), a response to all of the comments received will be prepared and published with the Final Environmental Impact Statement.

Consultation

US Fish and Wildlife Service

On May 6, 2008, and again on August 14, 2009 a list of threatened, endangered, and proposed species that may be present in the action area was discussed with the U.S. Fish and Wildlife Service (Arena 2008, personal communications; USDI Fish and Wildlife Service 2009). Results of these discussions concluded that only Canada lynx, Yellowstone Distinct Population of grizzly bear, and Northern Rocky Mountain gray wolf (currently delisted) have the potential to occur in or near the project area. Other species have no federal listing status, or do not occur in the area. No critical habitats occur in the project area.

A review of available information was conducted to assemble occurrence records, describe habitat needs and ecological requirements, and to determine whether additional field reconnaissance is needed to complete the analysis. Sources of information included interviews with Sheep Station staff, interviews with Forest Service biologists on the Caribou-Targhee National Forest, interviews with state wildlife agency employees, review of Idaho and Montana State Natural Heritage Program databases, and published research. An independent wildlife biologist (employed by the USDA Forest Service – TEAMS Enterprise Unit) visited the sites on four separate occasions including May 6th through 8th, 2008; July 6th through 14th, 2008; June 21st through 26th, 2009, and August 17th through 21st, 2009 in order to verify

wildlife habitat types, observe resource conditions, review details of proposed activities, gather additional site information, and contact local biologists from state and federal agencies.

Other than Canada lynx and grizzly bear, no further analysis is needed for threatened, endangered or proposed species because they are not known or suspected to occur in the project area, and no suitable habitat is present. Effects to non-listed species are reviewed in the “Analysis of Other Species” section in the Wildlife Report.

2008 - Interim U.S. Sheep Experiment Station and Associated Grazing Activities

The project biologist met informally several times with United States Fish and Wildlife Service staff in Chubbuck, Idaho (Arena 2008, personal communication). The initial meeting conducted on May 6, 2008 familiarized the Fish and Wildlife Service biologist with the project location and description of proposed activities. At that time, the project biologist and Fish and Wildlife Service biologist reviewed a list of species in or near the project area having federal status. A preliminary discussion of species occurrences in the area and potential project effects indicated that Canada lynx was the only federally-listed species and that effects are unlikely or minimal.

One federally-listed plant species, Ute ladies’-tresses (*Spiranthes diluvialis*), has been documented or has potential habitat near the geographic area of the Sheep Station. Upon review with the Fish and Wildlife Service, we agreed there is no habitat in the project area.

Additional phone calls and email exchanges occurred in September and October, 2008 to review potential effects to species, clarify procedural questions, and agree that the Sheep Station would work with the Chubbuck, ID Fish and Wildlife Service office as the lead contact. On December 9, 2008, the Fish and Wildlife Service concluded the consultation process for the interim grazing activities by providing written concurrence with the project biologist's determination of effects on listed species which included "Not Likely to Adversely Affect" Canada lynx (USDI Fish and Wildlife Service 2008). Similarly, the Fish and Wildlife Service acknowledged the biologist's determination that the project was "Not Likely to Jeopardize the Continued Existence of Gray Wolf".

2009 - U.S. Sheep Experiment Station and Associated Grazing Activities

On August 14, 2009, the biologist met with the Fish and Wildlife Service in Chubbuck, ID to again start the process of consultation. This phase of the project is the same as the interim phase, but activities and effects are considered over a longer time period, with more extensive scoping and public review. At the time of this meeting, (USDI Fish and Wildlife Service 2009) Canada lynx was the only listed species in the project area. The northern Rocky Mountain distinct population segment of gray wolf had been delisted on May 4, 2009.

In September, 2009, grizzly bears in the Yellowstone distinct population segment were restored as a threatened species. On October 1, 2009 the biologist contacted the Fish and Wildlife Service to discuss the recent court order relisting the Yellowstone distinct population segment of grizzly bear. Discussions included possible determinations and consultation process for control actions including hazing, trap and transport, lethal control, and personal safety if a herder is threatened by a bear. Similarly, the Sheep Station expressed their desire to participate in any upcoming Level 1 streamlined consultation meetings that occur between the Fish and Wildlife Service and the Caribou-Targhee National Forest, which also were likely to include discussions regarding previously analyzed projects in grizzly bear habitat. Based on the results of these discussions and a minimal history of Sheep Station encounters with grizzly bears (none with lethal control), the Sheep Station director concluded that the proposed action and alternatives do not include trap and transport or lethal control. These activities have not occurred in the past and are not expected to occur in the future.

Greater sage-grouse, pygmy rabbit, and northern Rocky Mountain gray wolf are all species that are not federally listed, but were recently either federally-listed or petitioned. Therefore, there is some possibility that one or all the species could become federally listed. These species occur on Sheep Station properties and should they become listed, the Sheep Station would need to initiate (or reinitiate) consultation on the potential effects the proposed activities may have on these species. In light of this, the wildlife analysis performed for this DEIS considers whether continued operation (proposed action) would cause any irreversible or irretrievable commitment of resources to these three species, vis-à-vis effects analysis. The wildlife analysis found that continued operations would not make such a commitment.

For the wolf, Sheep Station activities were analyzed in the 2008 wildlife report when the wolf was designated as a nonessential experimental population. The biologist's analysis and "No Jeopardy" determination was reviewed and recognized by the Fish and Wildlife Service. Wolves are no longer listed or proposed in Montana and Idaho, where the project occurs, so a biological determination is not required. The effects of the revised proposal are minimal and the same as those described in the 2008 biological analysis, so no further analysis will be completed. Should sage-grouse or pygmy rabbit become listed or critical habitat designated within the project area, prescribed burning activities would be deferred until consultation is completed. The current project proposal would not hinder or prevent the Sheep Station from implementing reasonable and prudent alternatives to protect those species (such as delaying prescribed fire treatments or modifying grazing strategies) until the consultation process is completed.

2011 – Biological Assessment Submitted for U.S. Sheep Experiment Station and Associated Grazing Activities

On August 19, 2011, the biologist submitted a Biological Assessment (BA) to the U. S. Fish and Wildlife Service. This BA found that projects activities May Adversely Affect grizzly bears in the Yellowstone Distinct Population Segment, and were Not Likely to Adversely Affect Canada lynx. The purpose of the 2011 BA was to accommodate that grizzly bears were returned to the list as a threatened species, and to account for potential take to grizzly bears that could occur as a result of habituation to ARS domestic sheep as a food source resulting in lethal control measures on adjacent private lands.

2011 – Biological Opinion Issued by U.S. Fish and Wildlife Service

On November 8th, 2011, the U. S. Fish and Wildlife Service issued a Biological Opinion regarding Sheep Station Activities effects on grizzly bears. The Opinion found effects from the project are not likely to jeopardize the grizzly bear. The Fish and Wildlife Service also concurred with the project biologist's finding that activities were "Not Likely to Adversely Affect" Canada lynx.

2013 – The Project Action Changed by Eliminating Sheep Grazing on BLM Bernice Allotment

The project change was to eliminate sheep and livestock grazing that occurs on the Bernice Allotment (BLM ownership), and maintain the animals with harvested feed in the Mud Lake Feedlot during that portion of the winter. Both areas are outside of grizzly bear or lynx habitat. On February 11th, 2013, the project biologist submitted a letter to the Fish and Wildlife Service Field Supervisor stating that "The existing Biological Opinion (page 19) indicates that specific project grazing areas that affect grizzly bears are Tom's Creek, Big Mountain, O'Dell, Henninger Ranch, and Meyer's Creek" (USDA Forest Service ownership). Livestock use and other activities on these grazing areas is unaffected by the proposed change to the project and thus will remain the same as was analyzed previously. The biologist concluded that the existing consultation and resulting Biological Opinion would remain applicable and that there was no need to reinitiate consultation (unless contacted immediately and requested otherwise by the U.S. Fish and Wildlife Service).

2014 – U.S. Fish and Wildlife Service Issues a Revised Biological Opinion

On May 30th, 2014, the U. S. Fish and Wildlife Service issued a new Biological Opinion that incorporated updated baseline information, and considered input received from ARS in a May 16th, 2014 letter and a subsequent interagency Level 2 consultation meeting on May 20th, and another ARS letter issued May 28th, 2014. The Biological Opinion remains in effect today.

State Historic Preservation Officer

Section 106 of the National Historic Preservation Act requires federal agencies consider the effects that their federally funded activities and programs have on significant historic properties. "Significant historic properties" are those properties that are included in, or eligible for, the National Register of Historic Places. The National Register is a list of districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, and culture. The National Register is administered by the National Park Service in conjunction with the State Historic Preservation Offices.

The Sheep Station has proposed several activities over the course of the next five years. In consultation with the Idaho State Historic Preservation Office the Sheep Station is developing a Heritage Management Plan. This plan will include a schedule of proposed activities for Section 106 review. Heritage surveys, recordation of sites, assessment of effects, and consultation with Idaho State Historic Preservation Office will be included in this plan. Idaho State Historic Preservation Office is currently reviewing the proposed activities to establish a baseline from which to proceed.

Informal communication is ongoing with both Montana and Idaho State Historic Preservation Offices. A draft of the Heritage Management Plan outline has been shared with both offices. This outline discloses the process by which Section 106 will be completed. Formal consultation with both State Historic Preservation Offices will begin with the initiation of the Section 106 process.

Tribal Consultation

Letters were sent to representatives of the Shoshone-Bannock Tribes during comment periods for the U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009 and for Scoping for the U.S. Sheep Experiment Station Grazing and Associated Activities Project 2010. One response has been received to date.

Chapter 2 – Alternatives

Fourteen alternatives were considered in this analysis:

- One (1) proposed action (same as No New Federal Action)
- Nine (9) alternatives eliminated from detailed study
- Four (4) alternatives to the proposed action studied in detail (carried forward from the environmental assessment being prepared for *the U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009* and modified for the loss of the BLM Bernice allotment (see page 43)

How were alternatives developed for this project?

Alternatives to the proposed action come from several sources:

- Developed in response to unresolved, site-specific issues with the proposed action;
- Suggestions from the public during scoping; and
- Developed in response to new information.

Issues

The overall purpose and need for this project has not changed from the *U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009* draft environmental assessment, and the *U.S. Sheep Experiment Station Grazing and Associated Activities Project 2010*, with minor changes due to updates to the National Strategic Plans and to show that the BLM Bernice Allotment will no longer be used. Therefore the comments received during scoping *U.S. Sheep Experiment Station Grazing and Associated Activities Project 2010* are still relevant to this project. However, rather than being site-specific, the comments were general in nature, such as: “Close the station;” “The presence of domestic sheep will kill big horn sheep;” “Grizzly bears will habituate to sheep as a food source.” Therefore, no site-specific issue-driven alternatives were developed.

Publicly suggested alternatives

There were numerous alternatives suggested by the public during comment on this project, many of which were variations of common themes. Some of the public suggestions have been incorporated into alternatives analyzed in detail (alternatives 2-5; see Alternatives Considered in Detail, page 44), and a number of alternatives suggested by the public were considered but eliminated from detailed study for various reasons (Alternatives Eliminated from Detailed Consideration, page 40).

The following are publicly suggested (PS) alternatives included in public comments that relate to the lands grazed by the Sheep Station.

PS-A) An alternative that would eliminate sheep grazing in the East and West Summer Ranges, the Humphrey Ranch, the East Beaver, and Meyers Forest Service allotments, and the Henninger Ranch. This would increase utilization of the Headquarters and Humphrey Ranch, while providing increased protection to grizzly bears and an opportunity for the BLM to reintroduce bighorn sheep on lands north of the East and West Summer Ranges.

PS-B) A modified version of a no grazing alternative that does not confine sheep to the Mud Lake feedlot and includes other opportunities for grazing on private or public lands where conflicts with wildlife do not occur.

PS-C) An alternative that would maximize consistency with the Forest Service plans for forests in the Greater Yellowstone Area by ending grazing in allotments within the Primary Conservation Areas; thereby reducing conflicts between sheep and large carnivores.

PS-D) An alternative that considers limiting all grazing to only the Sheep Station headquarters property.

PS-E) An alternative that eliminates sheep grazing in the Centennial Mountains of both Montana and Idaho; thereby providing increased protection for grizzly bears and wolves.

PS-F) An alternative that evaluates the feasibility of relocating the Sheep Experiment Station to another location.

PS-G) An alternative that transfers the Sheep Experiment Station's function to another ARS facility.

PS-H) An alternative that makes reducing conflicts with and minimizing impacts of sheep grazing on wildlife a priority of operations and research, and ends use of the East Summer pasture and Myers Creek allotment.

PS-I) An alternative that analyzes relocation of the Sheep Station, is wildlife friendly, encompasses best management practices for making sheep production compatible with maintaining native wildlife, implements and researches the effectiveness of existing and new methods of coexistence into its research.

PS-J) An alternative that would focus on reducing contact between domestic and bighorn sheep.

Our analysis of these publicly suggested alternatives identified four main themes that we used to develop a range of reasonable alternatives to the proposed action.

1. Eliminate sheep grazing altogether;
2. Eliminate sheep grazing in the Centennial Mountains to eliminate potential carnivore/livestock conflict in the wildlife corridor along the Centennials between Yellowstone and the central Idaho ecosystem;
3. Eliminate sheep grazing adjacent to and within the grizzly bear primary conservation area to eliminate potential carnivore/livestock conflict (Note: ARS properties are not within the grizzly bear primary conservation area.); and
4. Eliminate domestic sheep grazing that is a potential threat to big horned sheep populations.

These 4 themes were used to develop alternatives 2-5 analyzed in the 2011 DEIS and described in more detail beginning on page 44.

Alternatives eliminated from detailed consideration because it is outside of the control of the USDA since that is under the purview of Congress. Alternative 2 considers the cessation of all grazing in detail.

End all livestock grazing by the Sheep Station and relocate the facility elsewhere.

See response above.

Moreover, the Agricultural Research Service does not have other lands to which it can transfer the Sheep Station facility.

Thus, this alternative was eliminated.

Conduct a land exchange of the East and West Summer Ranges as well as in the Humphrey pasture to allow Agricultural Research Service to continue current research.

There are no lands in the vicinity of the Dubois, ID Headquarters property that are comparable, in terms of research opportunities and forage quantity and quality, to the East and West Summer Ranges. In addition, the proximity of the East and West Summer Ranges to the Headquarters, where scientists and technicians are housed, is ideal for the efficient execution of research projects.

Further, the U.S. Sheep Experiment Station, Dubois, ID was established through a series of Executive Orders and Public Laws, which resulted in Agricultural Research Service lands being removed from the public domain. Return of lands to the public domain and (or) federal land exchanges are the purview of Congress as are appropriations for maintaining the lands. Changes in these conditions are beyond the scope of this project.

Thus, this alternative was eliminated.

Phase out existing sheep allotments and limit grazing of Sheep Station sheep to Agricultural Research Service Properties.

Grazing sheep on National Forest System lands allows the Sheep Station to minimize and distribute the grazing pressure on all lands. Based on the available evidence, the results of implementing this alternative would not be expected to change wildlife populations or movements or improve rangeland health. Refer to Table 2, which demonstrates an extremely low use of available forage across all lands. If Sheep Station grazing on National Forest System lands were eliminated, no access to winter grazing would be possible, because snow depth on Agricultural Research Service property exceeds the ability of sheep to reach forage, and sheep would have to be kept in feedlots. Keeping the sheep in feedlots would preclude meaningful genetic evaluation of sheep that are intended for lands west of the 100th meridian. Eliminating summer grazing on National Forest System lands would force the Sheep Station to increase grazing pressure on Headquarters Range and other ARS properties. Finally, eliminating these areas and the access to summer range that they provide would alter program objectives in a way that would be inconsistent with research purpose, goals, and objectives.

Thus, this alternative was eliminated.

Consider and/or analyze other research on these lands that is valuable to American agriculture yet compatible with the landscape and the wildlife in the area lands.

Based on the evidence, the Sheep Station actions are compatible with the landscape and wildlife in the area, and implementing this alternative would not be expected to benefit wildlife populations or the landscape. Further, current grazing and research that requires a grazing component are relevant to Agricultural Research Service national programs, agriculture, and land management agencies charged with managing land that is used for multiple purposes, which include addressing the interface between agriculture, wildlife, and recreation. Based on data collected since the inception of the Station, moderate sheep grazing is the most responsible use of these lands that provides for both agriculture and wildlife needs. The data indicate that agricultural land management practices, such as strict cattle grazing or land cultivation, which are used on neighboring properties (e.g., private, BLM, Forest Service), do not support multiple land-use objectives.

Thus, this alternative was eliminated.

Use bison when supplemental grazing is needed.

Agricultural Research Service properties are not suitable for bison, and Sheep Station facilities were not built to contain bison. In the autumn of some years, cattle are grazed on Headquarters property, and occasionally on the Humphrey and Henninger Ranches, to reduce fuels and consume plants that sheep do not select to create a more balanced mix of shrubs, grasses, and forbs. Headquarters has no surface water and is too arid to favor bison grazing; bison seem to prefer cooler and moister conditions (Lyman and Wolverton 2002). The Humphrey and Henninger Ranches are cooler and somewhat moister than the Headquarters. However, the Humphrey and Henninger Ranches contain legacy networks of irrigation canals, which were constructed before the Agricultural Research Service purchased the ranches from the private sector in the 1940s that bison may damage or destroy. Overall, bison grazing would have a negative effect on Agricultural Research Service properties and fences.

Thus, this alternative was eliminated.

Eliminate sheep grazing in the East and West Summer Ranges, the Humphrey Ranch, the East Beaver, and Meyers Forest Service allotments, and the Henninger allotment. This alternative eliminates sheep grazing in the Centennial Mountains of both Montana and Idaho. This would increase utilization of the Headquarters, while providing increased protection to grizzly bears and an opportunity for the BLM to reintroduce bighorn sheep on lands north of the East and West Summer Ranges.

This is similar to modified alternative 3, with the exception that the Henninger Ranch and Humphry Range west of Beaver Creek were added to the list of properties and allotments that cannot be grazed. The alternative strictly limits summer sheep grazing to the Headquarters Range and Snakey-Kelly allotments only.

Eliminating summer grazing on the East and West Summer Ranges, the Humphrey and Henninger Ranches, and the Forest Service-Meyers Creek and Forest Service-East Beaver allotments would force the Station to strictly limit summer sheep grazing to Headquarters Range and Snakey-Kelly allotments, which would threaten the stability of vegetation communities on Headquarters Range and impair the ability of the Station to develop land and ecosystem management systems/programs applicable to the Intermountain West. There is not enough grazing land for the sheep for the summer. For a majority of the summer and fall, the sheep would have to be fed harvested feed in feedlots. Keeping our sheep in feedlots would preclude meaningful genetic evaluation of sheep that are intended for lands west of the 100th meridian.

Thus, this alternative was eliminated.

Consider a modified version of alternative 2 that does not confine sheep to the Mud Lake feedlot and includes other opportunities for grazing on private or public lands where conflicts with wildlife do not occur.

The United States sheep industry and land management agencies in the Intermountain West depends on research data from the Sheep Station and Sheep Station collaborators to improve the genetic potential of the nation's maternal and paternal breeds or composite lines of sheep, improve nutritive and reproductive efficiency of sheep, improve sheep grazing practices, and develop land and ecosystem management systems/programs applicable to the Intermountain West. The majority of the sheep in the U.S. are produced west of the 100th meridian, which represents the historical boundary between the moist east and the arid west. Compared with research conducted east of the 100th meridian, the Station’s research programs are more applicable to the nation's sheep flock and lands on which the majority of the nation's sheep are grazed. The Sheep Station, is the only USDA, Agricultural Research Service location that is focused solely on sheep research, and the only USDA, Agricultural Research Service location that can

address range sheep and sheep grazing issues in the Intermountain West that are focused on the region where most of the nation's sheep are produced.

The Sheep Station occupies a minuscule portion of the federal land in Idaho and Montana. Wildlife in the region freely crosses Agricultural Research Service properties without resistance. Based on the available evidence, the results of implementing this alternative would not be expected to change wildlife populations or movements or improve rangeland health. However, implementing this alternative would prevent the Agricultural Research Service from conducting research aimed at improving the genetic potential of the nation's maternal and paternal breeds or composite lines of sheep west of the 100th meridian, improve nutritive and reproductive efficiency of sheep west of the 100th meridian, improve sheep grazing practices west of the 100th meridian, and develop land and ecosystem management systems/programs applicable to the Intermountain West.

There are no lands in the vicinity of the Sheep Station Headquarters that are comparable, in terms of research opportunities and forage quantity and quality, to the East and West Summer Ranges. In addition, the proximity of the East and West Summer Ranges to the Sheep Station Headquarters, where scientists and technicians are housed, is ideal for the efficient execution of research projects.

The Sheep Station is not authorized to conduct long-term research on private land or other federal lands. Therefore, implementing this alternative is not possible, and thus, would result in restricting sheep to the Mud Lake feedlot, where the sheep are fed harvested feed. Keeping the sheep in feedlots would preclude meaningful genetic evaluation of sheep that are intended for lands west of the 100th meridian.

Thus, this alternative was eliminated.

Consider an alternative that limits grazing to only the Sheep Station headquarters property.

This alternative was eliminated because it is nearly the same as modified alternative 3, with the exception that the Henninger Ranch and west Humphrey Ranch were added to the list of properties and allotments that cannot be grazed. The alternative strictly limits summer sheep grazing to the Headquarters Range only. It is similar to the alternative above that limits sheep grazing to Headquarters and Snakey-Kelly in response to PS-A and PS-E (page 39). See the rationale above for eliminating that alternative.

Alternatives modified by new information

There was new information regarding the relisting of the Greater Yellowstone Area grizzly population, which resulted in the development of the 2011 DEIS, at that time it was determined that no new alternatives needed to be considered in detail.

After the public comment period for the 2011 DEIS, the BLM revoked authorization for Agricultural Research Service use of the Bernice Allotment. The elimination of the Bernice allotment and the lack of a suitable replacement led to housing sheep at the Mud Lake facility. This in turn renders alternatives 1, 3, 4, and 5 no longer feasible in their current form. In this 2015 revised DEIS, those alternatives have been modified to account for no longer utilizing the Bernice allotment. Changes in sheep numbers and utilization have been made to ensure that the alternatives remain feasible.

In addition, Alternative 3 has been modified to allow grazing to continue within the portion of the Humphrey Ranch that lies west of Beaver Creek, as this portion is outside of the Centennial Mountain range. This change still meets the intent of the alternative to address concerns about grazing operations within the Centennial Mountains.

Tables that display grazing times and AUMs have been updated as appropriate. Therefore, our analyses of effects in this 2015 Revised DEIS will reflect those changes and differ appropriately from the analysis of effects in the 2011 DEIS.

Alternatives (1-5) Considered in Detail

- In considering the public-suggested alternatives described above, and given our need to modify the alternatives from the 2011 DEIS, the following alternatives will be considered in detail: Modified Alternative 1 – Modified Proposed Action – No New Federal Action: **Preferred Alternative**. This alternative proposes no new federal action, just a continuation of the historical and ongoing grazing and associated activities necessary to achieve the mission of the station. Grazing currently occurs on Headquarters pastures, Henninger and Humphrey Ranches, and East and West Summer Ranges. In addition, the following Forest Service allotments are utilized: Snakey-Kelly, East Beaver, and Meyers Creek.
- Alternative 2 - No Grazing Alternative: Grazing would not occur on any of the ARS lands or allotments. The University of Idaho would dispose of all sheep or seek alternative lands outside the scope of this project.
- Modified Alternative 3 - No grazing would occur on the East Summer Range, West Summer Range, and Humphrey Ranch east of Beaver Creek, as well as on the following allotments: East Beaver and Meyers Creek. Grazing would continue to occur on Headquarters, Henninger Ranch, Humphrey Ranch west of Beaver Creek, and the Snakey-Kelly allotments.
- Modified Alternative 4 –No grazing would occur on the East Summer Range as well as on the Meyers Creek Allotment. Grazing would continue to occur on Headquarters, Henninger Ranch, Humphrey Ranch, West Summer Range, and Snakey-Kelly and East Beaver allotments.
- Modified Alternative 5 –No grazing would occur on the Snakey-Kelly allotments. Grazing would continue to occur on Headquarters, Henninger Ranch, Humphrey Ranch, East and West Summer Range, Myers Creek allotment, and East Beaver allotment.

Table 10. Matrix of alternatives considered in detail (alternatives 1-5, as modified for the 2015 Revised DEIS), by pasture, to allow or prohibit grazing (yes or no)

Property	Mod. Alt. 1	Alt 2	Mod. Alt. 3	Mod. Alt. 4	Mod. Alt. 5
ARS Properties					
Headquarters Range	Yes	No	Yes	Yes	Yes
Henninger Ranch	Yes	No	Yes	Yes	Yes
Humphrey Ranch	Yes	No	Yes[b]	Yes	Yes
East Summer Range	Yes	No	No	No	Yes
West Summer Range	Yes	No	No	Yes	Yes
Forest Service Allotments[a]					
Snakey-Kelly	Yes	No	Yes	Yes	No
East Beaver	Yes	No	No	Yes	Yes
Meyers Creek	Yes	No	No	No	Yes

a - Forest Service allotments are on National Forest System Lands which are managed by the USDA Forest Service. An agreement between the Forest Service and ARS authorizes sheep grazing on three allotments.

b – Sheep grazing would not occur east of Beaver Creek within the Humphrey Ranch under Modified Alternative 3.

Table 10 displays the properties where grazing would or would not occur under alternatives 1-5. When not being grazed, sheep are maintained at the Mud Lake feedlot (see Table 2 page 18). Appendix B provides descriptions of the annual sheep movements by alternative.

Modified Alternative 1 –Proposed Action/No New Federal Action (Map 2)

The proposed action is also the no-new-federal-action alternative. This alternative is described in detail in the "What is being proposed?" section beginning on page 13.

There are two options for a no action alternative:

1. No new federal action – This means that ongoing federal actions would continue, but that no new or additional federal actions would take place.
2. No activities would take place – This means all activities would cease.

The purpose of a no action alternative is to provide a baseline for analysis purposes. For this analysis, the existing condition (no new federal action) serves as the baseline.

No new federal actions are proposed under this alternative. This alternative describes a continuation of the historical and ongoing activities already occurring on the Sheep Station. Ongoing activities consist of rangeland-research and sheep-research associated activities in conjunction with research to increase the production efficiency of sheep and improve the sustainability of rangeland ecosystems. These activities enable us to carry out the mission for which the station was established by executive order and public law (see page 1). Details of the proposed action and mitigations are found beginning on page 13.

Alternative 2 (Map 12)

Alternative 2 is considered a 'no grazing' alternative, as grazing would not occur on any Agricultural Research Service properties or Forest Service allotments.

Table 11. Alternative 2: Projected annual AUM utilization per property within the approximate grazing periods that are specified. The calculations are based on 0 sheep; a 100 percent reduction in alternative 1 sheep inventory (Taylor 2015, pers. comm.).

Properties	AUM Available	AUM Utilized	Utilization Percent	Approximate Grazing Dates
ARS Properties	**NA**	**0**	**NA**	**NA**
Headquarters	NA	0	NA	NA
Humphrey	NA	0	NA	NA
Henninger	NA	0	NA	NA
East Summer (Toms Creek)	NA	0	NA	NA
West Summer (Odell Creek/ Big Mountain)	NA	0	NA	NA
Forest Service Allotments	**NA**	**0**	**NA**	**NA**
Snakey-Kelly	NA	0	NA	NA
East Beaver	NA	0	NA	NA
Meyers Creek	NA	0	NA	NA

a - Animal Unit Month. By definition, one (1) AUM represents 790 lbs. of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. Five (5) mature sheep (see footnote b immediately below) are equivalent to one (1) AUM.

b - A mature sheep is any sexually-mature ewe or ram that that is retained as a part of the core breeding flock.

Alternative 2 was developed to respond to the public suggestion that sheep grazing be eliminated completely from the Sheep Station operation (page 40). See Table 10, page 44, for properties used for grazing. Animal units are based on a 100 percent reduction from alternative 1 sheep inventory. Table 11 displays the expected distribution of AUM utilization (sheep only). Until new grazing lands are obtained, University of Idaho would dispose of all sheep or seek alternative lands outside the scope of this project.

Modified Alternative 3 (Map 13)

Alternative 3 was developed in response to the public suggestion that grazing be eliminated in the Centennial Mountains (page 40). In addition, the alternative was modified from the 2011 DEIS to remove the BLM Bernice allotment. The modified alternative also adds that portion of the Humphrey Ranch west of Beaver Creek[8] to make the alternative more viable, but still respond to concerns about Centennial Mountains (see Alternatives Considered but Eliminated from Detailed Study for more information).

See Table 10 (page 44) for pastures used for grazing. According to alternative 3, grazing would not occur in the Humphrey Ranch property that is east of Beaver Creek, East Summer Range, and West Summer Range, and Forest Service -Meyers Creek and Forest Service -East Beaver allotments. The majority of AUMs needed would be taken from the Sheep Station Headquarters Range, Humphrey Ranch property west of Beaver Creek, and Henninger Ranch. Sheep would graze portions of the Headquarters Range when sheep would normally be on summer ranges. Increased use of Headquarters Range as a source of summer range would threaten the stability of vegetation communities on Headquarters Range.

Table 12. Alternative 3: Projected annual AUM[a] utilization per property within the approximate grazing periods that are specified. The calculations are based on 1,500 sheep [b]; a 50 percent reduction in Alternative 1 sheep inventory.

Properties	AUM Available	AUM Utilized	Utilization Percent	Approximate Grazing Period
ARS Properties	**31,387**	**1950**	**6 percent**	
Headquarters	28,353	1343	5 percent	late April to early December
Humphrey Ranch (west of Beaver Creek)	1,120	305	27 percent	mid-July to mid-September
Henninger Ranch	1,914	302	16 percent	mid-June to mid-September
Summer East (Toms Creek)	NA	NA	NA	NA
Summer West (Odell Creek/ Big Mountain)	NA	NA	NA	N/A
Forest Service Allotments	**1,756**	**220**	**13 percent**	
Snakey-Kelly	1,756	220	13 percent	early November to late December
East Beaver	NA	NA	NA	N/A
Meyers Creek	NA	NA	NA	N/A

a - Animal Unit Month. By definition, one (1) AUM represents 790 lbs. of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. Five (5) mature sheep (see footnote b immediately below) are equivalent to one (1) AUM.

b - A mature sheep is any sexually-mature ewe or ram that that is retained as a part of the core breeding flock.

[8] This includes 23 pastures, 5 of which lie between Interstate 15 and Beaver Creek (pastures include: Creek, House, Northwest Cow, South Cow, Horse). All of these, except House pasture, include portions of Beaver Creek within the pasture. The pasture fences are generally following the foothill slopes to the east. The remaining 18 pastures lie west of Interstate 15 (pastures include: Rock, North, South Meadow West, South Meadow East, North Meadow, Mackin, Plow 1 W, Plow 2 E, Trivngle, Plow 3, Plow 2, Swamp, Hold, Beaver, Grunt, Lupine). See Map 13.

Sheep grazing periods and AUM, for alternative 3, are shown in Table 12. Table 12 is based on plant productivity estimates from the last 15 years of sheep grazing data (Taylor, 2015, personal communication) and demonstrates the expected distribution of sheep AUM utilization based on a 50 percent reduction from alternative 1 (proposed action) sheep numbers, which resulted in 1,500 head retained for research purposes. Animal unit months are based on approximate grazing dates; actual grazing dates vary from year to year depending on weather and plant conditions.

Modified Alternative 4 (Map 14)

Alternative 4 was developed in response to the public suggestion that we eliminate grazing adjacent and within in the grizzly bear primary conservation area (PCA) (page 40) (Note: Agricultural Research Service properties are not within the grizzly bear primary conservation area). In addition, the alternative was modified from the 2011 DEIS to remove the BLM Bernice allotment. See Table 10, page 44, for pastures used for grazing. According to alternative 4, Sheep Station properties East Summer Range and Forest Service -Meyers Creek would not be grazed. The AUM needed would shifted to Humphrey Ranch and Forest Service -East Beaver allotment.

Sheep grazing periods and AUM, for alternative 4, are shown in Table 13. Table 13 is based on plant productivity estimates from the last 15 years of sheep grazing data (Taylor, 2015, personal communication) and demonstrates the expected distribution of sheep AUM utilization based on Alternative 1 (proposed action) sheep numbers. AUMs are based on approximate grazing dates; actual grazing dates vary from year to year depending on weather and plant conditions.

Table 13. Alternative 4: Annual AUM[a] utilized per property within the approximate[b] grazing periods that are specified. The calculations are based on 3,000 sheep[b]; no reduction in Alternative 1 sheep inventory is necessary.

Properties	AUM Available	AUM Utilized	Utilization Percent	Approximate Grazing Periods
ARS properties	**44,624**	**3,625**	**8 percent**	
Headquarters	28,353	1,825	7 percent	late April to early July; late August to early December
Humphrey Ranch	4,476	900	20 percent	early June to late October
Henninger Ranch	1,914	400	21 percent	mid-June to mid-July; late August to mid-September
East Summer Range (Toms Creek)	NA	NA	NA	NA
West Summer Range (Odell Creek/ Big Mountain) [c]	9,881	500	5 percent	early July to early September
Forest Service Allotments	**19,633**	**790**	**4 percent**	
Snakey-Kelly	1,756	440	25 percent	early November to late December
East Beaver	17,877	350	2 percent	mid-June to late August
Meyers Creek	NA	NA	NA	NA

a - Animal Unit Month. By definition, one (1) AUM represents 790 lbs. of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. Five (5) mature sheep (see footnote b immediately below) are equivalent to one (1) AUM.

b - A mature sheep is any sexually-mature ewe or ram that that is retained as a part of the core breeding flock.

c - Unlike all other grazing properties, where rest rotations are conducted within property grazing subunits, rest rotation is applied to the whole grazing units of West (Odell and Big Mountain) Summer Range. Rotations are two years of grazing and one year rest (no grazing); therefore, annual AUM utilized are calculated as an annual average over 3 years, with one of the three years having a value of zero (the rest year).

Modified Alternative 5 (Map 15)

Alternative 5 was developed in response to the public suggestion that grazing be eliminated to avoid areas that are near bighorn sheep range (page 40). In addition, the alternative was modified from the 2011 DEIS to remove the BLM Bernice allotment. See Table 10, page 44 for pastures used for grazing. Animal units are based on a 40 percent reduction from alternative 1 sheep inventory, which resulted in 2,000 head retained for research purposes. According to alternative 5, Forest Service -Snakey-Kelly allotments would not be grazed. Until new winter grazing lands are located, sheep would be maintained at Mud Lake Feedlot and fed harvested feeds. The reduced sheep inventory would be necessary to remain within available funds for purchasing harvested feeds and maintaining a feedlot facility.

Sheep grazing periods and AUM, for alternative 5, are shown in Table 14. Table 14 is based on plant productivity estimates from the last 15 years of sheep grazing data (Taylor, 2015, personal communication) and demonstrates the expected distribution of sheep AUM utilization based on and 40 percent reduction in alternative 1 (proposed action) sheep numbers. Animal unit months are based on approximate grazing dates; actual grazing dates vary from year to year depending on weather and plant conditions.

Table 14. Alternative 5: Annual AUM[a] utilized per property within the approximate[b] grazing periods that are specified. The calculations are based on 1,800 sheep[b]; a 40 percent reduction in alternative 1 sheep inventory is necessary (Taylor 2015, Pers. Comm.).

Properties	AUM Available	AUM Utilized	Utilization Percent	Approximate Grazing Periods
ARS properties	**48,667**	**2,175**	**5 percent**	
Headquarters	28,353	1,050	4 percent	late April to early July; late August to early December
Humphrey Ranch	4,476	480	11 percent	early June to late October
Henninger Ranch	1,914	210	11 percent	mid-June to mid-July; late August to mid-September
East Summer Range (Toms Creek) [c]	4,043	135	3 percent	mid-July to early September
West Summer Range (Odell Creek/ Big Mountain) [c]	9,881	300	3 percent	early July to early September
Forest Service Allotments	**20,953**	**163**	**<1 percent**	
Snakey-Kelly	NA	NA	NA	NA
East Beaver	17,877	150	<1 percent	mid-June to late August
Meyers Creek [c]	3,076	13	<1 percent	mid-July; early September

a - Animal Unit Month. By definition, one (1) AUM represents 790 lbs. of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. Five (5) mature sheep (see footnote b immediately below) are equivalent to one (1) AUM.

b - A mature sheep is any sexually-mature ewe or ram that that is retained as a part of the core breeding flock.

c - Unlike all other grazing properties, where rest rotations are conducted within property grazing subunits, rest rotation is applied to the whole grazing units of West (Odell and Big Mountain) and East (Toms Creek) Summer Ranges. Rotations are two years of grazing and one year rest (no grazing); therefore, annual AUM utilized are calculated as an annual average over 3 years, with one of the three years having a value of zero (the rest year). Grazing on FS-Meyers Creek allotment is always in conjunction with ARS-Toms Creek.

Associated Activities for All Alternatives 1-5

For all alternatives, the associated activities (as described in Chapter 1 pages 13 through 28) would occur wherever grazing operations took place. However, in general, associated activities would no longer occur in grazing areas that are unused in Alternatives 2-5.

Table 15. Alternatives 2-5 associated activities for alternatives 2-5 (alternative 1 discussed in detail in the proposed action beginning on page 13)

Activity/Mitigation/Location	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	No grazing would occur on the HQ Range, East and West Summer Ranges, Henninger and Humphrey Ranches, and FS-Snakey Kelly, FS-East Beaver, and FS-Meyers Creek allotments	**No grazing would occur on the East Summer Range, West Summer Range, and Humphrey Ranch property east of Beaver Creek, and FS-East Beaver and FS-Meyers Creek allotments**	**No grazing would occur on the East Summer Range and FS-Meyers Creek allotment**	**No grazing would occur on FS-Snakey-Kelly allotments**
Sheep Trail and Driveway Use and Maintenance				
Trailing on road	None used	Trailing would occur from HQ Range to Henninger Ranch	No trailing would occur to FS-Meyers Creek or from Summer East Range	No trailing to FS-Snakey-Kelly allotments
Summer range trails	None used	None used	Toms Creek units 5-7 not used	Same as alternative 1
Stock Water Operations - Water Developments				
Headquarters, Humphrey and Henninger	None used	Water developments on Humphrey Ranch east of Beaver Creek would not be used for sheep	Same as alternative 1	
West Summer Range		None used		
Camp Tending - Sheep Herding Camps				
Camps	None Used	Camps only on HQ Range, Humphrey Ranch west of Beaver Creek, and FS-Snakey-Kelly allotment	No camps on East Summer Range or FS-Meyers Creek allotment	No camps on FS-Snakey-Kelly allotments

Activity/Mitigation/Location	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	No grazing would occur on the HQ Range, East and West Summer Ranges, Henninger and Humphrey Ranches, and FS-Snakey Kelly, FS-East Beaver, and FS-Meyers Creek allotments	**No grazing would occur on the East Summer Range, West Summer Range, and Humphrey Ranch property east of Beaver Creek, and FS-East Beaver and FS-Meyers Creek allotments**	**No grazing would occur on the East Summer Range and FS-Meyers Creek allotment**	**No grazing would occur on FS-Snakey-Kelly allotments**
Fences				
Pasture Fences	None Used	None on West Summer Range	Same as alternative 1	
Horse Corral				
Exclosures				
Maintenance and repair of existing roads and fire breaks				
Roads	Maintained	Maintained	Same as alternative 1	
Firebreaks				
Range Improvement				
Prescribed Burning	Same as alternative 1			
Seeding				
Shrub Management	Same as alternative 1			
Cattle and Horse Grazing	Same as alternative 1			
Predator Avoidance and Abatement	None	Same as alternative 1		
Integrated Pest Management – Noxious weeds	Same as alterative 1. Ability to monitor is severely limited on properties where herders, camp tenders, etc. are not riding over the land.			
Grizzly Bear Measures	Not needed	Same as alternative 1		

Sheep Herd

There would be no change in existing sheep numbers from the existing condition under alternatives 1 (proposed action) and 4. Alternatives 2, 3, and 5 would each require a reduction in the numbers of sheep that could be retained at the Sheep Station for research purposes. Excess sheep would be returned to the University of Idaho and either re-located, sold or euthanized. For a number of reasons, some research animals cannot be sold for breeding stock or go into the food chain. In those cases, the animals must be retained until they die of natural causes or are euthanized and their carcasses are rendered inedible and disposed of properly. Listed below are some of the types of sheep that the Sheep Station now euthanizes when they are no longer part of a research project. If the Sheep Station terminated research projects, all of the sheep of the following types would be euthanized.

- Sheep with genotypes that make them susceptible to certain diseases: These genotypes occur naturally. Some of the sheep with these genotypes are used for research to gain an understanding of the relationship between genotype and onset of disease (i.e., mechanism of action); study the onset and natural progression of certain diseases; develop genetic tests that can be used to reduce the frequency of sheep with genotypes that make them susceptible to certain diseases; develop genetic tests that can be used to produce sheep that are resistant to certain diseases; produce effective vaccines; and improve the care of sheep that develop certain diseases.
- Sheep that have been treated with experimental pharmaceutical compounds.
- Sheep that are part of research to quantify the effects of certain naturally occurring diseases on lifetime productivity.
- Sheep that have been ovariectomized and used for various research projects.

Table 16 displays the adjustment in sheep numbers from the proposed action that would need to be made for alternative 2and modified alternatives 3-5 based on the reduction of grazing areas.

Table 16. Sheep number adjustments by alternatives 2-5

Sheep	Alternative 2	Modified Alternative 3	Modified Alternative 4	Modified Alternative 5
Number of sheep to be retained	0	1,500	No Change from existing	1,800
Percent of Existing herd retained	0 percent	50 percent		60 percent
Numbers of sheep to be disposed of[a]	3,000	1,500		1,200
Percent of Existing herd disposed of[a]	100 percent	50 percent		40 percent

a – 'disposed of' means that these excess sheep would be returned to the University of Idaho and either re-located, sold or euthanized.

Comparison of Alternatives

AUM Utilization

Table 17 displays the changes in AUM utilization for the Agricultural Research Service properties and Forest Service allotments. Alternatives 2, 3, and 5 have reduced numbers of sheep that would be grazed, and alternative 4 would graze the same number of sheep.

The location of grazing operations varies by alternative. In general there is a reduction in grazing utilization across alternatives and properties. However, because of the need to reconfigure grazing

options, under alternative 4 sheep grazing utilization would increase over alternative 1 (See Table 2 and Table 13). AUM utilization rate increase at Headquarters, Humphrey Ranch, Henninger, and East Beaver to account for reduced use of other grazing areas.

Table 17. Available AUM[a] and percent AUM used by sheep[b] for each alternative for each property

Property	Percent of Available AUMs used by Alternative				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
ARS properties	**8**	**NA**	**6**	**8**	**5**
Headquarters	6	NA	5	7	4
Humphrey	18	NA	27	20	11
Henninger	18	NA	16	21	11
East Summer Range (Toms Creek)	6	NA	NA	NA	3
West Summer Range (Odell Creek/ Big Mountain)	5	NA	NA	5	3
Forest Service Allotments	**3**	**NA**	**13**	**4**	**<1**
Snakey-Kelly	25	NA	13	25	NA
East Beaver	1	NA	NA	2	<1
Meyers Creek	1	NA	NA	NA	<1

a - Animal Unit Month. By definition, one (1) AUM represents 790 lbs. of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. Five (5) mature sheep (see footnote b immediately below) are equivalent to one (1) AUM.

b - A mature sheep is any sexually-mature ewe or ram that that is retained as a part of the core breeding flock.

Meeting the Mission and Purpose and Need

As described above, the Sheep Station is the only USDA, Agricultural Research Service location that is focused on range sheep research in the Intermountain West, and the only Agricultural Research Service location that can address sheep and sheep grazing issues that are focused on the region where most of the nation's sheep are produced. Research is done to develop animals with fitness traits and genetics suited to the broad spectrum of range conditions. The purpose of this research is to develop animals with genetics adapted to that environment. The complete purpose and need is described in the Why is the project being proposed? section in chapter 1 on page 7. The following section describes the National Program Action Plans that guide research activities at the Sheep Station.

See Table 18 for a side-by-side comparison across alternatives based on the National Program Action Plan components and problem statements. As shown in the table, elimination of certain grazing options in whole or part would mean that for some alternatives, some of the Sheep Station objectives would not be met.

NP 101 Action Plan

Component 1: Improving Production and Production Efficiencies and Enhancing Animal Well-Being and Adaptation in Diverse Food Animal Production Systems

Problem Statement 1A: Improving the Efficiency of Growth and Nutrient Utilization

Problem Statement 1B: Reducing Reproductive Losses

Component 2: Genetic Improvement - Understanding, Improving, and Effectively Using Animal Genetic and Genomic Resources

Problem Statement 2B: Identify Functional Genomic Pathways and Their Interactions.

Problem Statement 2D: Develop and Implement Genome-Enabled Genetic Improvement Programs.

Component 3: Measuring and Enhancing Product Quality and Enhancing the Healthfulness of Meat Animal Products

Problem Statement 3A: Systems to Improve Product Quality and Reduce Variation in Meat Animal Products.

NP 215 Action Plan

Component 1. Improved Rangeland Management for Enhanced Livestock Production, Conservation, and Ecological Services

Problem Statement A: Developing economic livestock grazing systems for rangelands that meet global food security objectives while being adaptable to changing climate and varying environmental conditions and preserve the natural resources integrity.

Problem Statement B: Need for management strategies and practices that enhance and conserve rangeland ecosystems to provide multiple ecosystem services including forages for livestock, soil conservation, water quality, control of invasive species, recreation and wildlife habitat conservation under changing environmental conditions.

Table 18. Comparison of alternatives by National Program 101 and 215 applicable components and purpose and need

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No sheep grazing would occur on Headquarters, Henninger and Humphrey Ranches, East and West Summer Ranges, as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No sheep grazing would occur on the East Summer, West Summer Ranges, and Humphrey Ranch east of Beaver Creek as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No sheep grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey-Kelly allotments**
Purpose and Need				
To provide for the continuation of historical and ongoing grazing and associated activities at the Sheep Station in support of the mission of the ARS, USSES in Dubois, Idaho.				
NO IMPACT; MEETS PURPOSE AND NEED: Continuation of historical and ongoing grazing and associated activities at the Sheep Station in support of the mission of the ARS, USSES in Dubois, Idaho would occur.	GREATEST IMPACT TO PROGRAM; DOES NOT MEET PURPOSE AND NEED: Historical and ongoing grazing and associated activities at the Sheep Station would not occur. Because sheep inventory would be disposed, all sheep grazing and supporting activities would be eliminated, and research would essentially terminated.	MAJOR IMPACT TO PROGRAM; DOES NOT MEET PURPOSE AND NEED: Historical and ongoing grazing and associated activities at the Sheep Station would not occur at the existing levels. Sheep numbers available for research would be reduced by 50 percent over the current numbers of research animals. Because sheep numbers would be decreased by 50 percent and all grazing on traditional summer ranges, grazing elsewhere, and supporting activities would be eliminated or altered, research would be severely limited.	MODERATE IMPACT TO PROGRAM; MEETS WITH SOME LIMITATIONS: Historical and ongoing grazing and associated activities at the Sheep Station would not occur at the existing levels. Because some grazing at high elevations, grazing elsewhere, and supporting activities would be eliminated or altered, research could be limited.	MAJOR IMPACT TO PROGRAM; MEETS WITH SOME LIMITATIONS: Historical and ongoing grazing and associated activities at the Sheep Station would not occur at the existing levels. Sheep numbers available for research would be reduced by 40 percent over the current numbers of research animals. Because sheep numbers would be decreased by 40 percent some grazing, and supporting activities would be eliminated or altered, research could be limited.
NP 101 Action Plan				
NO IMPACT; MEETS PURPOSE AND NEED: All activities linked with these components would occur, and the research associated with these components would continue	GREATEST IMPACT TO PROGRAM; DOES NOT MEET PURPOSE AND NEED: Sheep inventory would be disposed, which would adversely affect all existing research. Would preclude genetic evaluation of sheep that are intended for lands west of the 100th meridian.	MAJOR IMPACT TO PROGRAM; DOES NOT MEET PURPOSE AND NEED: Sheep numbers available for research would be reduced by 50 percent over the Alternative 1 sheep inventory. Reduction in sheep numbers would adversely affect some existing research.	MODERATE IMPACT TO PROGRAM; MEETS WITH SOME LIMITATIONS: Sheep numbers available for research would not be reduced over the Alternative 1 sheep inventory. Could limit research into predator avoidance and abatement. And would limit predator avoidance and abatement that maintains	MAJOR IMPACT TO PROGRAM; MEETS WITH SOME LIMITATIONS: Sheep numbers available for research would be reduced by 40 percent over the Alternative 1 sheep inventory. Reduction in sheep numbers could adversely affect some existing research.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No sheep grazing would occur on Headquarters, Henninger and Humphrey Ranches, East and West Summer Ranges, as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No sheep grazing would occur on the East Summer, West Summer Ranges, and Humphrey Ranch east of Beaver Creek as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No sheep grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey-Kelly allotments**
	Would preclude research necessary to the development of genetic improvement programs needed to enhance adaptability, productivity, and suitability of sheep that are grazing western U. S. rangelands, and to enable the Sheep Station to develop and evaluate environmentally adapted breeds and genetic lines of sheep. Production environment affects the expression of functional genes linked to important production traits. Would preclude research to develop management strategies needed to enhance sheep well-being in diverse production environments and ensure efficient reproduction and conversion of nutrients from rangelands to sheep products Would preclude research involving prescribed burning, seeding, and cattle and horse grazing activities that influence availability of nutrients on western U.S. rangelands and, thus, the well-being of sheep.	Would preclude genetic evaluation of sheep that are intended for lands west of the 100th meridian. Would preclude research into predator avoidance and abatement Would preclude research necessary to the development of genetic improvement programs needed to enhance adaptability, productivity, and suitability of sheep that are grazing western U. S. rangelands, and to enable the Sheep Station to develop and evaluate environmentally adapted breeds and genetic lines of sheep. Would preclude research to develop management strategies needed to enhance sheep well-being in diverse production environments and ensure efficient reproduction and conversion of nutrients from rangelands to sheep products	safe and productive environments for research sheep. Would somewhat limit research to develop management strategies needed to enhance sheep well-being in diverse production environments.	Would limit genetic evaluation of sheep that are intended for lands west of the 100th meridian. Would preclude or limit research necessary to the development of genetic improvement programs needed to enhance adaptability, productivity, and suitability of sheep that are grazing western U. S. rangelands, and to enable the Sheep Station to develop and evaluate environmentally adapted breeds and genetic lines of sheep. Would preclude or limit research to develop management strategies needed to enhance sheep well-being in diverse production environments and ensure efficient reproduction and conversion of nutrients from rangelands to sheep products
NP 215 Action Plan				
NO IMPACT; MEETS PURPOSE AND NEED: All activities linked with these components would occur, and the research	GREATEST IMPACT TO PROGRAM; DOES NOT MEET PURPOSE AND NEED:	MAJOR IMPACT TO PROGRAM; DOES NOT MEET PURPOSE AND NEED: Sheep numbers available for research would be reduced by 50	MODERATE IMPACT; MEETS WITH SOME LIMITATIONS: Sheep numbers available for research would not be reduced over the Alternative 1 inventory.	MODERATE IMPACT; MEETS WITH SOME LIMITATIONS: Sheep numbers available for research would be reduced by 40 percent over the current numbers

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No sheep grazing would occur on Headquarters, Henninger and Humphrey Ranches, East and West Summer Ranges, as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No sheep grazing would occur on the East Summer, West Summer Ranges, and Humphrey Ranch east of Beaver Creek as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No sheep grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey-Kelly allotments**
associated with these components would continue	Sheep inventory would be disposed, which would adversely affect all existing research. Would preclude research involving economically viable rangeland management practices, germplasm, technologies and strategies to conserve and enhance rangelands ecosystems. Would preclude activities necessary for developing management practices that enhance viability and productivity of western U.S. grazing lands. Would preclude co-species grazing with sheep and cattle required to manage decadent forage, maintain range condition and reduce the risk of fire on research lands. Would preclude seeding required to evaluate restoration, rehabilitation, and mitigation activities to manage disturbed sites (e.g., road sides, firebreaks, historical borrow pits, and mines) that may be susceptible to weed invasion or erosion. Would preclude integrated pest management components necessary to developing rangeland monitoring tools. Seeding, prescribed burning, and sheep grazing activities are needed to evaluate plant species	percent over the Alternative 1 inventory. Reduction in sheep numbers would adversely affect some existing research. Would limit research involving economically viable rangeland management practices, germplasm, technologies and strategies to conserve and enhance rangelands ecosystems. Would preclude or limit activities necessary for developing management practices that enhance viability and productivity of western U.S. grazing lands. Would preclude co-species grazing with sheep and cattle required to manage decadent forage, maintain range condition and reduce the risk of fire on research lands. Would preclude or limit seeding required to evaluate restoration, rehabilitation, and mitigation activities to manage disturbed sites (e.g., road sides, firebreaks, historical borrow pits, and mines) that may be susceptible to weed invasion or erosion. Would preclude or limit sheep grazing, prescribed burning, seeding, cattle and horse grazing, and integrated pest management components necessary to	Would limit research involving economically viable rangeland management practices, germplasm, technologies and strategies to conserve and enhance rangelands ecosystems. Would limit activities necessary for developing management practices that enhance viability and productivity of western U.S. grazing lands.	of research animals. Research currently involving these areas could not occur. Reduction in sheep numbers could adversely affect some existing research.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No sheep grazing would occur on Headquarters, Henninger and Humphrey Ranches, East and West Summer Ranges, as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No sheep grazing would occur on the East Summer, West Summer Ranges, and Humphrey Ranch east of Beaver Creek as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No sheep grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey-Kelly allotments**
	that are developed for rangeland improvement programs. Would preclude activities required to plant, establish, maintain, and evaluate forages. Would jeopardize a 90-year-old rangeland research program, focused on describing post-fire vegetation dynamics and developing post-fire grazing strategies in mountain big sage and three-tip sage ecosystems, and a 50-year-old sage grouse monitoring program. Therefore, this alternative would preclude the Sheep Station from meeting all program objectives.	developing rangeland monitoring tools. Seeding, prescribed burning, and sheep grazing activities are needed to evaluate plant species that are developed for rangeland improvement programs. Would preclude or limit activities required to plant, establish, maintain, and evaluate forages. Would jeopardize a 90-year-old rangeland research program, focused on describing post-fire vegetation dynamics and developing post-fire grazing strategies in mountain big sage and three-tip sage ecosystems, and a 50-year-old sage grouse monitoring program. Therefore, this alternative would preclude the Sheep Station from meeting all program objectives.		

Comparison of Resource Effects by Alternative

Table 19 displays the summary of resource effects by alternative. For detailed analyses, see the individual resource sections in the Environmental Effects section of this document or the individual specialist reports found in the project file.

Table 19. Comparison of alternatives by resource effects

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No grazing would occur on the East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey Kelly allotments**
Range				
Headquarters/Humphrey /Henninger/East and West Summer Range - Continued current grazing would have little effect on this range Mud Lake Feedlot/ Snakey, Kelly, and Meyers Creek Allotments - No change is expected from continued current management	Ending grazing would have little effect on Headquarters, Humphrey, and East Summer /West Summer. Weed control would not continue, and this could result in increasing weed populations. On Henninger, range vegetation condition would probably move to fair with an upward trend. Invasive weed control and fence maintenance would not continue. Smooth brome (non-native grass) would remain on site and could replace some native species. Mud Lake Feedlot, Snakey, Kelly, and Meyers Creek Allotments - no change is expected from continued current management.	Headquarters/Humphrey East Summer /West Summer Ending grazing would have little effect on these range properties Mud Lake Feedlot - Continued growing season use of available AUMs could reduce more palatable plants, affect species diversity and create conditions more favorable for noxious weeds. Snakey, Kelly and Meyers Creek Allotments – Ending grazing would have little effect	Headquarters - although much of the forage would be provided by increased use on property, forage use is well within acceptable standards and would provide desirable range conditions. Henninger - Forage use would be reduced, deferred grazing during the growing season would be lost and could affect species diversity. Smooth brome could spread to new areas. Humphrey/Summer West and Mud Lake Feedlot, Snakey, Kelly, – Same as alternative 1. East Summer Range and Meyers Creek Allotment – Same as alternative 2	Headquarters/Humphrey/ Henninger/East Summer/ West Summer and Mud Lake Feedlot, and Meyers Creek Allotment Effects same as alternative 1. Snakey Kelly allotments – Same as alternative 2

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No grazing would occur on the East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey Kelly allotments**
Federally-Listed Wildlife Species				
Canada Lynx (Lynx canadensis) U. S. Sheep Experiment Station Grazing and Associated Activities Project 2011, "may affect, but is not likely to adversely affect Canada lynx." The project would have "No Effect" on critical habitat as none is present or proposed within the project area.				
For all alternatives there is a very low probability of Canada lynx occurrences on Agricultural Research Service properties				
Minimal, if any, effects would occur with regard to Canada lynx, both to individuals as well as to habitat. No effects would occur to designated critical habitat as none is present, and none is being proposed or considered in the area.	Elimination of all grazing and associated activities in the Centennial Range would eliminate the potential effects	Elimination of all grazing and associated activities in the Centennial Range would eliminate the potential effects	Minimal, if any, effects would occur with regard to Canada lynx, both to individuals as well as to habitat. No effects would occur to designated critical habitat as none is present, and none is being proposed or considered in the area.	Minimal, if any, effects would occur with regard to Canada lynx, both to individuals as well as to habitat. No effects would occur to designated critical habitat as none is present, and none is being proposed or considered in the area.
***Grizzly Bear* (*Ursus arctos horribilis*)**				
"May affect, but is not likely to adversely affect the Yellowstone Distinct Population of grizzly bear"	"No Effect" on the Yellowstone Distinct Population Segment of grizzly bears	"No Effect" on the Yellowstone Distinct Population Segment of grizzly bears	"May affect, but is not likely to adversely affect the Yellowstone Distinct Population of grizzly bear"	"May affect, but is not likely to adversely affect the Yellowstone Distinct Population of grizzly bear"
Gray Wolf (Canis lupus) Northern Rocky Mountain Distinct Population Segment. Currently not a listed species. Determination applies if returned to previous federal status of nonessential experimental population)				
"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"	"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"	"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"	"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"	"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"
Other Wildlife Species				
Rocky Mountain Bighorn Sheep (Ovis canadensis canadensis) Not a federally listed species. State game species with controlled hunts in some areas				
Not directly affected by grazing on any of the ARS properties	Removal of Sheep Station grazing on the Snakey-Kelly allotments would reduce one potential vector of respiratory disease transmission. It is speculative that this alternative would result in an observable change in the existing	Not directly affected by grazing on any of the ARS properties	Not directly affected by grazing on any of the ARS properties	Removal of Sheep Station grazing on Snakey-Kelly allotments would reduce one potential vector of respiratory disease transmission. It is speculative that this alternative would result in an observable change in the existing bighorn

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No grazing would occur on the East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey Kelly allotments**
	bighorn sheep herds' condition, health, or population.			sheep herds' condition, health, or population.
Greater Sage-grouse (Centrocercus urophasianus) Currently not a listed species, details included in the Wildlife Report				
Benefits to habitat derived from increased mosaic of shrubs, forbs, grasses, and maintained lek sites. Small temporary displacement from grazing sheep during early brood rearing. Overall balance between positive and negative effects are neutral.	Eliminates direct disturbance and displacement of grouse, but also eliminates benefit that maintain leks and improves habitat mosaic between forbs, grasses, and shrubs.	Larger number of sheep on headquarters and Henninger for longer duration increase disturbances to sage-grouse.	Benefits to habitat derived from increased mosaic of shrubs, forbs, grasses, and maintained lek sites. Small temporary displacement from grazing sheep during early brood rearing. Overall balance between positive and negative effects are neutral.	Benefits to habitat derived from increased mosaic of shrubs, forbs, grasses, and maintained lek sites. Small temporary displacement from grazing sheep during early brood rearing. Overall balance between positive and negative effects are neutral.
Pygmy Rabbit (Brachylagus idahoensis) Currently not a listed species, details included in the Wildlife Report				
Pygmy rabbits would persist with population numbers and trends similar to the current condition. Prescribed or wildland fires would temporarily reduce portions of pygmy rabbit habitat until shrub cover returns to a mature state.	Pygmy rabbits would persist with population numbers and trends slightly increased from the current condition. Eliminates any sheep interaction with or displacement of pygmy rabbits.	Pygmy rabbits would persist with population numbers and trends slightly reduced from the current condition. Longer temporal disturbances from sheep with additional displacement of pygmy rabbits.	Pygmy rabbits would persist with population numbers and trends similar to the current condition. Prescribed or wildland fires would temporarily reduce portions of pygmy rabbit habitat until shrub cover returns to a mature state.	Pygmy rabbits would persist with population numbers and trends similar to the current condition. Prescribed or wildland fires would temporarily reduce portions of pygmy rabbit habitat until shrub cover returns to a mature state.
Connectivity habitat for wide- ranging carnivores (Concern brought up during public scoping). Details included in the Wildlife Report				
Carnivore use of the Centennial Mountain range would continue similar to the current condition. Would not reduce connectivity in the Centennial Range. Large carnivores travel through and/or occupy habitat mostly without disturbance because of the large scale of available habitat, and sheep bands occupy only a small acreage for short duration. Lethal control actions would remain minimal and at levels similar to	Carnivore use of the Centennial Mountain range would continue similar to the current condition, with additional potential for black bears and wolves to more fully utilize the current habitat within a given homerange. Changes in the effectiveness of the Centennial Range as a wildlife migration corridor remain speculative, but are unlikely since evidence suggests that Sheep Station activities have a minimal effect to	Carnivore use of the Centennial Mountain range would continue similar to the current condition, with additional potential for black bears and wolves to more fully utilize the current habitat within a given homerange. Changes in the effectiveness of the Centennial Range as a wildlife migration corridor remain speculative, but are unlikely since evidence suggests that Sheep Station activities have a	Carnivore use of the Centennial Mountain range would continue similar to the current condition. Would not reduce connectivity in the Centennial Range. Large carnivores travel through and/or occupy habitat mostly without disturbance because of the large scale of available habitat, and sheep bands occupy only a small acreage for short duration. Lethal control actions would remain minimal and at levels similar to	Carnivore use of the Centennial Mountain range would continue similar to the current condition. Would not reduce connectivity in the Centennial Range. Large carnivores travel through and/or occupy habitat mostly without disturbance because of the large scale of available habitat, and sheep bands occupy only a small acreage for short duration. Lethal control actions would remain minimal and at levels similar to

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No grazing would occur on the East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey Kelly allotments**
past actions. Lethal control would not occur for grizzly bears.	wide ranging carnivore use of the habitat.	minimal effect to wide ranging carnivore use of the habitat.	past actions. Lethal control would not occur for grizzly bears.	past actions. Lethal control would not occur for grizzly bears.
Fish and Amphibians Details included in the Wildlife Report				
No effects would occur to arctic grayling, westslope cutthroat trout, or Yellowstone cutthroat trout. Effects to spotted frogs, boreal western toads, chorus frogs, and other amphibians would be rare and limited to the loss of a few individual animals (adult amphibians or larvae) in localized areas associated with watering activities in springs and lakes. Interdisciplinary review of current aquatic conditions found stable stream channels, non-erosive banks, functioning flood plains, dense willows, and vigorous riparian vegetation is the dominant characteristic in all of the fish-bearing streams and lakes and where amphibians are expected to occur.	Vacated stream crossings and watering areas would rehabilitate naturally. Downstream effects to fisheries and amphibian habitats from Sheep Station activities would remain negligible.	No effects would occur to arctic grayling, westslope cutthroat trout, or Yellowstone cutthroat trout. Effects to spotted frogs, boreal western toads, chorus frogs, and other amphibians would be rare and limited to the loss of a few individual animals (adult amphibians or larvae) in localized areas associated with watering activities in springs and lakes. Interdisciplinary review of current aquatic conditions found stable stream channels, non-erosive banks, functioning flood plains, dense willows, and vigorous riparian vegetation is the dominant characteristic in all of the fish-bearing streams and lakes and where amphibians are expected to occur.	No effects would occur to arctic grayling, westslope cutthroat trout, or Yellowstone cutthroat trout. Effects to spotted frogs, boreal western toads, chorus frogs, and other amphibians would be rare and limited to the loss of a few individual animals (adult amphibians or larvae) in localized areas associated with watering activities in springs and lakes. Interdisciplinary review of current aquatic conditions found stable stream channels, non-erosive banks, functioning flood plains, dense willows, and vigorous riparian vegetation is the dominant characteristic in all of the fish-bearing streams and lakes and where amphibians are expected to occur.	No effects would occur to arctic grayling, westslope cutthroat trout, or Yellowstone cutthroat trout. Effects to spotted frogs, boreal western toads, chorus frogs, and other amphibians would be rare and limited to the loss of a few individual animals (adult amphibians or larvae) in localized areas associated with watering activities in springs and lakes. Interdisciplinary review of current aquatic conditions found stable stream channels, non-erosive banks, functioning flood plains, dense willows, and vigorous riparian vegetation is the dominant characteristic in all of the fish-bearing streams and lakes and where amphibians are expected to occur.
Infrastructure				
There would be no changes to the activities associated with the infrastructure.	The only activities that would continue would be: maintenance of roads to the headquarters area and the Mud Lake Feedlot; trucking between the Mud Lake Feedlot and Headquarters feedlot facility; and maintenance of the firebreak around the headquarters area.	Roads, fences, and firebreaks would continue to be maintained as necessary; sheep would continue to be transported to winter ranges and Mud Lake Feedlot by truck; sheep would continue to be trailed to Henninger and Snakey-Kelly;	Roads, fences, and firebreaks would continue to be maintained as necessary; sheep would continue to be transported to winter ranges and Mud Lake Feedlot by truck; sheep would continue to be trailed to Henninger, Snakey-Kelly, and West Summer; driveways in West Summer would continue to be used	Same as alternative 1, with the exception that trailing would only take place to Henninger and East and West Summer

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No grazing would occur on the East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey Kelly allotments**
Sheep				
There would be no change from the existing sheep herd (3,000 sheep)	0 percent of herd retained (0 sheep); 100 percent of sheep disposed of (3,000 sheep)	50 percent of herd retained (1,500 sheep); 50 percent of sheep disposed of (1,500 sheep)	There would be no change from the existing sheep herd (3,000 sheep)	60 percent of herd retained (1,800 sheep); 40 percent of sheep disposed of (1,200 sheep)
Soils				
Soils stable and productive except for low veg/soil state at Henninger. Maintains active noxious weed abatement program, though uses Krovar at feedlots. Maintains natural fire cycle at Headquarters.	Soils stable, possible increased leaf litter at Headquarters, Henninger, and Summer Range. Improved riparian soils on Beaver Creek willow tributary. Less potential weed dispersal from sheep, but less active weed control measures.	Soils stable, except continued low veg/soil state at Henninger. Improved riparian soils at Beaver Creek willow tributary. Possible increased leaf litter at Summer range. Maintains active noxious weed abatement program, though uses Krovar at feedlots. Maintains natural fire cycle at Headquarters.	Soils stable at Headquarters and Humphrey. Improved riparian soils at Beaver Creek willow tributary; Possible decreased plant vigor, litter production at Henninger and West Summer pasture. Decreased risk of invasive plants, though use of Krovar in feedlots; Maintains natural fire cycle at Headquarters.	Soils stable, possible increased leaf litter at Henninger and Summer Range. Decreased risk of invasive plants, though use of Krovar in feedlots. Maintains natural fire cycle at Headquarters.
Hydrology				
All proposed alternative would meet the intent of the Clean Water Act and the Executive Orders for wetlands and floodplains.				
No Change from present	No Change from present	No Change from present	No Change from present	No Change from present
Botany				
There would be no impacts to federally listed plant species from any alternatives proposed because no species occur and no habitat for federally listed plant species is present within Agricultural Research Service properties. All alternatives proposed within this environmental assessment would be in compliance with threatened and endangered plants according to the Endangered Species Act.				
Heritage				
Selection of any alternative would require Heritage review and compliance				
Socioeconomics				
No change in social or economic conditions	There would be no change in total amount of salary paid due to change in staff positions. Research scientist positions would replace technicians and herders not	There would be no change in total amount of salary paid due to change in staff positions. Research scientist positions would replace technicians and herders not	No change to employment and income conditions, and consequently no effect on household migration patterns and public services	No change to employment and income conditions, and consequently no effect on household migration patterns and public services

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No grazing would occur on the East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, and Meyers Creek allotments**	**No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey Kelly allotments**
	needed for operations under Alt 2 and 3.	needed for operations under Alt 2 and 3.		
Environmental Justice				
No change in the current economic conditions, and would not have any impact on minority or low income populations	Total impact to environmental justice populations would be limited by the structure of Clark County's economy, but any local spending lost may have some adverse effect on low income populations	Total impact to environmental justice populations would be limited by the structure of Clark County's economy, but any local spending lost may have some adverse effect on low income populations	No change in the current economic conditions, and would not have any impact on minority or low income populations	No change in the current economic conditions, and would not have any impact on minority or low income populations

Chapter 3 - Environmental Consequences

The U.S. Sheep Experiment Station (Sheep Station) operates on Agricultural Research Service properties that were set aside as a sheep-breeding and rangeland grazing research facility. As a research facility, our management is governed by research goals and objectives in support of the Sheep Station mission to develop integrated methods for increasing production efficiency of sheep and to simultaneously improve the sustainability of rangeland ecosystems. Because we are a research facility, the only standards that must be adhered to are those set forth in federal laws and regulations (i.e. Endangered Species Act; Executive Order 11990, Protection of Wetlands). The existing condition of the Sheep Station resources is used as the baseline for analysis of effects. The existing condition of resources currently meets the needs of the Sheep Station to conduct its research.

More detailed analysis of environmental effects can be found in the individual specialist reports in the project file, all of which are incorporated by reference for this analysis.

Dates photos were taken accompany the figure caption. To compare these dates with grazing, please see the grazing schedules in appendix B.

Activities Contributing to Cumulative Impacts

Cumulative effects analysis considers the effects of other past, present, and reasonably foreseeable actions that may result in cumulative effects when combined with the effects of the proposed action. Cumulative effects are analyzed by resource, and cumulative effects boundaries in time and space are described by individual resource. A list of past, present, and reasonably foreseeable actions associated with the project area is listed below. The baseline used for cumulative effects analysis is the no action alternative, or in this case, the no new federal action alternative (or the proposed action). The cumulative effects analysis; while it includes some consideration of past human actions; does not fully quantify all effects of past human actions by adding up all prior actions on an action-by-action basis. By looking at current conditions, we capture residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. The Council on Environmental Quality issued an interpretive memorandum on June 24, 2005, regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.” For these reasons, while some past actions are listed and considered specifically, the focus of the cumulative analysis for past actions is based on current environmental conditions which have resulted from past and ongoing management activities of the Sheep Station.

Other Lands Used by Sheep Station

Table 20 displays the allotments and feed lot that the Sheep Station uses as part of their research operation. See the What is being proposed? section (page 13) for descriptions of the allotments and the feedlot that the Sheep Station uses as part of their overall operations.

Table 20. Other lands utilized by the Sheep Station

USDA Forest Service (National Forest System)	Department of Energy
Meyers Creek (Island Park Ranger District)[a]	Mud Lake Feedlot
East Beaver Creek (Dubois Ranger District)	
Snakey Canyon (Dubois Ranger District)	
Kelly Canyon (Dubois Ranger District)	

- These lands are included in the cumulative effects rather than the direct and indirect effects analyses because separate NEPA analyses were prepared by the respective agencies for Sheep Station use of those lands. It is neither required nor appropriate that the Sheep Station revisit these decisions.

Thus this environmental impact statement analyzes the direct/indirect effects of the proposed actions on ARS properties only. The effects of grazing on the allotments and feed lot are considered in the cumulative effects analyses.

Idaho Power Transmission Line Upgrades

Idaho power is currently upgrading its existing transmission lines through the Headquarters Property. This line upgrade is occurring within the existing transmission line right of way, as displayed in Map 3.

Climate Change

Climate changes at national or regional levels will influence changes at smaller levels, such as a site-specific project area. Site-specific influences will be greatly modified by topography, elevation, aspect, local airflow patterns, vertical mixing and transport, lapse rates and the tendency for inversions to form (Furniss et al. 2010). Most modeling is done at gross scales (global, national or regional). Site-specific management activities are typically conducted at a much smaller scale, somewhere between 0.4 and 193 square miles, and there are problems with application of model results due to numerous factors not being accounted for or adequately considered at the proper scale (Furniss 2010, Salathe' et al. 2008). As a result, most models are not precise enough at this time to apply them to management activities at the project level. This limits the analysis of potential effects from climate change and the inter-relationship with proposed land management activities.

Due to these limitations it is not possible to determine specific climate changes and how they would affect implementation of any of the proposed alternatives or achievement of the project purpose and need. However, we do have information about anticipated trends in changing climate that we can use to understand how climate change may, generally affect the project area resources and influence range management activities at the Sheep Station. In the Intermountain West, climate change is anticipated to result in increased temperatures and changing precipitation patterns. This may include rising temperatures (especially in winter), wetter springs, summers, and falls, and longer or more severe droughts in summer (USDA 2015). The Sheep Station's integrated animal and range research programs have always evaluated adaptive management in response to changing environmental conditions. The Sheep Station developed sheep composites, grazing programs, and land management strategies that best maintain the functionality of the Intermountain West landscape.

Despite the potential for changing environment, ongoing management of Sheep Station operations would continue to ensure appropriate herd size and grazing practices for resource conditions available.

The proposed operations at the Sheep Station are anticipated to have small but unmeasurable effects on climate change, though minor greenhouse gas emissions resulting from ongoing operations (primarily, prescribed burning). At this time there are no regulations to limit greenhouse gas emissions. In its draft guidance on considering greenhouse gas emissions in project-level NEPA, Council on Environmental Quality recommends a quantitative greenhouse analysis occur where greater than 25,000 metric tons of CO_2 equivalent emissions are anticipated (Council on Environmental Quality 2014). This project is not anticipated to produce greater than 25,000 metric tons of CO_2 equivalent, thus only a qualitative analysis has been included. The total amount of pollutants released by prescribed burning operations is unlikely to have a significant adverse effect on human health or visibility due to the small number of acres proposed for burning and the fuel type to be burned. It is also probable that subsequent wildfires in the project area would produce fewer pollutants due to reduced fuel availability as a result of grazing and prescribed burning activities. For a more detailed discussion of air quality effects or greenhouse gasses emitted during prescribed burning, see the Air Quality Specialist Report.

Physical Environment

The ARS properties are made up of low and highland areas along the northeastern edge of the Snake River Plain. The highlands serve as summer range and are located within the Centennial Mountains to the northeast of the Sheep Station. The Centennials are part of the Rocky Mountain province and consist of folded and thrusted sedimentary rocks overlain with basalt and tertiary sediments. Vegetation ranges from mixed conifer to alpine meadow communities.

The lowlands are lava-dominated sage plains where the sheep are grazed fall through spring. The lowlands are gently sloping lava flow bench lands made up of Quaternary aged lava flows over rhyolite tuffs. These lava flows have interfingered alluvial deposits from the Centennial Mountains, in addition to fine-grained sediments from wind-blown and lake deposits (Stevenson 1993 unpublished report, Link 2008). The Sheep Station Headquarters Range and Henninger Ranch are located on these lowlands with sage steppe as the dominant plant community. Humphrey Ranch borders the lowlands on the western foot slope of the Centennial Mountains, near Monida pass and is predominantly sagebrush.

This volcanic or lava plain, increases in elevation to the northeast and generates a strong moisture gradient from Headquarters to Henninger. Annual precipitation is in the range of 8-12 inches near the southwest corner of Headquarters and increases to 17-22 inches in the upper portion of Henninger, due to the orographic lift of the Centennial Mountains (Hiett 2009, personal communication). The Centennials proper receive, on average, over 40 inches of precipitation annually primarily as snow (USDA NRCS 1991; Prism Model, USDA Forest Service 2009).

Moisture and temperature gradients drive vegetation and soil development, although parent material along with other soil forming factors are also very important as well in soil genesis, development and morphology. On the lowlands, the cold temperatures and arid conditions make for slow soil development, in part due to the relatively recent lava flow-rock. The inherent parent material properties of the lava and interbedded alluvium are factors in the formation of coarse to fine grained loamy soils, meaning they are well balanced in terms of their texture. In this area, soil forming factors lead to predominantly well-drained conditions, which may limit the water available to plants during the growing season. In addition, cold climatic conditions also limit vegetative types to those more adaptive species, especially in areas over 6,200 feet elevation where the with mean annual temperature is lower than 47 degrees F, which shortens the growing season and subsequent use and management of these soils. Headquarters, Henninger

Ranch, the summer pastures with gentle slopes and northern aspects in the Centennials, and foothill Humphrey sites are all subject to these cold air influences (Hiett 2009, personal communication).

Resource Effects

The two resources most directly affected by the alternatives in the project are range and wildlife and are detailed below. Following these are the analyses of effects to other resources.

Range

For additional details of the rangeland affected environment, see the range report.

Summary of Range Effects

Table 21 displays available AUMs for each property and allotment and percent used under each alternative.

Table 21. Available AUMs and percent AUMs used by alternative for each property

Property	Percent of Available AUMs Used				
	Alt1	Alt2	Alt3	Alt4	Alt5
ARS properties	**8**	**NA**	**6**	**8**	**5**
Headquarters	6	NA	5	7	4
Humphrey	18	NA	27	20	11
Henninger	18	NA	16	21	11
East Summer Range (Toms Creek)	6	NA	NA	NA	3
West Summer Range (Odell Creek/ Big Mountain)	5	NA	NA	5	3
Forest Service Allotments	**3**	**NA**	**13**	**4**	**<1**
Snakey-Kelly	25	NA	13	25	NA
East Beaver	1	NA	NA	2	<1
Meyers Creek	1	NA	NA	NA	<1

Under modified alternative 1, forage used by sheep grazing is well below total available forage – less than 10 percent on Headquarters, East Summer Range, and West Summer Ranges, and less than 20 percent on Humphrey Ranch and Henninger Ranch. Modified alternative 1 would continue to provide range conditions necessary for the Sheep Station to continue its mission of current and ongoing research.

Under alternative 2, ending grazing would have little effect on Headquarters, Humphrey and East and West Summer Range properties. Based on available data, there is little or no difference between grazed and ungrazed areas. On Henninger Ranch, residual effects from past agricultural use, sheep grazing, and heavy use areas (bedding and watering sites) would recover at natural rates. Alternative 2 would not provide range conditions necessary for the Sheep Station to continue its current and ongoing research mission.

Under alternatives 3, 4 and 5 reduced or eliminated utilization in some grazing areas would result in some decrease and some increases in grazing utilization in other areas. Overall, grazing would result in limited effects because it is still well below total available forage under any of the alternatives. However, the ability of the Sheep Station to carry out its current mission would be limited under these alternatives.

With the low AUM use in all alternatives, short-term sheep grazing and related operations effects of any alternative, would not adversely affect long-term site productivity.

Analysis Methodology

Short-term effects represent impacts that occur year to year, or for this analysis, across a time-span of up to five years. Long-term effects for this analysis represent resource impacts that occur across timeframes for five years or more. Direct and indirect grazing effects are discussed for Agriculture Research Service properties.

The 2009 Rangeland Assessment (USDA 2009) evaluated and assessed Headquarters, Henninger, Humphrey, and East and West Summer Ranges using an interdisciplinary team consisting of rangeland management specialists, a wildlife biologist, a soil scientist, and a hydrologist. Documents and publications used in the assessment process include the Soil Survey of Grant and Freemont County, Idaho (USDA NRCS 1999), Ecological Site Descriptions for Major Land Resource Area Bllb, Blla, B13 (USDA NRCS 1982) Interpreting Indicators of Rangeland Health (USDI BLM et al. 2005), Sampling Vegetation Attributes (USDI BLM et al. 1996), and the National Range and Pasture Handbook (USDA NRCS 1997).

Potential effects of the proposed management activities by alternative are evaluated using the following criteria:

- There are no federal laws and regulations applicable to grazing ARS Sheep Station properties. The existing condition is considered the baseline for comparison of alternatives.
- Proposed management activities have been evaluated using vegetation condition, forage utilization, and management or operations flexibility.
- Cattle and horse forage use and other grazing direct, indirect and cumulative effects are included in survey data analysis for ecological site status, rangeland condition and trend rating.
- Range site is a distinct rangeland, in absence of abnormal disturbance and physical site deterioration, has the potential to support a distinct native plant community with associated species, different from that of other sites (Holechek 1989).
- For this analysis range site condition can be rated: excellent, good, fair, or poor, site trend can be rated: up, down or static. Range condition is generally defined as departure from potential site productivity. Trend is the direction of change in range condition.
- Forage utilization (Table 22) is defined as amount of current year vegetation production grazed at the end of the grazing season. Percentage figures apply to current year's growth of key forage species on a site.

Table 22. Utilization

Level of Use	Percentage of grazed
None to Slight	0 to 10 percent
Light	10 to 30 percent
Moderate	30 to 50 percent
Heavy	Greater than 50 percent

Rangeland condition is a function of rangeland forage: condition, trend and utilization. The focus of the analysis of effects to the rangeland resource is on browse and forbs, which are the primary forage types

used by sheep. Effects to these forage types determine long-term sustainability of the rangeland resource, and are a key factor for effects analysis.

Spatial and Temporal Context for the Effects Analysis

The spatial boundary for range effects analysis is all ARS properties. Effects to range resources from the proposed action and alternatives are limited to those areas that are being grazed. Therefore, cumulative effects analysis includes ARS properties and allotments under MOUs (USDA Forest Service and DOE feedlot) used for grazing or animal storage throughout each year. The temporal boundary will represent resource impacts that occur across timeframes of five or more years. The five-year or more timeframe allows for yearly fluctuations while being an appropriate timeframe to identify range condition and trend.

Range Affected Environment

An overview of grazing areas is described below (also see Where is the project located? (page 5) and Appendix A - Project Maps).

- **Headquarters Range**: 27,930 acres of ARS property, includes office, laboratory, animal, equipment, and residential buildings, dry-lot facilities for research throughout the year, lambing facilities, and pastures used for spring and autumn grazing and rangeland research.
- **West and East Summer Range grazing areas**: 16,600 acres of ARS property, in the Centennial Mountains of Montana, are used for summer grazing and rangeland research.
- **Humphrey Ranch**: 2,600 acres of ARS property north of Headquarters in Idaho, has animal facilities and equipment buildings, and is used for spring, summer, and autumn grazing and rangeland research.
- **Henninger Ranch**: 1,200 acres of ARS property near Kilgore, Idaho, has animal facilities and is used for summer, spring and fall grazing and rangeland research.

During portions of the year, sheep utilize Forest Service grazing allotments and are held at the Department of Energy Mud Lake Feedlot (Map 2). These lands will be included in this analysis as appropriate, and use of these lands is covered under separate agreements with those agencies and will not be part of this decision. Available AUMs, grazing dates and percent forage or AUMs used for each property are shown in Table 21.

Range condition surveys on ARS properties were conducted in 2009, 1994, 1991, and 1989. Site condition and species composition studies have been conducted from 1924 to the present, resulting in 87 years of study (see Range Report). These studies and grazing effects studies indicate ecological sites are in good condition, functioning properly, with appropriate species composition. Surveys indicate that with continued grazing under current deferred and rotational grazing systems ground cover conditions (including biomass, taxonomic composition, and species richness) would remain static or move in an upward trend. Vegetation and site condition comparisons on exclosures, established in 1940, 1950, 1960 and 1978, (and not grazed for 30 to 70+ years), indicate no differences in all sampled components, which include plant species composition, inside and outside of the exclosures. Use of rotational, and deferred grazing systems along with rest from grazing and using light to moderate stocking rates resulted in fair to good range conditions with a static to upward trend. Portions of Henninger Ranch, where soils are stable with overall light utilization, had some species composition and rangeland condition concerns due to heavy browse species use.

Headquarters Property (Figure 21)

The majority of Headquarters property rangelands are currently late mid seral. The 2009 field surveys indicate Headquarters rangelands have a higher percent of shrub cover than would occur with more frequent natural fire. More frequent burning would provide conditions for a higher percent of forb and grass cover.

Headquarters soils are stable, with desirable forb, shrub, and grass diversity. With rotational and deferred grazing and light stocking, utilization is none to slight. Only small areas (sheep trailing, watering, bedding) less than 50 total acres, showed heavy use.

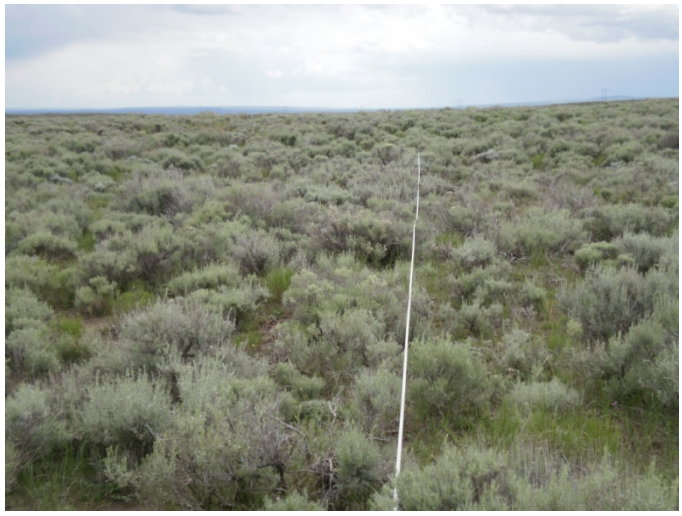

Figure 21. Headquarters pasture - (tg 08/09)

Yearly growing season rest across a majority of Headquarters property and the use of summer ranges is benefitting Headquarters, Humphrey and Henninger range resources by reducing amount of vegetation grazed during the growing season. Continued use of prescribed fire on Headquarters property rangelands improves forage by reducing sagebrush and increasing forbs and grass cover.

Cheatgrass was present on 38 Headquarters plots; a trace on 21 plots, 2 to 3 percent on 12 plots, 4 plots had 5 percent and one plot had 12 percent cheatgrass cover. Cheatgrass is an introduced invasive species which displaces native vegetation, is highly flammable, and alters fire regimes.

Henninger Ranch Pastures (Figure 22)

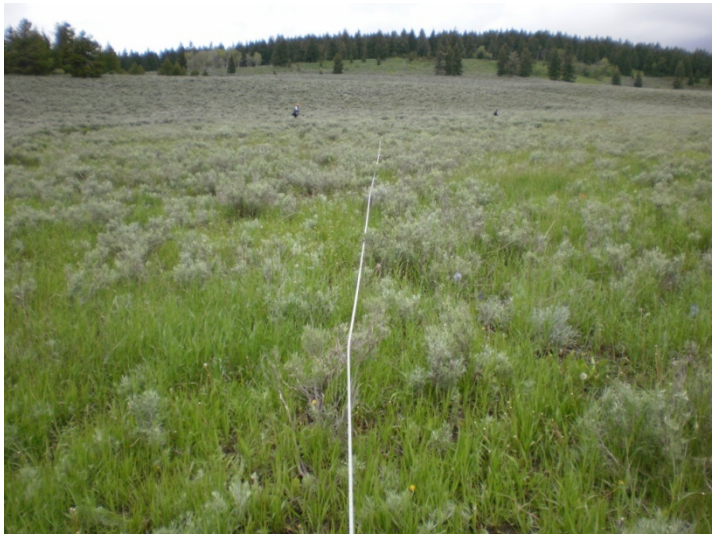

Figure 22. Henninger Ranch pasture - (tg 08/09)

Henninger Ranch pastures appear to have a static fair range condition with a downward trend on browse species. It is recovering from past cattle grazing and early agricultural practices. Current grazing periods are from July 1 through July 15 and again August 31 through September 15. This grazing and resting schedule is assisting with recovery.

Field surveys, done in 2009, found moderate to heavy browse species use. Use on some areas may be associated with early and late season deer and elk grazing.

Historically, the Ranch grazed cattle until purchased by ARS for the Sheep Station in the early 1940s. Smooth brome (*Bromus inermis*) presence in some pastures indicates that it was planted for cattle feed. Smooth brome is not preferred by sheep and could spread into native vegetation areas.

Humphrey Ranch Pastures (Figure 23)

The Humphrey Ranch rangeland is thriving in an early mid seral state. This site is very stable with desirable forb, shrub, and grass diversity. Fire has historically occurred on this property at 20 to 50 year intervals. Part of Humphrey ranch burned in the last 20 years.

Figure 23. Humphrey Ranch pasture - (tg 08/09)

Utilization is light with rams and small groups of sheep grazed here. Rotational and deferred grazing with light stocking rates have allowed for good range conditions with a static or slight upward trend. Only small areas, less than 50 total acres, where sheep are trailed, watered and/bedded showed heavy use.

In the 2009 range survey, species composition by percent cover was recorded for each line transect site and is included in the 2009 Rangeland Assessment Report (Grooms 2009).

East Summer and West Summer Ranges (Figure 24)

The Sheep Station summer ranges have a high diversity of forbs, grasses, and shrubs.

Figure 24. East Summer and West Summer range - (cj 08/09)

Sheep grazing is done during the summer, and is rotated between East Summer Range (Toms Creek) and West Summer Range (Big Mountain and Odell) grazing units with each pasture rested one year in three. Recent fall fires on Agricultural Research Service properties favor forb growth. Above average precipitation, and below average temperatures in 2009 provided high forb production. Exclosures in East and West Summer Ranges showed no visual difference in composition, vigor, or production over grazed areas. This finding is consistent with Klement's 1997 assessment. All sampled components were similar both inside and outside of exclosures. Figure 25 to Figure 27 display grazing effects at fence-line at sheep exclosure in West Summer Range (Odell).

Figure 25. Fence-line along sheep exclosure

Figure 26. Same location away from exclosure

Figure 27. Same location inside exclosure - West Summer Odell Unit (grazed area) - (cj 08/09)

Figure 28, West Summer – Big Mountain, shows the sheep driveway where some exposed soil is evident. Impacts to areas subject to concentrated localized activity such as the driveways, are mitigated by rest one in three years, and are considered short-term impacts. There is vigorous willow growth protecting the intermittent stream course at the toe of the slope (Figure 28). Driveway impacts are not characteristic of East and West Summer Range, or grazing units within them, where light stocking grazing is spread across the large landscape with minimal effects. Rotational and deferred grazing (rest one in three years); zero to slight utilization and light stocking; adaptive management; and best management practices have resulted in good range condition and slightly upward trend.

Figure 28. Driveway bottleneck West Summer - (cj 08/09)

Visual review of the grazed pastures during 2009 field surveys indicates that grazing effects are well below accepted utilization standards. Sheep grazing effects visually contrast with cattle use. Sheep are continually herded as they graze in tight patterns across the landscape. This, coupled with herd size, (approximately 900) can result in as much tramping of vegetation as grazing (Figure 29 to Figure 31).

Figure 29. West Summer Range, Odell. Upslope -Left side is ungrazed while right demonstrates herd grazing

Figure 30. West Summer Range, Odell. Down-slope – Note ungrazed areas bordering grazed/herded area

Figure 31. Grazed area exhibits minimal exposed soil and excellent residual litter - (cj 08/09)

Figure 32. Below area of concern Toms Creek – 8/09

Figure 33. Area of concern Toms Creek – 8/09

A comment received during Scoping indicated that the head of Toms Creek is a concern. Current condition is related to the harsh site (soil/aspect/slope/elevation), severe wildfire less than 50 years ago,

and past grazing, all combined to slow site recovery. Bare soil and lack of plants is not tied to current grazing. Figure 32 and Figure 33 display the existing conditions for the area of concern in Toms Creek that was noted in the Scoping comments. A diversity of plants and good production indicate that this area is recovering.

Range Direct and Indirect Effects

Alternative descriptions below display the differences among alternatives 2 to 5 and the proposed action (modified alternative 1). Table 23 displays the ARS properties or allotments where grazing would or would not occur under alternatives 1 to 5. When not grazing, sheep are held at the Mud Lake feedlot.

Table 23. Grazing properties by alternative

Properties	Modified Alternative 1	Alternative 2	Modified Alternative 3	Modified Alternative 4	Modified Alternative 5
ARS properties					
Headquarters	Grazing	No Grazing	Grazing	Grazing	Grazing
Humphrey	Grazing	No Grazing	Partial grazing	Grazing	Grazing
Henninger	Grazing	No Grazing	Grazing	Grazing	Grazing
Summer East	Grazing	No Grazing	No Grazing	No Grazing	Grazing
Summer West	Grazing	No Grazing	No Grazing	Grazing	Grazing
Forest Service Allotments					
Snakey-Kelly	Grazing	No Grazing	Grazing	Grazing	No Grazing
East Beaver	Grazing	No Grazing	No Grazing	Grazing	Grazing
Meyers Creek	Grazing	No Grazing	No Grazing	No Grazing	Grazing

With the low AUM use on all alternatives, short-term sheep grazing and related operations effects of any alternative, if implemented, would not adversely affect long-term site productivity.

Modified Alternative 1 - Proposed Action (No New Federal Action)

Direct and Indirect Effects

Modified alternative 1, the proposed action would continue sheep grazing and associated activities that have been historically occurring in conjunction with Sheep Station research to develop integrated methods for increasing production efficiency of sheep and to simultaneously improve the sustainability of rangeland ecosystems. These activities enable the Sheep Station to carry out the mission for which it was established by executive order and public law.

Headquarters

Continued current grazing would have little effect on this range. Based on available data, there is little or no difference between grazed and ungrazed areas. Rotational and deferred grazing with light stocking rates would continue to maintain fair range conditions with a static trend. Current seasonal use would continue to provide growing season deferment across the majority of the Headquarters property each year and provide its natural ecological function to continue. Stable soils would continue with desirable forb, shrub, and grass diversity. Only small areas (less than 50 acres) representing less than one percent of Headquarters grazing area would continue to show heavy use (trailing, watering, or bedding).

Associated activities (prescribed burning, seeding, invasive species control, fence maintenance, cattle and horse grazing, stock watering) would continue. Experimental herbicide application and prescribed

burning on Headquarters property to manage vegetation for fuel reduction and wildlife habitat improvement are proposed for small areas. These have little effect on available forage and range conditions. These activities would contribute to good range condition. Prescribed burning would continue to provide diverse seral species composition. Continued sheep grazing and spot herbicide application would control invasive species. Cattle and horse grazing during the non-growing season would continue removing last-season grass growth. Forage removal with infrequent light stocking of cattle and horse grazing would contribute to desirable forage production. Fence maintenance would continue to control sheep grazing within units and prevent livestock trespass. Stock watering would continue to distribute sheep by moving water sites to little-used areas. Road maintenance would continue to provide efficient management access.

Humphrey Ranch

Continuing current light grazing would have little effect on this range. Based on 2009 range surveys there is little or no difference between grazed and ungrazed areas, with little room for improvement. Rotational and deferred grazing with light stocking rates would maintain fair range conditions with a static trend. Very stable soil conditions would continue with desirable shrub, forb and grass diversity. Light stocking with less than 400 rams and 200 ewes would continue. Only small (less than 20 total acres) areas representing less than one percent of Humphrey property would continue to show heavy use from trailing, watering, and bedding.

Ongoing associated activities (seeding, fence maintenance, cattle and horse grazing) would contribute to good range condition. Invasive species control with sheep grazing and spot herbicide application would continue to keep weeds in check. Cattle and horse grazing during the non-growing season would continue when needed to remove last-season grass growth and dormant vegetation to enhance forage production. Fence maintenance would continue to control sheep grazing within units and prevent livestock trespass.

Henninger Ranch

Soils are stable; utilization is light on forbs and grass with diverse shrubs, forbs, and grasses in fair range condition. The 2009 field surveys found moderate to heavy shrub use with a downward trend on browse species. Early and late season deer and elk grazing contribute to forage use. The ranch primarily grazed cattle up until purchased by the Sheep Station in the early 1940s. Smooth brome (*Bromus inermis*) in some pastures indicates that it was planted for cattle feed. Smooth brome is not preferred by sheep and could spread into native vegetation areas.

Only small bedding areas(less than 10 total acres) representing less than two percent of the area grazed showed heavy use. Associated activities (noxious weed control, fence maintenance, seeding, predator mitigation measures) would continue. Effects would be the same as for Humphrey Ranch noted above.

Headquarters, Humphrey and Henninger Herder Camp Site

Crested wheatgrass provides the primary ground cover at the ¼ acre or less campsites where camp activities remove or trample sagebrush and other vegetation. These lower elevation camp sites are located adjacent to roads, where some camp activity occurs on the road bed, reducing effects Total area affected by all campsites is a very small or is a negligible, less than one tenth of one percent of the total pasture areas.

East Summer Range (Toms Creek)

Continued current grazing would have little effect on East Summer Range. There is little or no difference between grazed and ungrazed areas now and little room for improvement. Light forage use and good range conditions with static or slight upward trend would continue. Soils would continue to be stable with

a desirable shrub, forb, and grass diversity. Light stocking, rotation and rest one year in three have maintained good range conditions with a continued stable or upward trend. A comparison of exclosures that have not been grazed in 30 to 70 years to grazed areas showed no differences in plant species composition. Forb production in 2009, when sites were surveyed, was high and would be expected to continue with current stocking. Only small (less than 50 total acres) areas (sheep trailing, watering, bedding), representing less than one percent of East Summer Range, showed heavy use and this would continue under current grazing practices. Trail maintenance would continue to facilitate moving sheep to graze underutilized areas.

West Summer Range (Odell/Big Mountain)

Continued current grazing would have little effect on this range. There is little or no difference between grazed and ungrazed areas now and little room for improvement. Light forage utilization and good range conditions with static or slight upward trend would continue. Stable soil conditions would continue with diverse forb, shrub, and grass composition. Rotational grazing and rest one year in three with light stocking have developed good range conditions with a stable or upward trend that would continue. Small heavy use (less than 50 total acres) areas (sheep trailing, watering, bedding), representing less than one percent of West Summer Range would continue.

Summer Range Herder Camp Sites

East Summer Range has six herder camps. West Summer Range has 16 herder camp sites. With rest rotation grazing, each camp site is used two out of three years. Each camp site affects less than a 50 foot radius area that equals 1.08 acres total for all camps in East Summer Range and 2.9 total acres affected on West Summer Range. Camps are moved frequently as sheep are moved through the pastures. With this light infrequent use, camp areas on Summer Range retain native vegetative cover. Effects on the 15,850 acre Summer Range area, from camp use, would not be measurable.

Alternative 2 - Direct and Indirect Effects

Alternative 2 is considered a ‘no grazing’ alternative, grazing on all ARS properties would not occur.

Headquarters, Humphrey, East Summer, West Summer

Ending grazing would have little effect on these range properties. Based on available data, there is little or no difference between grazed and ungrazed areas now and little room for improvement. Alternative 2 would maintain satisfactory range conditions. Small disturbed areas of past grazing effects would recover at natural rates. This would include those areas of heavy use identified under modified alternative 1. Range vegetation condition of fair with static trend would be met. Existing infrastructure (water developments, troughs, fences, etc.) would not be maintained.

Ending grazing across all ARS properties would eliminate localized and short-term grazing effects on sheep trails, watering sites, and bedding grounds. No grazing would allow late-seral species to increase and maintain dominance in herbaceous vegetation types. Preferred forage species would not be harvested by sheep.

With current sheep grazing, invasive weeds are not a problem although small patches of noxious weeds do exist on these properties. Adjacent rangelands have more extensive weed infestations. Weed control (grazing and spot herbicide application) would not continue, and this could result in increasing weed populations. Fence maintenance on the Headquarters and Humphrey properties would not continue.

Henninger Ranch

Residual effects from past agricultural use, sheep grazing, and heavy use areas (bedding and watering sites) would recover at natural rates. Recovery would include areas of heavy use identified under modified alternative 1. Range vegetation condition would probably move to fair with an upward trend. Invasive plant control and fence maintenance would not continue. Smooth brome (non-native grass) would remain on site and could replace some native species. Long term effects on this historic ranch land would depend on what (undetermined actions) the property would be used for after sheep grazing for research was terminated.

Modified Alternative 3 - Direct and Indirect Effects

Modified alternative 3 was developed in response to the public scoping suggestion that grazing be eliminated in the Centennial Mountains. Under alternative 3, ARS properties East Summer, and West Summer, Humphrey Ranch area east of Beaver Creek and Forest Service Meyers Creek and East Beaver allotments would not be grazed. AUMs used are based on 1500 sheep, a 50 percent reduction from modified alternative 1 inventory, retained for research purposes. Reduced sheep numbers in alternative 3 are based on available forage (AUMs) on Headquarters and Henninger properties and Snakey-Kelly allotments. Five percent of available forage use on Headquarters property would be well within acceptable standards and would provide desirable range conditions. Forage use on Henninger would be reduced from 18.3 percent in modified alternative 1 to 16 percent of available AUMs under alternative 3 with expected improved range conditions. Forage use on Humphrey Ranch east of Beaver Creek would be 27 percent of available AUMs, higher than the 17.9 percent used under alternative1 for that portion of the Ranch. Additional forage use could reduce percent of sheep preferred shrub species cover. No sheep grazing would occur east of Beaver Creek, effects for this portion of Humphrey Ranch would be similar to alternative 2.

Appendix B displays alternative 3 scheduled sheep grazing inclusive dates and sheep numbers for each property.

Table 12 in chapter 2 displays alternative 3 available forage in AUMs, AUMs used, percent of available forage used, grazing period used during the year, and number of days grazed by property.

Headquarters

Light stocking under modified alternative 3 would use 5 percent of available AUMs, forage utilization would remain light. Growing season deferment provided under modified alternative 1 (June 25 – September 1) would be lost. Grazing would be moved from before and after the growing season to during the growing season. Continued growing season use could adversely affect plant composition and vigor, with increased use of sheep-preferred browse species and forbs, less desirable plants could increase.

Associated activities (prescribed burning, seeding, invasive species control, fence maintenance, cattle and horse grazing, predator avoidance and abatement described under proposed action, operations above) would continue, but with higher use under alternative 3, may be less effective than in modified alternative 1. Prescribed burning that currently contributes to keeping shrub densities from increasing could be implemented with adjustment in pasture grazing schedules. Grasses and forbs would decrease as shrub (sagebrush) densities increase, this species composition shift would be offset with continued prescribed burning described under operations. Invasive species control would continue. With vegetation removal by sheep during the growing season, plant and litter cover could decrease but residual plant material would be adequate with light, 5 percent of available forage used. Cattle and horse grazing during the non-

growing season could be done for a shorter period with less available forage. Fence maintenance would continue to facilitate sheep grazing within units.

Henninger Ranch

Forage use would be reduced from 18 percent in modified alternative 1 to 15.8 in modified alternative 3. Deferred grazing during the growing season provided under modified alternative 1 (mid-July – mid-September) would be lost and could affect species diversity. Smooth brome could spread to new areas. Invasive plant species, in small patches and at sheep handling facilities would be controlled. Fence maintenance would continue.

Humphrey (Area West of Beaver Creek)

Continuing grazing west of Beaver Creek would use 27 percent of available AUMs.

Alternative 3 increases forage use on the area west of Beaver Creek, over alternative 1, and could adversely affect range conditions and species diversity. Smooth brome could spread to new areas. Invasive species, in small patches and at sheep handling facilities would be controlled. Road and fence maintenance would continue.

Humphrey Area East of Beaver Creek/East Summer/West Summer

Same effects as alternative 2 (no grazing).

Headquarters, Humphrey and Henninger Herder Camp Site

Crested wheatgrass provides the primary ground cover at the ¼ acre or less campsites where camp activities remove or trample sagebrush and other vegetation. With these lower elevation camp sites located adjacent to roads, some camp activity occurs on the road bed. Total area affected by all campsites is a very small or is a negligible, less than 1/10 of one percent of the total pasture areas

Modified Alternative 4 - Direct and Indirect Effects

Modified alternative 4 was developed in response to the public scoping suggestion that grazing be eliminated adjacent and within in the grizzly bear primary conservation area. Under alternative 4, ARS East Summer Range and Forest Service Meyers Creek allotment would not be grazed. AUMs used and number of sheep retained for research are based on a 10-year average sheep inventory with a high of 3,000 head. The majority of AUMs needed to replace AUMs eliminated on East Summer Range and Meyers Creek allotment would be provided from West Summer Range.

Table 13 in Chapter 2 displays modified alternative 4 available forage in AUMs, AUMs used, percent of available forage used, grazing period used during the year, and number of days grazed by property.

Forage use would be well within accepted standards to maintain healthy range conditions.

Headquarters, Humphrey and Henninger Ranches

Under modified alternative 4, grazing effects on Headquarters and Henninger would be similar to modified alternative 1 with slightly higher, 20.9 percent, use on Henninger and about the same, 5.6 percent, use on Headquarters. Forage use on Humphrey would be 20.1 percent, slightly higher than modified alternative 1.

East Summer Range (Toms Creek)

Same effects as alternative 2 (no grazing).

West Summer Range (Odell/Big Mountain)

Forage utilization on West Summer Range would be the same 5.1 percent under modified alternative 4 as under modified alternative 1. Forage use, stocking and utilization would remain light. No grazing on East Summer Range would result in grazing West Summer Range (Odell/Big Mountain) each year. With rest rotation on some grazing units, good range conditions with a static or slight upward trend would continue. Small (less than 50 acres) areas of heavy use on sheep trails, watering sites, bedding areas and herder camps would receive higher use. These high use areas would still be a very small percent (less than 1 percent) of the total grazing area.

West Summer Range has 16 herder camp sites. With continued rest rotation grazing, each camp site would be used two out of three years. Each camp site would affect less than a 50 foot radius area which equals a total of about 2.9 acres in West Summer Range. Herder camps are moved frequently as sheep are moved through the pastures. With this light infrequent use, camp areas on West Summer Range would retain native vegetative cover. Effects on the 11,870 acre West Summer Range area, from camp use, would not be measurable.

Modified Alternative 5 - Direct and Indirect Effects

Modified alternative 5 was developed in response to the public suggestion that grazing be eliminated to protect big horn sheep populations. AUMs used and 1800 sheep retained for research are based on a 40 percent reduction from modified alternative 1 sheep inventory. Under modified alternative 5, the Forest Service Snakey-Kelly allotments would not be grazed. The remaining sheep would be held at the Mud Lake Feedlot where harvested feeds would be fed daily to meet nutrient needs of the sheep. Under alternative 5 sheep inventory reduction was necessary to remain within available funds for purchasing harvested feeds and maintaining a feedlot facility.

Appendix B displays modified alternative 5 scheduled sheep grazing inclusive dates and sheep numbers for each property. Table 14 in chapter 2 displays modified alternative 5 available forage in AUMs, AUMs used, percent of available forage used, grazing period used during the year, and number of days grazed by property.

Forage use under modified alternative 5 would be well within accepted standards to maintain healthy range conditions. Highest use would be 11 percent use of available AUMs, on Henninger Ranch and Humphrey Ranch.

Headquarters, Humphrey and Henninger Ranches, East Summer and West Summer Ranges

With a 30 percent reduction in sheep under modified alternative 5, grazing effects on Headquarters, Humphrey, Henninger, East and West Summer range would be similar but less than modified alternative 1.

Range Cumulative Effects

The spatial boundary for range cumulative effects for this analysis includes ARS properties (Headquarters, Humphrey, Henninger, East and West Summer Ranges) and allotments under MOUs with the Forest Service (Snakey- Kelly, East Beaver, Meyers) and DOE Mud Lake Feedlot. Use of these lands is part of the overall grazing strategy for the Sheep Station to carry out their mission.

Past action on Agriculture Research Service properties – all alternatives

The cumulative effects temporal scale includes effects of grazing activities prior to ARS owning some of the properties. The 28,000 acre Dubois Sheep Station (Headquarters property) was established in 1915. There are no records of on-site activities before the time ARS acquired Headquarters property. Grazing effects studies began in the 1920s, crested wheatgrass planting and forage production tests began in the 1940s. Grazing exclosures were established in the 1940s, 1950s (Bork 1998), 1960s and 1970s (Klements 1997) to assess grazing effects on plant composition and rangeland health. NRCS conducted range surveys on the Headquarters property to evaluate ecological status or range condition of the plant communities in 1989 and 1994. Site conditions on each vegetation type were sampled (162 study plots/sites), and on-site collected data was evaluated for sheep grazing effects. Results of these past and ongoing studies and the 2009 field survey data (USDA 2009) were analyzed to determine past present and foreseeable future effects for this NEPA project.

The East and West Summer Range grazing areas were withdrawn from the public domain in 1915, 1916, 1919, and 1922 and added to the ARS Dubois Sheep Station properties to provide the natural resource base for sheep production and grazing research.

Humphrey and Henninger Ranches were purchased in 1940 and 1942, and added to the Sheep Station's Dubois operations. Prior to the purchase from private holdings, Humphrey and Henninger Ranches were mainly used for farming: livestock production, with some crop land and, hay, production. Before transfer to ARS, ecological site descriptions indicate Henninger was grazed at heavier rates, closer to available AUMs.

Within the cumulative effects area, none of the individual ARS properties are adjacent to another. Sheep are trucked or trailed between properties and allotments. Therefore, effects on plant communities for each property are not interdependent. An increase or decrease in forage use and effects on range conditions on one property or allotment would not affect range condition on any other property. Humphrey Ranch east boundary is adjacent to part of East Beaver allotment and the north end of Meyers Creek allotment is adjacent to East Summer Range.

Based on 80 years of research and studies, cumulative effects from continued grazing and related activities including past, present, and foreseeable future grazing and related actions on ARS properties would not adversely affect the range resource.

Transmission Line Upgrade – All Alternatives

The existing transmission line across Headquarters property is scheduled to be upgraded. Cumulative effects of upgrading the existing transmission line would be similar for all alternatives. With transmission line upgrade or reconstruction accessed by existing roads (no new road construction) and no additional towers would be constructed (no additional tower sites disturbance) and effects would be similar to power line maintenance operations.

If new lines are strung during transmission line reconstruction, there would be minor short term disturbance at temporary pulling and tensioning sites, material staging sites, and splicing sites. These could range in frequency from one every 30 to 35 miles for material staging sites, to two sites every three miles for pulling, tensioning and splicing. For the eight miles of transmission line on ARS Headquarters property. An estimated five or six pulling, tensioning and splicing sites would affect vegetation and soil on about six acres. Effects on the disturbed area would be short term, native vegetation would be retained or reestablished after upgrade operations are complete. Generally, vegetation, range condition and forage production would not be affected.

There would be added risk of invasive species seeds introduced along roads, and to any disturbed areas, from additional vehicle and equipment travel during upgrading operations. Invasive species would be mitigated or controlled under existing ARS invasive weed management practices.

Modified Alternative 1 – Proposed Action

Mud Lake Feedlot

The Mud Lake allotment is primarily used as a feedlot operation. Harvested feeds provide the daily nutrient needs of sheep located there. No change is expected from continued current management.

Snakey and Kelly Allotments

Currently these allotments are lightly stocked with resulting light utilization. The grazing period is during the non-growing season (November – February). Plants are annually rested from growing season use, which allows for recovery. Rotational grazing within these units assists in keeping utilization light. These allotments currently are the only grazing lands available for winter use. All other properties are unavailable to sheep due to snow cover and extreme winter conditions. Only Mud Lake feedlot, using a daily feeding program, could be used as an alternative to grazing these allotments.

Grazing during the non-growing season with light stocking and utilization helps maintain the range condition. Only small (less than 50 acres) areas (sheep trailing/watering/bedding) would continue to display sheep use impacts. A satisfactory range vegetation condition of fair with upward or static trend would continue to be met. Existing infrastructure would be maintained. Snakey and Kelly are operated under a MOU with the Caribou-Targhee National Forest; grazing standards would be met with no cumulative effects.

Meyers Creek Allotment

Under the proposed action, modified alternative 1, this allotment is lightly stocked with an estimated 0.7 percent utilization. This is a transition unit between low- and high-elevation grazing areas. The grazing period is for three days in July and three days in September when about 900 sheep (average 600 sheep/year) are moved from Henninger to and from East Summer Range two out of three years. The flexibility provided by Meyers Creek allotment provides for light stocking, low utilization and good range conditions on Henninger Ranch and East Summer Range. Deferred use allows for recovery and regrowth after grazing. Meyers Creek allotment is rested, no grazing, when East Summer Range is rested (1 in 3 years).

Short duration grazing with light stocking and utilization would maintain current range conditions. Only small (less than 50 acres) areas (sheep trailing/watering/bedding) would continue to display grazing use impacts. A satisfactory range vegetation condition of fair with upward or static would continue. Meyers Creek operates under an MOU with the Caribou-Targhee National Forest; grazing standards would continue to be met, with no cumulative effects.

East Beaver Allotment

Currently this allotment is lightly stocked with an estimated 1.4 percent utilization, rotational grazing provides rest for plant regrowth. Only small (less than 50 acres) areas (sheep watering/bedding) would display sheep use impacts. Satisfactory range vegetation condition of fair with upward or static trend would continue. East Beaver operates under a MOU with the Caribou-Targhee National Forest; grazing standards with favorable range conditions would continue to be met.

Modified Alternative 1 – Summary Cumulative Effects

There would be no cumulative effects from continued grazing and related activities including past, present, and foreseeable future grazing and related actions would not adversely affect the range resource.

Alternative 2

Mud Lake Feedlot

No grazing is proposed at mud Lake.

Snakey and Kelly Allotments

Ending grazing would have little effect on this range. Currently these allotments are grazed only during the non-growing season. If sheep grazing on this land were terminated, slightly more forage could be available for wildlife. Additional plant canopy cover and litter would be available for soil protection.

The residual effects from past disturbances would recover at natural rates. This would include those areas of heavy use under modified alternative 1. Range vegetation condition of fair with upward or static trend would be met.

Meyers Creek Allotment

No grazing would have little effect on this range. This allotment is lightly stocked under modified alternative 1, with 0.7 percent forage use. This is a transition unit between low- and high-elevation grazing areas. The grazing period is for three days in July and three days in September when sheep are moved to and from east Summer Range. With the current light use under modified alternative 1, there would be very little difference in effects under alternative 2. Noxious weeds could increase without current control efforts implemented by ARS.

East Beaver Allotment

Ending sheep grazing would have little effect on this range. Currently, under modified alternative 1, East Beaver allotment is lightly stocked with an estimated 1.4 percent utilization. No sheep grazing would result in slightly more forage available for other uses, more canopy cover and additional litter left on site for soil protection or other benefits. Current sheep grazing under modified alternative 1with low forage use (1.4 percent) has very little effect on vegetation conditions.

The residual effects from past disturbances would recover at natural rates. This would include any areas of heavy use. Range vegetation condition of fair with upward or static trend would be met.

East Beaver allotment was originally planned as a common use allotment, for cattle and sheep grazing, to provide some forb use so that cattle grazing would not result in a shift from grass dominated to forb dominated. With no sheep grazing under alternative 2, cattle grazing, which is the bulk of the utilization for this allotment, would continue and may cause forbs to increase.

All properties would be eliminated from grazing. There would be additional forage availability and recover of residual effects from past disturbance. Modified Alternative 3

East Beaver and Meyers Creek Allotments

No grazing, would have the same effects as alternative 2.

Mud Lake, Snakey-Kelly

Grazing effects on the Snakey-Kelly allotments would be similar to modified alternative 1, however with a 50 percent reduction in number of sheep, percent forage use would be less than modified alternative 1 with favorable effects. Use of Mud Lake feedlots would continue with effects similar to alternative 1.

Modified Alternative 3 – Summary of Cumulative Effects

Losing East Beaver and Meyers Creek allotments for sheep grazing would eliminate the Sheep Station's operations grazing/flexibility.

There would be no cumulative effects from continued grazing and related activities including past, present and foreseeable future grazing and related actions would not adversely affect the range resource.

No grazing and associated activities on Humphrey Ranch east of Beaver Creek, East and West Summer Ranges and East Beaver and Meyers Creek allotments would provide some benefits to plant cover, mainly at the small areas affected by trailing, bedding, and watering site.

Modified Alternative 4

Snakey-Kelly and East Beaver Allotments

Same effects as modified alternative 1.

Meyers Creek Allotment

No grazing on Meyers Creek allotment would eliminate transition grazing between low- and high-elevation grazing areas. Loss of Meyers Creek Allotment would affect operation flexibility and increase forage use from 18 percent under alternative 1 to 21 percent under alternative 4 utilization on Henninger. Sheep would graze at Henninger until plants on West Summer Range are ready for grazing. Effects are the same as alternative 2.

Modified Alternative 4 – Summary of Cumulative Effects

There would be no adverse cumulative effects from continued grazing and related activities including past, present, and foreseeable future grazing and related actions on the current range resource.

No grazing and associated activities on East Summer Ranges and Meyers Creek allotment would provide some benefits to plant cover, mainly at the small areas affected by trailing, bedding and watering sites.

Modified Alternative 5

Meyers Creek, and East Beaver Allotments

With 40 percent sheep reduction and lower AUM use (4 percent on Meyers Creek and 0.8 percent on East Beaver), grazing effects would be less than modified alternative 1.

Snakey- Kelly allotments

Same effects as alternative 2, no grazing used.

Modified Alternative 5 – Summary of Cumulative Effects

Cumulative effects from continued grazing and related activities including past, present, and foreseeable future grazing and related actions would not adversely affect the range resource. Ending grazing and

associated activities on the Snakey-Kelly allotments would provide some benefits to plant cover, mainly at the small areas affected by trailing, bedding, and watering sites.

Irretrievable or Irreversible Commitment of Resources

There would be no irretrievable or irreversible commitment of rangeland resources from effects of continued sheep grazing and associated actions under any alternative.

Federally Threatened, Endangered, and Proposed Species

Grizzly Bear (Ursus arctos horribilis)

Grizzly Bear Affected Environment

Listing information, consultation history, and current status

On September 21st, 2009, grizzly bears in the Yellowstone distinct population segment returned to their previous status listed as a threatened species. The USDI Fish and Wildlife Service decision to remove the Yellowstone Distinct Population Segment of grizzly bear from the list of threatened species (USDI Fish and Wildlife Service 2007a) was vacated by order of the United States District Court (2009) in Missoula, Montana, based on two (of four) court findings:

> **The court found that the Conservation Strategy, Forest Plan Amendment, and State Plans are not adequate regulatory mechanisms because they are minimally enforceable, particularly outside of the primary conservation area, and rely on good faith and future promises of action. In addition, the final rule to delist didn't adequately analyze how various laws will protect the species.**
>
> **The court found that the USDI Fish and Wildlife Services did not articulate a good rationale regarding expected declines in whitebark pine and a lack of a threat to grizzly bears.**

In contrast, the court found in favor of the plaintiffs (USDI Fish and Wildlife Service) regarding the other two points of the complaint.

> **The court found that the USDI Fish and Wildlife Service analysis adequately demonstrated that maintaining a population size of 500 animals is sufficient for genetic diversity. Similarly, that translocation from other populations is an adequate method to address genetic diversity shortfalls over the long term, and that there is not a short-term issue with genetics. The population does not need to be "self-sustaining" to be delisted.**
>
> **The court found that the USDI Fish and Wildlife Service analysis and the final rule to delist provided good rationale that the Distinct Population Segment /Primary Conservation Area (PCA) constitutes a significant portion of the Yellowstone grizzly bears' range. The USDI Fish and Wildlife Service did not need to identify migration corridors, because grizzlies, outside of the Distinct Population Segment boundary, are still protected under Endangered Species Act.**

The Yellowstone Distinct Population Segment of grizzly bear was de-listed in 2007 because of an increasing population in and around Yellowstone National Park in the bear's Primary Conservation Area, and because grizzly bears are expanding their range to inhabit suitable habitat throughout the boundaries of the Distinct Population Segment (which includes Sheep Experiment Station lands in the Centennial

Mountain Range). Though the species has since been relisted, both of these factors are still applicable in evaluating the context of potential effects of the project. The USDI Fish and Wildlife Service Grizzly Bear Recovery website (http://www.fws.gov/mountain percent2Dprairie/species/mammals/grizzly/yellowstone.htm) summarizes information from the Final Rule to Delist (USDI Fish and Wildlife Service 2007) stating that,

> **The range of the Yellowstone grizzly bear population has increased dramatically as evidenced by the 48 percent increase in occupied habitat since the 1970s. Yellowstone grizzly bears continue to increase their range and distribution annually and grizzly bears in the Yellowstone area now occupy habitats they have been absent from for decades. Currently, roughly 84-90 percent of females with cubs occupy the primary conservation area and about 10 percent of females with cubs have expanded out beyond the primary conservation area within the distinct population segment boundaries. Grizzly bears now occupy 68 percent of suitable habitat within the distinct population segment boundaries and may soon occupy the remainder of the suitable habitat.**

ARS properties are within the Yellowstone Distinct Population Segment boundary for grizzly bear, but outside of the Primary Conservation Area. None of the ARS properties reside within the Primary Conservation Area. Suitable habitat for grizzly bear is managed differently within the Primary Conservation Area verses outside of it. As an example of this varying management strategy, The Forest Plan Amendment for the Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests (USDA Forest Service 2006) states succinctly,

> **Manage grizzly bear habitat outside the Primary Conservation Area in areas identified in state grizzly bear management plans as biologically suitable and socially acceptable for grizzly bear occupancy, accommodate grizzly bear populations to the extent that accommodation is compatible with the goals and objectives of other uses.**

The Sheep Station has an Interagency Agreement with the Caribou-Targhee National Forest for grazing on the Meyers Creek allotment, which is inside the Primary Conservation Area. This grazing has been analyzed in a biological assessment (Fletcher 2012) prepared by the Forest Service Wildlife Biologist which found that, "trailing sheep through the Meyers Creek allotment and the interrelated action to the use of the East Summer range incurs a may affect, likely to adversely affect determination for the grizzly bear." This finding was based on the following rationale.

- No direct grizzly bear mortality is expected from the Sheep Station grazing sheep in the Meyers Creek allotment and the East Summer range. Neither lethal control or trap and transport will be implemented or requested during the use of these areas. Should the need arise for these abatement techniques related to grizzly bear, consultation would be reinitiated.

- Potential effects are the limited probability over a 10-year period that a grizzly bear may become food conditioned to domestic sheep, change feeding behaviors, and confrontations develop on adjacent lands under other ownership. This change in patterns or habitat use on National Forest System, ARS, or other lands (indirect effects) could be considered harm to grizzly bears.

- The grazing and associated activities would not limit grizzly bear genetic exchange, occupancy or movement through the Centennial Mountains since habitat would not be reduced and Sheep Station grazing practices include light utilization, short duration, over a large landscape with pasture rest one out of every three years. These grazing methods prevent frequent and recurring encounters with grizzly bears which might otherwise alter bear behavior or necessitate the need for lethal control.

- Conservation measures are in place to ensure that the Sheep Station activities will minimize the potential for encounters and effects to grizzly bears. These conservation measures include the use of dogs, multiple sheep herders, storage/removal of attractants, annual training, requirements to address encounters non-lethally (move sheep, haze only if necessary) and communication with other agencies.

- There have only been a few encounters with grizzly bears in the past decade relative to Sheep Station activities. No grizzly bears have been killed, captured, or relocated from the Meyers Creek allotment or the ARS East Summer Range in response to Sheep Station activities. It is expected this trend would continue.

- The expected level of effects for the project is minimal and would not contribute to overall cumulative effects in a way which is detrimental to grizzly bear recovery.

- This project will be compliant with all management direction for the grizzly bear contained in the Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area.

- This project will be compliant with all standards and guidelines for the grizzly bear in the 1997 Revised Forest Plan for the Targhee National Forest.

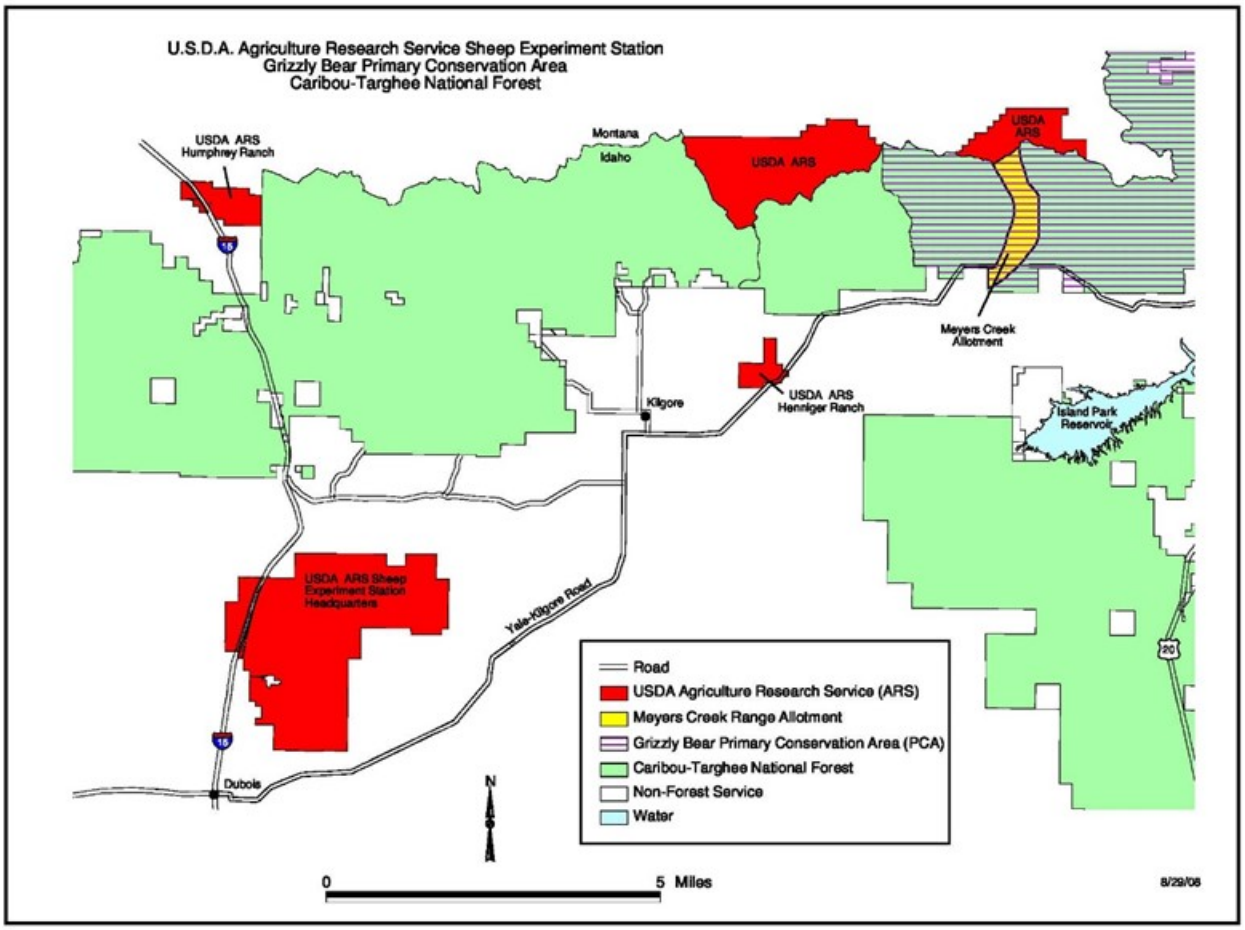

Figure 34. Vicinity map, ARS Sheep Experiment Station Lands and Grizzly Bear Primary Conservation Area

On May 30, 2014, the Fish and Wildlife Service issued a Biological Opinion (BO) for U.S. Sheep Experiment Station Grazing (USDI Fish and Wildlife Service, 2014). The BO found that the U.S. Sheep Station and associated activities was not likely to jeopardize the continued existence of grizzly bears and included an incidental take statement. The following information summarizes important elements within the Biological Opinion (BO) that pertain to grizzly bears[9].

- ARS continues a rotational grazing system of approximately 2,000 sheep. They would use Henninger Ranch in June/July. In early July, they would move sheep briefly across the USFS Meyers Allotment to the summer range which includes Tom's Creek Pasture (East Summer Range), Big Mountain Pasture (West Summer Range), and O'Dell Pasture (West Summer Range). In late August, sheep would be moved back to the Henninger Ranch. In Mid-September, sheep would be moved to lands outside of suitable grizzly bear habitat.
- All sightings that are confirmed grizzly bears or show positive evidence of grizzly bears in the vicinity of livestock will be reported by the Sheep Station to the Interagency Grizzly Bear Study Team.
- In 2012, a grizzly bear collar was found in the action area. The bear associated with the collar has not been found, and it is unknown if the bear was killed or not. No conclusions have been made that connect the bear collar to Sheep Station or its employees.
- No known grizzly bear mortalities or injuries have occurred in the action area in the recent past (i.e. since 2000).
- The period of ARS use of Meyers Creek Allotment is three day in early summer and three days in the fall, for trailing sheep.
- It is unlikely the Greater Yellowstone Area is serving as a grizzly bear source population for other ecosystems, nor are the Centennials.
- The GYA population of grizzly bear has experienced significant recovery and met its recovery zone goals.
- The Sheep Station is committed to implementing conservation measures that minimize potential impacts to grizzly bears.
- Individual grizzly bears may be adversely impacted as a result of the action, however the overall core population of grizzly bears in the GYA is expected to remain stable or increase.
- Sheepherders may haze grizzly bears by shooting a rifle into the air (not at the bear) or use bear spray, to discourage their use of the area with sheep.
- The estimated loss of no more than three bears[10] within the 10-year term falls within the scope of recovery criteria mortality thresholds established under the Recovery Plan. \
- The Sheep Station shall report annually to the Interagency Grizzly Bear Study Team and the USFWS Eastern Idaho Field Office in Chubbuck, Idaho information pertinent to bear/sheep conflicts, as described in detail on page 38 of the BO.

For 2014, grizzly bear monitoring results from the Annual Report of the Interagency Grizzly Bear Study Team (edited by van Menan et al. 2015) indicate the grizzly bear population is healthy and is meeting recovery criteria. The monitoring results summarized in the report display the following key information;

[9] Numbers of sheep and dates of occupancy are approximate.
[10] One adult grizzy bear (male or female), or one adult female grizzly bear and her dependent cubs.

- Unduplicated females with cubs of year were modeled at 62, which meets the recovery criteria of 48;
- The total population estimate in the Greater Yellowstone Ecosystem was estimated at 757 grizzly bears.
- All 18 bear management units were occupied by females with young;
- Natural and human caused mortality (28 in 2014) was within sustainable limits for independent males, independent females, and dependent young.
- None of the human caused mortalities or livestock conflicts occurred on ARS lands or the Meyers Creek allotment.

Effects to migration corridors and genetic diversity regarding the Yellowstone Distinct Population Segment of grizzly bears were brought up as a concern during previous public scoping. In order to review the pertinence of this concern to Sheep Station activities, summarized below is the current science regarding genetic diversity from the Final Rule to delist grizzly bears (USDI Fish and Wildlife Service 2007a). Key points include:

- Current levels of genetic diversity are consistent with known historical levels and do not threaten the long-term viability of the species.
- The Final Conservation Strategy (2007) includes the transplant of one to two effective migrants per generation if no movement or genetic exchange is documented by 2020.

"the viability of the Yellowstone grizzly bear population is unlikely to be compromised by genetic factors in the near future…" and that "…one to two effective migrants per generation from the Northern Continental Divide Ecosystem (NCDE) to the Yellowstone ecosystem is an appropriate level of gene flow."

- Indicators of fitness in the Yellowstone population demonstrate that the current levels of genetic heterozygosity[11] are adequate, as evidenced by measures such as litter size, little evidence of disease, high survivorship, an equal sex ratio, normal body size and physical characteristics, and an increasing population.
- Yellowstone grizzly bear populations are not as low as previously feared, and the need for novel genetic material is not urgent.
- In addition to monitoring for gene flow and movements, interagency efforts will continue toward completing the linkage zone task in the Recovery Plan (USDI Fish and Wildlife Service 1993, pp. 24-26) to provide and maintain movement opportunities for grizzly bears, and reestablish natural connectivity and gene flow between the Yellowstone grizzly bear Distinct Population Segment and other grizzly bear populations.
- Linkage work not directly associated with the Yellowstone grizzly population is being completed in the northern Rockies, to address ways to improve cooperation and affect management on public lands, private lands, and highways in linkage areas across the northern Rockies.

In court challenges to relist the grizzly bear, genetic diversity concerns were reviewed by the court (U.S. District Court 2009). The court found that in the Final Rule to delist the grizzly bear, the USDI Fish and Wildlife Service provided adequate evidence to support that maintaining a population size of 500 animals

[11] Heterozygosity: having dissimilar pairs of genes for a hereditary characteristic, used as a correlation to estimate the level of inbreeding within a population.

is sufficient for genetic diversity, there is not a short-term issue with genetics, and that translocation from other populations is an adequate method to address genetic diversity shortfalls over the long term.

Grizzly Bear Use of ARS Properties

Grizzly bear telemetry data has been collected by the Interagency Grizzly Bear Study Team at various levels since 2001 (provided by Haroldson, unpublished data). A summary of those data collection points within ARS properties as well as on the National Forest System Meyers Creek Allotment showed the following:

- A total of five different collared bears used ARS properties and National Forest System Meyers Creek Allotment since 2001.
- Most use was of short duration (one or two days).
- One bear (#387) was located on the Sheep Station West Summer Range during a 12 day period in 2001.
- Another bear, (#419) was located on multiple properties in 2005 covering a span of 61 days, then was located on ARS properties for only three days in 2006.

Based on radio-telemetry data of grizzly bear activity and habitat types on the ARS properties, the following can be inferred about grizzly bear habitat and occupancy on ARS properties.

- Two ARS parcels exist in Montana in high-elevation portions of the Centennial Range. These parcels contain suitable habitat that is occupied by grizzly bear. They include the East Summer Range (Toms Creek) and West Summer Range (Odell Creek and Big Mountain). All are outside of the grizzly bear Primary Conservation Area.
- The Henninger Ranch is a small ARS property in Idaho, at the base of the Centennial Range. Telemetry data indicates that, on occasion, grizzly bear have been in the vicinity of this parcel. However, the presence of county roads, open sagebrush habitat, and lack of white bark pine limit its value to grizzly bears. On rare occasion, this parcel could be temporarily occupied by a traveling grizzly bear.
- All other parcels of ARS properties are in Idaho and are unlikely to be occupied by grizzly bear. These parcels are dominated by sagebrush with frequent motorized activity on county roads. 2007 telemetry data indicated no grizzly bear observations on or adjacent to these properties. They include Humphrey Ranch and the Headquarters.
- The Sheep Station grazes sheep on additional federal agency lands. With the exception of the Meyers Creek Allotment on National Forest System land, these areas do not support grizzly bear activity, are dominated by sagebrush, and recent telemetry data showed no observations on or adjacent to these areas. They include the Snakey-Kelly allotments, East Beaver allotment (both National Forest System), and the Mud Lake Feedlot (Department of Energy).

Summary of Grizzly Bear Mortality Factors

Evidence that conflicts occur between grizzly bears and domestic sheep grazing is well supported. Knight et al. (1983) conducted a study to evaluate grizzly bears that killed livestock by radio-collaring 37 grizzly bears and tracking their movements and associated livestock conflicts between 1975 and 1979. Knight found that 7 of the 37 collared bears killed domestic sheep when they came into contact with them. It should be noted that the study occurred when sheep grazing was more prevalent within occupied grizzly bear habitat, many of the bears that were radio collared were already problem bears, and some sheep herders/private livestock operations were likely averse to protecting the newly listed grizzly bear. In the

report, Knight makes assumptions about poaching by herders that plays an important role in projecting excessive grizzly bear mortality. This assumption does not apply to sheep herders employed by the Sheep Station given their status working for the federal government.

In 2004, Gunther et al. prepared *Grizzly bear - human conflicts in the Greater Yellowstone ecosystem, 1992-2000*. This report presents several pieces of information quantifying the likelihood of grizzly bear mortality and effects to population. Although 44 percent of grizzly bear conflicts were attributed to livestock depredation, 71 percent of them were related to cattle incidents and a total of 2 grizzly bears were killed because of sheep related incidents over the 8 year study period. Grizzly bears were killed at a rate of one dead bear per 39 sheep incidents. When grizzly bears did depredate on sheep, they killed an average of 4.3 sheep per incident. The 2004 report acknowledges that permanent removal of chronic depredators has been the most effective method of alleviating livestock losses while having minimal impact on long term survival of the grizzly bear populations.

In 2009 the Interagency Grizzly Bear Study Team (IGBST) prepared the *Yellowstone Grizzly Bear Mortality and Conflict Reduction Report* (Interagency Grizzly Bear Study Team 2009). This report summarized the sources of grizzly bear mortality from 1997 through 2008. In addition, they reviewed the effectiveness of recommendations made in 2004, and made additional recommendations to reduce grizzly mortality into the future. Table 24 provides a summary of the total number of known and probable grizzly bear mortalities in the Yellowstone Ecosystem between 1997 and 2009. Data was taken from the 2008 *Yellowstone Mortality Report* (Interagency Grizzly Bear Study Team 2009) and the 2009 and 2010 *Known and Probable Grizzly Bear Mortalities in the Greater Yellowstone Area*, which is published on the Northern Rocky Mountain Science Center website (Interagency Grizzly Bear Study Team 2011). 293 grizzly bears were killed in 1997 through 2009. Various forms of confrontation with humans (but unrelated to hunting) resulted in nearly 31 percent of mortality. These confrontations included defense of life in "Front Country" settings, "Backcountry" settings, management removal in populated areas, and management removal because of human injury, road kill, and accidental bear death during management captures. Encounters related to hunting contributed another 26 percent of the mortality which includes mistaken identification during black bear season and hunter defense of life during big game seasons. A substantial amount of mortality between 1997 and 2008, nearly 20 percent, remained "undetermined" indicating that a dead bear was found, but investigations were unable to determine a specific human or natural cause of death. There is no indication that these undetermined mortalities were related to sheep grazing. The smallest amount of known and probable mortality, just over 1 percent, can be attributed to the sheep grazing activities, including three management removals and one illegal kill over the 12 year period. None of these mortalities are associated with Sheep Station activities.

Table 24. Known and probable grizzly bear mortalities, 1997-2009

Category of Mortality	Mortality, Number of Bears	Percentage of Total Mortality
Confrontation	90	30.72
Hunting	76	25.94
Undetermined	58	19.80
Natural	24	8.19
Poaching	16	5.46
Cattle Protection	13	4.44
Research	6	2.05
Under Investigation	6	2.05
Sheep Protection	4	1.37
Grand Total	**293**	**100**

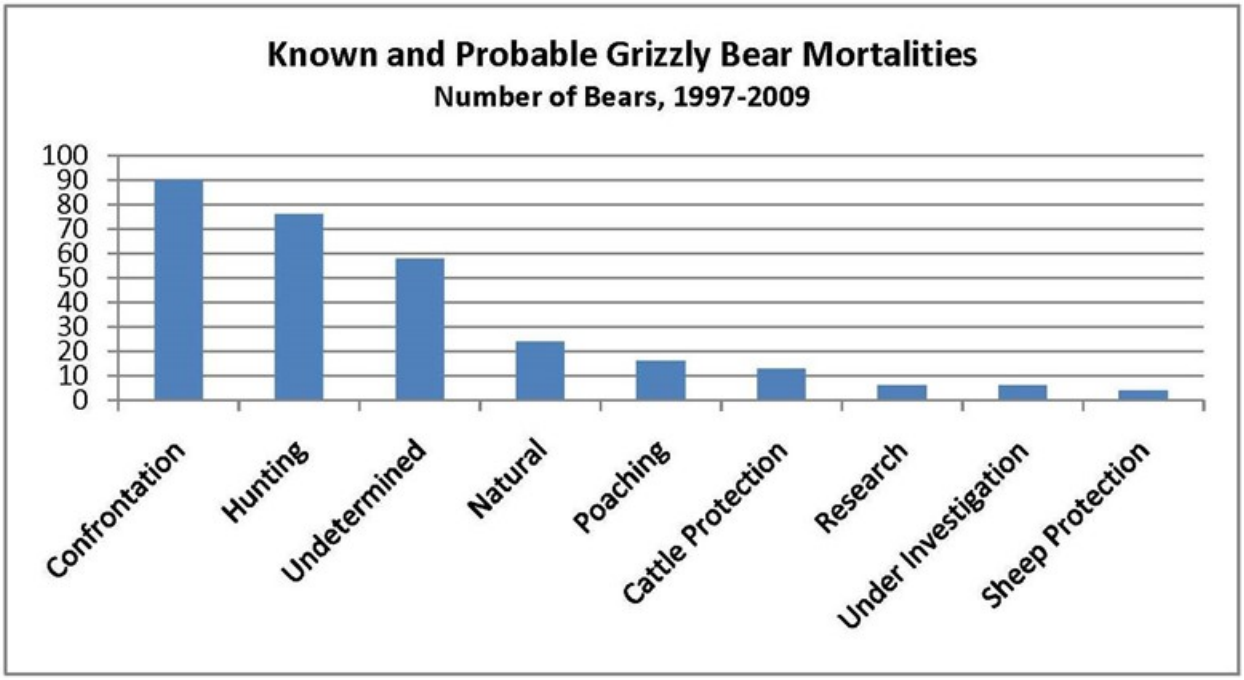

Figure 35. Number of known and probable grizzly bear mortalities, 1997-2009

In 2014 there were 28 known and probable grizzly bear mortalities in the Greater Yellowstone Ecosystem (Interagency Grizzly Bear Study Team 2015). Mortality-related livestock conflicts totaled 9 animals (32 percent). None of these was related to sheep depredation.

Activities to Reduce Grizzly Bear Conflicts

The Sheep Station implements a number of conservation measures to reduce the likelihood of potential conflicts with grizzly bear (as well as other predators) and domestic sheep or other livestock. These measures include:

1. Grizzly bear trapping, transportation, or lethal removal is outside the scope of this project and thus, if needed, would require the Sheep Station to re-initiate consultation or conduct an emergency consultation, in order to consider the probability of incidental take.
2. When creating research plans that include a sheep grazing component, consider the history of livestock-bear conflicts within ARS properties, pastures, and sub-drainages. Where a history of conflicts suggests the likelihood of habituation developing, the Sheep Station would modify the grazing schedule and/or sheep movements to avoid recurring conflicts.
3. Use good husbandry practices so that sheep are as healthy as possible, are suitable for research, and the number sick/stray animals is kept to a minimum. An institutional animal care and use committee evaluates research protocols and livestock management practices to ensure they are consistent with good animal husbandry, and comply with federal laws that govern the use of agricultural animals in research. Protocols and practices that do not comply are not approved.
4. Sheep herders, working dogs, and guard dogs are kept with the sheep full-time when on rangelands to reduce the likelihood of encounters, and to assist in efficient and prompt movement of animals when necessary. In the summer range, sheep are accompanied by a minimum of two guard dogs, two herd dogs, and a full time sheep herder. Very few stray animals occur over the course of the season because of the close contact the sheep herders have with sheep. In the evenings, sheep are bedded on an

approximate one-acre area. On moonlit nights when sheep have the tendency to get up and graze, extra vigilance is necessary to watch over sheep. Lame animals that may occur on occasion are watched closely because of the impact they have on moving the herd, and because animals need to be accounted for to maintain research objectives. Therefore, when lame animals do not recover, they are subsequently removed from the herd within a short period of time, (approximately every 3 days when the camp tender brings supplies) and transported back to the headquarters property.

5. All unnatural attractants to bears are minimized. This includes treatment or removal of livestock carcasses, and proper storage of human foods, garbage, and dog food. Approved "bear-proof" containers are used, and damaged containers are repaired or replaced so that they work as designed. Camp tenders and managers make periodic visits (approximately every three days) to remove trash and/or dead animal carcasses in order to eliminate potential bear attractants. In some locations it is not feasible to remove carcass (due to degree of decomposition and/or access to get them out).
6. At least two formal training-orientation meetings are conducted annually with Sheep Station employees and herders to review identification of grizzly bear, black bear, bighorn sheep, Canada lynx, mountain lions, etc. In addition, they discuss Sheep Station sanitation and garbage removal practices, nonlethal procedures to address livestock-wildlife encounters, and who to contact should encounters occur. Training and education are ongoing and not limited to formal meetings.
7. Regarding grizzly bears, herders are instructed to avoid an encounter. Moving the sheep to other areas of the pasture may occur to avoid an immediate threat, and moving sheep to other pastures/locations would occur if encounters persist.
8. Sheepherders carry guns and bear spray for safety and to scare off inquisitive animals. If a grizzly bear is threatening sheep, herders may discharge their rifle into the air if they think it would help frighten the bear (hazing). A herder may shoot directly at a grizzly bear only if his personal safety is threatened, however this situation has not occurred with Sheep Station grazing, and is not expected to occur.
9. Herders are to report all bear sightings to their supervisor. When on Agricultural Research Service property, all existing and suspected bear activity and (or) conflicts are reported directly to APHIS Wildlife Services. APHIS Wildlife Services then contacts state and federal agencies as necessary to conduct damage investigations.
10. All sightings that are confirmed grizzly bears, or show positive evidence of grizzly bear in the vicinity of livestock would be reported by the Sheep Station to the Interagency Grizzly Bear Science Team (IGBST).
11. When on USDA, National Forest System land, all existing and suspected bear activity and(or) conflicts are reported directly to the Forest Service contacts as well as APHIS Wildlife Services.
12. In an interagency agreement with the USDA Forest Service (USDA Forest Service 2007), the Sheep Station agrees they would comply with meeting grizzly bear management goals on the Meyers Creek and East Beaver Allotments including notifying appropriate personnel of encounters, and temporarily stopping or modifying grazing as necessary, should bear conflicts arise with humans or livestock. Refer to the specific interagency agreement for details. This agreement may be updated based on future consultation between USDA Forest Service and the USDI Fish and Wildlife Service regarding use of the Meyers Creek Allotment. The Sheep Station shall report incidental take by December 31st of each year as described in Term and Condition 1 in the Biological Opinion.
13. The Sheep Station shall coordinate annually with the Interagency Grizzly Bear Study Team to gather data on the number of confirmed or suspected grizzly bear/sheep conflicts in the surrounding area (Term and Condition 2 in BO).

14. The Sheep Station shall cooperate with other selected agencies regarding grizzly bear identification protocols in the surrounding area (Term and Condition 3 in the BO).

Known Accounts of Past Interactions between Domestic Sheep and Grizzly Bears

There have been very few grizzly bear/sheep encounters pertaining to Sheep Station grazing activities over the last 10 years despite the known presence of grizzly bears occupying the habitat. Encounters that did occur resulted in minimal loss of sheep, and ended after sheep were moved to a new location. APHIS Wildlife Services investigations of the incidents reported the possibility that the most recent encounters may have been black bears. No grizzly bears are known to have been killed, captured, or relocated from ARS properties or from Sheep Station activities on adjacent National Forest System Lands (Meyers Creek Allotment) and conflicts ended when sheep were moved.

In the past five years, there have been no reported grizzly bear/livestock conflicts on the Meyers Creek Sheep allotment of the Caribou-Targhee National Forest (Schwartz et al. 2008 in habitat monitoring report section; Farr 2008 and 2010, Personal Communication; Sheep Station personnel 2008, personal communication; Lewis 2011, personal communication).

A review of APHIS monitoring reports between 2002 and 2008 as well as personal communications with APHIS Wildlife Service officer (Farr 2008, 2010) indicate a total of four known grizzly bear-livestock encounters[12] on ARS properties.

1. Two grizzly bear encounters were reported in 1985 and 1999 and ended without grizzly bear mortality or control actions (Farr 2008, personal communication). To validate that these previous encounters did not result in direct or indirect grizzly bear mortality, the project biologist reviewed Gunther et al. 2004, which documents the location of all known grizzly bear mortality between 1992 and 2000. The biologist also contacted the Interagency Grizzly Bear Science Team for a map of grizzly bear conflicts and mortality from 1975 through 2009 (Haroldson 2010, personal communications). These references confirm that no sheep related grizzly bear mortality occurred in the area. Two mortalities did occur in 1981 and 1984 near the Meyers Creek Allotment on National Forest System Lands. According to Haroldson "There was no evidence that the 1981 and 1984 mortalities were associated with sheep. The 1981 event was claws only recovered. The 1984 event was a bear shot and left in the fall."
2. In 2007, in the Odell pasture of the West Summer Range, presence of a grizzly bear at a ewe sheep carcass was confirmed on August 2, but evidence was insufficient to verify loss attributable to grizzly bears; black bears were possibly involved (Farr 2010). When another ewe was killed on August 6th in the Odell Pasture, APHIS Wildlife Services (Idaho) consulted with APHIS Wildlife Services (Montana) to verify if they were eligible to conduct work on grizzly bears under Montana's documentation and establish protocol for involving Montana Fish, Wildlife and Parks personnel. Grizzly bears were not a listed species at the time. No follow up control action was taken. On August 20 in the Odell pasture, the Sheep Station had moved sheep to a different grazing unit for 'scoring' (weighing lambs) and returned briefly to the unit adjacent to where suspected bear predation had been occurring. The herder found remains of five ewes that had been depredated earlier in the season, but these were too far decomposed to establish cause (Farr 2010). A total of seven sheep had been killed. No further encounters occurred in 2007, nor were there any grizzly bear control actions taken on nearby adjacent lands.

[12] For the purposes of this report, grizzly bear/sheep encounters are defined as any event or series of related events when a grizzly bear is observed or suspected in the vicinity of sheep.

3. On July 28, 2008 Sheep Station personnel reported encountering a grizzly bear in the Big Mountain pasture of the West Summer Range. Investigation by APHIS Wildlife Services found evidence of both grizzly bear and black bear in the vicinity. On August 1st, in the Big Mountain grazing unit, the herder encountered a bear again. One ewe was found killed, possibly by black bear (Farr 2010). No further encounters occurred in 2008, and no encounters occurred in 2009 or 2010.
4. In 2012, a grizzly bear collar was found in the ARS Summer Range property. An investigation by USDI Fish and Wildlife Service did not find a bear associated with the collar, and it is unknown if the bear is alive or dead. The investigation made no conclusions that connect the bear collar to the Sheep Station, its employees, or bear/sheep interactions.

Grizzly Bear Direct and Indirect Effects

Modified Alternatives 1 and 5 Direct and Indirect Effects for Grizzly Bear

- Modified alternative 1 represents current operations at the Sheep Station.
- Modified alternative 5 represents grazing operations without using National Forest System Snakey-Kelly allotments.
- The effects of these alternatives are nearly the same since grazing operations in or near occupied grizzly bear habitat are similar between the alternatives.

To evaluate the potential and degree of effects to grizzly bears from the proposed activities, a variety of pertinent literature was reviewed. They included *Grizzly bear-human conflicts in the Greater Yellowstone ecosystem, 1992-2000* (Gunther et al. 2004), *Yellowstone Mortality and Conflicts Reduction Report* (Interagency Grizzly Bear Study Team 2009), Grizzly Bear – Human Conflicts in the Greater Yellowstone Ecosystem (Aber, Frey, Interagency Grizzly Bear Study Team, 2014), *Bear - Sheep Interactions on the Targhee National Forest* (Jorgensen 1983), *Sheep Losses on Grizzly Bear Range* (Johnson and Griffel 1982), *Does Aversive Conditioning Reduce Human-Black Bear Conflict* (Mazur 2010), *Feasibility of Using Portable Electric Fencing to Prevent Damage to Livestock and Apiaries by Bears and other Predators* (Debolt 2000), the *Biological Evaluation and Wildlife Specialist Reports for Meyers Creek Grazing Allotment* (Aber 2007), and the Biological Assessment for Meyers Creek Range Allotment Review (USDA Forest Service, 2012), and the Biological Opinion for U.S. Sheep Experiment Station Grazing (USDI Fish and Wildlife Service, 2014). A synthesis of the information in these documents and known encounters related to Sheep Station activities indicates that there is a likelihood that grizzly bear/sheep conflicts would occur during the 10 year period being considered for the project proposal. However, the number of conflicts that might occur in any given year is few. A projection of zero conflicts in most years, and up to three conflicts in occasional years will be used as an estimate for further analysis and is based on the previous number of encounters on ARS properties and an expanding population. The potential for those conflicts leading to injury, harm, or direct or indirect mortality to grizzly bears is minimal with reasoning described below.

The documents mentioned above describe fundamental biology of the grizzly bear and the importance of high calorie food sources, particularly important during August and September when bears are building fat reserves in preparation for winter denning. Since grizzly bears are opportunistic, they are known to scavenge or pray on easily available foods, including livestock, which places them in direct conflict with man and possibly leading to eventual mortality in defense of property, livestock, or human safety. Similarly, a concern has also been brought up during conferencing with the USDI Fish and Wildlife Service that bears to some extent may alter their feeding behavior in search of readily available livestock. For the purposes of this analysis, injury or harm would be considered a grizzly bear becoming food conditioned. Food-conditioned bears may become habituated, leading to a loss of avoidance behaviors (Mazur 2010). A food conditioned bear is more likely to periodically recheck areas where it successfully

found food, and also has the potential to associate the presence of man/sheep as a food reward. Once a bear is food conditioned, there is an increased risk of human/bear conflicts, and associated mortality from control actions that may result. Also, there could be some movement of bears away from active grazing areas if repeated hazing occurs.

Over the 10-year period for which the project decision would be valid and assuming continued expansion of bear populations and habitat use, there is some likelihood that an individual bear may become habituated/food conditioned. Although the number of repeat visits to a food source cannot be precisely determined before food conditioning has occurred, this analysis will assume that three or more visits to the same food source (similar to Mazur 2010) indicates that food conditioning/habituation is potentially occurring. If this happens, negative effects to grizzly bears could occur through three primary avenues:

1. A food conditioned bear could become a sheep killer, first attacking sheep associated with the Sheep Station, then progressing to other sheep on adjacent lands and not associated with Sheep Station activities. Although the Sheep Station proposed action indicates they would move sheep from the area and not request control actions, indirect effects could occur if adjacent private ranchers or other agencies experiencing problems from the food conditioned bear seek control measures eventually resulting in bear removal. This condition is not yet known or suspected to occur in association with Sheep Station activities.
2. Another scenario of possible negative effects is if a grizzly bear becomes food conditioned, and continues to repeatedly follow Sheep Station sheep around the properties rather than pursuing natural food sources. The resulting change in habitat use could be considered harm (USDI Fish and Wildlife Service communications). This condition is not yet known or suspected to occur in association with Sheep Station activities.
3. A third scenario of possible negative effects would be if Sheep Station personnel (sheep herder) shoots a grizzly bear in defense of his life and causes direct harm or injury to the bear and its young. This condition has not occurred, nor is it expected to occur in association with Sheep Station activities. Killing of a grizzly bear in defense of life is not considered part of the proposed action.

Although the literature suggests there is a possibility of the negative effects described above, there are a number of items indicating the likelihood of these effects occurring is low, and if they were to occur, the degree to which individual bears or the population would be affected is minimal.

Bear Encounters and Resulting Bear Mortality

There have been very few grizzly bear/sheep conflicts as a result of Sheep Station grazing activities over the last 10 years despite the known presence of grizzly bears occupying the habitat. Encounters that did occur resulted in minimal loss of sheep, and ended after sheep were moved to a new location. APHIS Wildlife Services investigations of the incidents reported some probability that the most encounters may also have been black bears. No grizzly bears are known to have been killed, captured, or relocated from ARS properties or from Sheep Station activities on adjacent National Forest System lands (Meyers Creek Allotment) and conflicts ended when sheep were moved. This indicates that food conditioning/habituation has not been occurring from Sheep Station activities, grizzly bears have not been removed or killed as a result of Sheep Station activities, and this trend is likely to continue.

Sheep Herding Practices

Sheep herding practices on ARS properties are implemented at a high quality standard and have been effective to date at minimizing the number of encounters and avoiding harm to grizzly bears. Herders are required to be on site with the sheep band full time, including camping adjacent to the sheep bed grounds and keeping 4 dogs (2 guard dogs and 2 herd dogs) with the band. Lame sheep, carcasses and trash are

removed during camp tender visits which occur every three days. Sheep are moved to new bed-grounds every three to five days. Sheep are kept in fairly tight bands so the herder has close watch over their health. The Sheep Station would move sheep within and outside of properties to avoid repeated encounters (avoid food conditioning), and herders carry bear spray as a first measure of protection against bears. They are trained annually and advised to avoid grizzly bear encounters if at all possible. Good herding practices and temporal movements are recommended as effective ways to reduce bear-sheep conflicts and ultimately bear mortality in Jorgensen (1983), and Gunther et al. (2004). Similarly, Johnson and Griffel (1982) indicated the importance of livestock permittees willing to deal with problems cooperatively and positively. This willingness is demonstrated by the Sheep Station commitment to the conservation measures in the proposed action. Johnson and Griffel also noted that allotments with grizzly bear depredation typically had a high amount of stray sheep and frequent small scattered groups of sheep which is contrary to the methodology used by the Sheep Station. In further support of Sheep Station practices, the Biological Evaluation for Meyers Creek grazing allotment (Aber 2007) concluded that the Sheep Station has had an excellent record of avoiding conflicts with bears for many years and that there is no reason to assume this record would change in the future. Similarly, the Biological Assessment prepared by Fletcher (2012) documents that "There have only been a few encounters with grizzly bears in the past decade relative to Sheep Station activities. No grizzly bears have been killed, captured, or relocated from the Meyers Creek allotment or the ARS East Summer Range in response to Sheep Station activities. It is expected this trend would continue." Also, she documented that "This project will be compliant with all standards and guidelines for the grizzly bear in the 1997 Revised Forest Plan for the Targhee National Forest."

Movement of Sheep

The proposed project employs a conservation measure of moving sheep frequently to new bedgrounds, and the ability to move sheep to entirely different pastures or properties if repeated bear -sheep conflicts develop. Jorgensen, 1983 studied bear and sheep interactions on the Targhee National Forest and showed that such movements reduced contact potential between bears and sheep, decreased resulting depredations, bears did not follow sheep, nor did the presence of sheep influence a bears homerange. Similarly, Knight (1983) found that grizzly bears that killed sheep were not exclusive to killing sheep, and had normal feeding habitats and behaviors similar to those of other bears monitored. Considering that the Sheep Station is willing to move sheep regularly in order to minimize potential contact, and to move sheep to a different pasture or property before repeated grizzly bear conflicts develop, the overall risk of food conditioning and resultant harm to grizzly bears is low.

Poaching by Herders

Knight (1983) estimated that a substantial amount of grizzly bear mortality might occur from unreported sheep-grizzly bear conflicts and subsequent poaching of grizzly bears (by sheep herders) in order to reduce economic losses. To some extent, the belief that this still occurs and is applicable to the Sheep Station activities persists in the small towns and restaurants that surround the Centennial Mountains. While poaching by private sector sheep herders may have been a substantial mortality factor during the time of the original study (1970s) it is unlikely to occur today regarding Sheep Station activities. Sheep herders for the Sheep Station are documented workers employed by the US government, are trained in grizzly bear/black bear identification, are issued instructions to avoid all contact with grizzly bears if possible, carry pepper spray as a first line deterrent against bears, and gun ammunition is kept as inventory. They are made aware that strict penalties may be incurred if grizzly bears are harmed without an immediate threat to life, and that any grizzly bear encounters are to be reported to their supervisor. Although private ranches and sheep herders may have had an economic incentive to poach grizzly bears when the species was newly listed, the Sheep Station and its employees have no such incentive and have

much to lose. As such, the likelihood of a sheep herder engaging in poaching of grizzly bears is negligible and is not expected to occur.

Effects over a 10 year period

The likelihood of negative effects to grizzly bear in any given year is low. Injury or harm to grizzly bears would not occur due to mere presence of a grizzly bear on the property; or even if there is a limited number of conflicts between grizzlies and the sheep. Harm would occur if grizzly encounters progress into repeated conflicts, which is unlikely unless the Sheep Station is unresponsive in moving sheep when conflicts occur. It is unlikely in the short term based on the limited number of previous encounters and because conservation measures including willingness to move sheep to avoid repeated conflicts. However, it is reasonable to expect that a small negative effect described previously may eventually occur because of continued grizzly bear expansion into suitable habitat, the continued presence of sheep within that occupied grizzly bear habitat, the opportunistic nature of grizzly bear feeding, and the total number of years which the activity is being analyzed. Gunther et al. (2004) found that one grizzly bear was killed for every 39 sheep incidents. The Sheep Station had a total of 5 grizzly bear/sheep interactions over a two year period (2007 and 2008) which represents a period where they had more grizzly bear interactions than typical. Therefore, a projection of three encounters per year, over a ten year period, will be used to account for an expanding grizzly bear population while considering the low number of historical encounters on the Sheep Station which peaked in 2007 and 2008. Using this assumption, there would be approximately 30 sheep incidents over the 10 year period of the project, which is less than the reported rate of 39 bear/sheep incidents for each bear mortality reported in Gunther et al. (2004). Considering that harm, if it occurs, could include a female with dependent young, it can be concluded that Sheep Station activities could result in negative effects to between zero and five grizzly bears over the next 10 year period[13]. These effects, which may or may not occur, are small in comparison to estimated population size of the Yellowstone distinct population segment of grizzly bears of over 700 animals; population increases between 4 and 7 percent annually; and known and probable grizzly human caused grizzly bear mortality, predominately associated with big game and black bear hunting seasons (estimated near 50 percent (in 2008 and 2009 annual reports)). Gunther, 2004 acknowledges that control actions between 1992 and 2000 did not affect the population to a degree that affects recovery.

Effects to grizzly bears from predator control activities are non-lethal and limited to occasional hazing of bears before they habituate to domestic sheep. As mentioned previously, herders are instructed to avoid all encounters if possible, move sheep within the pasture, and move sheep to other pastures if problems persist within a given area. On rare occasion, if sheep are being directly threatened, herders may fire rounds into the air in order to scare a grizzly bear away from the herd. There is no evidence to suggest that rare occurrence of this hazing would affect the grizzly bears ability to inhabit the landscape or raise cubs. If encounters continue, sheep would be moved out of the pasture or grazing unit to prevent continued losses to livestock and to prevent the need for lethal control measures. Herder's ammunition is accounted for, indicating that they have an incentive to address problem carnivores in a manner consistent with Sheep Station policy. All grizzly encounters are reported immediately to the herder's supervisor who contacts USDA Wildlife Services for additional investigation if needed. Through established Memoranda of Understanding, Wildlife Services contacts Idaho/Montana state wildlife agencies and/or USDI Fish and Wildlife Service.

There would be no effects to grizzly bear genetic diversity as demonstrated by several key points.

- First, as stated in the Final Rule to delist, current levels of genetic diversity are consistent with known historical levels and do not threaten the long-term viability of the species.

[13] Three types of negative effects were described previously.

- Second, The Final Conservation Strategy (USDI Fish and Wildlife Service 2007b) includes the transplant of one to two effective migrants per generation if no movement or genetic exchange is documented by 2020.
- Third, grizzly bear mortality or change in habitat use would not occur from Sheep Station activities based on the history of only a few encounters that ended without incident, and conservation measures in place to reduce the potential of conflicts.

Considering these factors, it is expected that grizzly bear movement through the Centennial Mountains would not be limited by Sheep Station activities, and thus would not limit genetic exchange with other grizzly bear populations.

Alternative 2 and Modified Alternative 3 Direct and Indirect Effects to Grizzly Bear

- Alternatives 2 and 3 affect grizzly bears similarly because grazing would not occur near currently occupied habitat[14].
- In alternative 2, no Sheep Station grazing would occur.
- In alternative 3, no Sheep Station grazing would occur on ARS properties or Meyers Creek allotment in the Centennial Mountains which is identified as biologically suitable and socially acceptable to grizzly bear occupancy (Schwartz et al. 2009 in the Habitat Monitoring Report section).

The intent of livestock allotment standard in the Final Conservation Strategy (USDI Fish and Wildlife Service 2007) would be fully implemented by eliminating sheep grazing on the last occupied sheep allotment (Meyers Creek) within the Primary Conservation Area. In these alternatives, presumably, the Meyers Creek allotment would become vacant and permanently close. Similarly, sheep grazing would be eliminated on the East Summer Range (Toms Creek), which is immediately adjacent to the Primary Conservation Area. The area is likely biologically suitable and socially acceptable to grizzly bear occupancy according to the Grizzly Bear Management Plan for Southwestern Montana (Montana Fish Wildlife and Parks 2002), though boundaries for such designation have not been formally identified in Montana. The potential for livestock/grizzly bear conflicts from the Sheep Station would be nearly eliminated in these alternatives since the predominant grizzly bear population is located within the Primary Conservation Area, and Sheep Station grazing would not occur within five miles of the Primary Conservation Area. Grizzly bear mortality from Sheep Station activities would not occur.

Modified Alternative 4 Direct and Indirect Effects to Grizzly Bear

- Modified alternative 4 was developed specifically to address public scoping comments related to sheep grazing within and adjacent to the grizzly bear Primary Conservation Area. In this alternative, Sheep Station grazing and associated activities would not occur on the East Summer Range (Toms Creek) or on the National Forest System Meyers Creek allotment.

In regards to alternative 4, the intent of livestock allotment standard in the Final Conservation Strategy (USDI Fish and Wildlife Service 2007) would be fully implemented by eliminating sheep grazing on the last occupied sheep allotment (Meyers Creek) within the Primary Conservation Area. In this alternative, presumably, the Meyers Creek allotment would become vacant and permanently close. Similarly, sheep grazing would be eliminated on the East Summer Range (Toms Creek), which is immediately adjacent to the Primary Conservation Area. The area is biologically suitable and socially acceptable to grizzly bear occupancy according to the Grizzly Bear Management Plan for Southwestern Montana (Montana Fish Wildlife and Parks 2002), though boundaries for such designation have not been formally identified in Montana.

[14] Humphrey ranch is considered outside of the current occupied range of grizzly bears (BO page 21).

Grizzly Bear Cumulative Effects

The spatial boundary for the discussion of cumulative effects for grizzly bears is the Greater Yellowstone Ecosystem, because it is the boundary for the Yellowstone Distinct Population Segment of grizzly bears, and, therefore, puts the potential effects in the context of grizzly bear recovery for the designated population. The temporal boundary is 10 years because projections beyond this time period are less likely to be accurate.

The expected level of the effects for the project would not contribute detrimental cumulative effects to grizzly bear recovery considering the following points:

- The Yellowstone Distinct Population Segment of grizzly bears continues to expand in both population size and distribution.
- No direct grizzly bear mortality is expected from Sheep Station activities, and the probability of food conditioning resulting in indirect grizzly bear mortality or removal is low. There is no expected loss of habitat or loss of use in existing suitable habitat. Effects would be limited to rare occasions when a lone bear or sow with cubs is temporarily hazed to stop an immediate threat to sheep or human safety.
- Occasional hazing of a bear and implementation of other conservation measures described previously would not measurably increase annual mortality or cause exceedance of mortality threshold described in the Final Conservation Strategy. Although mortality thresholds were exceeded in 2008 for the Distinct Population Segment, none of these mortalities were attributed to Sheep Station activities, and most were attributed to hunting related incidents (many related to black bear hunting). It is reasonable to conclude that management actions that reduce mortalities related to hunting incidents are a likely tool to minimize grizzly bear mortality and keep it below established thresholds.

Sheep Station activities are not expected to limit grizzly bear movement or occupancy in the Centennial Mountains, and similarly would not limit genetic exchange with other grizzly bear populations. This finding is based on a limited number of documented encounters, no previous control actions on ARS properties or Meyers Creek, no direct mortality as a result of Sheep Station activities, low probability of food conditioning resulting indirect mortality on adjacent lands, and large expanses of suitable habitat in the Centennial Mountains.

Climate change (warming) is expected to continue over the next decade and beyond, and, therefore, could be considered as a cumulative effect condition that might affect grizzly bears. Primary effects to grizzly bear regarding climate change trends are indirect, and related to losses of larger diameter white bark pine and its cone crop, an important food source for grizzly bears in the Greater Yellowstone Ecosystem.

Jean et al. (2010) demonstrated there appears to be a trend of dying whitebark pine in the Greater Yellowstone Ecosystem between 2007and 2010 from blister rust and mountain pine beetle. Similarly, Haroldson and Podruzny (2010) found that 2010 was a low cone production year and emphasize that grizzly bears eat more meat when production is low, there is an increase in hunter/grizzly bear conflicts, and that extensive areas of beetle-killed whitebark pine in the Greater Yellowstone Ecosystem may exacerbate this concern. Considering this trend, it can be expected that grizzly bears occupying the Sheep Station and adjacent lands may increase their food search area, and the Greater Yellowstone Ecosystem would experience an increase in grizzly bear confrontation and hunter related bear mortality. However, Sheep Station domestic sheep grazing would not accelerate these rates of conflicts (or mortality), because strong measures are in place to reduce potential conflicts including tightly herded bands, full time herders, guard dogs, and the Sheep Station is willing to move sheep before habituation occurs. Also, the Sheep Station is not seeking removal of problem grizzly bears in any of the proposed alternatives, so no direct increase in mortality is expected.

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. The removal and closure of sheep grazing permits on Forest Lands inside the primary conservation area, is an interrelated action. Under this interrelated action, all domestic sheep grazing on National Forests inside the primary conservation area has been subsequently vacated and/or closed except for that occurring on the Meyers Creek allotment by the Sheep Station.

- Under the proposed action and alternative 5 the Meyers Creek allotment would continue to be grazed for a short duration (3 days) during trailing activities. However, continued grazing remains consistent with the Final Conservation Strategy (USDI Fish and Wildlife Service 2007), because the standard applies to permittees voluntarily withdrawing their grazing. Since grazing on Meyers Creek allotment is critical to the research mission of the agency as well as the grazing rotation schedule and movement of sheep, the US Sheep Experiment Station would not currently be considered a "willing" permittee.
- Under alternatives 2, 3, and 4, domestic sheep grazing in the Centennial Range would not occur so the interrelated action of removing all sheep grazing within the primary conservation area would be implemented.

Preliminary Grizzly Bear Biological Determination

This determination was previously consulted on in 2014, and the USDI Fish and Wildlife Service issued a Biological Opinion (USFWS Tracking Number 2014-F-0074). The modifications in the project proposal and alternatives are minor adjustments that are not expected to change the way grizzly bears are affected from what was previously analyzed and determined.

The project biologist has determined that U. S. Sheep Experiment Station Grazing and Associated Activities Project - May affect, and are likely to adversely affect the Yellowstone Distinct Population of grizzly bear. This determination is applicable to the proposed action (modified alternative 1) as well as alternatives 4, and 5. Effects are similar in these alternatives. However, the potential encounters are further reduced in alternative 4. This determination is supported by rationale summarized below.

- No direct grizzly bear mortality is expected from Sheep Station activities. Neither lethal control or trap and transport will be implemented or requested under this proposal. Should the need arise for these abatement techniques related to grizzly bear, consultation would be reinitiated.
- Potential effects are the limited probability over a 10-year period that a grizzly bear (and/or cubs) become food conditioned to domestic sheep, change feeding behaviors, and confrontations develop on adjacent lands under other ownership. The resulting change in habitat use could be considered harm (USDI Fish and Wildlife Service communications). Also, indirect effects could occur if adjacent private ranchers or other agencies experiencing problems from the food conditioned bear seek control measures eventually resulting in bear removal.
- The project would not limit grizzly bear occupancy or movement through the Centennial Mountains because grizzly bear habitat would not be reduced, and Sheep Station grazing practices include light utilization, for short duration, over a large landscape, with Summer Pastures rested one out of every three years. This grazing method prevents frequent and recurring encounters with grizzly bears which might otherwise alter bear behavior or necessitate the need for lethal control.
- Potential opportunities for genetic exchange with other grizzly bear populations would not be affected since occupancy or movement through the Centennial Range would not be limited. In addition, recent evidence demonstrates that genetic diversity is not limiting Yellowstone distinct population segment grizzly bear populations in the short term, and that translocation from other populations is an adequate method to address genetic diversity shortfalls over the long term.

- Fifteen conservation measures (described previously) are in place to ensure that Sheep Station activities continue to operate in a manner that minimizes the potential for encounters and effects to grizzly bears. These conservation measures include proactive measures to avoid conflicts (research design criteria, guard dogs, sheep herders, and storage/removal of attractants), annual training, policy to address encounters non-lethally (move sheep, haze only if necessary), and established communication processes with other agencies.
- There have been only a few encounters with grizzly bears in the past decade relative to Sheep Station activities. No grizzly bears have been killed, captured, or relocated from ARS properties or on National Forest System/BLM allotments in response to Sheep Station activities. It is expected this trend would continue.
- Sheep Station sheep grazing in the Meyers Creek Allotment was analyzed previously by the USDA Forest Service who found that the grazing has occurred there for decades with minimal conflicts, meets the standards and guidelines from the Grizzly Bear Forest Plan Amendment, and noted that "The permittees (Sheep Station) have had an excellent record of avoiding conflicts with bears for many years."
- The potential for livestock/grizzly bear encounters would be further reduced in alternative 4, since the predominant grizzly bear population is located within the primary conservation area, and Sheep Station grazing would not occur within 5 miles of the primary conservation area.
- The expected level of effects for the project are minimal, and would not contribute to overall cumulative effects in a way which is detrimental to grizzly bear recovery.

The project would have "No Effect" on critical habitat as none is present or proposed within the project area.

The biologist has also determined that alternatives 2 and 3 would have "No Effect" on the Yellowstone distinct population segment of grizzly bears since Sheep Station sheep grazing activities would not occur in occupied grizzly bear habitat or alter habitat conditions.

Canada Lynx (Lynx canadensis)

Canada Lynx Affected Environment

A comprehensive review of Canada lynx life history can be found in Lynx Conservation Assessment and Strategy (LCAS) (Interagency Lynx Biology Team, 2013). A condensed version of life history from the Lynx Recovery Outline (USDI Fish and Wildlife Service 2005a) is summarized below.

Lynx are highly adapted for hunting snowshoe hare, the primary prey, in the snows of the boreal forest. Lynx in the contiguous United States are at the southern margins of a widely-distributed range across Canada and Alaska. The center of the North American range is in north-central Canada. Lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare. Lynx survivorship, productivity, and population dynamics are closely related to snowshoe hare density in all parts of its range. Both timber harvesting and natural disturbance processes, including fire, insect infestations, catastrophic wind events, and disease outbreaks, can provide foraging habitat for lynx when resulting understory stem densities and structure provide the forage and cover needs of snowshoe hare. These characteristics include a dense, multi-layered understory that maximizes cover and browse at both ground level and at varying snow depths throughout the winter. Despite the variety of habitats and settings, good snowshoe hare habitat has a common denominator - dense, horizontal vegetative cover 1-3 meters (3-10 feet) above the ground or snow level. In northern Canada, lynx populations fluctuate in response to the cycling of snowshoe hare. Although snowshoe hare populations in the southern portion of the range in the contiguous United States may fluctuate, they do not show strong, regular population

cycles as in the north. The southernmost extent of the boreal forest that supports lynx occurs in the contiguous United States in the Northeast, western Great Lakes, northern and southern Rockies, and northern Cascades. Here the boreal forest transitions into other vegetation communities and becomes more patchily distributed. As a result, the southern boreal forests generally support lower snowshoe hare densities, hare populations do not appear to be as highly cyclic as snowshoe hares further north, and lynx densities are lower compared to the northern boreal forest.

Canada lynx is a federally-listed threatened species and historically resided within the Centennial Mountain Range portions of the Sheep Station, which includes the West Summer Range (Odell Creek and Big Mountain) and the East Summer Range (Toms Creek). These areas are outside of, but adjacent to Lynx Analysis Units established on the Targhee National Forest in 2005. There is no Canada lynx critical habitat in the project vicinity. The Idaho statewide wildlife observation database indicates that historically, a number of Canada lynx have been observed in the Centennial Mountain Range. The TEAMS wildlife biologist has discussed occurrences of Canada lynx with US Fish and Wildlife Service in Chubbuck, ID (Arena 2008, 2009), Idaho Department of Fish and Game Biologists (Schmidt 2008, personal communications), and USDA Forest Service Biologists on the Caribou-Targhee National Forest (Aber, Keetch, Orme 2008, personal communications). Biologists with these agencies indicated that Canada lynx are unlikely to be currently residing year-round in the Centennial Range based on:

- A limited number of occurrences, 1874-1998
- Negative findings during hair snare surveys in 1999 - 2001, and
- Limited observations from winter track surveys conducted from 1996 - 2004.
- Biological Assessment for Meyers Creek Sheep and Goat Rang Allotment (Fletcher, 2012)

A summary of lynx habitat and observation data compiled for the Caribou-Targhee National Forest (adjacent to ARS properties) is presented in a Forest report prepared by Orme (2005). In the biological assessment (Fletcher, 2012) completed for sheep grazing on the USDA Forest Service Meyers Creek Allotment, which is adjacent to Toms Creek on ARS properties, the biologist determined that grazing activities are not likely to adversely affect Canada lynx and are consistent with the Lynx Conservation Assessment and Strategy. According to maps prepared for the Lynx Conservation Agreement between the USDA Forest Service and the US Fish and Wildlife Service (USDA Forest Service 2006), areas in the Centennial Range are Secondary Habitat, which the Lynx Recovery Outline defines as "those with historical records of lynx presence with no record of reproduction; or areas with historical records and no recent surveys to document the presence of lynx and/or reproduction." A majority of habitat on ARS properties is unsuitable for lynx, because it is in lower elevation shrublands (Headquarters, Henninger Ranch). Higher elevation properties (West Summer Range, East Summer Range, and Humphrey Ranch) are potential lynx habitat but are of lower quality, because the properties do not contain large, connected expanses of boreal forest. ARS properties are outside of established Lynx Analysis Units.

Based on a review of the above information, there is potential for an occasional lynx to use the area traveling through high-elevation ARS properties in the Centennial Mountain Range, while temporarily foraging or moving between larger expanses of quality habitat in northwest Wyoming and Central Idaho. However, the area is unlikely to be currently occupied by a resident lynx population considering the lack recent observations in the Centennial Range and the status of adjacent habitat on USDA Forest Service lands as unoccupied according to the Lynx Conservation Agreement (Fletcher 2012).

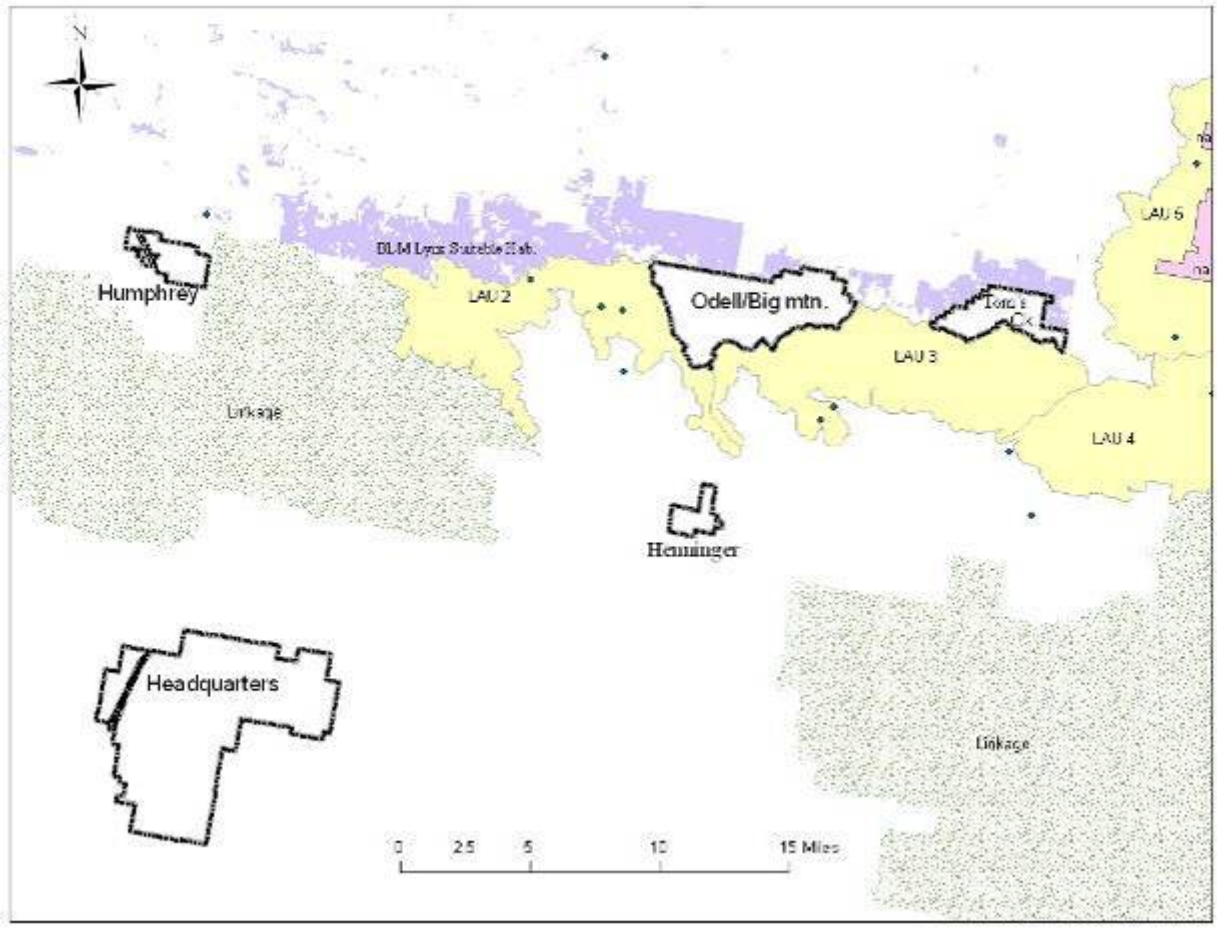

Figure 36. Sheep Station grazing lands adjacent to lynx analysis units on the Caribou-Targhee NF, 2005

Canada Lynx Direct/Indirect Effects

Modified Alternatives 1, 4, and 5 Direct and Indirect Effects Canada Lynx

- Modified alternative 1 represents current operations at the Sheep Station.
- Modified Alternative 4 - No grazing would occur on the East Summer Range as well as Meyers Creek allotment.
- Modified Alternative 5 - No grazing would occur on the Snakey-Kelly allotments.

The effects of these three alternatives are the same since grazing operations take place in suitable lynx habitat in the Centennial Mountains which is thought to be unoccupied.

A review of the activities for each of these alternatives indicates that minimal, if any, effects would occur with regard to Canada lynx, both to individuals as well as to habitat. No effects would occur to designated critical habitat as none is present, and none is being proposed or considered in the area.

Most of the activities would have no effect on Canada lynx or their habitat. Those activities that occur in sagebrush shrublands at lower elevation are outside of lynx analysis units; and are in areas that do not have continuous forested cover, and do not provide adequate habitat features for denning or routine lynx

foraging activities. The activities that are outside of suitable habitat and thus would have no effect include:

- All livestock grazing and camp tending activities during winter months,
- Livestock trucking activities,
- Cattle and horse research grazing,
- Activities on the Mud Lake Feedlot facility,
- Prescribed fire, Integrated pest management,
- Temporary watering sites,
- Road maintenance,
- Water diversions, and
- Permanent fencing and its maintenance.
- Herbicide use

Within the Centennial Range, there are five permanent watering features. However, their presence and associated maintenance activities would not alter available lynx habitat, do not affect lynx prey, nor would they be expected to affect individual lynx.

Activities that could have minimal effects to Canada lynx occur during the summer grazing season and are within or adjacent to suitable habitat. These activities include sheep grazing and trailing and camp tending activities in the West Summer Range (Odell Creek and Big Mountain) and the East Summer Range (Toms Creek). Although Canada lynx have not been recently documented within the Centennial Mountains through hair snare surveys, suitable habitat is present in these high elevation forests. They support a low density population of snowshoe hare, lynx primary prey, as well as patches of large diameter downed wood suitable as denning habitat. The delineation of Lynx Analysis Units (2005) in habitat nearby on the Targhee National Forest indicates the presence of suitable habitat.

Though habitat may be suitable, expected effects from the above activities are minimal. Domestic sheep are only present in the East and West Summer Range area for a short duration during the summer, generally from start of July through the first week of September. This period is not critical to denning, and any Canada lynx that might be in the area could continue to forage across the landscape. Human disturbances may result in an occasional incident where lynx temporarily avoid the immediate area coincident with a band of domestic sheep, guard dogs, and herd dogs. Where there exists small patches of suitable foraging and denning habitat in sufficient quantities, Canada lynx would remain in the area, but temporarily adjust their travel and foraging locations to avoid direct encounters.

Another possible indirect effect to lynx is that associated with competition for browse between livestock and snowshoe hare (Ruediger et al. 2000). On-the-ground conditions quantified in the Range Report indicate that sheep grazing in the Centennial properties is of low intensity with a high amount of available forage. Light stocking and a rotation schedule that rests areas one year in three have allowed for highly productive range conditions with a stable or upward trend. Appropriate diversity of forbs, shrubs, and grasses is present, and in 2009, forb production was double or triple that expected. Utilization was light. Visual comparison of plants inside exclosures that have not been grazed in over 30 years to those outside the enclosures showed no difference in vegetative composition. Forested understory that provides winter cover and browse for snowshoe hares is present, and remains unaltered by the sheep grazing activities except where down logs are occasionally bucked into pieces to allow sheep passage along established trails. Near pristine on-the-ground conditions in the Summer Range are a result of many previous years in

which the proposed activities have been occurring, and indicate that long-term habitat changes that might be of concern (described in the Lynx Conservation Assessment and Strategy (Interagency Lynx Biology Team, 2013) would not occur from the proposed activities.

No effect to Canada lynx from predator control activities is expected. Sheep herders are trained annually on predator control procedures. In order to protect the sheep herd and for the herder's safety, they are outfitted with rifles and all ammunition is inventoried. Fired ammunition is accounted for through an explanation to their supervisor. Herders are instructed how to address problems with wolves (*Canis lupus*), coyotes (*Canis latrans*), mountain lions (*Felis concolor*), and black bears (*Ursus Americanus*). Instructions are issued in semi-annual trainings that herders should not fire weapons at bobcat or lynx since they are difficult to identify, and the Canada lynx is a federally protected species. Ruediger et al. (2000) describes the risk of lynx mortality from predator control activities targeted for other carnivores as low because trapping efforts are reduced from historical levels, trapping efforts target individual offending animals, and trapping usually occurs in lower elevations (outside of lynx habitats). An interview with Wildlife Services (Farr 2008, personal communication) who conducts control actions on ARS properties indicated that:

- They have not caught any lynx in leghold traps.
- The lower elevation ARS properties are not suitable lynx habitat.
- There have been no depredations by felines in the Summer Range properties, so trapping for felines has not been necessary.
- Mr. Farr is not aware of lynx being captured in the area related to fur trapping.
- Canada lynx are unlikely, or unexpected to occupy the area.
- When trapping, Wildlife Services uses lures specifically targeted for canines and thus, greatly reduces potential of inadvertently capturing felines such as Canada lynx.

In addition to the information above that indicates a minimal potential for negative effects, it should also be noted that there is a very low probability of Canada lynx occurrences on ARS properties as discussed previously.

Alternatives 2 and Modified Alternative 3 Direct and Indirect Effects for Canada Lynx

- Alternative 2 - No grazing would occur.
- Modified Alternative 3 - No grazing would occur on ARS properties in the Centennial Range except west of Beaver Creek on Humphrey Ranch.
- These alternatives have the same effects on Canada lynx because grazing is eliminated in/or near suitable habitat that could provide for a resident population of lynx.

Elimination of all grazing and associated activities (alternative 2), or all grazing activities in the Centennial Range except west of Beaver Creek on Humphrey Ranch (alternative 3) would eliminate the potential effects discussed in other alternatives. Human disturbances from Sheep Station activities would not occur which otherwise may result in uncommon occasions where lynx avoid the immediate area coincident with a band of domestic sheep, guard dogs, and herd dogs. Where there exists small patches of suitable foraging and denning habitat in sufficient quantities, Canada lynx would not have to temporarily adjust their travel and foraging locations to avoid direct encounters. There would be no competition for browse between livestock and snowshoe hare.

Canada Lynx Cumulative Effects

The spatial boundary for the discussion of cumulative effects for Canada lynx is the Centennial Mountain Range, because this landscape incorporates multiple Lynx Analysis Units established by the USDA Forest Service (2005) in cooperation with the USDI Fish and Wildlife Service, and is large enough in size to support a resident population of several lynx. The temporal boundary is from present day through the next 10 years because projections beyond that timeframe are similar to that being described, but with reduced accuracy.

The status of adjacent habitat on USDA Forest Service lands is secondary habitat, with historical records of lynx present with no records of reproduction (Fletcher, 2012). There is potential for occasional lynx to use the Centennial Mountains while temporarily foraging or moving between larger expanses of quality habitat in northwest Wyoming and Central Idaho. The proposed project and alternatives do not reduce available habitat, would not add additional effects which would render potentially occupiable habitat as unsuitable, nor would it deter from the Centennial mountains ability to provide temporary Canada lynx travel and foraging between higher quality habitat in Yellowstone or Central Idaho. As such, the project and alternatives do not contribute to additional cumulative effects.

There are no interrelated actions associated with this project. Interdependent actions include livestock grazing permits issued in Targhee National Forest lands, as well as past and proposed timber sales there. Existing habitat on National Forest System lands is managed in compliance with the Lynx Conservation Assessment and Strategy, the Lynx Conservation Agreement, as well as Northern Rockies Lynx Management Direction (2007) and thus, would maintain conditions that provide for continued protection and recovery of Canada lynx. Considering that effects from the proposed project are negligible, and effects from past or planned projects provide for lynx conservation, then there are no additional cumulative effects to Canada lynx from the project proposal or its alternatives.

Canada Lynx Biological Determination

This determination was informally consulted on in 2011. The USFWS provided a letter (USFWS reference Number 14420-2011-F-0326) that concurred with this determination. The changes in the project proposal are minor adjustments that are not expected to change the way Canada lynx are affected from what was previously analyzed and determined. The project biologist has determined that modified alternatives 1, 4, and 5 may affect, but are not likely to adversely affect Canada lynx. This determination is supported by rationale presented in the Biological Assessment and summarized below.

- Suitable lynx habitat is present, however that habitat has been identified as secondary habitat having a low potential for year-round occupancy, and no records of Canada lynx reproduction.
- Canada lynx have not been targeted for abatement on ARS properties, nor are there records of personal accounts indicating that abatement actions have been taken to control Canada lynx on ARS properties. No take would occur from predator control activities.
- Grazing practices and associated activities implemented by the Sheep Station do not affect denning habitat, do not remove cover important to lynx travel, and retain adequate cover and forage available to snowshoe hares, lynx primary prey. Activities are consistent with standards in the Lynx Conservation Assessment and Strategy.
- Cumulative effects of the project are negligible.
- Negative effects are unlikely. If they occur at all, they would be limited to small temporary changes in daily movements. In the Centennial Mountains, individual lynx moving through the area may make small temporary adjustments in habitat use/travel routes to avoiding conflicts with guard dogs and/or humans associated with grazing a band of sheep.

Modified alternatives 2 and 3 would have no effect to Canada lynx.

Other Wildlife Species

The following section includes analysis of additional species of concern or their habitats, that are located on ARS properties, or that are located adjacent to or downstream of the project, and potentially could be affected by the project. A pre-field review of available information was conducted to assemble occurrence records, review habitat needs and ecological requirements, and determine what field reconnaissance was needed to complete the analysis. Sources of information included Idaho and Montana Natural Heritage Program databases, Idaho and Montana's Comprehensive Wildlife Conservation Strategy, Caribou-Targhee National Forest Species Lists, and Personal Communications with biologists from Idaho Department of Fish and Game, Montana Department of Fish and Game, biologists from the Caribou-Targhee National Forest, biologists from Bureau of Land Management Upper Snake Field Office, and from comments received during scoping. The wildlife biologist visited the sites on May 6th through 8th, 2008 to conduct interviews and cursory field review. The biologist conducted an extensive field visit July 6th through 14th, 2008 verifying habitat types, habitat conditions, observing proposed activities, and gathering additional site information.

While the pre-field review generated an extensive list of species that may occupy habitats on ARS properties, this analysis narrows the focus to those species where valid concerns were identified during litigation, scoping, and pre-field/field review. Other species may be addressed in future analysis if new pertinent information becomes available indicating Sheep Station activities are of concern for that species or its' habitat. The additional species and analysis listed below (in addition to the threatened/endangered species analyzed previously) adequately address the intent of the settlement, and provides a thorough review of the effects to known biological resources and their habitats.

Gray Wolf (Canis lupus)

Gray Wolf Affected Environment

Effective May 5, 2011 the US Fish and Wildlife Service removed gray wolves in a portion of the Northern Rocky Mountain Distinct Population Segment (DPS) encompassing Idaho, Montana and parts of Oregon, Washington and Utah from the Federal List of Endangered and Threatened Wildlife. This wolf population was de-listed due to recovery. The wolf population in Northern Rocky Mountains continue to hold steady. As of December 31, 2014, there were at least 1,657 wolves in 282 packs (including 85 breeding pairs) in Montana, Idaho and Wyoming. An additional 145 wolves in 31 packs (including 13 breeding pairs) were estimated in Oregon and Washington. Wolf numbers continue to be robust, stable and self-sustaining in the Northern Rocky Mountains (http://www.fws.gov/mountain-prairie/species/mammals/wolf/).

As summarized in the Montana Fish, Wildlife, and Parks Fact Sheet on Wolves (2011), "The northern Rocky Mountain gray wolf population first met biological recovery goals in 2002. The Northern Rockies "metapopulation" is comprised of wolf populations in Montana, Idaho, and Wyoming. About 1,650 wolves live in the region, where wolves can travel about freely to join existing packs or form new packs. This, combined with wolf populations in Canada and Alaska, assures genetic diversity. Federal rules require Montana and Idaho to maintain at least 150 wolves and 15 breeding pairs in each state (as well as Wyoming). About 566 wolves inhabited Montana in 2010 in about 108 packs, 35 of which were breeding pairs." Similarly, about 835 wolves inhabited Idaho in 2009 in about 94 packs, 49 of which were documented breeding pairs (Mack et al. 2010).

The wolf is reclassified under Montana law as a "species in need of management" statewide. Montana laws and administrative rules protect wolves. Wolves can only be legally killed: during an official hunting

season authorized by the FWP Commission; if the wolf is seen attacking or killing or threatening to kill dogs or livestock; to protect human life; or as authorized by FWP to resolve wolf-livestock conflicts.

In Idaho wolves are being managed as a big game animal. They are protected by state laws. The Idaho Fish and Game Commission approved 2011 wolf hunting season.

Wolf Control Procedure

Radio collars, leghold traps, and/or aerial control are methods used on private and federal lands to track problem wolves/wolf packs and, if conflicts persist, implement lethal removal, which is usually targeted at offending animals (Farr 2008, Meintz 2009, personal communications). APHIS Wildlife Services acts on the behalf of the Sheep Station to verify livestock damage before any control actions are taken. If wolf damage is verified, APHIS Wildlife Services contacts his supervisor as well as the state wildlife agency to request authorization if it is necessary to pursue direct control. Authority for control actions are granted through state wildlife agencies (Arena 2008, Farr 2009, personal communications).

The following text describes the typical methodology of "Incremental Control Measures" referred to in other portions of this document. Effects to wolves involved in depredation scenarios generally occur in three categories. First, if an individual wolf is involved in limited depredation such as while traveling through habitat to a new or different territory and no further incidents occur, non-lethal control measures (such as the presence of herders and guard dogs) are deemed adequate. Second, if offending wolves are part of a group, breeding pair, or pack and remain active in the vicinity, individual wolves may be radio-collared so activities can be monitored and tracked. If depredations continue, one to three animals are lethally removed, with the intention to target specific offending animals. If possible, the pack is left intact with a breeding pair. Third, if depredation is a recurrent problem and there are substantial livestock losses from a specific pack or group of wolves (including losses on private producers as well as Sheep Station livestock), authorization may be given to remove all or most pack members. This may involve individual trapping and/or aerial targeting (at the discretion of APHIS Wildlife Services and state agencies) to achieve removal of the breeding pair, pups, and other associated wolves.

Gray Wolf Direct and Indirect Effects

Modified Alternative 1, 4, and 5 Direct and Indirect Effects for Gray Wolf

Effects from activities in these three alternatives are essentially the same since each proposes similar livestock grazing in the Centennial Mountains where wolves are known and expected to occur. Modified alternative 1 proposes grazing in both the East and West Summer Ranges. Modified alternative 4 proposes grazing in the West Summer Range while discontinuing grazing in the East Summer Range and USDA Forest Service Meyers Allotment. Modified alternative 5 continues grazing in both the East and West Summer Ranges while discontinuing grazing from Snakey-Kelly allotments. Potential effects to wolves remain the same throughout each alternative, because each alternative continues grazing in occupied wolf habitat.

A review of the activities described in these alternatives indicates that activities would have effects on gray wolves and their habitat. Specifically, the activities that would have some effects can be categorized and described as follows:

1. Trailing, grazing, and camp tending activities in the Centennial Mountains have previously, and would continue to result in occasional encounters with wolves. The habitat is occupied by deer and elk (a natural food source for wolves), and the addition of sheep bands would, on occasion, attract wolves opportunistically searching for food, or wolves habituated to sheep as an easy food source. Mitigations including the presence of full-time sheep herders, guard dogs, and herd dogs provide

consistent and effective methods of non-lethal control, which in-turn discourages most individual wolves and wolf packs from habituating to Sheep Station sheep herds as a food source. In addition, on a daily basis, herders keep a daily count on sheep, and ride trails to gather strays. Dead or injured sheep are removed from the field when possible. As a result, the effect of attracting wolves to domestic sheep as a potential food source is substantially reduced because of continual human presence, guard dog presence, and by reducing the number of stray sheep, or dead sheep available as a food source. The overall direct and indirect effect to wolves from these activities is minimal. Effects of harassment and predator control activities (such as firing gun shots in the air and other abatement tools) are discussed separately in letter c below.

2. Activities that could affect daily or annual movements of wolf prey (deer, elk, and moose) also have the potential to indirectly effect gray wolf movements. Prescribed fire may improve range conditions such as increased vigor on the annual growth of shrubs and grasses, which correspondingly attracts more ungulates. Thus, wolves could be indirectly attracted to areas with prescribed fire, in search of big game food sources concentrated near productive foraging habitats. Prescribed fire is occurring on the Headquarters property, which is big game transitional range. Since this area is covered in snow much of the winter season, its capacity to support deer and elk in large concentrations is minimal, and its corresponding potential to affect gray wolf is even smaller and limited to a short duration as ungulates migrate through the area to different elevations. Maintenance of fire breaks and roads on the ARS properties could temporarily have small effects on deer and elk herd movements, where the ungulates avoid mechanized operating equipment. However, these effects are limited to times when heavy equipment is operating in the area. With a lack of public motorized access to roads on the Sheep Station, big game persists with minimal disruption across the landscape, which translates to few or no corresponding impacts to wolves. Water developments that occur in the Big Mountain grazing unit may occasionally attract deer, elk or moose, but these occasions are rare since ungulates more likely use natural water sources. Fencing on ARS properties at lower elevations is constructed to specifications that do not limit travel for ungulates, and upper elevation fencing (horse corral) is temporary, small in size, and is not big enough to substantially affect big game movements. The one large fence present on ARS properties near the Headquarters (coyote fence) does eliminate big game access to forage on approximately 640 acres. Since the fence is in low elevation sagebrush that does not include any mapped wetlands or unique wildlife habitat features, and is surrounded by thousands of acres of similar habitat, the fence does not limit ungulate use across the landscape or their access to limited habitats. As a result, effects would be limited to the loss of a small amount of available forage for deer and elk, a local change in daily movements of deer and elk around the one square mile exclosure, and ultimately, little or no corresponding effect to wolves.

3. Effects to wolves are expected from predator control activities on ARS properties including non-lethal measures such as hazing, lethal removal of individual animals, and in some cases, particularly when depredation to private livestock is also occurring, removal of entire packs and/or breeding pairs. The history of minimal conflicts with wolves on the Sheep Station before 2008, and the incremental control measures that resulted in the removal of two packs in 2009 near Humphrey Ranch, indicate that control measures are likely to vary from year to year. In most years, such as occurred in 2005 through 2008, non-lethal activities including having sheep herders and guard dogs with sheep, hazing individual wolves during encounters, and trapping/radio collaring individual wolves would be adequate to address depredation on Sheep Station herds. Despite proactive conservation measures to reduce conflicts, in some years packs would establish and/or expand in or near the Centennial Mountains, and depredate more heavily on livestock from the Sheep Station as well as adjacent private producers. In these cases, lethal control measures would be necessary to curtail depredation on Sheep Station sheep and/or prevent a pack from habituating to domestic sheep. Lethal removal would be implemented typically on one to three wolves. In uncommon circumstances such as occurred in

2009, when numerous depredations continue on private and Sheep Station livestock, control actions could continue in an incremental fashion until an entire offending pack is removed, varying between three and ten animals. At the legal discretion of Idaho/Montana Wildlife Agencies, and APHIS Wildlife Services, incremental control measures would continue to be authorized, to a varying degree, resulting in the removal of individual wolves, breeding pairs, and on occasion, established packs.

Overall, the effects described above are not expected to affect the delisted status of gray wolves nor reduce the population or number of breeding pairs to a level approaching the low-end threshold of 150 animals and 15 breeding pairs in each state.

Alternative 2 and Modified Alternative 3 Direct and Indirect Effects

- Alternative 2 and modified alternative 3 affect gray wolves similarly because all Sheep Station grazing activities in suitable wolf habitat would be eliminated in the Centennial Range.
- In alternative 2, no Sheep Station grazing would occur.
- In modified alternative 3, no Sheep Station grazing would occur in the Centennial Mountains

Elimination of all Sheep Station grazing and associated activities (alternative 2), or all Sheep Station grazing activities in the Centennial Range (modified alternative 3) (except west of Beaver Creek) would nearly eliminate the Sheep Station role in potential effects on wolves discussed in the earlier alternatives. Livestock grazing on ARS properties which otherwise may have resulted in lethal control actions to remove a few individual wolves annually, or in some years, up to two wolf packs or groups that are establishing, would likely not occur. However, control actions related to private livestock owners and USDA Forest Service/Bureau of Land Management Permittees in and adjacent to the Centennial Range would continue in its current fashion. It is unknown if new resident wolf packs would naturally reestablish, or if other control actions related to private/permitted producers would limit pack establishment on the Centennial Range.

Gray Wolf Cumulative Effects

The spatial boundary for the discussion of cumulative effects for wolves is the Centennial Mountain Range to the I-15 corridor because this area is:

- Large enough to sustain one or more wolf packs,
- Is influenced by (or influences) wolf management on adjacent lands under other ownership, and
- Is an important piece of undeveloped habitat between the Greater Yellowstone Ecosystem and Central Idaho.

The temporal boundary is 10 years because projections beyond that point are similar to those being discussed, but become less accurate over time.

The project is not expected to add cumulative effects detrimental to wolf recovery based on the following information:

- Hunting seasons are managed on an annual quota basis by state wildlife agencies, who point to evidence that such management would not detract from sustaining the current population, and that genetic connectivity would not be impacted, even if the maximum quota animals is reached.
- The Northern Rocky Mountain Wolf population is expanding in both size and distribution, and a limited number of wolves or packs have been or would be impacted by continued operations on the Sheep Station.

- State wildlife agencies have the authority to authorize or deny lethal control actions on private or agency lands, thus procedures are in place to balance lethal control actions with larger population/pack management goals in the Centennial Mountain Range.

Rocky Mountain Bighorn Sheep (Ovis canadensis canadensis)

Rocky Mountain bighorn sheep are not known or expected to be present on ARS properties. Bighorn sheep in Idaho and Montana portions of the project area have no federal listing status, and are managed as game species with controlled hunting allowed in certain areas. Bighorn sheep herds nearest to ARS properties are in Montana, approximately 20 miles removed from all Sheep Station activities such that interactions are not a concern with these herds. Two small herds from prior bighorn sheep reintroductions are present in the Upper Snake region of Idaho near the Snakey-Kelly allotments (National Forest System). The specified actions included in the Bighorn sheep Action Plan section of the BLM/Sheep Station Memorandum of Understanding are reasonable measures put in place to minimize the potential for interactions between domestic sheep and bighorn sheep in these areas.

Rocky Mountain Bighorn Sheep Affected Environment

In the Rocky Mountain west, a primary issue regarding bighorn sheep and domestic sheep interaction revolves around die-offs within native or transplant bighorn sheep herds, after coming in contact with domestic sheep. The issue has been largely polarized by evidence that domestic sheep diseases threaten the persistence of bighorn sheep populations, economic and social consequences of restricting domestic sheep grazing are substantial, and the effectiveness of maintaining separation between domestic sheep and bighorn sheep is debated. In examples such as occurred near Hell's canyon in Western Idaho, where one or more bighorn sheep became infected with pneumonia (*Pasteurella* or *Manhiemmia*), the pneumonia spread to other members within a bighorn sheep herd, and a portion of the bighorn sheep herd died. The majority of documented bighorn sheep die-offs follow contact with domestic sheep. Clifford et al. (2009) and Lawrence et al. (2010) demonstrated the transmission of *Mannheimia haemolytica* bacteria from domestic sheep resulted in the pneumonia and death of bighorn sheep under certain controlled conditions.

In contrast, in field situations, it isn't known if sufficient contact for a transmission event occurs under existing grazing conditions, and pneumonic disease in bighorn sheep has also been reported in the absence of detectable contact with small ruminants (Knowles2008, personal communication). Knowles describes the following events that must come together to infect bighorn sheep:

- A domestic sheep must be infected with appropriate organisms;
- The domestic sheep must be shedding these organisms in sufficient quantity for transmission;
- Due to the nature of the suspected organisms, mucosal contact must occur and match in time with the dose being shed for transmission and infection, and
- The bighorn sheep must become infected and replicate the organism(s) in sufficient quantity to both transmit and to reach other organ systems to cause disease.

Each of these steps has a probability associated with them, and regarding the limited overlap of Sheep Station grazing near bighorn sheep habitat, it is in question whether these events would occur in a quantity high enough to lead to disease and/or a further transmission event. Knowles (2010) also submitted a letter to the Payette National Forest clarifying that the study by Lawrence et al. (2010) indicates that "even extended fence line contact of 2 months didn't lead to disease and death" in bighorn sheep until 48 hours of confined co-mingling occurred. He concludes that the data from Lawrence et al. shows that transmission of *Mannheimia haemolytica* between domestic and bighorn sheep is a complex concept, requires extended periods of time, and doesn't necessarily lead to disease without confined co-mingling. Therefore, details of contact should be incorporated into management plans and risk models.

Payette National Forest Decision

State and federal agencies across the Western United States model bighorn sheep habitat and updated herd distribution based on models used for the Payette National Forest. In 2010 the Payette National Forest made a decision to discontinue sheep grazing in a number of areas where bighorn sheep use and domestic sheep use overlap. This decision was based on extensive modeling of observed bighorn sheep use and available habitat. The models predicted core herd home ranges with 95 percent confidence, a foray analysis, and summer source habitat. These models were then used to predict potential effects on a larger metapopulation of bighorn sheep made up of the smaller subset of herds and their potential interactions. The analysis and decision was completed to ensure compliance with regulations including National Forest Management Act, Hells Canyon National Recreation Area Act, and USDA Forest Service Sensitive Species Policy.

Since the Sheep Station is approximately 200 miles east of the Payette National Forest, the modeling process and effects analysis used on the Payette National Forest was reviewed. However, little to no telemetry data exists for bighorn sheep in the project area, and, therefore, core herd home ranges, foray areas, and metapopulations cannot be accurately delineated in order to assess risk. In lieu of this information a number of other sources were considered in order to accurately portray the existing condition and potential effects.

Idaho Department of Fish and Game (IDFG) Bighorn Sheep Management Plan

Idaho has drafted source habitat maps and bighorn sheep "Population Management Units" (PMU) which are displayed in the Idaho Department of Fish and Game Bighorn Sheep Management Plan, 2010. This data was considered in the Sheep Station analysis to better identify which bighorn sheep herds might be affected and where potential habitat or occupied habitat occurs. Idaho Department of Fish and Game population management units were formulated from opportunistic bighorn observations, potential suitable habitats and game management boundaries. It should be noted that population management units are general estimates of potential herd use and do not equate to core herd home ranges used in the Payette analysis which predicts bighorn sheep occupancy with 95 percent confidence based on telemetry information.

Bighorn Sheep Herd Information

ARS properties in Idaho are within Idaho Game Management Unit 61 of the Upper Snake Region. A small population of bighorn sheep occurs on the Idaho-Montana border in the Lionhead area of Idaho Game Management Unit 61. In Montana, this bighorn herd is known as The Hilgard herd, Montana Hunting District 302, with an estimated population of 105 animals, and a population goal of 100. The herd has limited available winter range, thus the Montana Fish Wildlife and Parks goal is to manage the herd at current levels. The herd is separated from the East and West Summer Ranges which include Odell Creek, Big Mountain, and Toms Creek grazing units by a distance of approximately 20 miles, Henry's Lake basin, and substantial geographic topography along the continental divide. Although the Idaho Bighorn Sheep Management Plan delineates the Lionhead population management unit closer to ARS property, there is no indication that a herd occupies the area adjacent to Toms Creek and-or Odell Creek grazing units. Neither the Idaho Fish and Game Bighorn Sheep Progress Report (2009) nor the Montana Draft Bighorn Sheep Strategy (2009), or the Idaho Bighorn Sheep Management Plan (2010) suggests any known interaction between the Hilgard/Lionhead herd and Sheep Station grazing activities. According to the Idaho Fish and Game Bighorn Sheep Progress Report, 12-15 sheep are seen in Idaho during the summer months.

Bighorn sheep populations in other adjacent areas of Montana, which are also outside of ARS properties, include the Tendoy Mountain herd, over 20 miles to the northwest of the Humphrey Ranch. The herd is in

Montana Hunting District 315, with an estimated population of 59, and a population goal of 200. It is currently closed to hunting until objectives are achieved.

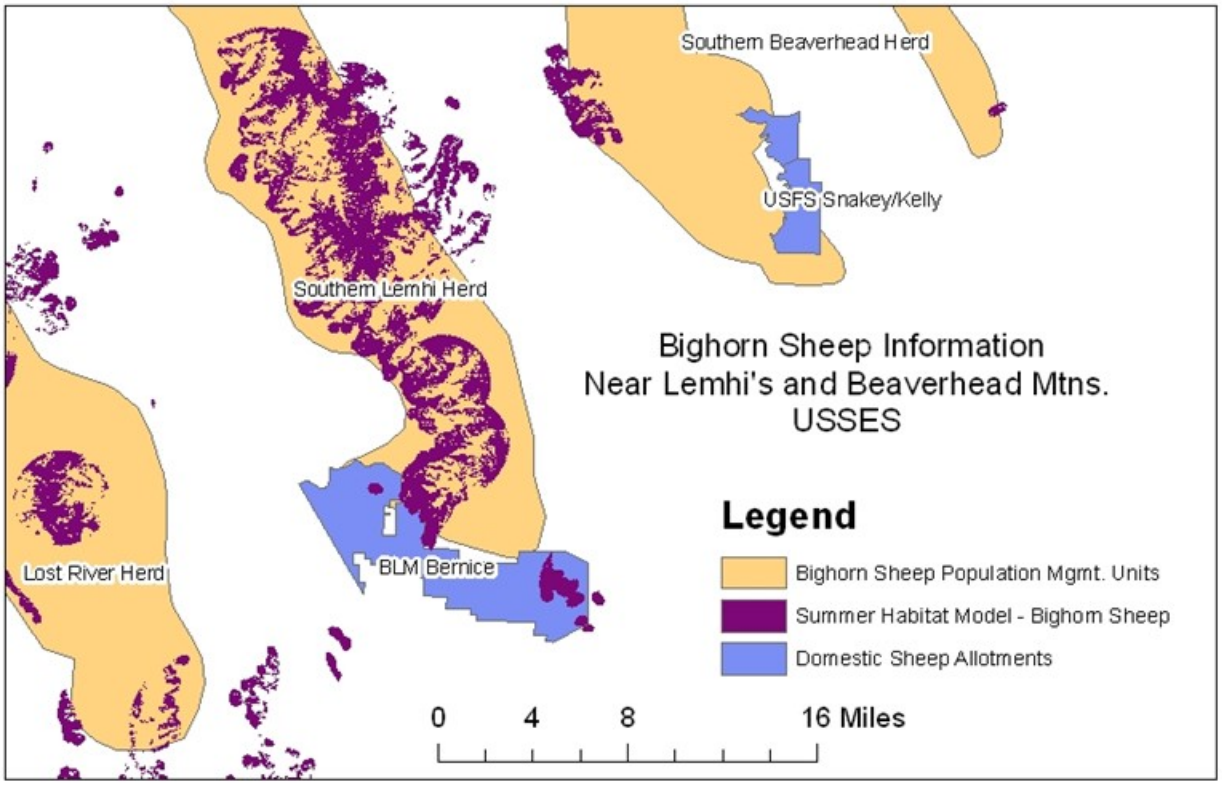

Figure 37. Bighorn sheep Idaho herd boundaries and modeled summer habitat near Snakey-Kelly grazing allotments used by the Sheep Station. (Based on Peyette Summer Habitat Model used in IDFG Bighorn Sheep Management Plan)

The Sheep Station also grazes sheep on National Forest System allotments (Snakey-Kelly). A review of the 2009 Idaho Progress Report indicates that:

- In the Beaverhead Range, the Snakey Canyon domestic sheep allotment (USDA Forest Service) overlaps with bighorn sheep range in Idaho Game Management Unit 59a.
- Observations of 30 bighorn sheep in the Lemhi range and nine bighorn sheep in the Beaverhead range occurred in 2007.
- There is no documented interaction/contact between domestic sheep and bighorn sheep on these allotments. However, there was one incident where a stray domestic sheep was observed three linear miles from bighorn sheep and a Sheep Station employee subsequently removed the domestic sheep.

Rocky Mountain Bighorn Sheep Direct and Indirect Effects

Modified Alternatives 1, 3, and 4 Direct and Indirect Effects to Bighorn Sheep

Effects from activities in these three alternatives are the same since each proposes similar livestock grazing and associated activities near occupied bighorn sheep habitat. Bighorn sheep are not directly affected by grazing on any of the ARS properties, because bighorn sheep do not occur there. The Hilgard bighorn herd in Montana (Lionhead Herd in Idaho) is over 17 miles away from the nearest ARS property (Summer East pasture), and the Tendoy bighorn herd also in Montana is over 23 miles away from the

Humphrey property. Interaction between domestic sheep on ARS properties and existing bighorn sheep herds is not known or expected to occur.

Sheep Station sheep grazing on the Forest Service Snakey - Kelly allotments has the potential to negatively affect the Idaho bighorn herds reintroduced into the Beaverhead range. However, measures in place are appropriate methods to minimize the potential of contacts, limit the probability of transmission and disease, and are consistent with Idaho direction. Bighorn sheep are thought to be geographically and temporally separated from areas grazed by Sheep Station domestic sheep on the Snakey-Kelly allotments, by an approximate distance of three miles or more of rough terrain and heavy snow loads during winter months (Keetch 2008, Personal communication). Bighorn sheep are known to occupy the west side of the Beaverhead Mountains in the winter months, while the Sheep Station grazes domestic sheep on the east side of the Beaverheads (Snakey - Kelly allotments) November through January. Based on a review of parameters modeled in Clifford et al. (2009), bighorn sheep herds that occupy the Beaverhead range have a minimal probability of coming into contact with domestic sheep over a period of a decade.

Alternatives 2 and Modified Alternative 5 Direct and Indirect Effects to Bighorn Sheep

Ending Sheep Station sheep grazing on the Snakey - Kelly allotments would occur in both alternatives 2 and 5. Alternative 2 eliminates all domestic sheep grazing by the Sheep Station while alternative 5 eliminates grazing in the National Forest System Snakey - Kelly allotments.

Grazing activities on ARS properties are not known or expected to affect the existing Tendoy and Hilgard/Lionhead bighorn sheep herds, so the alternatives would not change the condition of these bighorn sheep herds.

Ending Sheep Station sheep grazing on the Snakey - Kelly allotments would eliminate one potential source of infection to bighorn sheep in the Beaverhead Mountains. However, removal of this potential vector for disease spread would have unknown potential to eliminate or even largely reduce respiratory disease in the existing bighorn herds for the following reasons:

- Grazing on these allotments occurs outside of the suspected core winter range areas for these bighorn, and the bighorn summer ranges include a much larger landscape that intersects other potential sources of disease transmission.
- The small size and condition of the reintroduced bighorn sheep herds in this portion of Idaho may have many plausible explanations and is as likely to be a result of factors not associated with Sheep Station activities. They include respiratory diseases naturally circulating within the bighorn sheep population, limiting habitat conditions such as nutritional value of forage, fragmented seasonal migration routes, limited winter range capability, and other livestock operations.
- Ending Sheep Station grazing on the Snakey-Kelly allotments would reduce one potential vector of respiratory disease transmission. It is speculative that these alternatives would result in an observable change in the existing bighorn sheep herds' condition, health, or population. Just as likely, bighorn sheep herds would remain unaffected by these alternatives, and continue in their current condition.

Rocky Mountain Bighorn Sheep Cumulative Effects

The spatial boundary for the discussion of cumulative effects for bighorn sheep is the upper Snake River Region in Idaho as well as the Montana portion of the Centennial Mountain Range, because this area encompasses all Sheep Station grazing activities that occur in occupied and potential bighorn sheep habitat, and considers state management objectives for known bighorn herds in the area. The temporal boundary is 10 years because projections beyond this time period are less likely to be accurate.

The expected level of the effects for the project would not to contribute to overall cumulative effects in a way which is detrimental to bighorn sheep management in this portion of Idaho and Montana considering the following points:

- Grazing Sheep Station sheep on Forest Service lands has only a minimal risk of contact between bighorn sheep and domestic sheep because of geographic and temporal separation.
- Grazing Sheep Station sheep near occupied bighorn sheep habitat includes the presence of guard dogs and full-time sheep herders, which affords additional protection measures to reduce the possibility of actual contact between bighorn and domestic sheep.
- The Sheep Station follows the specified actions listed in the Bighorn Sheep Action Plan which includes procedures to manage separation between bighorn sheep and domestic sheep, and initiate a communication plan for prompt removal of infected bighorn or domestic sheep should contact be suspected.
- Although the risk of contact from Sheep Station activities can only be completely eliminated in alternative 2, additional sources for spread of respiratory disease occur throughout known or suspected bighorn sheep range. Thus, bighorn populations are expected to continue in their current condition and trend, regardless of which alternative is selected.
- There are no known or foreseeable planned bighorn sheep reintroductions in areas grazed by the Sheep Station. The proposed action and its alternatives do not preclude bighorn sheep reintroductions; however domestic sheep grazing is one variable that influences sites chosen for reintroduction.

Sage Grouse (Centrocercus urophasianus)

Sage Grouse Affected Environment

Sage-grouse are common on low elevation lands of the Sheep Station, particularly the Headquarters. Annual lek route surveys indicate that sage-grouse habitat on the Headquarters continues to attract numerous sage-grouse for breeding and nesting. The area falls within the Upper Snake Sage-grouse Planning Area identified by the Idaho Department of Fish and Game. This analysis synthesizes information pertinent to the local area including a review of the *Conservation Plan for the Greater Sage-grouse in Idaho* (2006) https://fishandgame.idaho.gov/public/wildlife/sageGrouse/, *Plan for Increasing Sage Grouse Populations Developed by the Upper Snake Sage Grouse Local Working Group* (2004), the *Greater Sage-grouse Habitat and Population Trends in Southern Idaho Progress Report* (2008), and sage-grouse lek survey data collected on ARS properties. Field visits were conducted in 2008 and 2009 to gather additional information regarding vegetation conditions (summarized in the range resource report), fire disturbance history, and to review habitat conditions and issues with area biologists.

The 2015 status review conducted by the U. S. Fish and Wildlife Service found that the greater sage-grouse remains relatively abundant and well-distributed across the species' 173-million acre range and does not face the risk of extinction now or in the foreseeable future http://www.fws.gov/greaterSageGrouse/findings.php. The Service's decision follows an unprecedented conservation partnership across the western United States that has significantly reduced threats to the greater sage-grouse across 90 percent of the species' breeding habitat. The U. S. Fish and Wildlife Service has determined that protection for the greater sage-grouse under the Endangered Species Act is no longer warranted and is withdrawing the species from the candidate species list. A review of greater sage-grouse life history can be found in the 2004 *Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats* (Connelly et al. 2004). A condensed version of life history specific to Idaho from the Idaho Fish and Game Comprehensive Wildlife Conservation Strategy (2006) is summarized below.

The greater sage-grouse occurs in 11 states and two Canadian provinces including: Alberta, California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, Saskatchewan, South Dakota, Utah, Washington, and Wyoming. This bird is widely distributed throughout sagebrush dominated habitats of southern Idaho (Schroeder et al. 1999).

Recent analysis of breeding population data indicates that 11 of 13 (85 percent) states and provinces showed significant long-term declines in size of active leks. Greater sage-grouse populations declined at an overall rate of 2.0 percent per year from 1965-2003. From 1965-1985, the sage-grouse population declined at an average of 3.5 percent per year. However, from 1986-2003 the population declined at a much lower overall rate of 0.4 percent. In Idaho, sage-grouse populations declined at an overall rate of 1.5 percent per year from 1965-2003. From 1965-1984, the population declined an average of 3.0 percent per year but from 1985-2003 the population had an annual change of only 0.1 percent per year (Connelly et al. 2004).

Greater sage-grouse are totally dependent on sagebrush-dominated habitats. Breeding habitat (areas used for breeding, nesting, and early brood rearing) is characterized by sagebrush canopy coverage of 15-25 percent with a healthy grass and forb understory (Connelly et al. 2000). During summer, sage-grouse may use a variety of habitats but are generally found in areas with succulent forbs and insects. Winter habitat consists of relatively large areas of taller sagebrush with 10-25 percent canopy cover. During the winter sage-grouse consume 99 percent sagebrush in their diet. In early spring the diet consists largely of sagebrush and some forbs. During later spring and summer, the bird's diet includes insects and forbs. Clutch size varies from 6-9 eggs and incubation time ranges from 25-29 days. Chicks are precocial and grow rapidly. Breeding is common for yearling hens and yearlings often have smaller clutches than adults (Schroeder et al. 1999). Sage-grouse are typically long-lived (4-5 years is not uncommon) with low reproductive rates compared to other game birds. Survival differs among age and gender groups and adult females tend to have higher survival rates than males or juvenile females.

In general, the loss, degradation, and fragmentation of sagebrush habitat are the major threats to the greater sage-grouse in Idaho (Connelly et al. 2004). Factors contributing to habitat degradation include alteration of historical fire regimes, conversion of land to farming or intensive livestock forage production, water developments, use of herbicides and pesticides, establishment of invasive species, urbanization, energy development, mineral extraction, and recreation (Connelly et al. 2004).

Sage-grouse have used the habitat in, on, and around the Sheep Station prior to settlement of the area. Sage-grouse research on the Sheep Station shows that they use the Headquarters area for breeding, nesting, and early brood-rearing activities. In late summer many of the grouse move further north towards Henninger and the foothills of the Centennial mountain range. They spend the late summer and early fall there before returning to the Sheep Station on a gradual migration to the south and lower elevations (such as areas around the Idaho National Laboratory (Department of Energy)). Some sage-grouse stay on the Headquarters property year-round, but most use it seasonally. It plays an important role in population growth and stability as it provides key habitat for pre-nesting, breeding, nesting, and early brood-rearing.

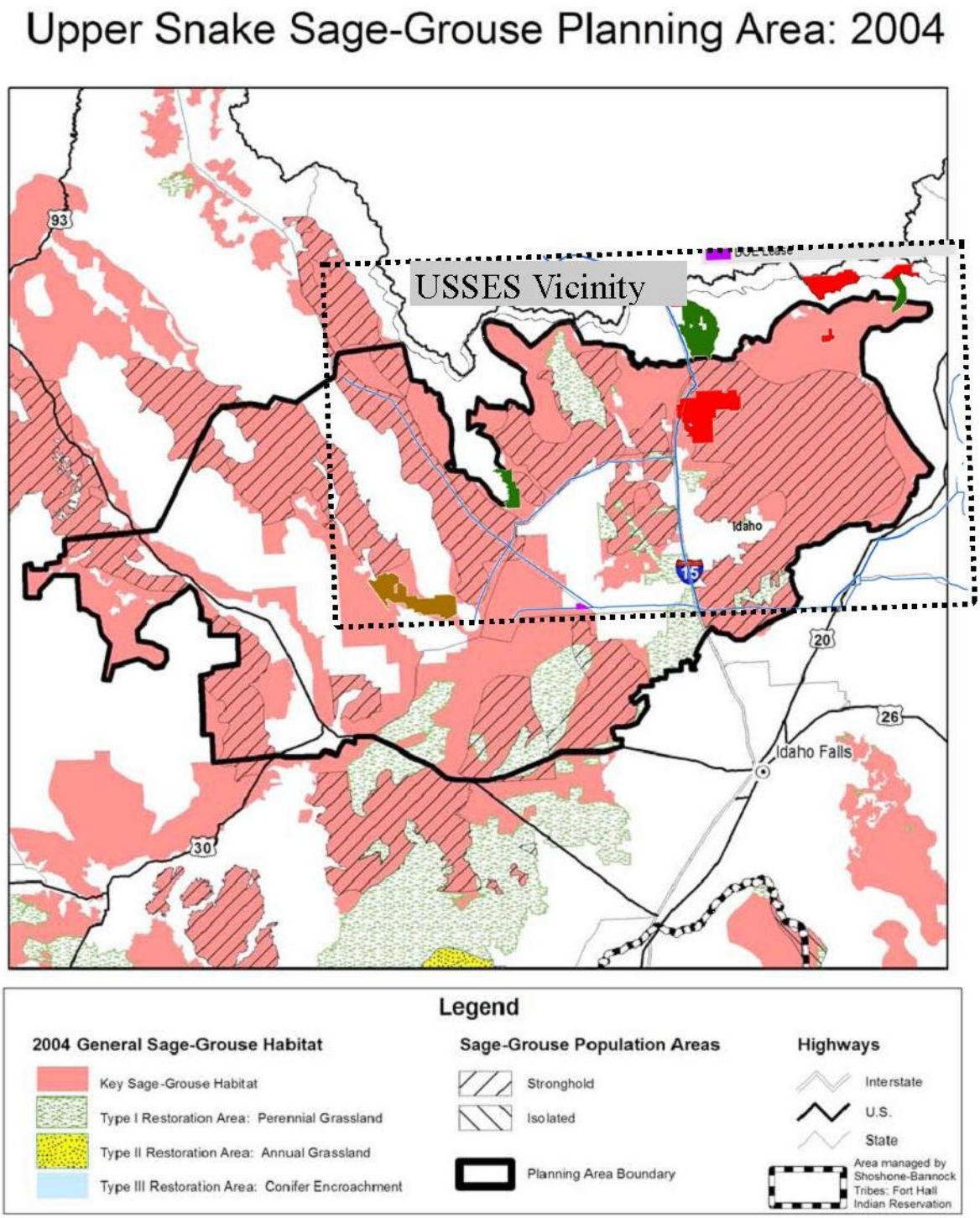

Figure 38. Upper Snake sage-grouse planning area with ARS properties and allotments

Lek surveys have been collected on Sheep Station Headquarters regularly from 1978 through 2009. Through a variety of observers and varying count methodologies, a trend of improvement is indicated. An informal review of past count information on the Sheep Station (Sheep Station personnel 2008, personal communications) shows that in 1966, 12 active leks were identified on the entire headquarter section of the Sheep Station. In the period of 2003 through 2009, the number of active leks on established routes

varied between 12 and 14. The Sheep Station has identified an approximate total of 20 active leks on the Headquarters property, but not all are included in the annual Upper Snake annual monitoring protocol. Overall the Sheep Station has seen fluctuations in the number of leks and the number of males strutting on each lek.

Nevertheless, numbers have increased since 1978. In 1978 there were 167 males on 10 active leks; in 2009 there were 351 males on 12 active leks. Hulet et al. (1986) studied movements and habitat selection of greater sage-grouse at the Sheep Station and found that some birds made very long seasonal migratory movements between the Sheep Station and winter range located towards the Department of Energy Idaho National Laboratory property to the south.

According to figures in the *Idaho Sage-grouse Local Working Group's Statewide Annual Report*, (2015), sage-grouse productivity in the upper snake has typically been similar to or higher than the statewide average. In 2009 through 2014, the Upper Snake Sage-grouse Planning Area showed relatively stable production with the number of active leks ranging between 111 and 126, average number of males per lek ranging between 12 and 18, and the total number of males counted at leks ranging between 1,234 and 1,575.

The *Conservation Plan for Greater Sage-grouse in Idaho* (2006) attributes habitat threats in the Upper Snake planning area primarily to a conversion to croplands and influences from roads and power lines, while wildfire has played only a minor role in habitat loss.

There are a number of conservation measures employed by the Sheep Station to minimize effects of sheep grazing and proposed activities. They include the following:

- Most leks have been identified on the ground and have previously been inventoried on an annual basis. As a result, the Sheep Station is able to closely monitor sage-grouse breeding populations and submit data to Idaho Game and Fish personnel.
- The Sheep Station employs a grazing strategy that avoids using active lek sites during the courtship season. During the period when leks are active, temporary troughs for watering sheep are specifically placed in locations and pastures without leks, in order to avoid disturbance. Also, full time sheep herders manage the daily movements of sheep and, thus, are able to assist in keeping sheep away from active leks.
- After courtship season, the temporary water troughs are specifically placed in sites that previously had active leks. Concentrated sheep activity keeps shrub encroachment to a minimum, ensuring that leks persist annually and do not become overgrown with big sagebrush.
- Sheep are moved rapidly through pastures which results in minimal disturbance to nesting or brood rearing sage-grouse that might be in the area, and utilization on forbs and grasses remains light. Pasture sizes on the Headquarters vary from approximately 640 acres to 1,100 acres, and sheep are moved through a pasture in six or seven days.

Fire History in Sage-grouse Habitat

Both wildfire and prescribed fire to improve range land has occurred on ARS property with records dating back to 1936. Burn records show that approximately 19,000 acres have burned in the past 30 years and approximately 4,000 acres have burned in the last 10 years. These figures represent total acreages burned, areas that have burned more than once, and a mosaic of burned and unburned patches within burn polygons. Prescribed fire has occurred in previous years at a rate of approximately 670 acres annually. These historical rates of natural and prescribed fire are greater than guidelines in Connelly et al. (2000) which suggest no more than 20 percent of breeding habitat should be modified in a 20-year breeding period. Despite this history of fire disturbance, ARS properties continue to support a healthy and stable

sage-grouse breeding population and associated leks. The continuing health of the sage grouse population and habitat on ARS properties is thought to be attributed to the patchy mosaic and small size of past fires, quick regeneration of sagebrush based on locally mesic conditions, and large expanses of dense sagebrush cover that remains across the headquarters property.

Sage-grouse Direct and Indirect Effects

Modified Alternative 1

This alternative would continue grazing practices as currently constituted. From mid-January to mid-April there would be no effect to sage-grouse, because all sheep would be on the Headquarters feedlots. From mid-April through mid-June, approximately 3,300 sheep would be grazing the Headquarters pastures. Although this could affect sage-grouse breeding, nesting, and early brood-rearing activity, conservation measures are in place that would minimize impacts and interactions of sheep with sage-grouse by avoiding leks, known nesting areas, and known early brood-rearing areas. Therefore, the effects to sage-grouse during this period would not greatly reduce productivity. From late June to early July (2 weeks) about 2,000 sheep would be moved north to graze on the Henninger ranch property. Local data shows that some sage-grouse move toward this area as early as late June. There would be some displacement of sage-grouse on this 1,100 acre property during this two week period, but effects to the population as a whole would be minimal due to the small proportion that the Henninger ranch comprises of the total available habitat on the surrounding BLM landscape. The remaining 1,300 sheep not on Henninger would be split between two areas: Humphrey ranch and East Beaver (both of which contain very little productive sage-grouse habitat because of their higher elevation). There would be minimal negative effects of displacement of grouse in these areas and overall effects to productivity, movements, or migrations would be minor.

From September to November all of the sheep return to the Headquarters pastures. This coincides with the movement and flocking of the grouse to the Headquarters range in their normal movements to lower elevations preparatory to winter. Some temporary displacement would occur as grouse avoid sheep herds. However, during the autumn season sage-grouse diets are rapidly changing to almost 100 percent utilization of sagebrush, so any dietary overlap with sheep would be minimal. Very few sage-grouse utilize the winter habitat near where sheep would be grazing on the Snakey-Kelly allotments because they are suboptimal with salt desert shrub habitat being more dominant, and therefore the effects would be negligible.

Planned prescribed fire would initially create a temporary loss of nesting, brood-rearing, fall, and winter habitat for sage-grouse in the 160 acre patches totaling 800 acres over the 5 years of planned burns. This small loss of habitat would temporarily displace grouse for a 5-10 year period until shrubs begin to reestablish and the areas return to use by brood-rearing grouse. It would take a total of 20-40 years for each burned area to return to a later mid-seral or pre-burn state. This may cause grouse to shift use of traditional areas until the area has recovered or provides optimal herbaceous requirements during each specific season of use. Given that the proposed acreage is minimal compared to the large amount of similar habitat available across the Headquarters property, these small-scale fires would not have a major effect on sage-grouse. Benefits to habitat overall would be derived from activities that increase a mosaic of shrubs, forbs, grasses; and maintain lek sites. There would be less desirable effects from temporary displacement of grouse and seasonal dietary overlap of grouse and sheep. Given the conservation measures in place, the overall balance between positive and negative effects to grouse would have a fairly neutral result. Sage-grouse populations would be maintained at levels similar to those present, and habitat on the Sheep Station would be maintained in a healthy condition overall and well distributed.

Alternative 2

Alternative 2 represents the no grazing alternative with a 65 percent reduction in the total number of sheep grazed, with remaining sheep maintained in feed lots. Grazing would be discontinued on all other properties. The direct and indirect effects to sage-grouse could be both beneficial from reduced grazing, and detrimental where vigorous forb and herb cover is decreased. A study performed on the Sheep Station (Bork et al. 1998) showed that areas of fall sheep grazing exhibited significantly greater live forb and herb cover than at control plots, and areas of spring sheep grazing exhibited significantly greater live shrub cover than control plots. Each of these components of sage-grouse habitat would be somewhat reduced, and the mosaic across the landscape would decrease to a moderate extent over the long term. However, displacement of sage-grouse from habitat and associated behavioral disturbances from livestock would be reduced. Overall, many of the potential benefits of reduced livestock would likely be offset by the loss of a mosaic among forb, grass, and shrub cover no longer created through Sheep Station activities.

Modified Alternative 3

The effects of alternative 3 differ from those of the proposed action. The differences are in the details of the grazing timeframes in Henninger and at Headquarters and the 20 percent reduction of total numbers of sheep from modified alternative 1. Instead of high-intensity short-duration grazing on Henninger, this alternative would result in low-intensity long-duration grazing. It would allow 340 sheep to graze from early June to sometime in mid-September when they would bring about 200 head back to Headquarters. The effects of longer duration grazing, even with fewer sheep, could cause long-term avoidance of that area by sage grouse during the season of sheep use. The direct effects of displacement on Henninger would be more pronounced than a two-week high-intensity use of the area. The indirect effects of having low-intensity and long-duration grazing would be decreased forb availability and abundance for sage-grouse. Sheep would have a longer duration to select for and thereby reduce succulent forbs important to post-nesting hens and new chicks. This alternative would place a large number of sheep (2,300-2,640) on the Headquarters pastures for a longer period of time causing additional detrimental effects to sage-grouse productivity during the nesting and brood-rearing seasons. It would be more difficult to implement avoidance conservation measures prescribed in those areas because of the increased duration of grazing in occupied habitat. The direct impacts could include disruption of nesting and brood-rearing activities, as well as seasonal (rather than short term temporary) displacement to suboptimal habitats. In addition, indirect impacts of long-term grazing plus prescribed fire would result in decreased forb abundance and diversity.

Modified Alternative 4

The effects of alternative 4 are the same as those of the proposed action (modified alternative 1) until early July through September. During that time, to minimize potential conflicts with grizzly bears, 2000 sheep would not graze the East Summer Pasture (Toms Creek) or Meyers Creek (National Forest System land), but would instead be placed in the West Summer Pasture (Odell and Big Creek) on the Centennial Range. Due to the fact that very few sage-grouse use the area and the habitat found throughout the Centennial Range is interspersed with conifers, the direct and indirect effects to sage-grouse of this alternative are the same as the proposed action and any differences are negligible.

Modified Alternative 5

The effects of modified alternative 5 are similar to the proposed action. However due to the 30 percent reduction in total sheep numbers (from 3,330 to 2330), less disturbance would occur during the breeding and brood-rearing season. The conservation measures in place would largely neutralize these effects. In addition the sheep would not be grazed southwest of Headquarters at the Snakey-Kelly allotments, but would instead be put in the feed lot from October into April. This change in winter grazing would have

negligible effects on sage-grouse or their habitat, so the effects would remain similar to those of Modified Alternative 1, but reduced because of fewer sheep numbers.

Sage-grouse Cumulative Effects

The spatial boundary for the discussion of cumulative effects for sage-grouse is the Upper Snake Sage Grouse Planning Area because it is the population boundary as managed by the Idaho Department of Fish and Game. The temporal boundary is 10 years, because projections beyond this time period are similar to those being described but with decreased precision. The expected level of effects from this project would not combine with overall cumulative effects in a way that is detrimental maintaining healthy sage-grouse populations and habitat in the Upper Snake Planning Area, considering the following points:

- Idaho Fish and Game assessed overall lek productivity in the Upper Snake Planning Area and found that counts were greater than 150 percent of the average 1996-2000 counts. Because of this increased productivity, daily hunting bag limits were increased and the length of the hunting season was expanded (Idaho sage-grouse Local Working Group Statewide Annual Report 2008).
- There has been a relatively stable trend of leks and males counted on leks during the past five years, indicating that habitat has not been limiting survival and productivity.

Pygmy Rabbit (Brachylagus idahoensis)

Pygmy rabbit was found to be "not warranted for listing" by the USDI Fish and Wildlife Service in September, 2010 (USDI Fish and Wildlife Service 2010).

The effects to pygmy rabbits under alternatives 1, 4, and 5 are similar. Temporary displacement of pygmy rabbits would occur in these alternatives. Pygmy rabbits would persist with population numbers and trends similar to the current condition, considering that they still exist in the same areas they were found in the 1950s, despite the last 50 years of grazing and land management in the area. From mid-March through mid-May, conservation measures taken to avoid sheep/grouse interactions on leks could create increased disturbance to rabbits. As areas close to leks are avoided, thicker more dense patches of sagebrush habitat may be used. This could directly impact feeding and/or breeding activities of rabbits. Only minimal dietary overlap between sheep and rabbits would occur, so the effects would be negligible. Because pygmy rabbits live in older, taller, denser stands of sagebrush and mixed shrubs, prescribed or wildland fires can eliminate, fragment, or degrade portions of pygmy rabbit habitat until shrub cover returns to a mature state. A study in Utah at similar elevations showed that pygmy rabbits would only venture 50 meters from the edge of mechanical treatments. Prescribed fire research in occupied pygmy rabbit habitat should consider design features that include narrow burn strips or an unburned sagebrush matrix to allow for continued occupancy by pygmy rabbit. Modified alternative 3 grazes a larger number of sheep at Headquarters for a longer duration. The effects of that alternative would be a longer temporal disturbance with additional displacement of pygmy rabbits. Alternative 2 would eliminate any interaction with or displacement of rabbits because all of the sheep would be on feedlots.

Pygmy Rabbit Affected Environment

The pygmy rabbit was found not warranted for federal listing by the U. S. Fish and Wildlife Service in 2010. A condensed version of life history specific to Idaho from the Idaho Fish and Game Comprehensive Wildlife Conservation Strategy (2006) is summarized below.

The pygmy rabbit is a sagebrush obligate inhabiting areas characterized by cold winters, warm summers, and scant precipitation. Elevations range from 900-2380 m (2800-7800 feet). Habitat comprises dense, tall stands of big sagebrush growing on deep, friable soils that allow the rabbits to dig rather extensive burrow systems (Janson 2002). Landscape features includes alluvial fans and hillsides, swales within

rolling topography, floodplains, brushy draws, riparian channels, edges of rock and lava outcroppings, and mima mounds (low, circular mounds of loose, unstratified soils that support distinctly taller patches of sagebrush). Sagebrush is the primary food item of pygmy rabbits and may comprise up to 99 percent of the winter diet (Green and Flinders 1980). Native forbs and grasses comprise a larger proportion of the diet (30-40 percent) in spring and summer. Under deep snow conditions, dense and structurally diverse stands of big sagebrush facilitate subnivean burrowing, providing access to forage and protection from predators and thermal extremes (Katzner and Parker 1997).

This species occurs in the Great Basin and adjoining intermountain regions. Populations are widely scattered across this landscape in association with tall, dense sagebrush aggregations with deep, loose soils of alluvial origin that allow burrowing. In Idaho, pygmy rabbits occur across the southern half of the state. The species is considered rare in Idaho, though data on abundance and population trends are generally lacking. Recent surveys for presence of pygmy rabbits have augmented statewide distribution data and documented relatively abundant populations in localized areas.

Loss, alteration, and fragmentation of sagebrush-steppe habitat and apparent declines in pygmy rabbit populations have elevated concern for this species (Knick and Rotenberry 1995). Since settlement by Europeans, sagebrush-steppe landscapes in Idaho and across the sagebrush biome have been greatly altered, resulting in loss and fragmentation of habitat for many sagebrush obligate species, including the pygmy rabbit. Agents of habitat loss and degradation include agricultural conversion, urbanization (and related infrastructure networks), prescribed and wildland fire, invasive plants (e.g. cheatgrass), conifer encroachment, vegetation treatments that remove sagebrush, and unsustainable livestock grazing (Connelly et al. 2004). Fragmentation of pygmy rabbit habitat has implications for this small mammal with limited dispersal capabilities, including reducing overall population size, isolating disjunct populations, increasing susceptibility to disease and other localized threats, and reducing gene flow among populations (Gilpin 1991).

Although extensive data on population numbers and the current distribution are somewhat lacking, research in the late 1970s showed that pygmy rabbits occurred on portions of ARS properties and they were abundant in those locations. Limited data obtained from the Idaho Department of Fish and Game showed four different point locations for pygmy rabbits on ARS properties and many locations on lands adjacent to the ARS properties. Suitable habitat exists not only on ARS properties, but on adjacent BLM, National Forest System, DOE Idaho National Laboratory, and private lands. The range assessment on ARS properties (July 2009) showed that two of the seven sites measured on ARS properties have similar shrub cover components to those measured on ARS properties in the late 1970s where pygmy rabbits occurred.

Pygmy Rabbit Direct and Indirect Effects

Modified Alternative 1

This alternative would continue grazing practices as currently constituted. From approximately mid-January to mid-April there would be no effect to pygmy rabbits, because all sheep would be on the Headquarters feedlot. Temporary disturbances to rabbits would begin as sheep are released to graze in the Headquarters pastures in mid-April. This disturbance may be exacerbated when sheep are moved to avoid interactions with grouse on leks. This may move sheep into areas of thicker more dense patches of sagebrush habitat, which, if occupied, are key to pygmy rabbit survival. This could also have small direct impacts on feeding and/or breeding activities of rabbits. There is very little dietary overlap between sheep and pygmy rabbits, so lasting effects of grazing to the vegetation needed by pygmy rabbits would be negligible.

From June through mid-September sheep would be grazing on the Henninger, Humphrey, and East Beaver pastures to the north. Pygmy rabbits are not expected to occur in these areas because of the habitat changes associated with higher elevations and soil types. No effect to pygmy rabbits is expected from activities in these pastures. During mid-September through mid-October, while all sheep are back on the Headquarters pastures there would be some displacement of pygmy rabbits or disruption of normal behaviors, but the effects would be minor. Late fall/winter grazing to the south would minimally affect pygmy rabbits. Dietary preference of pygmy rabbits switches from a mixture of shrubs, grasses and forbs, to about 99 percent sagebrush during the winter months. Grazing sheep on the Kelly and Snakey pastures to the south could temporarily disturb rabbits in that area. Effects would be minimal due to the fact that two-thirds of the total number of sheep grazed would be spread out over multiple pastures for about a month and a half each. More rabbits would be affected by winter grazing, but the disturbance would last for a shorter period of time, over a larger area and thus, is not expected to be of concern.

The proposed prescribed burning would have the potential to eliminate, fragment, and/or degrade a small amount of habitat (500 acres) by removing sagebrush. Pygmy rabbits prefer areas of dense mature sagebrush, ideally at a very late seral stage. The highest quality habitat may take 50 or more years to return to pre-burn conditions. Therefore, the small size and juxtaposition of prescribed burns would be important in minimizing long-term degradation of pygmy rabbit habitat. The small size of the proposed burning indicates minimal effects to pygmy rabbit and their available habitat.

Alternative 2

The direct and indirect effects to pygmy rabbits could be both beneficial and detrimental in nature. A study performed on the Sheep Station (Bork et al. 1998) showed that areas grazed in the spring by sheep exhibited significantly greater live shrub cover than in control plots. The same study showed that areas grazed in the fall by sheep exhibited significantly greater live forb and herb cover than at control plots. This shows that in the absence of spring grazing and other activities, shrub cover would decrease in some areas resulting in small reductions in pygmy rabbit habitat. Although displacement and behavioral disturbances to pygmy rabbit would be reduced, potential benefits would be offset by the change in forb, grass, and shrub cover no longer created through Sheep Station activities.

Modified Alternative 3

The differences of modified alternative 3 compared to the proposed action are in the details of the grazing timeframes in Henninger and at Headquarters and the approximate 20 percent reduction of total numbers of sheep. This alternative would place a larger number of sheep on the Headquarters pastures for a longer period of time causing additional potential for displacement and disruption of pygmy rabbit daily activities. Increased utilization by sheep would result in further reductions in shrub cover important to pygmy rabbits. On Henninger, the change is unlikely to affect pygmy rabbits because they are not known or expected to occur in that pasture.

Modified Alternative 4

The effects of modified alternative 4 are the same as those of the proposed action. To minimize potential conflicts with grizzly bears, 2,000 sheep would not graze the East Summer Pasture (Toms Creek) or Meyers Creek (National Forest System land) July through September. Instead, sheep would be placed in the West Summer Pasture (Odell and Big Creek) on the Centennial Range. Pygmy rabbits are not expected to occupy these areas of the Centennial Range because habitat is naturally fragmented and interspersed with conifers.

Modified Alternative 5

The effects of modified alternative 5 are similar to the proposed action. However due to the 30 percent reduction in total sheep numbers (from 3,330 to 2,330), less disturbance would occur during the spring and early summer. In addition, sheep would not be grazed southwest in the Snakey-Kelly allotments, but would instead be put in the feed lot from October into April. This change in winter grazing would have a small positive effect on pygmy rabbits and their habitat.

Pygmy Rabbit Cumulative Effects

The spatial boundary for the discussion of cumulative effects for pygmy rabbits is the Upper Snake Sage Grouse Planning Area because pygmy rabbit distribution is similar to sage-grouse distribution, and landscape conditions and threats for that area are described in the sage-grouse Conservation Plan. The temporal boundary is 10 years because projections beyond this time period are similar to those being described but with decreased precision. The combined effects from this project and other planned projects in the cumulative area boundary would be unlikely to reduce pygmy rabbit populations or habitat beyond a critical threshold for the following reasons:

- Observational data indicates that pygmy rabbits are persisting in the same areas they were found in the 1950s, despite the last 50 years of grazing and land management.
- Fire in the Upper Snake Planning Area has played only a minor role in loss of sagebrush habitat.

North American Wolverine (Gulo gulo luscus)

Wolverines are uncommon and wide ranging, but may use ARS properties in the Centennial Mountain Range for occasional foraging. On August 13, 2014, the U.S. Fish and Wildlife Service withdrew a proposal to list the North American wolverine in the contiguous United States as a threatened species under the Endangered Species Act (ESA). The wolverine, a large but elusive member of the weasel family found in the Mountain West, has made a steady recovery in the past half century after hunting, trapping and poisoning nearly extirpated the species from the lower 48 states in the early 1900s http://www.fws.gov/mountain-prairie/species/mammals/wolverine/.

Wolverine Affected Environment

A summary of regional wolverine distribution, habitat, ecology, and issues can be found in the Idaho Comprehensive Wildlife Conservation Strategy, species accounts in appendix F (Idaho Department of Fish and Game 2005). Wolverines use large tracts of land ranging from 150 square miles to over 500 square miles, and talus slopes are important for denning. ARS properties contain good summer wolverine habitat made up of sub-alpine forests and meadows, minimal roads, and minimal human disturbance on Odell Creek, Big Mountain, and Toms Creek allotments. Winter habitat may occur in the foothills including Humphrey Ranch and Henninger Ranch properties, in particular as it relates to ungulate use as a food source for wolverine. The Headquarters property is unforested and outside of wolverine habitat. ARS properties are small in comparison to overall habitat needs, so occurrences of wolverines are expected to be uncommon. A petition to list wolverine was found not-warranted in March of 2008 by the U.S. Fish and Wildlife Service (USDI Fish and Wildlife Service 2008), because in the contiguous United States, a significant portion of its range is not represented, and it is not a distinct population segment. Idaho lists the species as imperiled (S2) and Montana lists the species as vulnerable (S3), noting that human disturbances (such as roads and motorized winter recreation) may create barriers to movement, reduce winter foraging opportunities, and may affect reproductive success. State heritage databases indicate a number of wolverine observations in the Centennial Mountain Range.

Wolverine Direct and Indirect Effects

Wolverines have not been known to depredate domestic sheep on ARS properties. No control actions have occurred, and none are expected to occur for the species. The described activities for all alternatives do not create barriers to wolverine travel, do not alter forest vegetation or ungulate populations that might affect wolverine use, and do not concentrate activity on talus slopes that might be used for denning. Sheep Station activities would have no effect on wolverine or their habitat. Potential habitat connections provided by the Centennial Range between the Greater Yellowstone Ecosystem and Central Idaho would not be altered.

Wolverine Cumulative Effects

Activities would not have effects to wolverine and, thus, would not contribute cumulative effects to wolverine populations or habitat that might be present.

American Black Bear (Ursus americanus)

Black Bears are common in ARS properties in the forested portions of the Centennial Range. Statewide, they are managed as game species and legally hunted.

Black Bear Affected Environment

The status of the American black bear in Idaho and Montana is secure (S5). The species is considered a game species and is hunted in the spring and fall in both Montana and Idaho. The species has no federal status. Black bears are common in the foothills and the high elevation areas of the Centennial Mountain Range. Encounters can occur in suitable habitat in Odell, Big Mountain, and Toms Creek allotments, Henninger Ranch, and Humphrey Ranch. Black bears generally do not occupy the Headquarters pasture, though individual bears may occasionally travel along the riparian areas of Beaver Creek, which has thick cover adjacent to the stream. Sheep herders encounter black bears on an annual basis, but most encounters do not lead to lethal control (Farr 2008, personal communication). More often, sheep are moved to a new area, guard dogs discourage further incidents, or black bears lose interest in the domestic sheep as a food source. A review of known black bear control actions on ARS properties indicates that past black bear conflicts with sheep have resulted in 11 black bears being killed in 1988 in the Odell Creek pasture during the period of the Yellowstone fire, and employees killing two black bears related to other incidents. No black bears have been trapped and relocated from ARS properties. If a black bear is suspected of killing sheep, Sheep Station staff contacts Wildlife Services to investigate the matter and implement control actions if necessary. Mitigation measures to deter bears were discussed previously in the grizzly bear section. The use of guard dogs, full time sheep herders, and trash removal are instrumental in minimizing potential depredations, conflicts, and control actions.

Black Bear Direct and Indirect Effects

The direct and indirect effects to black bears are the similar to those described for grizzly bears. However, encounters are more likely to occur annually and lethal control would be implemented on occasion. Estimated figures for past lethal control of black bears on ARS properties indicates that only a small number of black bears (less than 20) have been removed over the last 15 years, and that most conflicts end without lethal control. It is estimated that black bear removals would occur at a similar rate in the alternatives that graze sheep in the Centennial Range (alternatives 1, 4, and 5). Most years, no black bears would be killed. However, in drought years with poor food production, more bears would be taken. These figures amount to an average of one bear being killed per year. In alternatives 2 and 3, control actions for black bear are likely to be unnecessary since sheep would not be grazed in typical suitable habitat except for the small area west of Beaver Creek on Humphrey Ranch. As a result, it is likely that no black bears would be killed due to Sheep Station activities under these alternatives. In all alternatives, black bear

populations are estimated to remain secure. The proposed action and its alternatives are not expected to limit habitat connectivity as is discussed in more detail in the "Connectivity" section of the wildlife report.

Black Bear Cumulative Effects

None expected. The species is common in the Centennial Mountain Range despite legal hunting pressure and occasional control actions. Spring and fall hunting seasons that occur in Idaho and Montana are most likely to determine local black bear population statistics.

Fish and Amphibians

Fish and Amphibians Affected Environment

Fish habitat on ARS properties is limited to just a few perennial streams and lakes. In Idaho, Beaver Creek intersects Humphrey Ranch for about 1.5 miles and the Headquarters property for approximately 0.75 miles. It has substantial flow during spring run-off, and, in some areas supports stocked rainbow trout, brown trout and brook trout. During summer periods, the stream becomes a dry channel along lower sections near the Headquarters property because of decreased summer water flows and the geology of the area. Thus, it does not support a year-round fishery there.

The *Management Plan for Conservation of Yellowstone Cutthroat Trout in Idaho* (Idaho Department of Fish and Game 2007a) indicates that Yellowstone cutthroat trout are found in a few isolated tributaries to Beaver Creek, but none are on or immediately adjacent to ARS properties. Henninger Ranch has two intermittent streams, Dry Creek and Moose Creek, neither of which support a fishery.

The Montana portions of ARS properties include several drainages: Odell Creek allotment contains two branches of Odell Creek and the headwaters of Corral Creek. Big Mountain Allotment contains Spring Creek. The Toms Creek allotment contains Hell Roaring Fork and three headwater branches of Toms Creek. Odell Creek was observed to be fish bearing on ARS properties during 2008 field surveys conducted by the project biologist who noted a population of brook trout in the west branch of Odell Creek. Montana Heritage database records indicate that Odell Creek and Hell Roaring Fork Creek have westslope cutthroat trout populations.

Four lakes are within the Montana portions of ARS properties including Big Odell Lake, Little Odell Lake, Blair Lake, and Lillian Lake. Montana Fish Wildlife and Parks informed us during scoping that stocked sport fisheries are currently managed in Blair, Lillian, and Odell Lakes within the project area and could be desirable for stocked westslope cutthroat trout.

- During field surveys conducted in 2008 and 2009, the wildlife biologist identified the following amphibians:
- Spotted frogs and confirmed breeding populations in the west fork of Odell Creek, Big Odell Lake, Little Odell Lake, and Blair Lake;
- Boreal western toads on Big Odell Lake; and
- Western chorus frog on the stock watering pond on Humphrey property.

Arctic grayling use spawning habitats in lower reaches of Red Rock, Odell, and Corral Creeks downstream of the ARS properties. This downstream population is one of two confirmed native Arctic grayling populations in the 48 contiguous states. Healthy stream and vegetation conditions demonstrated in the range and watershed reports indicated that downstream sedimentation from ARS activities is not a concern. On August 19, 2014: The U.S. Fish and Wildlife Service announced that protecting the Upper Missouri River Distinct Population Segment (DPS) of Arctic grayling under the Endangered Species Act

is not warranted at this time. The efforts made by federal, State, and private partners – who have worked to address the factors that negatively influence Arctic grayling populations – have helped bring the species to the point that it does not meet the definition of threatened or endangered under the Endangered Species Act at this time http://www.fws.gov/mountain-prairie/species/fish/grayling/grayling.htm.

Interdisciplinary review of current aquatic conditions found that sheep grazing and associated activities are having minimal effects to streams and that healthy aquatic and riparian habitat conditions are being maintained for perennial streams and lakes. Most channel segments were rated as in "Proper Functioning Condition" by the interdisciplinary team, and the concerns in those segments rated otherwise are attributed to historical and other uses such as an old gravel pit (lower Beaver Creek, Headquarters), an old mining road (Spring Creek), and irrigation ditches associated with intermittent streams on Humphrey and Henninger Ranch. Stable stream channels, non-erosive banks, functioning flood plains, dense willows, and the vigor of riparian vegetation are characteristic in all of the fish-bearing streams and lakes and where amphibians are expected to occur (Summer Range). Field observation on Blair Lake, little Odell Lake, Big Odell Lake, Odell Creek and other areas indicate that quality amphibian habitat is abundant, remains occupied with breeding individuals, and effects to habitat are minimal.

Fish and Amphibians Direct, Indirect, and Cumulative Effects

Observed conditions indicate that all of the alternatives would have negligible effects to stream hydrology and associated fish habitat, as well as riparian habitats and associated amphibian populations. There would be no change in fisheries or amphibian habitat between the proposed action (modified alternative 1) and those areas of alternatives 2-5 where grazing no longer would occur. In those areas, vegetative conditions and soil compaction immediately at vacated stream crossings and watering areas would rehabilitate naturally. Downstream effects to fisheries and amphibian habitats from Sheep Station activities would remain negligible. No cumulative effects would occur.

Effects to fisheries and amphibians and associated aquatic resources are minimal, and would maintain the current condition in the proposed action (modified alternative 1), as well as in alternatives 3, 4, and 5. Areas of bare soil would occur at stream crossings. However, these effects are limited to the narrow trail width approaching the streams, which varies between five feet (typical) and 15 feet (atypical). No effects would occur to arctic grayling or westslope cutthroat trout because they occur well downstream of the project, and proposed activities would not degrade downstream habitats. There would be no effects to Yellowstone cutthroat trout because they occur in tributaries outside of and unaffected by ARS properties and activities. There would be no effect to sport fisheries that occur in the larger lakes. Effects to spotted frogs, boreal western toads, chorus frogs, and other amphibians would be rare and limited to the loss of a few individual animals (adult amphibians or larvae) in localized areas associated with watering activities in springs and lakes. There would be no effects from the small localized use of herbicides to remove invasive weeds since those activities occur outside of wetland and riparian areas. Although the location of effects may differ among alternatives because of varying locations grazed, the overall health of aquatic resources would continue similar to the current condition without threat to fish, amphibians or associated habitat.

Connectivity

Numerous scoping comments were received indicating the importance of the Centennial Mountain Range as a component of contiguous habitat for carnivores, providing linkage between the Greater Yellowstone ecosystem, Central Idaho, and the Northern Continental Divide Ecosystem. The area is relatively free of human disturbances and provides varying amounts of suitable habitat for wide-ranging carnivores including grizzly bears, wolves, black bears, wolverines, mountain lions and Canada lynx. The area’s east-west juxtaposition between the relatively intact ecosystems of Greater Yellowstone and Central Idaho

identifies it as a logical pathway for wide-ranging carnivores to migrate between populations and habitats in those ecosystems.

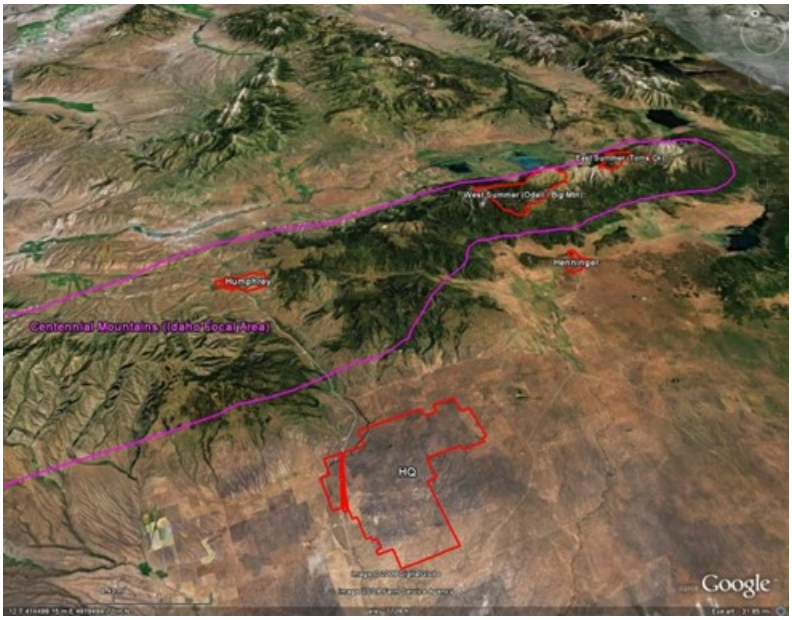

Figure 39. Centennial Mountain Focal Area (Idaho Department of Fish and Game)

Background

The Western Governor's Association developed the *Wildlife Corridors Initiative Report* (2007) and established the Western Wildlife Habitat Council to identify key wildlife corridors in the west, and coordinate implementation of needed policy options and tools for preserving those landscapes. Primary drivers for this initiative are to address changes in land use, transportation, energy development, oil and gas, and climate change while preserving sensitive wildlife habitats. Statewide maps prepared for the corridors are depicted as large polygons or arrows that indicate where more detailed corridor mapping is needed. The Idaho Comprehensive Wildlife Conservation Strategy incorporated these key wildlife corridors through the delineation of "focal areas" which include the Centennial Mountains as an area of core grizzly bear habitat.

In 2007, a workshop was conducted with numerous biologists in attendance, to examine connectivity issues between the Greater Yellowstone Ecosystem and the Northern Rocky Mountains. The summary notes for this workshop, (Beckman et al. 2008) indicated:

- There is a need or desire to provide linkage habitats for wildlife, particularly wide ranging carnivores, between the Greater Yellowstone Ecosystem, Central Idaho, and the Northern Rocky Mountains.
- General agreement among the group that loss of linkage is due to rapid loss of valley bottom habitats from human population expansion and associated infrastructure.
- Themes emerged regarding issues related to livestock grazing and carnivore conservation including mistrust, lack of information sharing, ineffective compensation programs, and economic shifts (such as changes in livestock industry coupled with housing development in open spaces).
- The group is planning to reconvene in the future to identify and prioritize specific connectivity issues in the Centennial region.

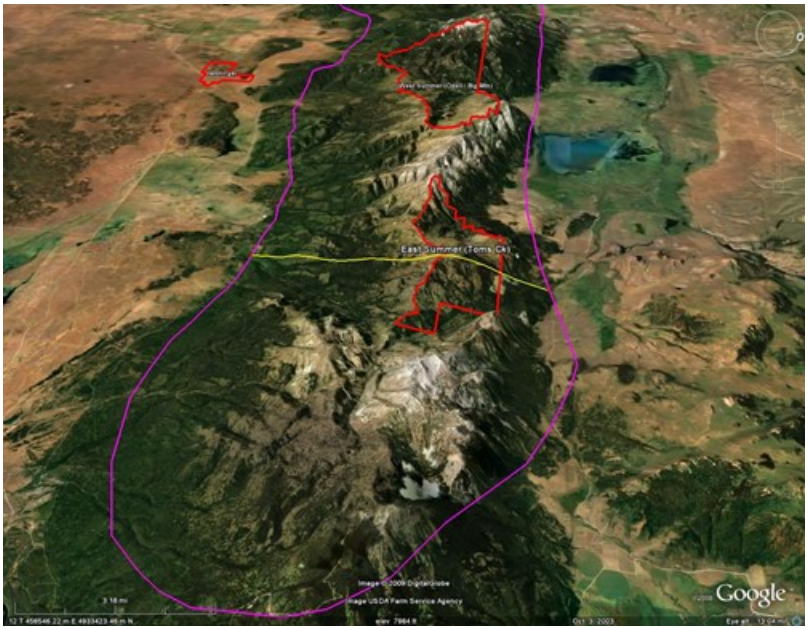

Figure 40. Centennial Mountain Focal Area, ARS properties, and available habitat for carnivore movement

The extent to which the Centennial Mountains are used by various carnivores is described previously in the individual species analyses (i.e. Canada lynx/wolf/grizzly bear existing condition sections). Beckman (scoping letters 2009, 2011) suggests that habitat quality is high, and various mapping exercises indicate that the area is an important connection between Greater Yellowstone Ecosystem and Central Idaho, particularly important for grizzly bears over the long term. In addition, he points out that a higher number of carnivore observations in eastern half of the Centennial Mountain Range compared to the western half of the range could indicate a bottleneck; and that if a bottleneck is occurring, the cause is unknown, and it is also unknown whether Sheep Station activities are contributing to that bottleneck.

In reviewing these comments it is important to consider the following points:

- Sheep Station activities use only a small proportion of Centennial Mountain Range in comparison to available carnivore habitat, approximately 10 percent (and less than 1 percent if considering the area occupied by domestic sheep at any given time).
- The primary linkage corridor of concern is in relation to the two species which are federally listed, grizzly bears and Canada lynx and suitable habitat that exists within and adjacent to ARS properties. However very few grizzly bear encounters have occurred on ARS properties. The range is thought to be secondary habitat for Canada lynx with no evidence of reproduction. There is no record of mortality for either species in association with the Sheep Station activities.
- Other species such as wolves, black bears, and mountain lions are not federally listed, are widespread, and are legally hunted in the region. Thus, Sheep Station activities are unlikely to be the major influence on movements and occupancy of those populations.
- Sheep grazing and associated activities in the Centennial Range are "permeable", meaning that they do not form a physical or permanent barrier to carnivore travel and occupancy. Sheep bands only occupy two pastures at any given time, are moved rapidly through the area, and are temporary, using the Centennial Range only for a portion of the summer.
- Interstate 15 is a restrictive barrier in the area including the physical barrier of the highway corridor, disturbances from frequent motorized traffic, and increased human use and occupancy.

- In a proactive approach to further investigate the situation, an informal meeting occurred between the Sheep Station and Wildlife Conservation Society. The parties agreed to explore research questions for consideration pertaining to the use of ARS properties by carnivores, carnivore migration patterns in the Centennial Mountains, and effects of non-lethal control measures (such as moving sheep to avoid conflicts) on sheep production. If funded, rigorous experimental design would be used to obtain statistically solid answers to these questions, and thus improve knowledge of how to maintain large carnivores on the landscape while at the same time maintaining sheep production in those same landscapes. Once drafted, research proposals would be submitted into the outyear ARS budgeting process, and potentially become part of the approved Sheep Station research plan.

Connectivity Direct and Indirect Effects

Modified Alternatives 1, 4, and 5

A review of the information discussed previously for individual carnivores indicates that Sheep Station activities are unlikely to reduce connectivity in the Centennial Range. ARS properties have minimal infrastructure on both Montana and Idaho parcels. Roads are few and closed to public use, so motorized traffic is kept to a minimum. Large carnivores can travel through and occupy habitat on ARS properties mostly without disturbance because of the large scale of available habitat, with sheep bands occupying only a small acreage at any given time in comparison to available habitat. Similarly, sheep are in the Centennial Mountain Landscape for a relatively short duration (July/August), with limited stay in any one area, and absent from each pasture one out of every three years. The range assessment demonstrates that utilization of available forage is light, particularly in the Centennial Range, which indicates that competition for available forage between sheep and the potential prey base (deer, elk, other species) is not a concern. At times, harassment from full-time sheep herders and/or guard dogs may cause individual carnivores to temporarily avoid a particular location when occupied by sheep. This avoidance would last only a few days as sheep are moved rapidly through the meadows, hillsides, and other forage areas throughout the high mountain pastures. Should encounters occur that threaten livestock on ARS properties, lethal control actions would occur for wolves, black bears, and mountain lions, presumably at levels similar to past actions. Wildlife control actions related to livestock depredation and large carnivores has been limited over the past decade (see individual species write-ups for details). Should the need for lethal control increase for wolves beyond past levels (based on an increasing population or pack expansion), removal would only occur within approved management thresholds, because authorization would be granted or denied to APHIS Wildlife Services by the State wildlife agencies commensurate with their responsibilities for overall pack/population management. Lethal control of grizzly bears is not part of this proposal and would not occur without re-initiating consultation with the U.S. Fish and Wildlife Service. There have been four grizzly bear encounters involving Sheep Station activities in the last decade, and no grizzly bears have been removed as a result.

Conclusion

In summary, the connectivity of carnivore habitat on Sheep Station and surrounding lands in the Centennial Range remains relatively undisturbed because human activity is low and sheep grazing activities are of short duration during the summer months while moving through pastures quickly. Sheep station policy is to proactively avoid encounters with carnivores; implemented through full time herders, guard dogs, movement of sheep, and occasional hazing of individual carnivores. Lethal control is implemented only when livestock is being killed or repeatedly threatened, and would not occur for grizzly bears. The Sheep Station is exploring research proposals which would describe and quantify carnivore movements in the Centennial Range, evaluate the effects of current grazing practices on carnivores, and address the effects of avoidance and other non-lethal control measures on sheep production and animal husbandry practices. Sheep Station activities are permeable to carnivores, while other more restrictive

barriers occur in the area such as the Interstate 15 corridor, landscape settlement/residences, and legal hunting seasons.

The effects of modified alternatives 4 and 5 are essentially the same as the proposed action. Lethal control actions on carnivores other than grizzly bears would occur on a limited basis when livestock are being killed. The varying numbers or concentrations of sheep relative to each alternative would not substantially change habitat conditions or carnivore movements within the corridor in comparison to the proposed action. The Centennial Range would continue to function as high quality habitat for wide-ranging carnivores, and would not be limited as a migration corridor or linkage.

Under modified alternatives 1, 4, and 5, carnivore use of the Centennial Mountain range would continue similar to the current condition, with additional potential for certain species (or individuals) to more fully utilize the current habitat within a given home range. Changes in the effectiveness of the Centennial Range as a wildlife migration corridor remain speculative, but are unlikely since evidence suggests that Sheep Station activities have a minimal effect to wide-ranging carnivore use of the habitat. Grizzly bear would continue to occupy the range, but the already rare potential for encounters with Sheep Station activities would be eliminated. Long-ranging movements of grizzly bear in search of food sources would continue without potential of harassment from Sheep Station activities. Wolf conflicts which typically occur near the Humphrey Ranch property would no longer involve Sheep Station activities, however livestock conflicts on adjacent allotments and private lands could still occur, and warrant lethal control actions on a case by case basis. Black bears would continue to occupy the habitat without the need for lethal control. Mortality would continue based on black bear hunting season quotas which maintain sustainable populations. There would be no effect on wolverine movements since conflicts do not occur with Sheep Station activities and wolverine habitat would not change. Effects to mountain lion use of the Centennial Range are minimal since conflicts have only rarely occurred with domestic sheep, and lions predominately use the lower elevation areas of Henninger/Humphrey, which represent a small fraction of the overall corridor.

The direct and indirect effects of alternative 2 and modified alternative 3 would be the same. The Centennial Range would continue to function as a wildlife corridor similar to its current condition. However, removal of individual wide-ranging carnivores would be limited to encounters on private and other federal lands, and not as a result of Sheep Station activities.

Soils

Summary of Soils Effects

Table 25. Summary of soil effects

Soil Effects	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Grazing					
Agricultural Research Service Properties					
Headquarters	Stable	Slight improvement with added leaf litter	Stable		
Henninger	Downward trend from decreased plant vigor, litter production	Improvement on lowland and footslopes with higher litter, less disturbance	Downward trend	Downward trend	Slight improvement with less grazing use
Humphrey	Stable	Improvement in Beaver Creek riparian soils	Stable	Stable	Stable
Summer Range	Stable	Slight improvement with added leaf litter	Slight improvement with added leaf litter	Risk for downward trend in summer west from no rest-rotation	Slight improvement with added leaf litter
Forest Service Allotments					
Snakey-Kelly	Stable	Improvement	Stable		Improvement
East Beaver	Stable	Improvement	Improvement	Stable	
Meyers Creek	Stable	Improvement	Improvement	Stable	
Other Activities					
Herbicide Use	Decreases risk of invasion from invasive species	Uncertain: eliminates grazing invasive species dispersal, decreases active control	Decreases risk of invasion from invasive species		
Prescribed burning	Mimics fire cycle, increases cheatgrass spread risk	Tradeoff: Lowers cheat grass risk and active burning program	Mimics natural fire cycle, increases cheatgrass spread risk		

Soils Affected Environment

For a detailed discussion of the soils affected environment see the soils report in the project record. For the Headquarters Property and Henninger Ranch, the degree of soil development on the lava flows is a strong indicator of potential productivity. Lava ridges have very poor productivity potential compared to adjacent concave shaped swales that have accumulated sediment over time in response to water erosion/runoff from exposed bedrock. The basalt exposures, also known as pressure ridges, have lithic soils less than 20 inches deep to hard bedrock, with exposed bare mafic lava rock on the surface. In contrast, soil development and productivity are accentuated by the microtopography of the lava flows where swales continue to trap alluvial (water-born) and Aeolian (wind-blown) sediment. Old alluvium and Aeolian deposition from nearby mountain glaciers and Pleistocene-aged Lake Terreton, once located

at the foot of the Centennials, provides fine sediment for much of the soil profile (Stevenson 1993, Hiett 2009 personal communication).

The productivity contrasts on the lava plain are highlighted by the vegetation. The lava pressure ridges support sparse sub-shrub communities compared to adjacent communities where grasses are dominant on deeper, more productive soils. More generally, vegetation includes: three-tip sage (*Artemesia tripartita*) as the dominant vegetation; with needle and thread (*Hesperostipa comata*), bluebunch wheatgrass (*Psuedoroegenaria spicata*), prairie junegrass (*Koeleria macrantha*), and sandberg poa (*Poa secunda*) typical grasses. Cheatgrass (*Bromus tectorum*) tends to occupy these less fertile areas in occasional small, less than half-acre clumps.

Soils deepen dramatically to greater than 60 inches in landforms characterized by concave shaped swale bottoms where thicker topsoil and subsurface clay accumulation provide increased water holding and cation exchange capacity. Both these positive and productive attributes support native and introduced pasture grasses. The swale indicator species are basin big sagebrush (*Artemesia tridentata* spp. *tridentata*) and basin wildrye (*Leymus cinereus*).

Soils on the lava plain can also vary according to the type of lava flow; the rough surface lava breaks to coarse rock that allows for deeper development and efficiently catches Aeolian (wind-blown) sediments while the smooth pahoehoe lava formed a viscous and smooth surface that is prone to wind scour. Soils on both Henninger Ranch and Headquarters are over pahoehoe lava.

Across the lava plain, the shift in moisture to the northeast increases the potential vegetative productivity, with subsequent increase of fescue grasses (*Festuca* spp.) closer to the Centennial Mountains. Rainfall increases to 16-22 inches, creating an even-tempered growing environment with most of the carbonates in the soil profile leached to a lower depth below the effective rooting area. The reduction of carbonates is marked by increases in mountain big sagebrush (*Artemesia tridentata* ssp. *vaseyana*) and Idaho fescue (*Festuca idahoensis*) (Ecosite B13-05, B13-39, USDA Natural Resource Conservation Service (In development)). This increase in soil moisture is most evident in the Henninger pasture where the lava pressure ridges support aspen (*Populus tremuloides*) instead of sage. The plantings of crested wheatgrass in the southwest corner of Headquarters correlate to the low productive conditions from high carbonates and very low precipitation. These areas represent an altered plant community from the historical vegetation (Ecosite B11b-R011BY010ID, USDA Natural Resource Conservation Service (In development)).

Henninger Ranch soils have greater depth than Headquarters soils because of alluvial deposits with underlying glacial outwash from the Centennial Mountains. This alluvium creates flat surfaces, resulting in dry meadow conditions that support hay production fields. Silver sage (*Artemesia ludoviciana*) and mules-ears (*Wyenthia amplexicaulis*) are the prominent indicators of these semi-wet meadows along with associated vegetation species: death camas (*Zigadenus venenosus*), sedge (*Carex* spp.), and pasture grasses (Kentucky bluegrass (*Poa pratensis*) and timothy (*Phleum pratense*)). These soils have a very dark brown to black surface horizon, high in organic matter, characteristically formed under grass; with clay subsoil, which have good productive capacity (R013XY039ID, USDA Natural Resource Conservation Service (in development)). Adjacent footslopes have moderately steep slopes with inceptic soils, which are very young soils with low nutrient status (R013XY005ID, USDA Natural Resource Conservation Service (in development)). Range production is upwards of 1,800 pounds forage per acre for hillocks and benchlands, compared to 1,400 pounds forage per acre on alluvial flats for average years.

Soils at Humphrey vary highly due to the minor slump (mass wasting) terrain. Ridge soils are lithic (shallow, less than 20 inches over hard bedrock) and skeletal (more than 35 percent rock (coarse) fragments at least 2mm by volume below 10 inches) with poor site quality. Back slope concavities are

prone to form from the unconsolidated nature of the parent material; old alluvium gravels and cobbles from the Beaverhead formation. These “slips” form catchments that have deep soils below. Across a hill slope, soil depth varies from moderately deep, to deep with dark topsoils; which are 20 inches to 40 inches, and greater than 40 inches deep respectively. Productivity varies accordingly with the soils below catchment areas supporting robust grassland species. Mountain sage is the dominant component along with Idaho fescue and mountain brome.

The soils on the Summer Range are correlated with aspect and slope location or position on the landscape, which heavily influence productivity and vegetation. Moderately-deep loamy soils (20 to 40 inches deep) occur on ridgetops and hillslopes that support rich forb and short grass communities with forage production in the realm of 1,000-1,200 pounds per acre on windswept ridges, and 2,000-2,400 pounds per acre on deeper soils on protected gentle to rolling slopes. Topsoil contains a high percentage of organic matter since forming from forb and grassland vegetation. Conifer thickets on side slopes and within protected aspects, shift forest floors to forest herb and conifer litter, with production of forages less than 200 pounds per acre.

Shifts in geology from igneous and metamorphic rocks to sedimentary limestone or shales can lead to shallow and less productive soils. Within soils forming in limestone and shale parent materials, steep armored gravel slopes support a sparse shrub layer and clumped conifers. Toms Creek is a good example of where a contact exists between sedimentary and volcanic rocks in the upper watershed. The western portion of the watershed has steep graveled slopes with sparse snowberry (*Symphorocarpos* spp.) and conifer clumps on shale and limestone, compared to the forb- and grass-rich eastern portion of the watershed on mafic volcanic material.

Existing Conditions

Soil condition surveys were conducted in 2008 and there have been no major changes to the project area since that time. A classification of soil condition and cover with ratings 1 through 4 was devised to catalogue observations. These classifications were quantified to portray general conditions and spatial trends.

- Condition Class 1 represents soils that have had severe disturbance and are hydrologically impaired. Soil conditions follow USDA Forest Service (2003) criterion for long-term impairments to soil productivity with sparse ground cover, evidence of severe compaction (surface ponding), displacement, or erosion (rills, soil pedestals).
- Condition Class 2 represents soils showing evidence of disturbance with marginal impaired hydrologic functionality, and little or no sign of recent sheet erosion. Soil ground cover and understory vegetation are adequate to resist erosion.
- Condition Class 3 indicates soil conditions reflecting a one-time impairment, but fully recovered hydrologic function.
- Condition Class 4 soils have a minimal sign of impairment, with full recovery of soil and hydrologic function.

Headquarters

The results of the summer 2008 survey found about 10 percent of 127 data points are soil condition class 1 or 2 showing substantial soil disturbance. Half of these points (and all with soil class condition rating of 1) are trails or roads. The remainder are small depressions that hold surface water or remain moist due to clayey deposits, and are trampled by livestock. Compaction and ponding of surface water are the most apparent disturbance.

Henninger Ranch

About one-half of the data points are soil condition class 1 or 2 due to compaction or soil loss. All of these points are on flat irrigated fields (points 2, 9 and 10) that have desert-like pavement, gravel surface, are highly compacted, and support little plant life other than arrowroot (*Maranta arundinacea*). Cover ranges between 70 and 95 percent in these areas. There is little slope to farmed fields, and therefore, it is plausible that soil loss is due primarily to wind erosion.

Humphrey Ranch

Disturbed areas are due to natural slumping in weakly cemented inter-bedded sandstone and silt stone. Sheep bedding areas are well vegetated, although they are compacted. The Beaver Creek floodplain/valley bottom has lush grass cover; as do all the smaller tributary valleys that support only ephemeral or disconnected flow in small incised, and loamy bank channels. The ephemeral drainage that connects with Beaver Creek ,which has abundant willow growth, showed bank trampling from sheep watering along a quarter mile of the stream. The sedge meadow drainages had no observed bank disturbance.

Soils Environmental Consequences

Spatial and Temporal Context for the Effects Analysis

The spatial boundaries for soils direct, indirect and cumulative effects are the discrete ARS properties Headquarters, Henninger, Humphrey and the East and West Summer Ranges because soil processes occur largely in-place.

The Forest Service grazing allotments were established under separate NEPA analysis and documentation, and they concluded the grazing activities permitted were not detrimental to soil productivity. Because the Forest Service grazing allotments are not adjacent, connected or otherwise contiguous to each other, or to ARS properties, there could be no cumulative effects among these properties.

Effects occurring within ten years are considered short term, while long-term impacts are typically greater than 10 years. Short-term impacts are considered recoverable, with regrowth established and no displacement of topsoil. For long-term impacts, vegetation is slow to re-establish, and soil is partially removed by physical displacement and/or water and wind erosion processes, with slow to limited recovery of projected productive potential.

Direct and Indirect Effects

Modified Alternative 1 - Direct and Indirect Effects

The proposed action would continue sheep grazing and associated supporting management activities. The current soil conditions appear functional at all ARS properties. Bare soils are in the expected range for all areas sampled, and evidence of accelerated (outside natural range of variability) soil erosion is rare. Some compaction is evident on intensely used areas (e.g. around watering troughs, sheep driveways, bedding areas). However, soil properties and conditions (i.e. soil moisture, texture) for optimum compaction on lands normally grazed is minimized by dispersed use and rest rotation, limiting compaction that may be potentially detrimental to soil properties and qualities to seasonal periods (e.g. late April to Mid-June) when soil water content/compressibility is highest. From a soil physical standpoint, all areas are functional and show no overt signs of degradation.

Grazing effects

Using vegetation as an indicator of soil health, the current vegetation composition for Humphrey and the East and West Summer Ranges appears stable, showing no signs of degrading range conditions. Reports on trend for the East and West Summer Ranges by Klements (1997) and VanHorn-Ecret (1986) show the composition of vegetation within exclosures installed in the 1960s does not differ substantially from the composition outside exclosures. Humphrey has a strong presence of desirable native range species and approaches the expected sagebrush community type based on the Natural Resource Conservation Service range sites (Soil Conservation Service 1981). These conditions should persist given the long history of managed grazing by the Sheep Station. The low utilization of six percent at Headquarters and 18 percent at Humphrey, along with the varied staging/gathering of sheep throughout the year; has resulted in the conditions observed. At Henninger, grazing use observations and higher utilization (18 percent) compared to the other properties, indicate a downward trend (see Range Report 2011), possibly related to the altered hydrology regime from historical downcutting of Dry Creek and irrigation diversion.

Localized areas of soil disturbance associated with sheep driveways and bedding would continue to occur, though the vegetation appears stable, healthy, and robust enough to recover seasonally, and no chronic erosion is occurring. Sheep on bedgrounds generate a substantial amount of nutrients from manure and urine. In addition, bedding reduces the amount of standing vegetation and can potentially increase the amount of bare-exposed soil from disturbance, and cause some compaction. However, infiltration rates would remain high. Only a rare storm occurrence (i.e. greater than or equal to 100 year-24 hour rainfall) yielding a high intensity, long duration precipitation event, would runoff occur above background or historical occurrence could potentially cause erosion damage and transport suspended sediment, particulate matter (manure) and dissolved solids/nutrients off-site; resulting in adverse effects to potential soil productivity and water quality.

Headquarters

Soil function would remain stable at Headquarters with vegetation composition aligning with expected diversity and species representation (USDA Natural Resource Conservation Service (in review)) on the shallow and moderately deep soils. Bottomlands have more divergent species mixes with a higher abundance of pasture grasses in addition to approximately 5 percent of the property planted with crested wheatgrass (*Agropyron cristaetum*) to improve forage. The productive swales have an influx of exotic pasture grasses due to the richer soil. In these arid environments, higher productivity sites have a propensity for supporting exotic species (Lejuene and Seastedt 2001, Bashkin et al. 2003). Vegetation composition would persist in the Headquarters areas, although crested wheatgrass could expand.

The presence of exotic grasses such as the planted paddocks of crested wheatgrass and pasture grasses impact the soil biotic community (Wardle et al. 2004, Wolfe and Klironomos 2005), but does not lower productivity per se. Expansion of the perennial grasses would have less impact than expansion of cheatgrass (*Bromus tectorum*) (Norton et al. 2007). Predominance of cheatgrass changes the moisture regime in soil with finer root structure and different litter quality, ultimately shifting the fertility regime to favor itself, an unwelcome departure from conditions preferred or desired for adaptations by competing native species (Belnap and Phillips 2001, Thorpe and Callaway 2005, Norton et al. 2007). Currently, cheatgrass is relatively sparse across the range; at most 1 percent. The presence of the exotic perennial grasses would most likely show changes in arbuscular mycorrhizal assemblages (Wardle et al. 2004) but not impact resources such as nutrients and water (Norton et al. 2007).

Henninger Ranch

Henninger shows degradation on the sage flats where conditions have departed from the expected community (see Range Report 2011 (project record), USDA Natural Resource Conservation Service (in

review)). Species composition is stable with pasture grasses and grazing increaser forb species, but lacks native grass species. The current condition shows a downward trend, although no obvious evidence of erosion was observed. Historical grazing at the site along with evidence of dewatering from entrenched drainages and irrigation diversion suggests a shift in the water table. There is irrigation both on-site and by adjacent land users. The upland sage community has likely expanded into bottomland areas though the extent is uncertain.

Henninger uplands show fair conditions with plant species diverging from the historical community. The exotic perennial grass smooth brome (*Bromus inermus*) is common, indicating past seeding, which may interfere with recolonization of native grass species. Observations found that upland rocky areas where conifers and aspen predominate are closer to the expected plant assemblage. This area receives higher sheep use at 18 percent utilization than all other ARS properties except Humphrey. The forested upland areas are stable, and soil erosion is sparse at the site.

Humphrey Ranch

Continued sheep grazing at Humphrey would not substantially change soil resources from existing conditions. This area has moderate use at 18 percent and the vegetation is close to the expected range for this area. Overall, vegetation is robust, diverse and soil erosion not evident outside the bare slope zones from small landslips. These bare slope areas are considered a natural feature and continue to supply water to deep soils in adjacent swales below. Soil development is a century to millennium process. The very dark accumulated organics in these swales compared to much shallower adjacent hill slope soils, suggest that these slips/shallow slope failures are a natural ongoing process.

Riparian soil impacts are mixed at Humphrey. Sedge meadow soils appear intact with minimal impacts for the north tributary of Beaver creek on Humphrey. Willow sedge soils along a quarter mile of southern Beaver Creek tributary would continue to experience seasonal impacts from sheep watering. Canada thistle and upland species along the banks here show historical grazing use at the site. Given the long history and steady grazing numbers, the conditions would likely stay the same with continued grazing.

East and West Summer Range

The East and West Summer Ranges shows abundant productive capacity given the higher precipitation regime and vegetation state than on the lowland properties. Current vegetative assemblages suggest a stable vegetation community. Keith Klement found no outstanding differences for vegetation inside and outside exclosures during his 1990s sampling (1997). Sampling during summer 2009 showed vegetation within expected ranges for the sites compared to the soil surveys in the 1990s (see Range Report 2011 (project record), Natural Resource Conservation Service 1991). Given the similar management regime to the 1990s, the existing range and soil conditions would continue.

Some bare soils resulting from annual operations were observed, but they do not show evidence of chronic accelerated erosion. Soil disturbance from sheep drives is temporary and groundcover restored with regrowth. Past evidence of bare soils and degraded conditions is referenced (Klement 1997) and reported for Toms Creek in the middle 1980s (Montagne 1988). Bare soils are isolated and related to sheep bedding on ridges, past impacts from a combination of old wildfire and historical grazing practices (Klement 1997), and natural bare slopes related to snow patches on protected aspects. Sheep bedding areas are typically scattered and less than one quarter acre each. The single chronic erosion patch observed is one-quarter acre and continues to sheet wash. This area is not grazed. The snow slopes are steep, unvegetated slopes and therefore experience only transient use by sheep.

Sheep impacts on the nutrient regime are most prevalent at bedding sites. A recent study by Leytem and Seefedt (2008) for sites on the East and West Summer Ranges highlights the changes. The bedding sites

have reduced vegetation and this translates to lower organic carbon and long-term nitrogen (total N). The input of sheep feces offsets the lack of vegetation somewhat with spikes of ammonium (NH4-N) and soluble phosphorus (P), although overall the bedding areas experience a net loss of nutrient potential (Leytem and Seefedt 2008). The impact of these conditions can influence the vegetation at these bedding areas although specifics were not given in the study. More opportunistic vegetation is associated with these spikes (Vinton and Burke 1994) with exact characterizations dependent on grazing history and ecological context (Milchunas and Laurenroth 1993, Biondini et al. 1998).

Nutrient impacts from sheep grazing outside of the main congregation areas such as bedding areas are not expected. Areas outside of the bedding areas are well vegetated. Therefore shifts in nutrient cycling due to urine and manure would not occur. The dispersal of sheep and low utilization of available forages diminishes potential impacts.

Overall the East and West Summer Ranges are believed to have improved from the 1980s because of rest rotation, eliminating one band of sheep (1,000 animals), and emphasizing herding for light, even use by sheep. Adaptive management principles emphasize even usage by the sheepherders and avoiding low productivity sites. The poor conditions cited by Montagne (1988) at Toms Creek were initially monitored for grazing effects, and later closed to grazing altogether due to low availability of forage, and snow displacing the monitoring exclosure fencing (Jacobson 2009, personal communication).

Infrastructure

Other effects considered are the impacts of grazing-related actions such as fence building and road-grading. On the Headquarters area, approximately 2 miles of paved road, 21 miles of gravel-surfaced roads, and 120 miles of dirt-surfaced roads; most on flat terrain, and many having a gravelly surface with some vegetation on the roadway; are subject to wind-blown fugitive dust, and localized sheet and rill erosion in response to intense, longer duration rainfall events. Although these potential effects are viewed as minimal; in that fugitive dust is limited due normal formation of a physical crust; limited vehicular traffic, and annual maintenance is provided on about 20 miles by motor grader; including cross drain construction or surface drain installation, and spot surfacing where needed. Erosional sediment will most always be trapped in roadside vegetative cover or where undulating surfaces and/or litter, etc. is present to trap sediment. Soil productivity would be maintained.

In addition, about 14,000 linear feet (2.65 miles) of permanent firebreak about 30 feet wide is maintained and rough-graded by motor grader annually around the headquarters office and housing area. About 10 acres of bare mineral soil, including unsurfaced roads, is potentially subject to erosion from wind and from overland water flow from intense, longer duration rainfall events. Likewise, about 15 acres of bare soil could be created by dozer and motor grader each year in conjunction with the Sheep Station's prescribed annual burning program.

Herbicide Use

The control of invasive plants enhances soil productivity by limiting the spread of weeds capable of adversely influencing soil function, properties and qualities. Containment and eradication strategies pose a risk of adverse effects from select grazing and herbicide use. Select grazing can result in overgrazing of non-target species if grazers are mismanaged.

Herbicides are used to control the spread of invasive plants, and manage vegetation for both fuel reduction and wildlife habitat purposes. In addition three experimental applications of herbicide to Headquarters for shrub management are planned over the next five years, totaling up to approximately 375 acres (see Map 5). The most common herbicides used, 2,4 D-amine, bromacil, diuron, and glyphosate

have minimal adverse effects on soil biota, but do vary in leaching and runoff potential. Bromacil and diuron has particularly high risk for offsite transport to groundwater and runoff (Table 26).

Table 26. Herbicide general use, types and location

Active ingredients	Area	Frequency	Notes
Clorpyralid	Roadside, fence line, and pasture invasive species treatment	Annual	Leaches, esp. sandy soils and shallow water tables
Trilsopropanol	Roadside, fence line, and pasture invasive species treatment	One time	Leaches, esp. sandy soils and shallow water tables.
2,4 D amine	Roadside, fence line, and pasture invasive species treatment	One time/annual	Weak adsorption to soil particles
Aminopyralid	Roadside, fence line, and pasture invasive species treatment	One time/annual	Relatively mobile in soil, but most retained in the upper 12 inches of the soil profile (fine-loamy or finer textures); moderate leaching risk
Bromacil and Diuron	Feedlot surfaces	Annual	Weak sorption in soil; leaches readily
Non-aquatic glyphosate	Roadside, fence line, and pasture invasive species treatment	One time	Strong adsorption to soil
Tebuthiuron	Selective shrub management in pastures	One time	Highly water soluble, low adsorption to soil particles, high leaching potential
Picloram	Pasture invasive species management	One time	Weak adsorption to soil; moderate leaching risk

Herbicide application indirectly benefits soil function by containing the spread of invasive plant species, particularly those that alter soil nutrient regimes. Most of the spraying focuses on invasive species containment and eradication along travelways and high-disturbance areas such as the feedlots. Adverse impacts on soil organisms overall is not expected given the low toxicity listed by Tu et al. (2003) and using application rates within label restrictions. Decomposition of all listed herbicides is primarily by soil microbe metabolism. Use of herbicides in typically compacted areas (such as roads), may increase herbicide residence time.

However, certain suites of microbes are sensitive to picloram, imazapyr and tryclopyr. Picloram has some toxicity to certain fungi at high application rates and is known to affect the nitrification portion of the N mineralization cycle (SERA 2003a). Tryclopyr is toxic to some soil bacteria at low and high doses (2004). Imazapyr has slight effect on soil microbes at high doses (SERA 2004).

Herbicide combinations using 2,4 D, clorpyralid, trilsopropanol, aminopyralid, bromacil, tebuthiuron, triclopyr amine, and picloram have moderate to high leaching potential and can contaminate groundwater if used near shallow aquifers (Extronet 1993, Dow 2008, Dupont 2008). Herbicide buffers are recommended to ensure adequate protection (see Best Management Practices and appendix C). Glyphosate has a very strong affinity to soils and thus has the least potential for affecting groundwater. Once absorbed by soils the herbicide is degraded by soil microbes and is unavailable to plants.

The herbicides selected will be used according to label directions, and other available technical guides that reflect soil properties, suitability, site conditions; hydrology; herbicide mobility and persistence;

weather; timing, and method of application; and protocols for personal safety, storage, handling, mixing, transportation, spills, disposal of unused herbicide and containers.

Prescribed Burning

Prescribed burning is conducted as part of ongoing operations. Actual burned area (prescribed burn and wildfire) over the past 30 years is about 6,054 acres. In the next five years, the Sheep Station plans to experimentally burn up to approximately 700 acres on the Headquarters Range. However, since the natural burning cycle yields a return cycle of once every 30 years these acres are allowed to fully recover their vegetation cover within two to three growing seasons. Erosion and sedimentation therefore, is of low risk to soil productivity and water quality.

Indirect activities considered are range stewardship activities such as prescribed burning and treatment of noxious invasive weeds. The latter is done through a combination of targeted grazing by sheep and use of herbicides (appendix C).

Prior to implementing a prescribed burn, a burn plan will be prepared by trained professional range scientists and technicians, which reflects range conditions (soil and vegetation) and weather to achieve burn objectives while protecting soil productivity. Short-term adverse impacts to soils from burning are not expected from either fall or spring burning as fuel loads are light, resulting in fires of shorter duration and intensity (less soil heating). Erosion rates are not predicted to increase given the low seasonal rainfall. Prescribed burning is expected to increase mineral forms of Nitrogen and Phosphorus in the short term (1-2 years), with long-term effects uncertain. Soil biota and productivity would be adversely affected with expansion of cheatgrass.

Prescribed fire generally increases mineralization cycles in the short term (Fisher and Binkley 2000, Erickson and White 2008) with long-term consequences depending on the vegetation and soil biotic conditions (Hart et al. 2005). Plant available nitrogen and phosphorus increases for the first year, while increases in sagebrush systems of up to four years for nitrate are reported (Rau et al. 2007). Mackenzie et al. (2006) have found elevated nitrate in nearby forested systems for up to 60 years. The effects are highly dependent on biological substrate and precipitation since mineralization is a soil biotic process (Hart et al. 2005, Rau 2007).

Cheatgrass is of particular concern with regard to changes to the soil nutrient regime and the risk of more frequent flashy fires (D'Antonio and Vitousek 1992, Norton et al. 2007). These sagebrush regimes appear sensitive to the increased fire frequency associated with cheatgrass expansion (USDA Natural Resource Conservation Service (in review), Zouhar et al. 2008). Cheatgrass invasion is thought to occur during high moisture years and may actually decline in drought (Zouhar 2008). Sheep Station personnel have not observed cheatgrass expansion in the mountain big sagebrush vegetation types where they are prescribed burning.

Modified Alternatives 2-5 Direct and Indirect Effects

Where grazing is to be discontinued, this would allow for more leaf litter to become available for organic accumulation and recovery of soil function in compacted areas in the long term. Alternative 2, the no grazing alternative, would not produce detectible/measurable changes in the short-term for soils on Headquarters, Humphrey, Henninger Ranch, or East and West Summer Ranges; since the current utilization is only slight to light use. Soil conditions should improve at Henninger for alternative 2, since use would be discontinued compared to the current 18 percent forage utilization, but recovery would not likely be discernible in the short-term. Modified alternative 3 and 4 would extend grazing through summer months on Headquarters, and boost AUMs used, but the effect is uncertain as no discernible

changes are anticipated since utilization of available forages continues at less than 5 percent, and sheep grazed per acre over this large acreage would be insignificant.

Conceptually, where grazing is discontinued on lowlands, plant and soil associations would persist since the arid conditions lend to slow recovery potential. Long-term studies on sheep grazing during the mid-20th century show varied potential for recovery based on current soil potential and vegetation composition (Michunas and Laurenroth 1993, Johnson 2003). State and transition models developed for rangeland integrate these ideas and use indicator species and surface soil conditions to judge not only current condition, but also recovery or trajectory of the plant community (USDA Natural Resource Conservation Service (in review)). Compacted staging areas for animals would stay compacted for the long term given the arid conditions and the relatively infertile environment. In contrast, uplands with species compositions closer to the historical climax communities and with hydrologic regimes intact would have greater regrowth potential. For the ARS properties on the lava plains, Henninger has the highest potential for regrowth with no grazing given the favorable climatic conditions.

The absence of sheep grazing would improve litter accumulation and biomass retention. This cover would add mulch and protect soils. Plant composition changes would be difficult to detect after resting given the resilience of the current communities and the closeness to the expected natural habitat for the northern reaches of Headquarters, and especially Humphrey, using the Natural Resource Conservation Service ecological site logic. Again, the differences may be subtle given the current low uses on these lands.

Ending grazing would improve footslope and dry meadow sites at Henninger for alternative 2. Henninger serves as a staging area and has utilization of 18 percent Henninger has higher moisture, deep soils, and lacks the calcareous upper soil layer that can limit plant production. Improvement would be most notable on the footslope sage sites. The predominant species mix of pasture grasses in the lowlands would persist and therefore a higher-level plant community state is not expected, though production could improve. In addition, the altered hydrology from irrigation and deeper entrenchment of Dry Creek has less potential to support historical dry meadow plant species.

Humphrey Ranch has strong semblance to the expected native vegetative community, and, therefore, may show minute improvements except in the willow riparian area. Floodplain soils along this tributary of Beaver Creek would show improvement over the current condition if grazing were terminated, since soils have good functional attributes, albeit with some Canada thistle and upland shrubs. Compaction is rare and the current vegetation suggests good soil through-flow. Given these conditions, recovery potential is high. The collapsed banks would stabilize allowing improved movement of soil moisture outward. In addition, mesic vegetation species adjacent to the stream could establish without sheep grazing facilitating vegetation and soils recovery.

No differences would be detected in the short term for alternatives 2-5.

Herbicide use

Ending grazing and active management in alternatives 2-5 would have uncertain impacts for invasive weeds and thus soils productivity. Ending selective sheep grazing and loss of active management could further expand distribution of existing invasives. On the other hand, reduced sheep numbers and associated inputs of fecal matter and disturbance, along with less travel use of road ways decreases opportunities for invasive plants and, thus reduces impacts to soil productivity.

Herbicide use would decline or cease altogether. No changes in soil productivity are anticipated with this reduction in use since the sprayed areas are primarily disturbed sites. The tradeoffs are similar to those for the elimination of selective grazing.

Prescribed Burning

Alternatives 3-5 would have similar impacts from prescribed burning to modified alternative 1, since these alternatives retain Headquarters as primary range. The assumption is the elimination of sheep grazing at Headquarters would eliminate the burning program.

Cumulative Effects

Modified Alternative 1 – Cumulative Effects

Grazing and associated supporting management activities, as proposed under this alternative, would have little if any additional cumulative effects on soils.

The additive effects of past grazing are considered more in detail within the context of the current plant community and soil condition (see Affected Environment and Direct Effects sections in specialist report for more detail). Over the last 86 years, grazing management appears relatively consistent with possibly upward trends in the last twenty years from reduced grazing and rest rotation in the uplands along with evolving grazing practices.

Historical wildfire could continue to affect soil productivity on ARS properties on the East and West Summer Ranges. Wildfire effects from the early 1900s remain visible in the East Summer Range, with old erosion gullies still observed on the north side of Toms Creek divide. This is indicative of the low productive soils forming from interbedded dolomitic limestone and shale on steep slopes. Elsewhere, evidence of old wildfires is not visible, and soils are stable and vegetation robust. Recent fire on the Meyers Creek allotment shows quick recovery.

Of the grazing allotments under MOUs utilized by the Sheep Station, Meyers Creek and East Beaver Creek (National Forest System lands) are grazed in summer to early fall when soil conditions are capable of supporting managed grazing with slight risks of adverse impacts to soil properties and qualities, particularly with sheep numbers ranging between somewhat less than 10 percent to less than 20 percent of the number authorized or permitted by the USDA Forest Service, with a very light forage utilization that ranges between 2.3 and 1.2 percent respectively. On the Snakey-Kelly (National Forest System) allotments, used for winter grazing, a period when soil conditions are most favorable for protecting soil productivity (e.g. low soil moisture, thus potential compaction, and likely frozen soil in the upper soil horizons) the number of sheep are less than 20 percent of number authorized or permitted, and utilization is less than 25 percent of available forages.

Since the Forest Service allotments and winter feedlot (Mud Lake), are not contiguous to one another, or to ARS properties, there are no additive cumulative effects among these various properties.

Furthermore, since utilization of available forages under alternatives 2-5 would be eliminated or reduced for all allotments, with exception of the Mud Lake (DOE) feedlot, where utilization would see a very slight increase of 1 percent compared to modified alternative 1; soils would remain stable and well suited for grazing, related supporting management activities, and other resource benefits and values. Thus cumulative effects would not occur, so as to be easily discernible, if at all, on non-ARS lands.

If an upgrade of the existing transmission line occurs in the future, and existing roads are used, and there are no new tower locations, effects to soil productivity would be comparable to normal power line maintenance operations. Effects would be short term in that they would be appropriately mitigated by installation of various best management practices (e.g. cultivation/ripping, fertilization, and revegetation).

Alternatives 2-5 – Cumulative Effects

Adverse cumulative effects are not expected for any of the alternatives. Where grazing is eliminated there would be no further effects. Effects from continued grazing and related activities on Forest Service grazing allotments, supporting the mission of Sheep Station, including past, present, and foreseeable future grazing and related actions is not foreseen as detrimental to soil productivity, and/or other functions and values provided by the soil resources in the long term.

Because utilization of available forages under alternatives 2-5 would be eliminated or reduced for all allotments, adverse soil effects to productive potential would be slight, and likely not measurable; retaining fair-good suitability for long-term grazing use as planned. No cumulative effects are anticipated.

Irreversible and Irretrievable Commitment of Soil Resources

There are no irreversible commitments of soil resources on ARS properties, under all alternatives considered. Although, there are areas where productive potentials are considered irretrievable, where soils have been committed to or restricted for other uses (e.g. permanent annually maintained firebreaks, roads, sheep trails). This represents a management decision to restrict use and management of those properties for purposes other than grazing, but those decisions/actions are not irreversible. They represent a commitment of soil resources necessary to support the overall research mission established by executive order and public law for the Sheep Station, through use and management as proposed in each alternative. Potential impacts to soil productivity have been recognized, but those impacts are not irreversible; adversely impacted soils can be managed and/or restored to achieve full benefits, functions and values.

Hydrology

For additional details of the hydrologic affected environment see the hydrology report located in the planning record.

Summary of Hydrological Effects

With the proposed action for continued Sheep Station operations, the type and magnitude of direct and indirect effects are expected to remain the same as current conditions except for reductions in localized sediment transportation that would be reduced at two sheep trails (OD4 and OD5) and on the road to Blair Lake, where mitigation measures would be implemented. Effects if the application of herbicides would probably not be discernable at the 6th watershed level due to the application of best management practices and project design features.

Under alternatives 2, 3 and 5, the type and magnitude of direct and indirect effects would be expected to be less than modified alternative 1 as there would be less utilization on ARS lands and Forest Service allotments. However, changes may not be measurable at the 6th watershed level, and therefore there are no cumulative effects.

Under alternative 4, the type and magnitude of direct and indirect effects are expected to be relatively less than modified alternative 1. While some effects are reduced in areas that are not grazed, there would be a small increase in utilization on other some grazing areas. However, changes may not be measurable at the 6th watershed level, and therefore there are no cumulative effects.

Summary of Measures Used for Analysis

Table 27 displays a summary of the measures used for analyzing potential effects by alternative.

Table 27. Summary of analysis measures by alternative

Unit of Measure	Modified Alternative 1- Proposed Action/ No New Federal Action	Alternative 2	Modified Alternative 3	Modified Alternative 4	Modified Alternative 5
Total Miles of Sheep Trails (Trails off of Roadways)	3.1	0	0	2.3	3.1
Total Miles of Sheep Trails (Trails off of Roadways) within 300 feet of Streams	1.4	0	0	1.2	1.4
Percent change in Number of ARS Property Acres Grazed Compared to Modified Alternative 1[a]	0 percent (47, 606 acres total)	NA	-36 percent	-8 percent	-0 percent
Additional Measures for Cumulative Effects					
Total Miles of Trail (Total Sheep Trails off Roads Plus Total Trails on Roadways)	50.9	0	6.7	33.6	40.1
Total Miles of Trail within 300 feet of Streams (Trails Both on and off Road)	20.2	0	3.1	16.2	17.1

a - A negative number means reduction in acres grazed on ARS properties

Hydrologic Affected Environment

Watershed Characteristics and Conditions

In general, alluvial flats found on lower basin floors are dominated by sagebrush and underlying basalt flows. Areas underlain by basalt flows lack defined drainages due to the basalts high permeability and porosity. Adjacent lower elevation flatlands are very well drained and have moderate grassland productivity. Table 28 summarizes the miles of road within 300 feet of streams on the Headquarters property. There are 2.7 miles of existing firebreak around the Headquarters buildings. The firebreak is roughly 20 feet wide and is comprised of mineral soil. The total area of the firebreak is 65 acres. No streams, springs, or wetlands are adjacent to the firebreak.

Table 28. Summary of road miles within 300 feet of streams

Headquarters Area	
Road Surface Type	**Miles of Road**
Native Surface	5.4
Gravel	3.0
Paved	0.2

The East and West Summer Ranges have complex stream networks that dissect the rolling ridges of the Centennial Mountains, and are characterized by relatively high productivity with intermixed grass-forb lands, sagebrush, and conifers.

Sheep bedding areas are found in all the grazing areas used by the Sheep Station. Traditional bed-grounds are defined only for the West Odell and Big Mountain grazing units. However, each defined bed is not used annually. The total area used is less than one percent for Big Mountain and West Odell grazing units.

Beds have not been mapped with GPS for the other ARS properties. Herders try to use different sites every night, which minimizes compaction, trampling, and loss of vegetative cover. A study by Moffet (2009), studied the hydrologic effects of sheep beds on subalpine ranges. It was determined runoff and erosion is more likely on bed grounds after use, but only under extreme rainfall conditions.

In the area, a 100-year, six-hour precipitation event is around 1.9 inches per hour; however to ensure capturing runoff generation the study simulated rainfall at 6.2 inches per hour. For a 30-minute rainfall event at 6.2 inches per hour, the study found erosion increased approximately ten times. Field observations made in 2008 and 2009 at various bedding areas noted no rilling, gully development, or upland-associated sediment transport with these bed areas. As a result, it was determined these areas do not affect watershed condition and are not functioning as sources of erosion and sediment transport.

Table 29. Summary of observed surface conditions by ARS properties and grazing units

Property/Grazing Unit	Watersheds Where GPS Points were Taken	Number of Points Taken	Range of Surface Conditions	Range of Percent Total Cover/ Average
Big Mountain	100200012102 170402020802	3	2-4	0-80/43
Odell	100200012102	12	2-4	0-100/64
Toms Creek	100200012101 100200012201 10200012202	9	1-4	0-95/64
Humphrey Ranch	170402140404 170402140405	23	1-4	25-100/89
Henninger Ranch	170402140607	10	2-3	0-95/75.5
Headquarters	170402140101 170402140501	128	1-4	0-100/73.4
DOE Feedlot	No Data Taken-Industrial Area			

Big Mountain Grazing Unit (West Summer Range)

Watershed condition generally appeared consistent throughout this grazing area, based on the ride-through in 2008. Three data points were taken, as the area was very consistent in appearance. Uplands were generally well vegetated with little evidence of surface runoff or erosion (Figure 41). No evidence of desertification was observed in the field. Desertification occurs when the amount of dry-land biological productivity is reduced. There are several reasons why desertification occurs, and grazing can be one of them, or there can be several factors causing this to occur. Two locations received a rating of proper functioning condition and one location received a rating of functional-at-risk. Bare soils were primarily associated with steep southwest facing ridges and were largely due to active slip faces. These slumps start with a convex shape, and then evolve into a concave shape, where they appear to stabilize and re-vegetate. No evidence such as trailing, trampling, or bed grounds was noted in association with these slumps. As a result, these areas of disturbance are considered “natural” and not related to grazing

activities. Bare ground was also noted in association with bed grounds (Figure 42). However, these areas were very limited spatially in extent. The main bedding area observed had a surface condition rating of two, with soil hydrology and nutrient cycling rated as fair.

Figure 41. Views of uplands, Big Mountain Grazing Unit (Western Summer Range)

Figure 42. Edge of bedground, Big Mountain Grazing Area, view to northwest

Figure 43. Revegetated roadbed leading to closed phosphate mine, bottom of Spring Creek drainage

Two and one half miles of driveway are found within the West Summer Range. None of the portions of driveway in the Big Mountain grazing unit were found to be sources of sediment.

An old road leading to the J.R. Simplot mine is located in the bottom of the Spring Creek drainage (Figure 43). The road is confining the drainage in places, leading to increased downcutting and channel confinement. Erosion of the road prism was observed in several places. However, the road surface is generally well vegetated, filtering sediment.

Very little evidence of surface runoff and erosion related to the road surface was noted (Figure 43). Road reclamation activities, such as culvert removal, were conducted in 1997 (USDA ARS 2009).

Figure 44. View of vegetation growth adjacent to water trough

In total, there are five water developments within this grazing area. Springs have been developed with permanent troughs to provide water for ewes and lambs in low-flow areas. Wildlife are known to use these water developments. It is estimated that there is ¼ acre, or less of disturbance per trough (Smith and Yurczyk 2008). Several developed water sources were inspected during the 2008 field seasons. All appeared to be sprouting healthy vegetation covers. This portion of the grazing area had been rested in 2007. Vegetative recovery appeared to be consistent around these water developments, indicating that detrimental compaction and degradation of soil hydrology has not occurred to the extent that it impairs vegetative growth (Figure 44).

West Odell Grazing Unit (West Summer Range)

Watershed conditions appeared to be good and consistent within the West Odell grazing unit. No evidence of desertification was observed in the field. Twelve GPS points were taken throughout the grazing area. Although soil surface conditions varied from a "2" to a "4," the average was 3.6 indicating fully hydrologic function and almost minimal signs of impairment Figure 45. No evidence of rilling and gully, or other signs of surface overland flow were noted on uplands. Six proper functioning condition surveys were conducted and all received ratings of proper functioning condition.

Figure 45. West Odell Grazing Unit (West Summer Range) looking to the northeast

Slumping and earth flows related to the Cretaceous geology were noted. As in the Big Mountain grazing unit, grazing activities were not observed to have initiated or enhanced the movement of these features.

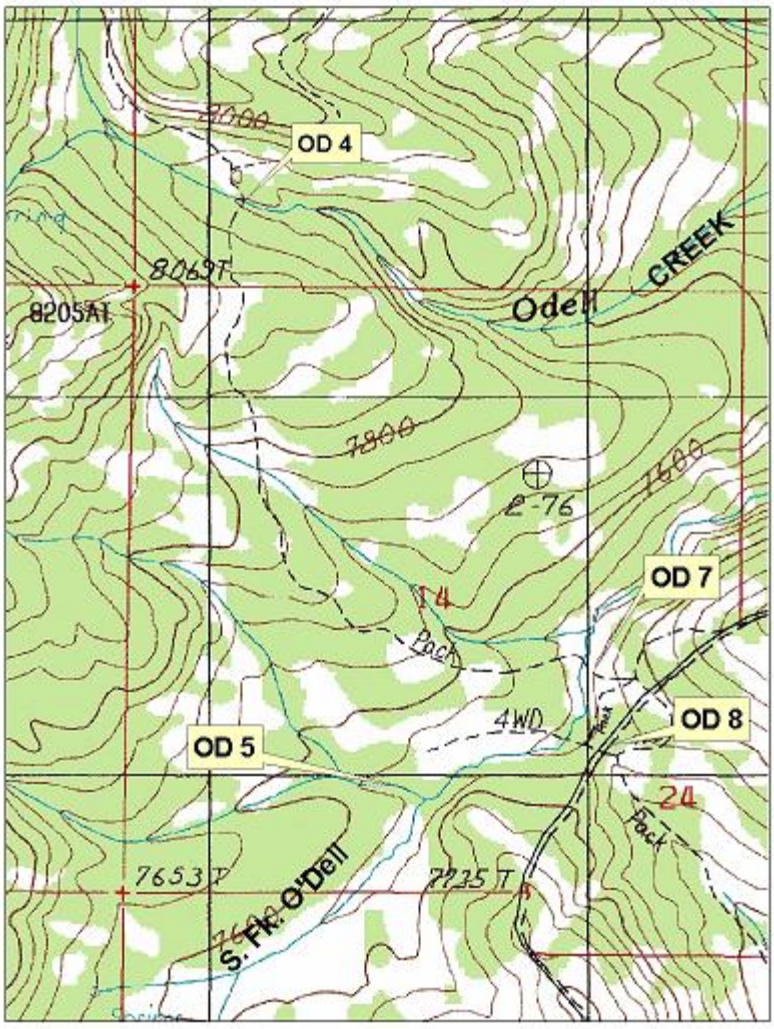

Figure 46. Locations of field observation points OD 4, OD 5, OD 7 and OD 8

The West Summer Range contains 2.5 miles of driveways. Within the West Odell grazing unit, four stream crossings, associated with these driveways, were evaluated (Figure 47). At all four crossings streams were observed to be in proper functioning condition. No evidence was observed indicating that stream morphology has been impacted, in any significant way, up or downstream of the crossings. There were no overt indications or evidence of excessive sediment within the associated channels. In addition, there was no indication of heavy or unusual browsing on associated riparian vegetation.

OD 4 is located in SW ¼, Section 11 T15S R2W, and is the major crossing of the four within the West Odell grazing unit. A secondary crossing lies nearby to the west. At the main crossing bare ground was associated with this trail (Figure 46). Although soil stability, hydrology, and nutrient cycling were rated as impaired in this area, active erosion features were noted only on the far side of the crossing. Rilling and incipient gullying were noted and were adjacent to, and perpendicular to the stream crossing. Minor bank hardening was also noted. Although some extra sediment was being derived from this trail, no detrimental bimodal distribution of sediment was observed in the streambed.

As a result, it does not appear that sediment contributions are exceeding natural sediment loads being carried by this stream. In addition, bank degradation was confined to where the driveway crosses Odell Creek.

At the secondary crossing, the trail was becoming trench-like and confined.

The other three crossings are located to the southeast of OD 4, in the SE ¼ of Section 14, T15S, and R2W. Each of these three sites involves the South Fork of Odell Creek. Disturbance at these three crossings were confined to the crossings proper and vegetation immediately adjacent was in good condition.

Figure 47. Sheep driveway crossing at Odell Creek, upstream to readers right

At OD5, the entry into the stream crossing was an estimated five feet wide with the exit onto a steeper slope, which was largely bare of vegetation and somewhat compacted. There were no well-developed rills or gullies leading down to the creek (Figure 48 and Figure 49). Substrate in the stream bottom appeared not to be dominated by fines, with sub-angular siltstones to cobbles predominating. There did not appear to be a bi-modal sediment distribution.

Figure 48. Entry to sheep driveway, OD 5

Figure 49. Close up of exit of sheep driveway, OD 5

At OD 7, minor bank degradation was present at the two stream crossing areas, with one of the crossing exhibiting revegetation. Minor sediment contributions to the stream are derived from these trampled areas. However, there were no rills or gullies observed and there was no observable bimodal sediment distribution of stream substrate, which would indicate an unusually high percentage of fines for this mountain stream. Adjacent uplands were in good health with a well-distributed groundcover of broadleaf

forbs and grasses. The driveway crossing at OD 8 was in good shape and had not been recently used. No rilling or gullies on adjacent uplands were noted.

Toms Creek Grazing Unit (East Summer Range)

Toms Creek grazing unit comprises the East Summer Range (Figure 50). During the summer of 2008, this grazing unit was reviewed for existing conditions. Proper functioning condition surveys were conducted at three locations; all received ratings of proper functioning condition.

Figure 50. Views of uplands in Toms Creek Grazing Area

No evidence of desertification was observed in the field. Uplands were remarkably consistent in vegetative cover. No sources of upland erosion, consisting of rills and gullies were noted. Some evidence of overland flow was noted in association with melting snow fields and was confined to within 50 feet of these areas, and no erosional features were noted in association with the melt water. Earth-flows and slumps were occasionally present, associated with unstable stratigraphic layers.

One area of uplands was of special interest, which is located at the head of the North Fork of Toms Creek, and has been an area of past debate (Figure 51 and Figure 52). This area burned in a forest fire sometime between 1880 and 1930. Burned trees still stand and charcoal is still found in upper portions of the soil horizon. Slopes tend to be steep (over 10 percent) with poor site productivity (Jacobson 2009a). There has been debate regarding supposed over-grazing practices by the Sheep Station. This area was surveyed with Sheep Station, Soil Conservation Service and University of Idaho personnel to review upland conditions. Sheep Station notes on the meeting state: “Soil Conservation personnel believe grazing abuse by the Sheep Station had not occurred, that the site was as good as could be expected, that no current erosion was occurring, and the overall trend was up” (Jacobson 2009a).

Figure 51. View looking west to area underlain by Park Shale, west half of North Fork of Toms Creek

In 2009 field work was conducted again to assess this area (Fryxell 2009). The eastern portion of this headwater supports a consistent vegetative cover, which is being re-established after historical and Sheep Station grazing. Relict trailing was noted, but trails are revegetating throughout this portion of the headwaters (Figure 52). This area is designated as Unit 8 Toms Creek grazing area (Eastern Summer Range) and has had only incidental grazing since 1994 (Jacobson 2009a, Moffet 2009). The 2009 field inspection revealed no evidence of

rilling or gullies, but there was evidence of naturally occurring soil creep, as indicated by trees and snags leaning into the hillslope. Soils are stony and provide a notable measure of cover. This portion of the headwaters is underlain by the Cambrian Bighorn Dolomite.

Figure 52. Vegetation and recovery of trailing, east portion, North Fork Toms Creek (Bighorn Dolomite Area)

To the south, an abrupt and dramatic change in vegetative cover was observed, as vegetation becomes largely absent on the uppermost and steepest portions of the western half of these headwaters (Figure 52). On the lower portions of this area, where slope gradients are shallow vegetative cover becomes consistent and lush. Trees are sporadic in both the northern and southern portions of these headwaters due to poor site productivity. Even though cover is largely lacking there was no observed evidence of overland surface flow, rills, gullies or mass movement. To the north and west additional trailing was noticed, but as mentioned above these areas are now green due to revegetation. The North Fork of Tom Creek appears to be ephemeral to intermittent. Channel definition increased in a downstream direction, reflecting increased flow volumes. The channel was classified as a Rosgen A3[15], characterized as a steep, entrenched, cascading, step pool stream, in proper functioning condition. Uplands were not observed to be eroding or contributing excessive amounts of sediment (Fryxell 2009).

Several bedding areas were noted. In these areas, vegetative cover was reduced and soil disturbance increased. However, these areas were estimated not to exceed 0.5 acre and were not observed to upland sources of sediment or erosion (Moser and Fryxell 2008).

[15] **Rosgen's Stream Classification System (Rosgen 1996)** The purpose of this system is to classify streams based on quantifiable field measurements to produce consistent, reproducible descriptions of stream types and conditions. There are four levels in Rosgen's classification hierarchy: geomorphic characterization (Level 1), morphological description (Level 2), stream condition assessment (Level 3), and validation and monitoring (Level 4). A more detailed description can be found at http://www.stockton.edu/~epsteinc/rosgen~1.htm. The full classification method is contained in: Rosgen, D. (1996). *Applied river morphology*. Wildlife Hydrology, Pagosa Springs, CO. (http://el.erdc.usace.army.mil/emrrp/emris/emrishelp2/rosgen_s_stream_classification_system_spatial_topics.htm)

The only areas receiving a surface Condition Class rating of 1 was the road, which starts on National Forest System land, and leads towards Blair Lake. The initial portion of the road was ripped and seeded by the Forest Service in the summer of 2008. From the ARS/National Forest boundary to near Blair Lake, various degrees of rilling, rutting, and gully development were observed (Figure 54). Near the ARS/National Forest boundary, minimal slash is in place but has not been effective in diverting water from the road. Erosion and gully development are the most severe near the end of the road where there is a 15-20 percent grade. Ruts and gullies are one to three feet in depth. An area of at least 1,000 feet by10 feet by 3 feet is estimated to be involved (Figure 55). Areas adjacent to the road are used to drive the sheep down to the stream, where they cross on their way to Blair Lake.

Figure 53. Views of Intermittent drainage, North Fork Toms Creek, Park Shale Area

Figure 54. Ruts on road to Blair Lake

Figure 55. Road and erosion, lower portion of road to Blair Lake

The Toms Creek grazing area contains approximately 0.5 miles of sheep trail with minor trailing noted in other areas. Field work in 2008 showed that trails were generally in acceptable condition. Minor compaction in wet areas was noted associated with trailing leading down to Blair Lake, with the area generally looking good at the lake. At Corral Creek a trail crossed a tributary headwater stream to Hell Roaring Creek. No sheep trail-related issues were noted (Fryxell and Moser 2008).

The road ends near a Rosgen A4 type stream (Rosgen 1994). The road has functioned as a long-term chronic source of sediment to this channel. Based on the proximity of the road to the channel and the

contributions of sediment over time, this stream received a functional-at-risk rating. There are no water developments in this grazing area.

Humphrey Ranch

The Humphrey Ranch is grazed from May to October. Some cattle grazing is also conducted on this Ranch to help control vegetation and to improve sheep range conditions. No cattle-related impacts were observed within their grazing area. No evidence of desertification was observed in the field. Six proper functioning condition surveys were conducted. Five received ratings of proper functioning condition and one received a rating of functional-at-risk. See "Channel and Floodplain Conditions" section later in this report for additional detail. Uplands tended to be well vegetated as indicated by the 89 percent cover. Lushly vegetated lowlands separate the highlands, indicating areas of increased moisture and possible subsurface flow (Figure 57). These low areas "flow" into a major lush lowland that has poorly defined drainage. Some trampling and holding of water within these areas was noted, but was considered very minor.

An earthen dam was formed to develop a watering pond for the sheep. Trailing from "upstream" and "downstream" directions was noted leading to this pond. This pond area is roughly rectangular in shape and covers an estimated 132 square feet. Bank trampling is present and has resulted in vertical bank development on the south side of the pond. Bank height was variable ranging from several inches up to 18 inches or so (Figure 59). Bare and compact ground was present immediately around the pond. The pond and associated bare and compact ground is less than an estimated half-acre. No headcutting above the pond was noted and no down cutting below was noted. Areas below the pond were noted to be especially lush and well vegetated and included equisetum or horsetail, indicative of chronically moist soils.

Two bedding areas were observed within the grazing area. One area, on the shoulder of a hilltop was an estimated 50 feet by 50 feet with no vegetation. Although vegetation was absent and the surface condition was rated as Condition Class 2, there were no observable features indicating surface overland flow, erosion, and sediment transport (Figure 56).

The second bedding area is immediately adjacent to the perennial stream found in the northeastern-most quarter of the grazing area, which is used for watering the sheep. Evidence of use includes bank trampling, some vertical bank development less than ten inches high, trampling in areas next to the stream and some accumulation of fines in areas where water velocity would be less during higher flow. Some channel over-widening was also observed, as were small, vegetated islands. Despite these indicators of use during watering, riparian vegetation was well developed with a variety of age classes, and some hedging due to browsing was noted. Equisetum and iris were also noted. There was no evidence of channel dewatering. Upstream from this area, the amount of use varied and channel width decreased.

Downstream from the area of use channel width also decreased and the absence of excessive fines was observed. Bank incision also decreased both up and downstream from the area of use. The channel was in proper functioning condition below and above the area of use.

Figure 56. View of bedding area, Humphrey Ranch, view to north/northwest

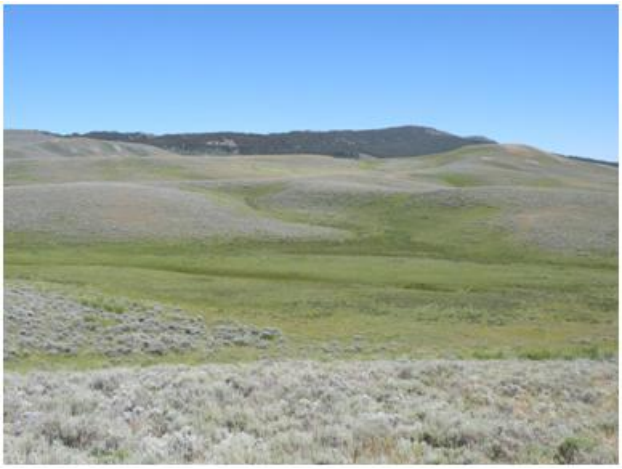

Figure 57. View of lowlands, Humphrey Ranch

Figure 58. Disturbance around watering pond

Figure 59. Perennial stream, Humphrey Ranch

Figure 60. Riparian vegetation, perennial stream, Humphrey Ranch

Figure 61. Beaver Creek, Humphrey Ranch

The second perennial drainage in this grazing area is located on Beaver Creek, which is in the far western portion of the area. Beaver Creek, where it crosses the road, is a Rosgen E3/E4 channel type, roughly five feet wide, with an anastomosing channel pattern (Figure 61). These channels are defined as low gradient and meandering, characterized by little deposition, and typically found in the bottom of broad low gradient valleys with fine alluvium or lacustrine soils.

The banks were stable and well vegetated and show recovery from past over-widening (Rosgen 1994, Moser and Fryxell 2008). No evidence of degradation related to present grazing activities were noted. However, within the length of reach used for watering there was some decline in condition. This portion of the stream was rated as in the lower end of the proper functioning condition due to channel over-widening, development of "vegetated islands" due to trampling, minor vertical bank development and the presence of fines, due to livestock watering.

Flood irrigation is used to water sheep. This water is diverted from Modoc Creek, west of the Humphrey Ranch grazing area. The diversion is located on Modoc Creek, a few hundred yards upstream of the confluence with Beaver Creek and about seven miles upstream of the gage, located on Beaver Creek.

When sheep are moved out of the pasture, water diversion canvas dams are removed and the diversion shut off. There are about two miles of irrigation ditch at Humphrey, which has irrigation rights for 2.623 acre-feet from May 1 to October 31. The water used for irrigation falls under water rights # 31-46, 31-47 and 31-48. The amount appropriated for water right 31-46 is 4.0 cubic feet per second, while it is 1.6 cubic feet per second for water rights 31-47 and 48. These three water rights total 7.2 cubic feet per second. Average irrigation season flow is 309 cubic feet per second for Modoc Creek and the range of average flow from May 1st through October 31st is 1.21-7.45 (Fryxell 2011, Table 30).

Table 30. Compilation of StreamStat data for Dry and Modoc Creeks

Watershed	Area (square mile)	Average Annual Peak Flow (cubic feet per second)	7-day, 2-year Low Flow (cubic feet per second)	Average Irrigation Season Flow (cubic feet per second)	Range of Average Flow 5/1-10/31
Dry Creek	36.9	141	5.6	7.89	1.77-25.5
Modoc Creek	19.1	35.4	1.62	3.09	1.21-7.45

Modoc Creek is an ungaged stream and flow statistics were developed using StreamStat, a program that utilizes regional regression models to compute flow frequency statistics for any given drainage basin. For this report StreamStats results for median monthly, bankfull l (1.5 year frequency), and low flow (7-day, 2-year) were used. For the area of the ARS pastures, the standard error of estimates was as follows:

- Median monthly-approximately +100 to -50 percent
- Bank full--+165 to -63 percent
- Low flow--+43 to -30 percent

A flow duration curve for Beaver Creek is displayed below in Figure 62.

The X-axis of the graph is the probability of exceedance of a given flow value. The high values on the steep left hand side of graph are snow melt runoff peak values; the long low tail is mid-summer to fall values. Values from zero to 50 percent exceedance probability represent spring to early summer flows while values from 50 -100 percent exceedance probability represent late summer flows.

Flows in Beaver Creek from June through October are less than 50 cubic feet per second, with flows in mid-July less than 20 cubic feet per second.

At Dry Creek average irrigation season flow was estimated at 7.89 cubic feet per second and range of average flow from May 1 to October 31 is 1.77-25.5 cubic feet per second with the allocated amount to the Sheep Station being 14.2 cubic feet per second (Table 30).

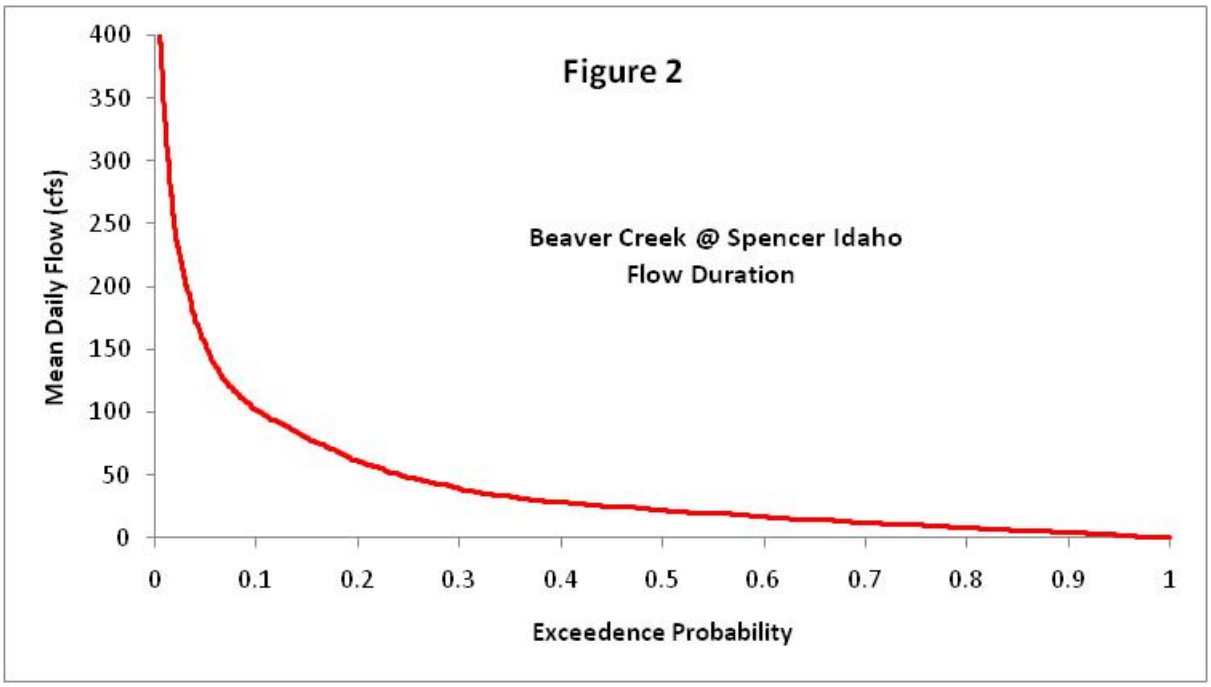

Figure 62. Flow duration curve from the Beaver Creek Gage, during irrigation season (May 1st-Oct 31st)

Henninger Ranch

This grazing area was purchased from private owners in the 1940s. During the time of private ownership, Henninger was a working ranch used for livestock production, with some cropland and hay production. Before purchase by the ARS, grazing usage was heavier than current Sheep Station usage (USDA ARS 2009). As a result, a small area (less than an acre) was noted to exhibit characteristics of desertification.

In several areas, desert-like pavement, consisting of a gravelly surface, was present. These areas lacked any vegetative diversity and consisted of only arrow leaf balsam root (Figure 63). The very low gradient surfaces may lend themselves to the effects of wind erosion (Moser and Fryxell 2008). Two proper functioning condition surveys were conducted at this property on Moose and Dry Creeks. Both received ratings of functional-at-risk due to flow diversion and rip-rapping.

Much of the rest of the grazing area is covered by sage brush and underlain by basalts, resulting in little natural surface expression of water. The major drainage that does exist on the property is Dry Creek, which was classified as a Rosgen C4 channel type (Rosgen 1994). A proper functioning condition survey was conducted, and a rating of functional-at-risk with no apparent trend assigned. The functional-at-risk rating was due to alteration of channel flows from irrigation that includes ditching, past agricultural practices, historical rip-rapping of the channel, and possible effects related to the main road leading into the property.

Figure 63. Arrow leaf balsam root field, Henninger Ranch

Figure 64. Historical rip-rapping, Dry Creek, Henninger Ranch

Irrigation practices were ongoing at the ranch prior to the purchase of the property by ARS, and a well-developed network of irrigation ditches is still present today (Jacobson 2009a). The remains of an historical head-gate, located in the channel proper, are still present. Additional historical management of the channel is evidence by rip-rapping (Jacobson 2009a). The rip-rap has been there so long that portions of it have become entrained as part of the channel bedload and pieces are found deposited within the channels banks (Figure 64).

Today, these ditches are used for irrigation and to flood pastures where sheep graze (Figure 65). Maintenance of these ditches is conducted annually. This activity is covered by an exemption from the requirement of a 404 permit by the Army Corps of Engineers (ACOE) as dictated by 33CFR 323.4(a) (3) (Yurczyk 2009a, http://edocket.access.gpo.gov/cfr_2006/julqtr/pdf/33cfr323.4.pdf). Section 404 of the Clean Water Act establishes programs to regulate discharge of dredged or fill material in waters of the United States, including wetlands (http://www.epa.gov/owow/wetlands/pdf/reg_authority_pr.pdf).

Diversion is accomplished through the use of canvas dams. Diverted water is used for watering sheep and for providing green forage for extended periods of time in dry seasons. The numbers of days that are used each year depend on water availability and grazing needs. Diversions are removed once the sheep are moved out of pasture (Smith and Yurczyk 2008). Water rights at Henninger are Federal Reserved Right Claims (Gough 2009).

Henninger Ranch has the right to use water from May 1 to October 31 of each year. Spring water use is not allowed until the flow in Dry Creek no longer reaches Spring Creek in mid to late June. Average past ten year use is 675 cubic feet per second with a high of 1125 cubic feet per second in 1999 and a low of 474 cubic feet per second in 2000. The average use of 675 cubic feet per second translates to 3.7 cubic feet per second per day. The low of 474 cubic feet per second translates to 2.6 cubic feet per second while the high of 1125 cubic feet per second translates to 6 cubic feet per second per day. The average use of 3.7 cubic feet per seconds indicates that the maximum water right amount of 14.2 allotted for use on Dry Creek is not being used.

Figure 65. Ditching and maintenance, Henninger Ranch

The average irrigation season flow for Dry Creek is 7.89cubic feet per second and the range of average flow for the period of May 1 through October 31 is 1.77-25.5 cubic feet per second (Figure 65). See the Channel, Riparian and Floodplain Conditions section for additional information.

Some cattle grazing is also conducted on this ranch to help control vegetation and to improve sheep range conditions. No cattle-related impacts were observed within the grazing area.

Headquarters Property

The Headquarters property is underlain by flood basalts, resulting in an uneven topography, due to multiple flow events, pressure ridges, lava tubes, “blisters” and other surficial expressions of volcanism. In addition, there appears to be a pattern of regular jointing or fracturing. As a result, there is little water retention and the area is dominated by sagebrush (Figure 67, Moser et al. 2008).

No evidence of desertification was observed. Percent ground cover ranged from 0 to 100 percent, with an average of 73.4 percent. Approximately 10 percent of 128 data points had a soil Condition Class 1 or 2. Half of these points were trails or roads, the remainder were small depressions that held surface water or remained moist due to clayey deposits and were trampled by livestock. Compaction and ponding of surface water were the most apparent disturbance (Moser et al. 2008).

No proper functioning condition surveys were conducted on this property due to the lack of drainages sustaining surface flow.

Occasionally, cattle and horses are grazed on Headquarters property to improve sheep range conditions. Numbers are determined on the area and amount of vegetation that needs to be removed (Smith and Yurczyk 2009). No observable effects, related to cattle and horses, on watershed condition was observed.

Hydrology

Three primary creeks are located on ARS properties. Beaver Creek flows through the Headquarters, Henninger, and Humphrey properties. Odell and Toms Creeks flow from the Montana side of the Summer Range.

Peak flows in watersheds influenced by the Centennial Mountains are during late spring snowmelt, usually during May and June for all three gauges. Toms Creek was dry July through September. Beaver Creek is perennial throughout its period of record from April through June. During drought years, it may be dry at the station site July through March, only running with snowmelt runoff. During wet years, the stream flows year round.

Odell Creek has consistent flow spring through fall during all the years of record.

On the Idaho side of the continental divide, the drainage in the Headquarters and Henninger Ranch properties is imprinted with a degree of disorder, with many small depressions that are possibly the result of partial collapse of tubes or blister cones within the flow, and other small basins created between ridges. The deep and regular fracturing, or joint sets, that is frequent in basalts provides excellent downward percolation of precipitation water, and a potentially high volume of storage, very often creating the so called “dry mountain” effect: a terrain with marked absence or low density of drainage features, a complete lack of surface scour channels, and underdeveloped low order valley form. The regular jointing is caused by shrinkage of the flow due to slow and relatively uniform cooling, and is analogous to shrink cracks in clay. Throughout these two properties, the exposed top surface of flows, usually on very broad, shallow ridges clearly shows well developed hexagonal joint patterns that likely persist deep into the rock of an individual flow layer.

Within the Humphrey Ranch property, the subdued topographic relief does not generate enough water-yield to sustain perennial flow in the smaller tributaries to Beaver Creek. These tributaries are ephemeral or have surface water expressed during base flow periods, where there are poorly drained relatively impermeable soils in the valley bottoms. Long Creek and Beaver Creek are probably both perennial based on 2008 field observations.

The East and West Summer Ranges are divided between bedded sedimentary rock and felsic extrusive igneous mostly either rhyolites or trachytes. Fracturing in the felsic igneous is considerably less regular than that for thick basalt flows. In any case stream flow yield from the ridges of extrusive igneous in the upper portion of the Odell and east side of the Toms Creek grazing units, is evidently high and more analogous to granitic slopes, which because of poor transmissivity of the rock (volume of water that can move through it), and typical steepness, are “wet” slopes. Precipitation water does not percolate far into relatively unweathered rock under the soil mantle, but instead travels down slope as shallow subsurface interflow in the soil to daylight frequently at major breaks in slope or geologic facies into springs and boggy seeps. In addition, the large mass of slump material filling the topographic lows of these properties may provide storage area for release during the summer baseflow. The slump slopes in the other properties have much less displacement and have not collected in such quantity in the steeper and narrower valleys.

The Spring Creek drainage network is ephemeral to intermittent in nature. A single unnamed first order draw provides the only surface flow during summer base flow season to the main stem, which is insufficient to charge the valley fill. By contrast, the Odell Creek drainage system contains abundant surface flow throughout the property. There is a clear correlation between fault lines and stream valley alignment (including the perennial tributary to Spring Creek). Unmapped but inferred faults in the lower reach of Spring Creek act as barrier to flow with surface flow ceasing at a possible intersection of a fault.

Channel, Riparian and Floodplain Conditions

Overall, channel conditions are good to excellent on ARS properties, with few exceptions. Good and excellent are defined as meaning that bank stability, fine grained sediment (sand size and smaller), apparent water clarity and channel morphology and pattern are within expected and acceptable limits for a given channel type. This means that the given flow regime, valley slope and slope delivery mechanism for sediment to valley bottoms are appropriate for the channel type at each surveyed location. Exceptions were noted at one location on Spring Creek (Big Mountain grazing area), at the point of diversion just past the confluence of Berry and Modoc Creeks on the Humphrey Ranch and at Henninger Ranch on Moose and Dry Creeks.

Diversion has occurred on all four streams for irrigation purposes and at Berry and Modoc Creeks diversion appears to have been used in order to route only one channel under the Interstate. Diversion has resulted in alteration of floodplain and channel function for all four channels, and on Modoc Creek, small levee type features were on either side of the channel/ditch.

Springs and Wetlands

No springs were observed during field work in 2008 and 2009.

Field reconnaissance was conducted during the summer 2008 and 2009. Based on field observations water-influenced soils were only found associated with flowing streams or at Blair Lake. The width of water-influence appeared to be limited and often reflected by the presence of *Salix* spp. and *Equisetum fluviatile*.

Wet meadow conditions were observed in the Humphrey Ranch adjacent to Beaver Creek and in several swale areas on the Ranch. These low-lying areas lacked developed channel morphology, but appeared to have seasonally wet conditions or have wet conditions that were sustained after periods of precipitation.

Water-influenced soils around Blair Lake were observed to have limited trampling and compaction. These areas were limited to driveway crossings and areas around Blair Lake where sheep access the water for drinking. At sheep trail crossings and around Blair Lake adjacent vegetation and water-influenced soils did not appear to be disturbed or otherwise compromised.

No bedding areas were observed in areas of water-influenced soils. These field observations support information provided by Sheep Station personnel that sheep prefer to congregate on slopes and ridge tops and avoid wetland and riparian areas.

Water Quality

303(d)/305(b) Report

The Clean Water Act, of 1972, and subsequent amendments of 1977 and 1987, is the primary federal law that governs water pollution in the United States. Under the act states are required to set water quality criteria standards. A biennial report, under section 305(b), is prepared for congress by the states and Environmental Protection Agency. Within that report a list of impaired water bodies within the state (section 303(d) of the Clean Water Act) is required.

Since the project area includes parts of Montana and Idaho both States integrated reports for 303(d) and 305(b) information was reviewed. Waters in the integrated 303(d)/305(b) reports are classified by category, denoting their compliance with applicable water quality standards. The relevant categories for this analysis are 4a, 4c and 5.

- Category 4a waters Impaired water bodies are placed in Category 4a when a total maximum daily load (TMDL)[16] is developed by Department of Environmental Quality and approved by Environmental Protection Agency such that, when implemented, full attainment of the water quality standards is expected for the specific impairment (e.g., sediment) for which the TMDL was developed. If the water body has any other impairment(s), then it may be included in other categories of the Integrated Report (State of Idaho, 2010).
- Category 4c indicates that non-support of water quality standard(s) is not due to a pollutant.
- Category 5 streams are defined as waters where one or more applicable beneficial uses are impaired or threatened, and a (TMDL) is required to address the factors causing the impairment or threat (State of Idaho 2014, State of Montana 2014). Ten and a half miles of stream flowing through ARS properties are categorized as 4a and 5, 0.6 miles is categorized as 4c (see Table 31).

16 A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards,

Table 31. Summary of Montana and Idaho State impaired reaches within the project area

Listed Reach Name	Category	Length (miles)	Beneficial Uses Not Supported	Probable Cause(s)	Probable Source(s)[c]
Beaver Ck (Beaver Ck-Dry Creek to canal)/(ID17040214SK014_05) (Humphrey Ranch)	4A	2.7	Coldwater Aquatic Life (Other Uses Not Assessed)	Water temperature	Streambank erosion reduced riparian vegetation due to grazing and low flow conditions. Ongoing drought exacerbating stream temperature elevation
Beaver Ck (Source to Idaho Ck)/(Id17040214SK021_02) (Long Creek) (Modoc) (blank) (All Humphrey Ranch)	4A	5.8	Domestic Water Supply, Salmon Spawning, Primary Contact Recreation, Coldwater Aquatic Life	E. Coli and water temperature	Streambank erosion reduced riparian vegetation due to grazing and low flow conditions. Ongoing drought exacerbating stream temperature elevation
Beaver Ck. (Source to Idaho Ck./ID17040214SK021_3)	4A	2.0	Coldwater Aquatic Life (Other Uses Not Assessed)	Water Temperature	Streambank erosion reduced riparian vegetation due to grazing and low flow conditions. Ongoing drought exacerbating stream temperature elevation
Corral Ck. (Headwaters to Mouth of Red Rock Ck.)	5	0.4	Aquatic Life (P)	Alteration in stream-side or littoral vegetative covers, Total Phosphorus and Sediment	Grazing in riparian or shoreline zones; Unspecified unpaved road or trail
Hell Roaring Ck. (Headwaters to Mouth of Red Rock Ck.)	4C	0.6	Aquatic Life (N)	Alteration in stream-side or littoral vegetative covers	Grazing in riparian or shoreline zones
Odell Ck. (Headwaters to Mouth of Red Rock River)	5	5.7	Aquatic Life (N) Primary Contact Recreation (P)	Anthropogenic substrate alteration, physical substrate habitat alteration; High flow regime and Alteration in stream-side or littoral vegetative covers	Agriculture, Channelization, Habitat Modification, Hydrostructure Flow regulation, Irrigated Crop Production and Grazing in Riparian or Shoreline Zones;
Tom's Ck. (Headwaters to the mouth of Upper Red Rock Lake)	5	1.8	Aquatic Life (P)	Alteration in stream-side or littoral vegetative covers; Low flow alterations; Sedimentation and siltation	Grazing in Riparian or Shoreline Zones; Irrigated crop production

A TMDL for temperature has been developed and approved by EPA for Beaver Creek but not implemented; and Beaver Creek is still considered impaired. Fieldwork in 2008 conducted three proper functioning condition surveys on Beaver Creek, where it flowed through ARS properties. Two of the surveys found the stream in proper functioning condition with abundant riparian vegetation and no signs of upland disturbance. At the third site, a rating of functional-at-risk was given due to the immediate adjacency of an old inactive gravel pit and a road crossing the stream.

On the Humphrey Ranch, surveyed sections of Beaver Creek and Long Creek did not show evidence of flow, physical substrate, and habitat alterations during the 2008 and 2009 field seasons. Fieldwork along Beaver and Long Creeks did not provide indications of past riparian harvest or removal. As a result, water temperature alterations may be due to flow alterations. It should be noted that Beaver Creek is listed by the State of Idaho as impaired although proper functioning condition surveys conducted on Humphrey Ranch rated the stream as in proper functioning condition. Analysis of the State of Montana's draft 2010 Water Quality Integrated Report (303(d)/305(b) list) shows three streams originating in the Centennial Mountains on the 303(d) list or listed as impaired, but not requiring a TMDL. Corral Creek, Odell Creek, and Tom Creek are listed as Category 5 streams (State of Montana 2010). Hell Roaring Creek is listed as a category 4C. Although Corral, Odell and Tom Creeks have been listed as requiring TMDLs, and a date has been assigned for TMDL completion, none of these TMDLs have been developed as of yet (State of Montana 2010, appendices B and F, http://cwaic.mt.gov/query.aspx).

Although these streams are listed from headwaters to steam mouths, the listings appear to be based on problems specific to certain reaches lower in the Red Rock Lakes basin, which are not located on ARS properties. Discussions with the State of Montana indicated that the listing of the entire reach appears to be more a matter of convenience than impairment (Fryxell 2011a).

The State of Montana's Clean Water Act Information Center, for the 2014 reporting cycle describes the upper reaches of Corral and Hell Roaring Creeks, whose headwaters are in the Tom Creek summer range, as in reference condition (http://cwaic.mt.gov/query.aspx). Field observations in July 2008 and August 2009 support these conclusions (Moser and Fryxell, 2008, Fryxell, 2009). Further communications with the State of Montana document conditions in these two drainages. The upper reach of Hell Roaring Creek is documented as in near pristine/reference condition and that the upper reach of Corral Creek is a mountain stream with good cool flow, stabile stream banks, good riparian vegetation and shading and clean substrate (Fryxell, 2011b).

In both areas, vegetation appeared consistent and well established, in the areas that were visited. There were no major areas of upland instability or erosion observed in these field trips that could be potential sources of sediment. No areas of excessive riparian impacts and browse were observed that could be construed as alteration of riparian vegetative cover (Moser and Fryxell 2008, Fryxell 2009).

The entire length of Odell Creek is listed, due to impairments which were the result of severe erosion from grazing in riparian areas and dewatering due to irrigation (State of Montana 2006, http://cwaic.mt.gov/query.aspx). The last time this reach was assessed was 1999. The report is not specific to where these problems are located and neither of these issues was observed during field work conducted in 2008 on ARS property in this area. In addition, during field work vegetation appeared consistent and well established in the areas that were visited. There were no major areas of upland instability or erosion observed in these field trips that could be potential sources of sediment. No areas of excessive riparian impacts and browse were observed that could be construed as alteration of riparian vegetative cover.

No areas of streambank degradation were noted except at two minor areas on Odell Creek (OD4 and 5, Moser and Fryxell 2008).

Figure 66. Location of Odell Creek Sheep Station stream crossing research points

A similar situation exists with Tom Creek. Probable causes of impairment are grazing in riparian or shoreline zones and irrigated crop production (Montana 2009, 2006e, http://cwaic.mt.gov/query.aspx). No grazing related sources of sediment and siltation, alterations to flow or to stream side vegetation were observed during the field seasons of 2008 or 2009 in the headwaters of Tom Creek (Moser and Fryxell 2008 and Fryxell 2009). However, the map for this reach indicates that the entire listed segment does not extend beyond the valley floor, in front of the north boundary of the Centennials.

In Montana, there is only one impaired waterbody within the project area. Upper Red Rock Lakes is listed as impaired due to other flow regime alterations and sedimentation and siltation. These problems are due to agriculture, grazing in the riparian or shoreline zones, range land grazing and upland sources (State of Montana 2010, appendix A. Examination of maps associated with Red Rock Lake on the Montana Department of Quality Clean Water Information Center Mapper shows that both the Upper and Lower Red Rock Lake areas do not involve ARS properties (http://cwaic.mt.gov/query.aspx). In Idaho there are numerous waterbodies present but only one is assessed at fully supporting. The others have not been evaluated.

Municipal Watersheds

There are two wells located on the Headquarters property. One well, developed in 1918, is estimated to be at least 350 feet deep. The other well, developed in 1937, is 856 feet deep with the water level at 731 feet.

These wells are used for drinking water and are tested quarterly for the presence/absence of coliform and are tested annually for copper and lead. Volatile organic compounds and arsenic are monitored once every three years. Inorganic compounds and nitrite are required to be monitored every nine years. Nitrates are required to be monitored annually. Synthetic organics (herbicides) are required to be monitored every six years. Out of the three compounds known for groundwater contamination, only Picloram is monitored, apparently Bromacil and Diuron are not regulated in Idaho (Feisthamel 2009). Exceedances above maximum contaminant levels are rare, with only one exceedance in 2005 for coliform. There have been no detections of Picloram (Feisthamel 2009).

There is also a domestic well on the Henninger Ranch, but that well is not used and is not monitored (Jacobson 2009b, Yurczyk 2009b).

Hydrologic Environmental Consequences

Analysis Assumptions

All proposed design features and mitigation measures would be implemented for action alternatives where grazing occurs. Chapter 1, page 29 describes project design features and mitigation measures to reduce potential effects to water resources. Best management practices for herbicide applications are listed in appendix C.

Figure 67. Views of typical alluvial flats underlain by basalt, Headquarters Property

Effects Common to All Alternatives

Best Management Practices, Mitigation Measures and Monitoring Recommendations

Best management practices have been proven effective across the country in managing non-point sources of pollution, and their implementation is required in both Idaho and Montana as part of the Clean Water Act (Seyedbagheri, 1996, Schuler and Briggs, USDA Forest Service 2002, State of Idaho 1999 and State of Montana 2007)).

Grazing

Table 32 displays a comparison of forage utilization for all alternatives. Percent of utilization is used for comparative purposes.

Table 32. Summary of percent utilization by alternative

Property	Percent of Available AUMs Used				
	Alt1	Alt2	Alt3	Alt4	Alt5
ARS properties	**8**	**NA**	**6**	**8**	**5**
Headquarters	6	NA	5	7	4
Humphrey	18	NA	27	20	11
Henninger	18	NA	16	21	11
East Summer Range (Toms Creek)	6	NA	NA	NA	3
West Summer Range (Odell Creek/ Big Mountain)	5	NA	NA	5	3
Forest Service Allotments	**3**	**NA**	**13**	**4**	**<1**
Snakey-Kelly	25	NA	13	25	NA
East Beaver	1	NA	NA	2	<1
Meyers Creek	1	NA	NA	NA	<1

a - Animal Unit Month. By definition, one (1) AUM represents 790 lbs. of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. For the purposes of this table, five (5) sheep are equivalent to one (1) AUM

Ground Disturbance from Sheep Trailing

Total miles of trailing and total miles of trailing within 300 feet of streams does not vary substantially between alternatives 1, 4 and 5, and there would essentially be no differences between direct and indirect effects for these three alternatives. Alternatives 2 and 3contain zero miles of trailing and zero miles of

trailing within 300 feet of streams. Although there would be a decrease in direct and indirect effects, the decrease in erosion and sediment generation would not be measurable.

As there are no discernable direct and indirect effect for total miles of driveway and total miles of driveway within 300 feet of streams and therefore, no cumulative effects.

Herbicide Use

Non-native invasive species are present and have been addressed through targeted select grazing and localized herbicide use. Herbicides are used to kill or inhibit the growth of invasive undesirable or exotic broadleaf weeds and/or woody plants.

Herbicides have been used along roads, buildings, feedlots and corrals for the past thirty years following manufacturer's directions. Spraying occurs semiannually. Herbicides that are used include, but are not limited to: clopyralid, triclopyr amine, Imazapyr, Diuron, Picloram, Bromacil, non-aquatic glyphosate, imazapic, and 2, 4-D amine. Application methods are spot application, hand wand application to control weeds along roadsides, in dry-lots and corrals and near building structures. Four-wheeler-mounted and tractor-mounted boom-sprayer applications are done in small pastures and large dry lots (USDA ARS, Appendix C 2008). A summary of the herbicides utilized for various purposes within the ARS properties and their relationships to soil and water are summarized in appendix C and Table 26. Applications are according to product directions and adhere to directions in the material safety data sheets. Herbicide application requirements are defined in Appendix C.

In general, up to 60 acres of herbicide application occurs for the treatment of invasive plants on ARS properties; approximately 90 percent of this is along roadsides. In 2014 and 2015 17 miles of Sheep Station and co-owned road (state, county, private) roadsides were spot treated for various noxious weeds. Herbicides used were non-aquatic glyphosate, 2,4-D amine and aminopyralid. Road surfaces were also treated. These treatments consisted of two miles per year of asphalt road surface with cracks. These areas were spot treated with Bromacil plus Diuron. Lot surfaces were also treated, which included animal holding lots surfaces at Headquarters and the Mud Lake Feedlot, as well as parking areas. Approximately two acres per year were treated using Bromacil and Diuron. Pastures were also treated at Humphrey, Headquarters or Mud Lake. Twelve acres per year were treated.

Range Improvements (Shrub Management)

The Sheep Station is proposing to study the use of herbicides in helping to control wildfire in sagebrush ecosystems. This is part of the issued directives to help suppress rangeland wildfire in order to protect shrub-dense areas that provide critical sage grouse habitat (appendix C). Consequently, this is resulting in large, contiguous area of non-sagebrush species, such as bitterbrush. To treat these areas the Sheep Station is proposing to conduct experimental strip and spot treatments of herbicides on the Headquarter property. Strips would be less than 150 feet wide. The purpose of these narrow strips would be to reduce shrub density and reduce the likelihood of wildfire advancing at an uncontrolled and destructive rate through contiguous shrub-dense sage grouse habitat. Aerial application would be used to apply the herbicide, tebuthiuron. Spot treatment with tebuthiuron would occur as needed following strip treatments. Proposed areas of application are shown in Map 5.

Tebuthiuron persists in the environment and has been found as a groundwater contaminant. It has a low adsorption to soil and is highly persistent in soils. It degrades slowly in aquatic systems (Bureau of Land Management 2010, http://pmep.cce.cornell.edu/profiles/extoxnet/pyrethrins-ziram/tebuthiuron-ext.html). The EPA considers tebuthiuron to be one of a group of pesticide compounds that have the greatest potential for leaching into, and contaminating, groundwater. It was not found in groundwater in a U.S. groundwater survey conducted by the EPA (http://pmep.cce.cornell.edu/profiles/extoxnet/pyrethrins-

ziram/tebuthiuron-ext.html). Fish and aquatic insect exposure to tebuthiuron occurs primarily through direct contact with contaminated surface waters and sediment (State of Washington 2006).

Spot applications may also occur where seeding of test plant products occur for experimental evaluation. All herbicide applications would occur according to label specifications and would follow protocols in appendix C.

These treatments would occur under alternatives 1-5. Two groundwater wells occur on the Headquarters property and are used for drinking water. Table 9 requires a 100 foot minimum buffer for aerial application of tebuthiuron. Tebuthiuron would not be used when the ground is frozen or saturated with water (http://www.keystonepestsolutions.com/tebuthiuron-80wg-herbicide-4-pounds-brush-killer-replaces-spike-80wg-spike-80df-281.html). This includes when the intermittent stream, located in the western-most treatment polygon is flowing or the streambed is water saturated or frozen.

The granular form of Tebuthiuron would not be applied when wind speeds exceed 10 mph. Herbicides will not be applied when conditions stated on the herbicide label cannot be met and when air turbulence significantly affects the desired spray pattern (Bureau of Land Management 2010).

Buffers are effective at reducing the movement of herbicide to streams (Bureau of Land Management 2010). The project design features limiting application to dry conditions are to prevent mobilization of Tebuthiuron into the water column. The design feature involving wind speed and turbulence are to limit the potential for drift. Based on the effectiveness of best management practices, it would be expected that Tebuthiuron entrainment into the water column would be prevented or mitigated to the maximum extent possible. Effects may not be discernable at the 6th watershed level. Water quality monitoring is recommended for this herbicide. Bahr 2015 does note that there are no requirements for its monitoring under the Safe Drinking Water Act.

Prescribed Burning

As part of ongoing research activities the station conducts burning in areas on the Headquarters Range to test research hypotheses. Over the next five years several small burns are planned, of up to approximately 700 acres over the next five years. Fires would provide opportunity to validate post-fire recovery models and help reduce fuels on small strips of land to mitigate wildfires threatening large areas of sage grouse habitat. Prior to each burn a fire plan would be prepared. Temporary graded fireline would be constructed around proposed burn areas. Construction would be with a dozer and motor grader and lines would be approximately 15 feet wide.

The soil specialist report states that for a prescribed burn, a burn plan will be prepared by trained professional range scientists and technicians, that reflect range conditions (soil and vegetation) and weather to achieve burn objectives, while protecting future soil productivity. Short-term adverse impacts to soils from severe burning are not expected from either fall or spring burning as fuel loads are light, resulting in fires of shorter duration and intensity (less soil heating). Nor is erosion predicted to increase given the low seasonal rainfall. The natural burning cycle yields a return cycle of once every 30 years, and these acres should fully recover their vegetation cover within two to three growing seasons. Erosion and sedimentation therefore, is of low risk to soil productivity and water quality (Chalfant 2015). In addition it should be noted that mapped drainages are largely absent within the proposed treatment polygons.

For hydrology the primary direct effect is ground disturbance with erosion and sedimentation the main indirect effects. Based on the information above it is expected that direct and indirect effects would be short term. No impacts to streams due to erosion would be expected due to the lack of flowing streams at the Headquarters property.

Modified Alternative 1 - Direct/Indirect Effects

Under modified alternative 1, there would be no change in the amount of acreage grazed compared to existing operations. Under alternative 1 a total 3.1 miles of sheep trail (off road), are proposed, with 1.4 of these miles within 300 feet of streams. This would be the same as existing conditions. Hence there are no changes in direct or indirect effects when compared to existing conditions.

Modified alternative 1, the proposed action, also represents current operations at the Sheep Station as well as no new federal action. Modified alternative 1 would continue grazing at Headquarters, Humphrey, Henninger, and the East and West Summer Ranges. Under this alternative, the number of sheep grazed and the grazing schedule would be the same as what is currently implemented. All properties currently in use would still be used (Headquarters, Humphrey, Henninger Ranch, East and West Summer Ranges). Planned activities in addition to grazing include road and fire break maintenance at Headquarters and Henninger; fence maintenance at Headquarters, Humphrey and Henninger Ranches, and in the East and West Summer Ranges; and maintenance of water developments in Humphrey and Henninger Ranches as well as in the East and West Summer Ranges.

The primary direct effect is ground disturbance and water withdrawal. The total acreage grazed under modified alternative 1 is the same as current operations. There would be no discernable difference in ground disturbance. Ground disturbance, loss of vegetative ground cover, and compaction would be associated with watering troughs, along sheep trails, bedding areas and corrals. Other areas of compaction include trailing along fence lines. In-stream disturbances would occur as the sheep actually cross a stream. Potential in-stream disturbances would include substrate trampling and incorporation of manure into stream flow.

Ground disturbance would also occur during road and firebreak maintenance activities, as well as when temporary firelines, associated with the prescribed burning/herbicide application experiment are constructed. Maintenance activities have the potential for generating localized areas of disturbance during road grading, maintaining the firebreak, fence and water development replacements and ditching. Potential direct effects include erosion and the introduction of sediment into streams. Burroughs and King (1989) and Burroughs (1990) document that little sediment beyond 300 feet is transported to streams. 8.5 of the 142.3 miles of road on the Headquarters property occur within 300 feet of streams (Table 28).

All stream drainages located on the Headquarters property are intermittent and are underlain by flood-basalts characterized by lava tubes, blisters and jointing, making the area highly porous and permeable with little evidence of sustained surface flow. As a result, minimal erosion and sediment transportation are expected. Indirect effects would be expected to be short term and associated with initial disturbance. Long-term effects associated with roads would be expected to remain the same as no road construction was proposed.

Principal indirect effects would be erosion and sediment introduction into streams and alterations of stream flow and channel morphology. The type and magnitude of direct/indirect effects, both of a short-term and long-term nature, for all 6th level watersheds, is generally not expected to change with the implementation of the proposed action. There are two exceptions to this generalization in modified alternative 1. The first is in watershed 100200012102 where there would be a reduction of localized sediment sources at OD4 and OD 5 (see hydrology report). The second exception is in watershed 100200012202, on the road to Blair Lake (see hydrology report). As current management and modified alternative 1 are one in the same, there would be no quantifiable changes to the measures used for analysis.

There would be no modification to current floodplain function, water-influenced soils and riparian areas as there would be no change in utilization modified alternative 1.

Recovery from past prescribed burns would continue and as these areas recover their ground cover the risk for transportation of surface sediment would decline. Monitoring has shown that within two years forbs and grass cover returns, minimizing the potential for erosion.

Historically less than 60 acres per year are treated with pesticides for treatment of invasive plants. This is assumed for alternative 1, which is the same as current management. In addition, as part of the proposed prescribed burn/herbicide treatment experiment an estimated 50 additional acres would be treated through aerial applications of Tebuthiuron. Herbicides listed in Table 26 on page 141 are used at the Sheep Station. By implementing recommended best management practices and buffers, surface water contamination would be reduced both in the short and long term. Long-term effects to water quality would also be reduced by applying best management practices (see hydrology report). For a discussion of best management practice effectiveness, the reader is referred to page 43 in the Hydrology Report. Additional direction regarding herbicide applications at the Sheep Station is found in Appendix C – ARS Sheep Station Integrated Invasive Plant and Weed Control.

There would be no change in effects to water-influenced soils and riparian areas as the number of sheep and grazing locations would not change.

The short-term effect of withdrawing water would continue. Indirect effects related to water withdrawal, such as potential impacts to channel function would continue in the long term as long as water is withdrawn in Modoc Creek (6th level watershed 170402140404) and Dry Creek (6th level watershed 170402140607) (Hydrology Report, page 52).

Modified Alternative 1 – Cumulative effects

Grazing would continue on Snakey-Kelly and Meyers Creek and the East Beaver allotments. Winter feeding of sheep would continue at the Mud Lake Feedlot. The number of sheep would not change from the sheep currently being grazed. The effects of the Sheep Station grazing operations on these properties would not vary from those analyzed in the NEPA done for the allotments by their respective agencies.

As there were no predicted changes in direct and indirect effects to watershed condition, hydrology, riparian, channel and floodplain conditions, springs and wetlands, and water quality in all watersheds except 100200012102 and 100200012202; there would be no cumulative watershed effects.

Sediment contributions from the old phosphate mine would continue in 6th level watershed 100200012102. In watersheds 100200012102 and 100200012202 existing levels of sediment would be reduced locally at points OD 4 and 5 and on the road to Blair Lake. Decreases would be related to implemented design features and mitigation measures. This would result in a reduction to existing cumulative watershed effects. However, the reduction would likely not be measurable in either 6th level watershed due to scale.

The Idaho Power Transmission Line currently crosses the Headquarters property and is located in two 6th level watersheds (170402140401 and 170402140101). At present there is ongoing work to upgrade this line. No new roads have been constructed for the upgrade. Existing roads are being used to access the line and no new towers are being constructed. As a result the use of the existing roads is similar to the use of the roads for power line maintenance. The difference in the amount of use is not discernable at the 6th watershed level. As no new towers are being constructed there is no additional ground disturbance. Minor short term disturbance may occur at material staging sites, pulling, tensioning and splicing sites. However this disturbance would be expected to be well below one percent of watersheds 170402140401 and

170402140101. As a result measurable increases for short term cumulative effects would not be expected. Existing long term effects would continue at the same level.

Application of Tebuthiuron on 50 additional acres would probably not be discernable at the 6th watershed level due to the application of best management practices and project design features. Water quality monitoring has been recommended.

There would be no discernable changes in cumulative effects related to sheep trailing, on or off roadways.

Alternative 2 – Direct/Indirect Effects

No direct or indirect effects related to grazing, and prescribed burning, such as ground disturbance and introduction of sediment, would occur under this alternative. Water rights would not be utilized and there may be potential local improvements to flow. Indirect effects to channel morphology related to water withdrawal would decrease. Indirect effects related to road and firebreak maintenance, and temporary firelines associated with prescribed burning, would occur as described under alternantive1, but indirect effects related to fence and water development maintenance would not. Indirect effects related to current herbicide use would continue along with applicable best management practices and buffers. Application of Tebuthiuron would be mitigated with the implementation of project design features and best management practices, including stream buffers. Indirect effects may occur but may not be discernable at the 6th watershed level.

These changes to direct and indirect effects, both those that are short and long term, would occur in all 28 6th level watersheds involved in this project. Existing sources of sediment from the road to Blair Lake, at sheep crossing points OD 4 and OD5, and at the mine waste water pond would continue, as mitigation measures would not be implemented. Although there would be reductions in both direct and indirect effects these changes may not be detectable due to the size of these 6th level watersheds.

Alternative 2 - Cumulative effects

No grazing would occur on the Snakey-Kelly, East Beaver, and Meyers Creek allotments under this alternative, and utilization on all allotments would decrease to zero. Although decreases would occur for both direct and indirect effects these changes may not be detectable due to the size of these 6th level watersheds.

Because there are no discernable direct/indirect hydrological effects under alternative 2 compared to alternative 1, there are no cumulative effects. Sediment contributions from the old phosphate mine would continue in 6th level watershed 100200012102. Levels would not be expected to change. Application of Tebuthiuron on 50 additional acres would probably not be discernable at the 6th level watershed due to the application of best management practices and project design features. Water quality monitoring has been recommended.

Compared to alternative 1, alternative 2 does not propose trailing on roads or trails. Hence the total miles of trail, both on and off road, would decrease from 50.9 to 0. Sheep trails (both on and off road) within 300 feet of streams would remain but not be used. Sediment generated from these trails would be expected to decline over time as they re-vegetate due to lack of use. Both would result in a decrease of sediment and a decrease in existing cumulative effects. However the change would not be expected to be discernable at the 6th watershed level.

Modified Alternative 3 - Direct/Indirect Effects

Direct and indirect effects, both short and long term, as described in modified alternative 1 would be reduced on Henninger Ranch as the percent utilization is 2 percent less. Direct and indirect effects, both

short and long term, as described in alternative 1 would be reduced on Humphrey Ranch east of Beaver Creek, the East Summer Range, and West Summer Range as there would be no grazing. The effects would be the same as for alternative 2. For the portion of Humphrey Ranch, west of Beaver Creek, the percent utilization would increase by nine percent, from 18 to 27 percent. This would translate to an increase in direct and indirect effects. Approximately 340 acres of the increased utilization would occur in watershed 170402140404 with roughly 20 acres total occurring in watershed 170402140405. Consequently, direct and indirect effects would not be expected to be discernable in each watershed. In each watershed the acreage experiencing increased utilization would be well below one percent of the watershed area.

The short-term effect of withdrawing water would continue.

Current levels of direct and indirect effects related to water withdrawal would be the same as described in alternative 1.

However, the mitigation measures recommended for implementation under alternative 1, for the road to Blair Lake, the sheep crossings at OD 4 and OD 5 and for the drainage exit at the mine wastewater pond would not be implemented. As a result, sediment generation at these areas would continue at their present levels.

Under modified alternative 3, forage utilization on Headquarters allotment would remain the same as under alternative 1 as the number of grazed sheep remains the same. When compared to modified alternative 1, no discernible difference would be expected for direct and indirect effects. This is due to the size of the Headquarters property, approximately 28,000 acres.

Modified Alternative 3- Cumulative effects

For the Snakey-Kelly allotments, there is a decrease in the number of AUMs utilized from 25 to 13 percent. Although the decrease in AUMs utilized would result in a decrease in both effects, for both the short term and the long term, effects may not be discernible as the allotment is approximately 5,800 acres.

For the East Beaver and Meyers Creek allotments utilization would change as these allotments would not be grazed. Direct and indirect effects related to ground disturbance, potential erosion and sediment generation would occur in watersheds 170402140404, 405, 406,407, 408 and 60, 1002000012101 and 170402020803.

No changes in existing effects would be expected in 6th level watersheds 170402150102 and 17040215014 where the Mud Lake allotment exists as there would be no changes to existing levels of effects.

Sediment contributions from the old phosphate mine would continue in 6th level watershed 100200012102. Levels of sediment generation should not change. The design feature for rest and incidental use of the North Fork Tom Creek would not be implemented as this area would not be grazed. This change would not make a discernable difference in existing cumulative effects. Mitigation measures for sheep driveways at OD 4 and OD 5 and the road to Blair Lake would not be implemented. Existing levels of erosion would be expected to continue.

Alternative 3 proposes 6.7 miles of total sheep trail (both on and off road) compared to 50.9 miles for alternative 1, a decrease of 44.2 miles. Alternative 3 would have 3.1 miles of trail (both on and off road) within 300 feet of streams compared to 20.2 for alternative 1, a reduction of 17.1 miles. Although these reductions would result in a decrease of generated sediment, these reductions would not be expected to be

discernable at the 6th watershed level due to the amount of trailing involved compared to watershed size. As a result no discernable changes in cumulative effects would be expected.

Application of Tebuthiuron on 50 additional acres would probably not be discernable at the 6th watershed level due to the application of best management practices and project design features. Water quality monitoring has been recommended.

Modified Alternative 4 – Direct and Indirect Effects

The direct and indirect effects, both short term and long term are essentially the same as described in modified alternative 1 for Headquarters and Humphrey. The differences in AUM percent utilization are an increase of 1 percent for Humphrey Ranch when compared to alternative 1, and increase of 3 percent for Henninger Ranch and a 1 percent increase for East Beaver allotment.

On the East Summer Range, grazing would be discontinued. As a result, there would be a decrease in existing levels of direct and indirect effects when compared to modified alternative 1. The design feature for rest and incidental use of the North Fork Tom Creek would not be implemented as the East Summer Range would not be grazed. There would no discernable change in direct and indirect effects related to this. Mitigation measures for sheep driveways at OD 4 and 5 (Figure 46) in the West Summer Range would be implemented. As a result, existing levels of direct and indirect effects would decrease. Mitigation measures would not be implemented on the road to Blair Lake and existing levels of erosion and sediment introduction would continue as the East Summer Range would not be grazed. Compared to modified alternative 1, the number of AUMs utilized on Henninger Ranch would increase by 0.8 percent and on the West Summer Range utilization would increase by 2.1 percent. As utilization increases are so low, no discernable changes, when compared to modified alternative 1, would be expected for both short- and long-term direct and indirect effects as described in modified alternative 1.

As a result, no discernible difference between short- and long-term direct and indirect effects as described in modified alternative 1 would be expected. Mitigation measures recommended for sheep crossings at OD 4 and OD 5 would be implemented and effects would be expected to be the same as described in alternative1.

Modified Alternative 4 - Cumulative Effects

Under this alternative, there would be no change in the number of AUMs for the Snakey-Kelly allotments. The East Beaver allotment would increase from one percent under alternative 1 to two percent for alternative 4. There would be no discernable increase in direct and indirect effects due to this change. As a result, there would be no discernable changes to existing levels of direct and indirect effects at the 6th watershed level.

Ending grazing on the Meyers Creek allotment would reduce utilization from 1.0 percent to zero percent, and the change would not be discernible at the 6th watershed level.

Alternative 4 would have 33.6 miles of total trail (both on and off road) and alternative 1 would have 50.9 miles, a decrease of 17.3 miles. Total miles of trail (both on and off road) would be 16.2 under alternative 4 compared to 20.2 for alternative 1, a difference of four miles. These reductions in cumulative effects, while positive, would not be noticeable due to the relatively small amount of trail compared to watershed size.

Because there are no discernable direct/indirect hydrological effects under alternative 4 compared to alternative 1, related to AUM utilization there are no cumulative effects.

Modified Alternative 5 - Direct and Indirect Effects

Modified alternative 5 would have the same type of direct effects (water diversion, ground disturbance) and indirect effects (alteration of channel morphology and function due to water withdrawal, sediment introduction) as described in modified alternative 1, although the magnitude of effects would decrease in all of the ARS properties grazed. This would apply to both short- term and long-term effects as described in modified alternative 1. Mitigation measures would be implemented on the road to Blair Lake, at sheep crossing at OD 4 and 5 and at the drainage exit to the mine wastewater pond. Effects would be expected to be the same as under modified alternative 1.

Modified Alternative 5 - Cumulative Effects

Utilization on both the East Beaver and Meyers Creek allotments would be less than one percent. These changes would not be discernible at the 6th level watershed due to scale.

No grazing would occur on the Snakey-Kelly allotments under modified alternative 5. The effects would be the same as discussed under alternative 2.

Under alternative 5 the Snakey-Kelly allotments would not be grazed. Without this grazing (1, 756 acres) there would be a decrease in existing cumulative effects primarily in 6th level watershed 170402150401, and to a lesser extent in 170402160601. The allotment represents eight percent of the total watershed size, so decreases in existing cumulative effects would probably not be discernable at the 6th watershed level.

Under alternative 5 there would be 40.1 miles of trail (off road) compared to 50.9 for alternative 1, a decrease of 10.8 miles. For total miles of trail (both off and on road) alternative 5 would propose 17.1 miles of trail compared to 20.2 for alternative 1-a minimal decrease. Although these reductions in cumulative effects are positive, there would be no discernable changes at the 6th watershed level.

Compliance with Relevant Laws, Regulations, Policies and Plans

These alternatives would meet the intent of the Clean Water Act and the Executive Orders for wetlands and floodplains.

Irretrievable and Irreversible Commitment of Resources

Streamflow diverted for irrigation purposes is irretrievably lost from the bypass reach. This commitment is not irreversible, since the diversion could be removed or the water right not used.

Socioeconomics

Socioeconomic Summary

The Sheep Station is the 13th largest employer in Clark County and thus it provides important economic contributions to local businesses and public services. Under the alternatives there would be no net change in area social or economic conditions since Sheep Station expenditures are not anticipated to change. Under the action alternatives small reductions in forage utilization and research capacity could affect the value of research to the sheep industry. Regardless, continuation of management under the modified proposed Action alternative would maintain the value of research conducted at the station while also providing an important source of local economic contributions, in terms of employment and income. Under all the alternatives disproportionate and adverse effects to minority or low income populations would not occur.

Socioeconomic Affected Environment

Based on comments received during public scoping two analysis areas are considered: the importance of Sheep Station salary related impacts are considered within Clark County, ID while non-salary related station expenditures are considered for a larger analysis area that includes Beaverhead County in Montana and Clark, Bonneville, Jefferson and Madison counties in Idaho. Housing, commuting and expenditure patterns of Sheep Station employees suggest that the primary economic area of concern for salary related impacts is Clark County. However, almost all non-salary related station expenditures occur within the surrounding area outside of Clark County. Thus two analysis areas allow for measurement of the importance of Sheep Station employee expenditures within Clark County while also considering effects within the larger 5 county area where non-salary expenditures are made. Using two analysis areas avoids potential dilution of important relationships with Clark County while also comprehensively examining the role of the Station's contributions on the surrounding area economy.

With the changes in population, and possible changes to industry composition, from the most recent publicly available employment data, a secondary data source is utilized to report employment and income. Minnesota IMPLAN Group (MIG) reports annual economic data for all counties in the United States. MIG utilizes national, state and local data sources to report employment, and includes full-time, part-time, seasonal and self-employment. Therefore, IMPLAN data is reported simply as jobs, not full time equivalents (FTEs), and one person with multiple jobs would show up more than once in the data. This prohibits the comparison to local population data provided by the U.S. Census.

According to 2014 IMPLAN data, total employment is 1,090 jobs in Clark County and 101,366 in the 5 County analysis area. The most prominent industries in terms of employment are the Government and Retail Trade sectors in Clark County and the 5 County analysis area, respectively. Jobs supported by the Sheep Station are within the government sector and provide 21 percent of all Government employment in Clark County. Currently the Sheep Station supports 13 full-time federal employees. In addition to these full-time positions, the Sheep Station also supports non-permanent jobs, including postdoctoral fellows, student interns, and intermittent general duty employees.

Expenditures by the Station have an economic contribution to Clark County and the larger 5-County analysis areas. Non-salary or operational related expenses made by the station largely occur outside of Clark County since opportunities to purchase supplies and equipment are not available within the county. On an average annual basis approximately $415,000 is spent on feed, materials, supplies, equipment and services in the 5 county analysis area. As a result of these expenditures the station supports 5.7 total jobs (direct, indirect and induced) and $181,000 in total income on an average annual basis. In addition, salary related expenditures by the station within the 5-County analysis area support an additional 30.9 total jobs (direct, indirect and induced) and $1,972,089 in total income on an average annual basis. Consequently, the Station supports 36.6 total jobs (direct, indirect and induced) and $2,153,148 in total income within the 5-county analysis area on an average annual basis as a result of salary and non-salary related expenditures (MIG 2014).

While non-salary expenses by the station mostly occur outside of Clark County, salary related expenditures occur within Clark County to a greater degree. The 13 people employed at the station are paid a total of about $1,400,000 in annual salaries. Of the total salary paid, about $878,000 is earned by residents of Clark County. Thus, the direct contribution to employment and income is 13 jobs and $878,000 in household income. In addition to contributing to employment and income, activities at the Sheep Station also affect the total tax base. The largest contribution falls within the federal social security and income taxes. These taxes should have no direct bearing on the current state of Clark County's economy as such funds are allocated to the federal government and are not immediately spent on local

services. However, other tax categories such as property tax, motor vehicle licensing and sales tax may affect to the total funding available for operating services such as law enforcement, roads, and schools. Thus, the tax base supported by Sheep Station activities provides for improved social and economic conditions.

Stimulus in the form of employment and monetary flows, there is also the knowledge gained with the research conducted at the Sheep Station. It is the sole sheep research facility specializing in range sheep in the United States west of the 100th meridian. Seventy percent of all sheep and lamb products produced in the Country come from the western states, the vast majority of which are range fed. Thus, the research conducted at the Sheep Station in Dubois is carried out in conditions very similar to those under which a large proportion of sheep producers operate (Orwick 2008). Research valuable to the production of sheep and lamb products includes the mapping of specific genetic traits resistant to certain types of disease allowing for better health management, as well as the identification of traits important to both the maternal and paternal side of reproduction. Such information aids in the production efficiency of operations as the more healthy lambs born, the more competitive farmers and ranchers may be in today's dynamic agricultural markets. Furthermore, research regarding how sheep respond to drought cycles and the associated change in the nutritional value of plant species is valuable when dealing with issues of climatic change in rangelands. Thus, the activities associated with Sheep Station management have implications for agricultural productions across the Country, and have proven valuable to farmers and ranchers involved in the sheep industry.

Research valuable to the production of sheep and lamb products in the United States includes the mapping of specific genetic traits resistant to certain types of disease allowing for better health management, as well as the identification of traits important to both the maternal and paternal side of reproduction. Such information aids in the production efficiency of operations as the more healthy lambs born, the more competitive farmers and ranchers may be in today's dynamic agricultural markets. Furthermore, research regarding how sheep respond to drought cycles and the associated change in the nutritional value of plant species is valuable when dealing with issues of climatic change in rangelands. Thus, the activities associated with Sheep Station management have implications for agricultural production across the nation.

Socioeconomic Direct and Indirect Effects

Effects Common to all Alternatives

Under all the alternatives there would be no change from the current socioeconomic conditions. The Station would continue to support 36.6 total jobs (direct, indirect and induced) and $2,153,148 in total income within the 5 county analysis area on an average annual basis as a result of salary and non-salary related expenditures (MIG 2014). In addition, salary and tax related contributions within Clark County would continue to be supported on an average annual basis. Forage utilization and sheep numbers are expected to change under the alternatives however; the Station budget is not expected to change under any of the alternatives. As a result of decreases in sheep inventory or forage utilization employment associated with herding could decrease however, employment associated with other station activities would increase resulting in no net decrease in employment or total salaries paid. For example, research technicians could replace herders. Therefore, no changes to the Station employment, income or tax contributions are anticipated.

Effects Common to all Action Alternatives

Under all action alternatives there could be effects on the sheep industry resulting from potential reductions in research capacity at the station. Current research contributions to the sheep industry are

summarized in the affected environment. Sheep Station research is dynamic; and therefore it is impossible to predict the full extent of impacts to sheep producers and the entire industry. However, it is reasonable to assume that if a reduction in grazing related research occurs, adverse impacts to the sheep industry could also occur.

Socioeconomic Cumulative Effects

No net change in employment and income effects are anticipated under the alternatives since salary and non-salary expenditures made by the Station are not anticipated to change amongst the alternatives. Consequently no cumulative effects to local employment, income or tax contributions would occur.

Environmental Justice

The Environmental Justice principles set forth in Executive Order 12898 and CEQ (1997) were considered in regards to activities on the Sheep Station. Alternatives were reviewed to determine whether or not the proposed actions adversely impact minority and low-income populations. Salary and non-salary expenditures by the Station are anticipated to continue at current levels under all the alternatives thus no net change in current economic conditions is anticipated. However with changes in operations and associated station expenditures, adjustments in area employment and income could occur. Given presence of low income and minority populations in the analysis area these populations could be affected by these adjustments. Regardless, any adverse indirect or induced effects would be spread amongst all segments of the population despite their racial, ethnic or poverty status.

While no net decrease in economic conditions are anticipated, the effects to human health of environmental justice populations are of concern. There are risks associated with sheep grazing activities and sheepherders may be of minority or low income groups. However, the alternatives do not increase time spent by herders in the field or possible exposure to such risks. In addition, such exposure risks do not present a disproportionate adverse impact minority or low income groups under the alternatives. Any alternative that would reduce grazing would likely reduce exposure to human health risks rather than increase disease risk for any ethnic or income group. Additionally, the alternatives would not cause any significant changes to community composition or the social dynamic of Clark County. Economic and demographic composition would likely remain the same as a result of the alternatives. Therefore, there are no disproportionate adverse impacts to minority or low income groups.

Air Quality

Effects to air quality are regulated through a complex series of federal, State, and local laws and regulations designed to assure compliance with the Clean Air Act. This regulatory framework and effects are described in more detail in the Air Quality Report in the project record.

Air Quality Summary

Prescribed burning treatments would have direct, short-term impacts on air quality in the project area and surrounding areas from any of the alternatives. Prescribed burning for this project would occur during the spring and/or fall seasons and when weather conditions and dispersion forecasts are favorable and risk of escape is low. Transitory smoke as a result of implementation of the alternatives could produce some smoky days in the local area, and may also result in the form of nuisance smoke, smell, or haze. Smoke would also be expected to settle into the lower draws during the evening hours following ignition, this would most likely occur during the burn smoldering phase. All prescribed burning will be implemented in compliance with the Idaho Department of Environmental Quality (IDEQ). All burning would take place under the guidelines set forth in a prescribed fire burn plan developed specifically for this project area. Prescribed burn plans address parameters for weather, air quality, smoke impacts and contingency

resources. The total amount of pollutants released by prescribed burning operations is unlikely to have a significant adverse effect on human health or visibility due to the small number of acres proposed for burning and the fuel type to be burned.

Cumulative effects on air quality as a result of the implementation of any alternative would result in an incremental decrease in air quality as pollutants from this project combine with other particles produced by the implementation of other aspects of this project, particularly fugitive road dust. Pollutants from fire do have an effect on an area, which depends on atmospheric conditions at the time of the fire.

Compliance with Relevant Laws, Regulations, Policies and Plans

The smoke concentrations from prescribed burning operations are expected to be within National Ambient Air Quality Standards and state of Idaho air quality standards. Idaho's smoke management program is EPA-certified, and the prescribed fire activities associated with the project would meet Clean Air Act requirements. In addition, since the nearest class 1 area is approximately 50 air miles away, there would be no significant impacts to any class 1 area.

Botany

There are no land management guidelines or standards that focus management of specific botanical resources at the agency level. Effects to the botany resource are subject to the Endangered Species Act. Effects are described in more detail in the Botany Report in the project record.

Botany Summary

There would be no impacts to federally listed plant species from any alternatives proposed, because no species occur and no habitat is present within Agricultural Research Service properties. There is also no habitat for the endangered plant Ute ladies' tresses there are no direct, indirect of cumulative effects. No specific management direction exists for Special Status Plants in Idaho or Montana, and a brief discussion of potential impacts, if these species are present, could include: short-term plant trampling impacts from grazing, sheep herding camps, and temporary watering areas; short-term plant dieback or temporary loss of reproductive ability due to prescribed fire activities, coupled with potential long-term benefits from prescribed fire treatments providing new habitat; short-term and possibly long-term impacts from non-target herbicide treatments along roadways and sheep pens; and long-term impacts from permanent water developments and summer range sheep trails . Due to short duration grazing periods in combination with historical and current stocking rates that maintain range carrying capacity well below standard stocking rates, only short-term impacts are anticipated to any existing special status plants.

Cumulative effects to special status plants are based only on the presence of habitat for each species and the past, present and foreseeable future activities occurring on ARS lands. No cumulative effects to specials status plants are anticipated.

Compliance with Relevant Laws, Regulations, Policies and Plans

All alternatives proposed within this environmental assessment would be in compliance with threatened and endangered plants according to the Endangered Species Act.

Heritage Resources

Activities on the Sheep Station are governed by the National Historic Preservation Act (NHPA) of 1966 as amended, the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, and the Archaeological Resources Protection Act.

Desired Condition

Properties under the purview of the ARS, and the activities associated with the stated Mission objectives, would be reviewed for compliance with the National Environmental Protection Act (NEPA) and the National Historic Preservation Act (NHPA) of 1966 as amended.

Under the NHPA and its attendant regulations found at 36 CFR Part 800, an inventory strategy and management plan for the Sheep Station has been developed in consultation with the Idaho and Montana State Historic Preservation Offices (SHPOs).

Heritage Summary

Grazing and associated activities at the Sheep Station have occurred for approximately 86 years. Knowledge of prehistoric archaeological data is limited within the Agricultural Research Service properties, but such sites and resources are known to exist. Ranching, mining, and Sheep Station activity and development make up the historic component for the area.

The Sheep Station has proposed several activities over the course of the next five years. To comply with Section 106, a Heritage Management Plan has been developed. This plan establishes a baseline from which to begin heritage work. Both Montana and Idaho State Historic Preservation Offices have approved the Heritage Management Plan.

Selection of any alternative would require Heritage review.

Compliance with Relevant Laws, Regulations, Policies, and Plans

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects that their federally funded activities and programs have on significant historic properties. "Significant historic properties" are those properties (historic and prehistoric) that are included in, or eligible for, the National Register of Historic Places. Properties that have not been evaluated for significance are considered eligible until such evaluation occurs. The National Register is a list of districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, and culture. The National Register is administered by the National Park Service in conjunction with the State Historic Preservation Offices (SHPOs).

As defined in 36 CFR Part 800 (Protection of Historic Properties as amended in August 2004), the Section 106 process and compliance with such also includes the coordination with other reviews, including NEPA, the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, the Archaeological Resources Protection Act and any agency specific legislation (36 CFR Part § 800.3). Coordination and consultation with Idaho and Montana State Historic Preservation Offices would fulfill compliance with Section 106 of the National Historic Preservation Act.

As proposed, the Heritage Management Plan (Plan) would consider all activities in the Agricultural Research Service, U.S. Sheep Experiment station five-year action plan for Section 106 compliance procedures. The Plan would also include survey, recording and evaluation of Agricultural Research Service historic facilities, and provide a guidance plan for general maintenance and facility use of the historic resources (appendix D).

The Plan would provide for a phased compliance survey procedure. According to 36 CFR Part 800, a phased identification and evaluation is possible when:

> …alternatives under consideration consist of corridors or large land areas, or where access to properties is restricted, the agency official may use a phased process to conduct identification

> and evaluation efforts. The agency official may also defer final identification and evaluation of historic properties if it is specifically provided for in a memorandum of agreement executed pursuant to § 800.6, a programmatic agreement executed pursuant to §800.14 (b), or the documents used by an agency official to comply with the National Environmental Policy Act pursuant to §800.8 (36 CFR Part 800.4).

The phased-in compliance procedure would be conducted in consultation with the Idaho State Historic Preservation Office and would provide direction for surveying areas of high probability regarding the potential occurrence of historic properties. This would include a sampling procedure of the high probability areas, phased in over a three- to five-year period, depending on the occurrence of historic properties.

Chapter 4 – Consultation and Coordination

Preparers and Contributors

The Agricultural Research Service consulted the following individuals, federal, State, and local agencies, tribes and persons during development of this Revised DEIS. We specifically list the project role and qualifications for those members of the interdisciplinary team that prepared sections of this document. Others that were consulted throughout the project for input, advice, and review are listed separately.

Forest Service Enterprise TEAMS Core Interdisciplinary Team

A USDA Forest Service unit was contracted to prepare the Revised Draft Environmental Impact Statement on behalf of and with the guidance of the Sheep Station and ARS personnel. The following individuals served as the project core team and contributed directly to the preparation of the Revised DEIS.

- Christine Handler, Interdisciplinary Team Leader, USDA FS TEAMS
- George Chalfant, Soil Scientist, USDA FS TEAMS (contractor)
- Jenny Fryxell, Hydrologist, USDA FS TEAMS
- Lucretia Smith, GIS, Botany, NNIS, Rangeland Specialist, USDA FS TEAMS
- Steve Kozlowski, Wildlife Biologist, USDA FS TEAMS
- Frank Yurczyk, Rangeland Specialist, USDA FS TEAMS
- Amanda Campbell, Archaeologist, USDA FS TEAMS
- Kristin Whisennand, Technical Writer/Editor, USDA FS TEAMS
- Henry Eichman, Economist, TEAMS

Other Contributors

This Revised DEIS is based on previous versions. The following individuals prepared documents for this project in the past that helped to develop this Revised DEIS.

- Sue Wingate, Former ID Team Leader, USDA FS TEAMS
- Troy Grooms, Rangeland Specialist, USDA FS TEAMS
- Vince Archer, Soil Scientist, USDA FS TEAMS
- Charles Jankiewicz, Rangeland Specialist, USDA FS TEAMS
- Eric Moser, Hydrologist, USDA FS TEAMS
- Jim Dilley, Botanist, USDA FS TEAMS
- Julie Laufman, Botanist, USDA FS TEAMS
- Joshua Wilson, Economist, USDA FS TEAMS
- Tracie Buhl, Air Quality, USDA FS TEAMS

The following individuals also contributed information, reviews and support in preparation of the Revised DEIS or previous documents.

- Bret Taylor, Animal Scientist/Acting Research Leader, ARS USSES
- Quinn Jacobson, Rangeland Scientist, University of Idaho
- Greg Lewis, Research Leader, ARS USSES
- Corey Moffet, Rangeland Scientist, ARS USSES
- Mark Williams, Animal Supervisor, ARS USSES

List of Agencies, Organizations and Persons to Whom Copies of the Revised DEIS Were Sent

Federal, state, and local governments and organizations:

- Environmental Protection Agency, Regions 8 and 10
- Caribou-Targhee National Forest
- Beaverhead-Deerlodge National Forest
- Bureau of Land Management
- US Fish and Wildlife Service, Red Rocks Lakes National Wildlife Refuge
- US Fish and Wildlife Service, Eastern Idaho Field Office
- USDA, APHIS Wildlife Services
- Montana Fish, Wildlife, and Game
- State of Montana State Historic Preservation Office
- Idaho Department of Fish and Game
- State of Idaho State Historic Preservation Office
- Idaho Governor's Office of Species Conservation
- Clark County Idaho
- Jefferson County Idaho
- Fremont County Idaho

Federally Recognized Tribes

- Chairman, Shoshone-Bannock Tribes
- Cultural Resource Program, Shoshone-Bannock Tribes
- Policy Representative, Shoshone-Bannock Tribes
- Fish and Wildlife Director, Shoshone-Bannock Tribes
- Environmental Program Manager, Shoshone-Bannock Tribes

Organizations

- American Sheep Industry
- Center for Biological Diversity
- Gallatin Wildlife Association
- Hagenbarth Livestock
- Helle Livestock

- Montana Director Greater Yellowstone Coalition
- National Parks Conservation Association
- National Wildlife Federation
- Natural Resources Defense Council
- Pintler Audubon Society
- Rocky Mountain Region Representative Defenders of Wildlife
- Safari Club International
- Sierra Club Intern, Eastern Idaho
- US Meat Animal Research Center
- Wildlife Conservation Society
- Public Lands Council
- Idaho Rangeland Resource Commission
- Nevada Rangeland Resources Commission
- Wyoming Wool Growers Association
- Utah Wool Growers Association
- Idaho Wool Growers Association
- Montana Wool Growers Association
- Wyoming Farm Bureau
- Idaho Farm Bureau
- Montana Farm Bureau
- Oregon Sheep Growers Association
- Center for Large Landscape Conservation
- Endangered Species Coalition
- Montana Rivers
- Yellowstone Buffalo Association
- Wild Sheep Foundation
- National Wildlife Action Fund
- Humane Society
- Western Watersheds Project
- Cottonwood Environmental Law Center
- Wyoming Outdoor Council
- American Wildlands
- Greater Yellowstone Coalition
- Wildlands C.P.R.

In addition, this environmental impact statement has been distributed to 15,000 individuals who specifically requested a copy of the document or commented on the 2010 Draft Environmental Impact Statement.

References

The sections below list the references cited in the Revised Draft Environmental Impact Statement. For additional references, see the references cited in each resource report. The references are organized by section or resource area of the Revised DEIS.

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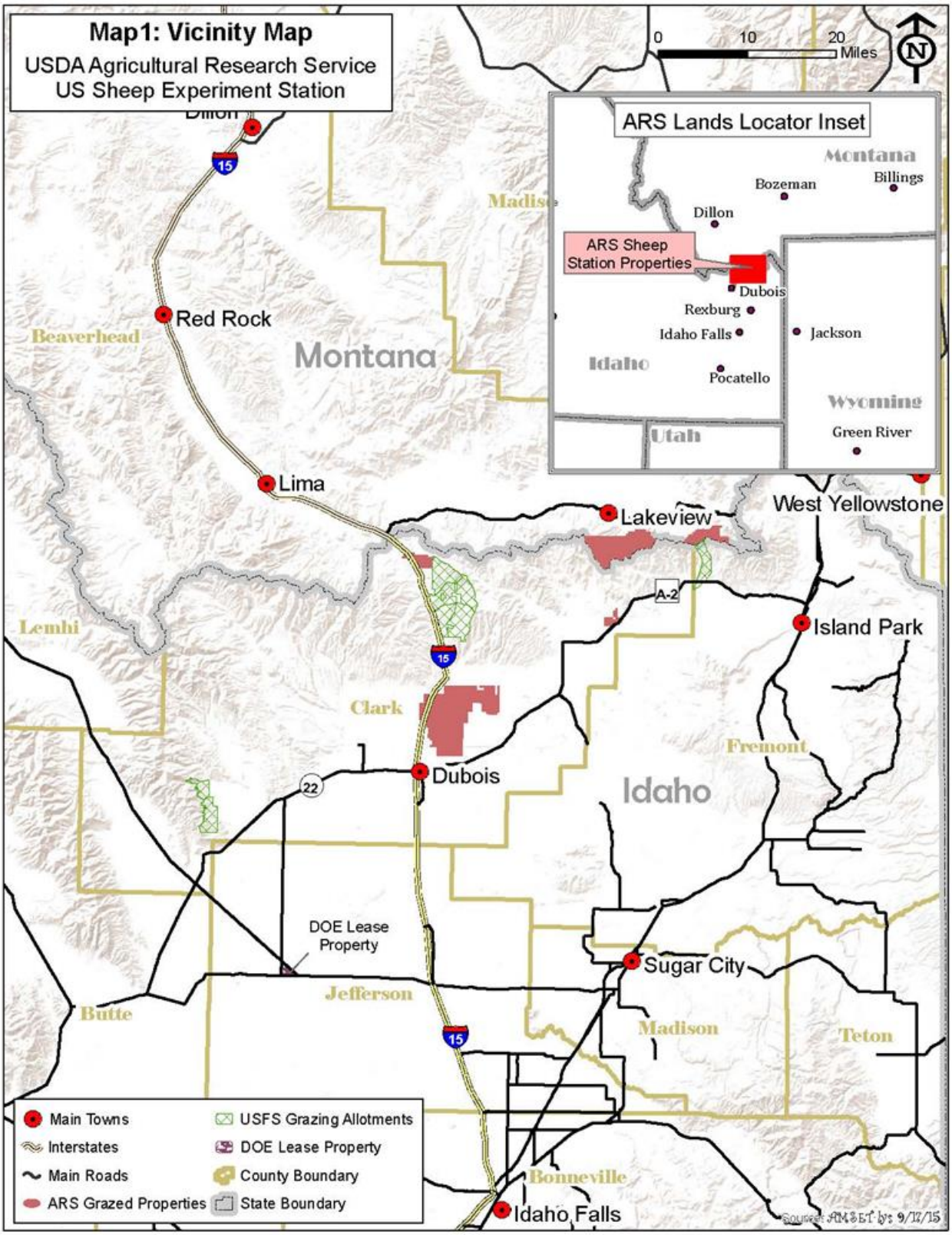
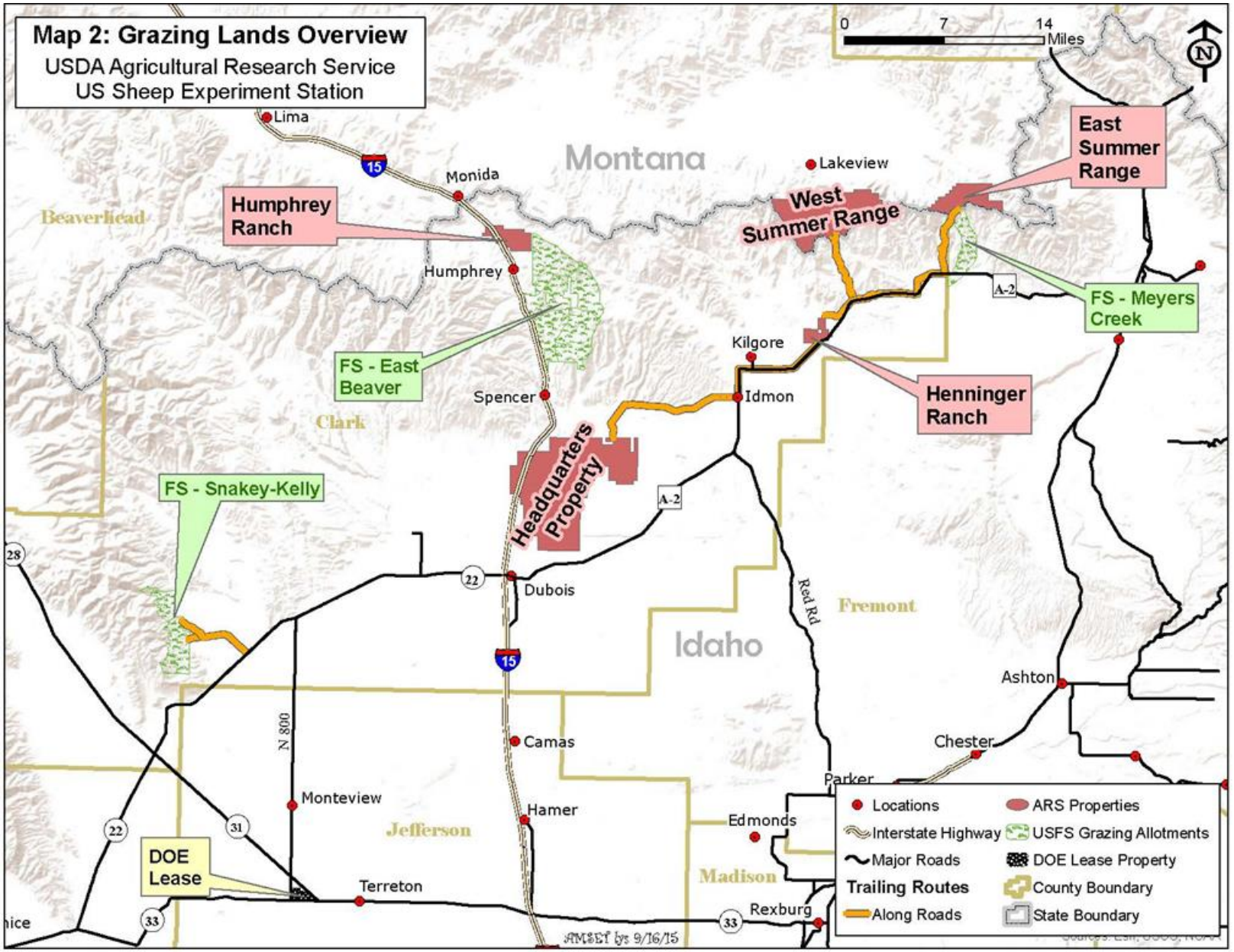
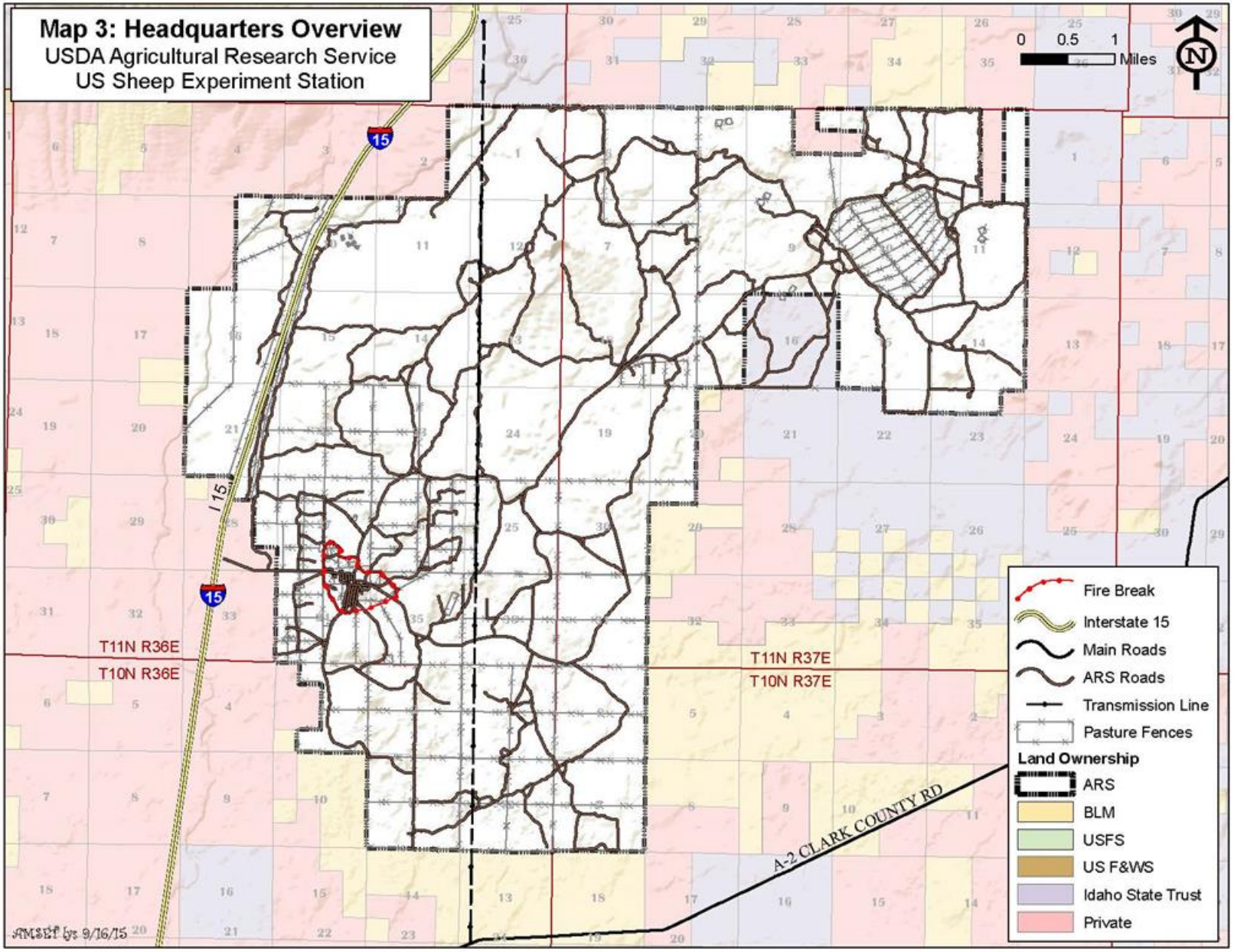
Appendix A - Project Maps



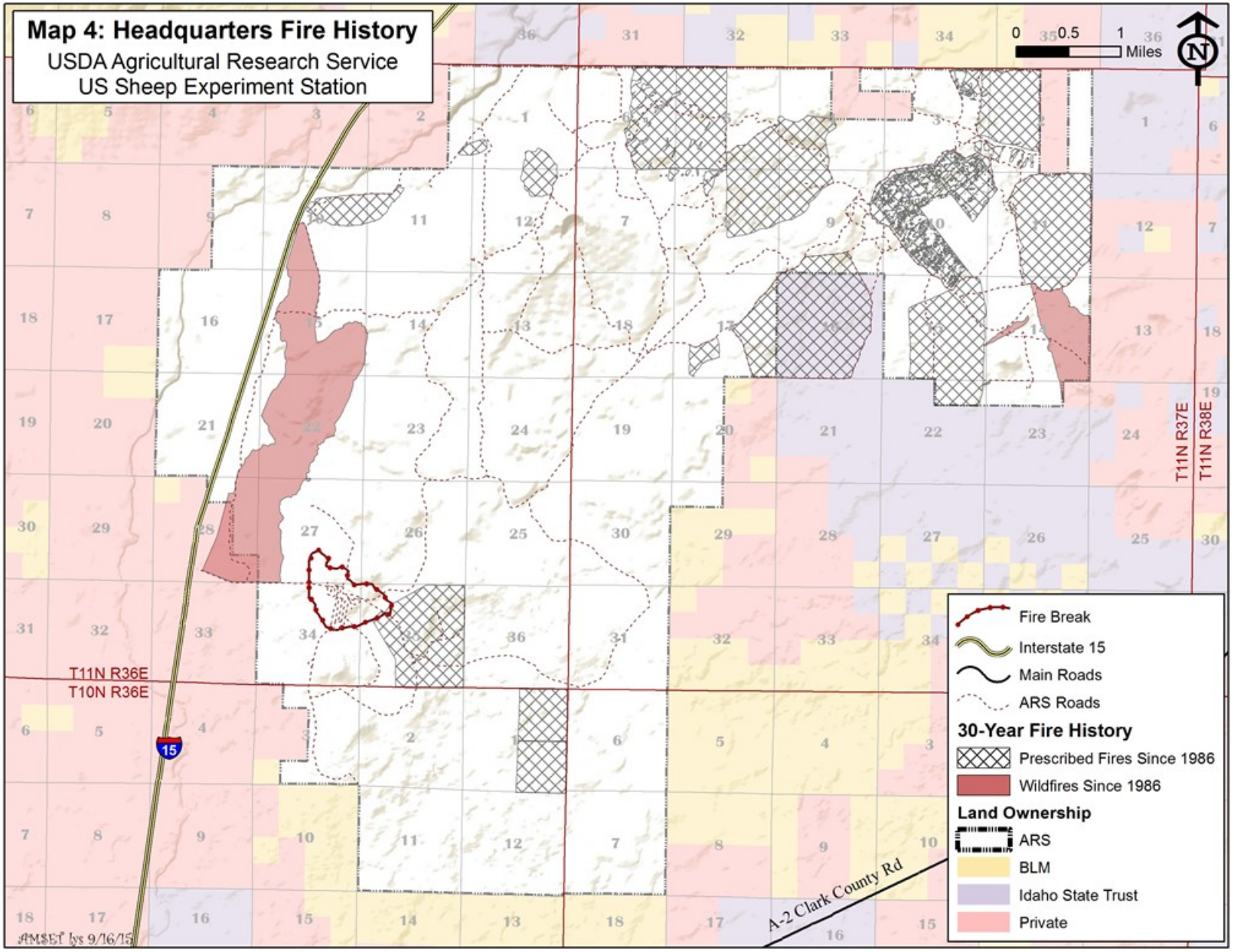
Map 1. Vicinity map



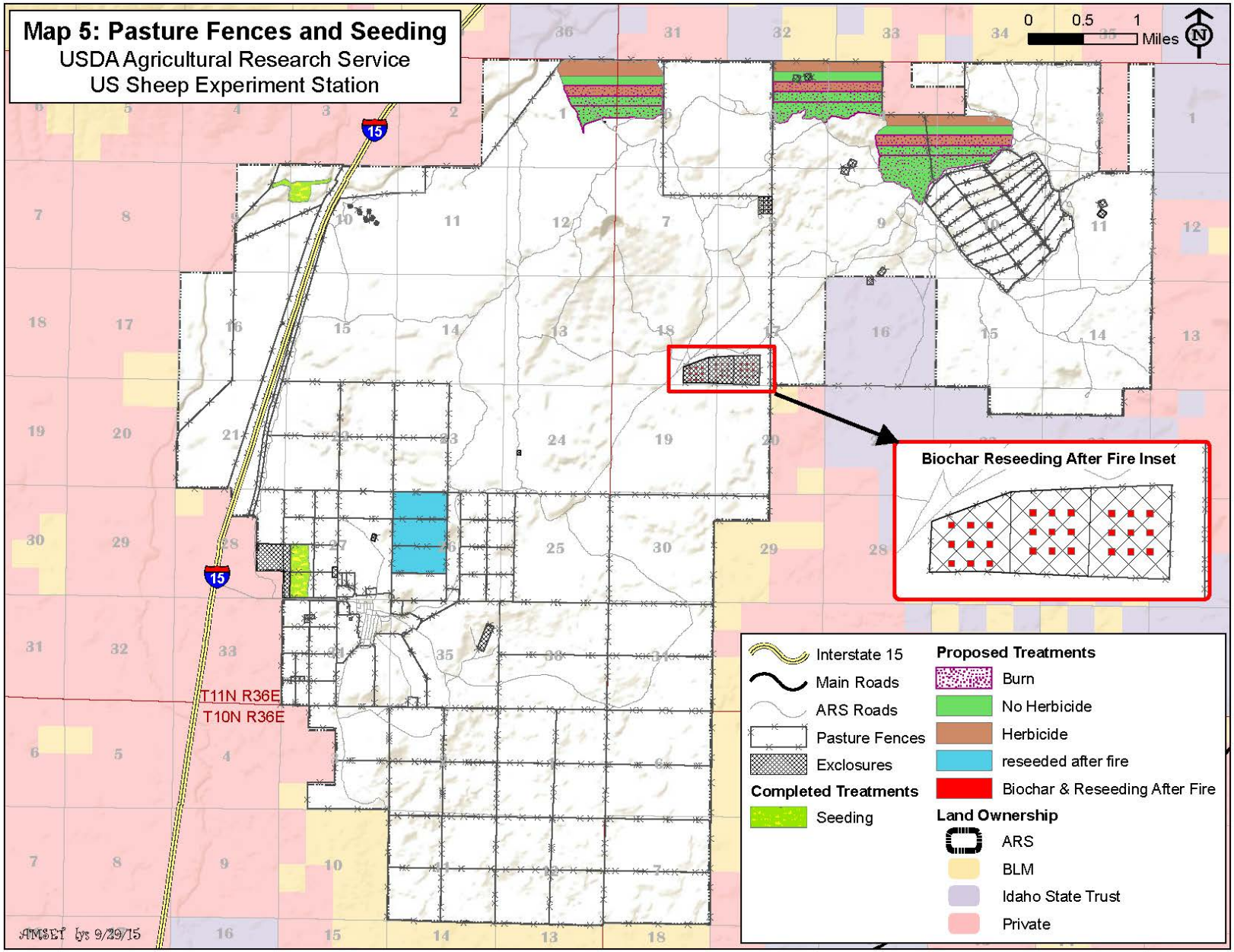
Map 2. Proposed Action (alternative 1) overview with allotments and sheep trails



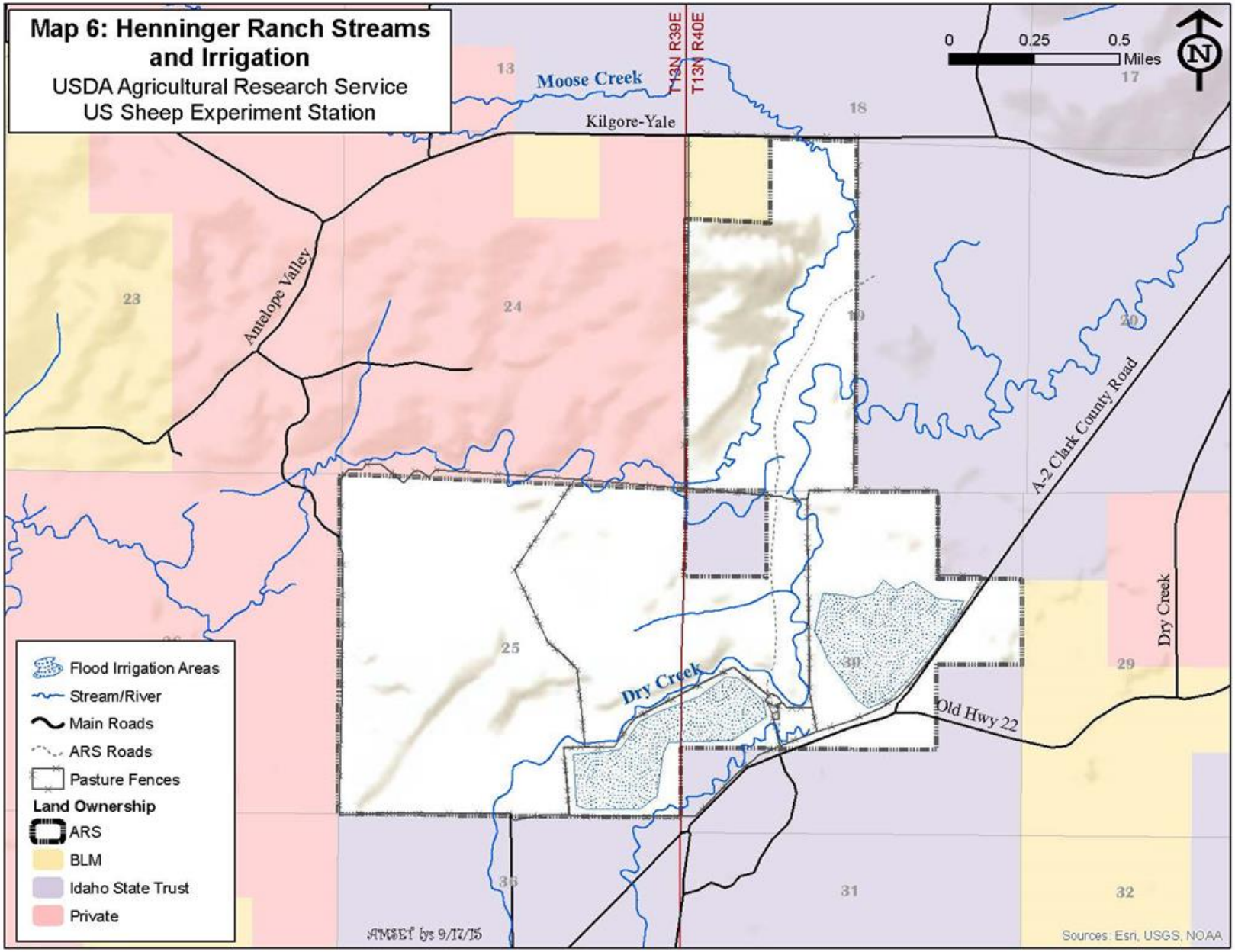
Map 3. Headquarters pasture overview



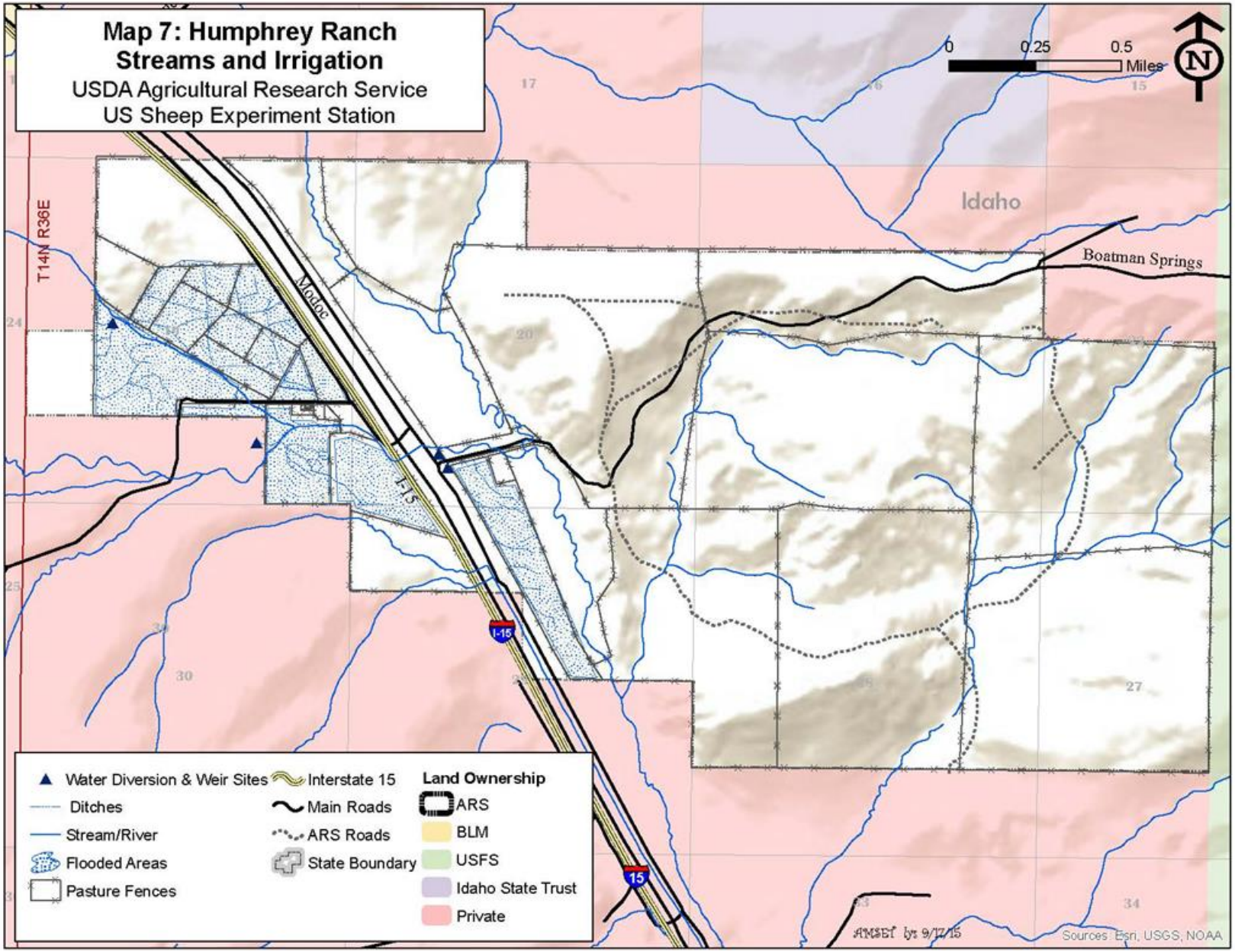
Map 4. Headquarters wildfire history



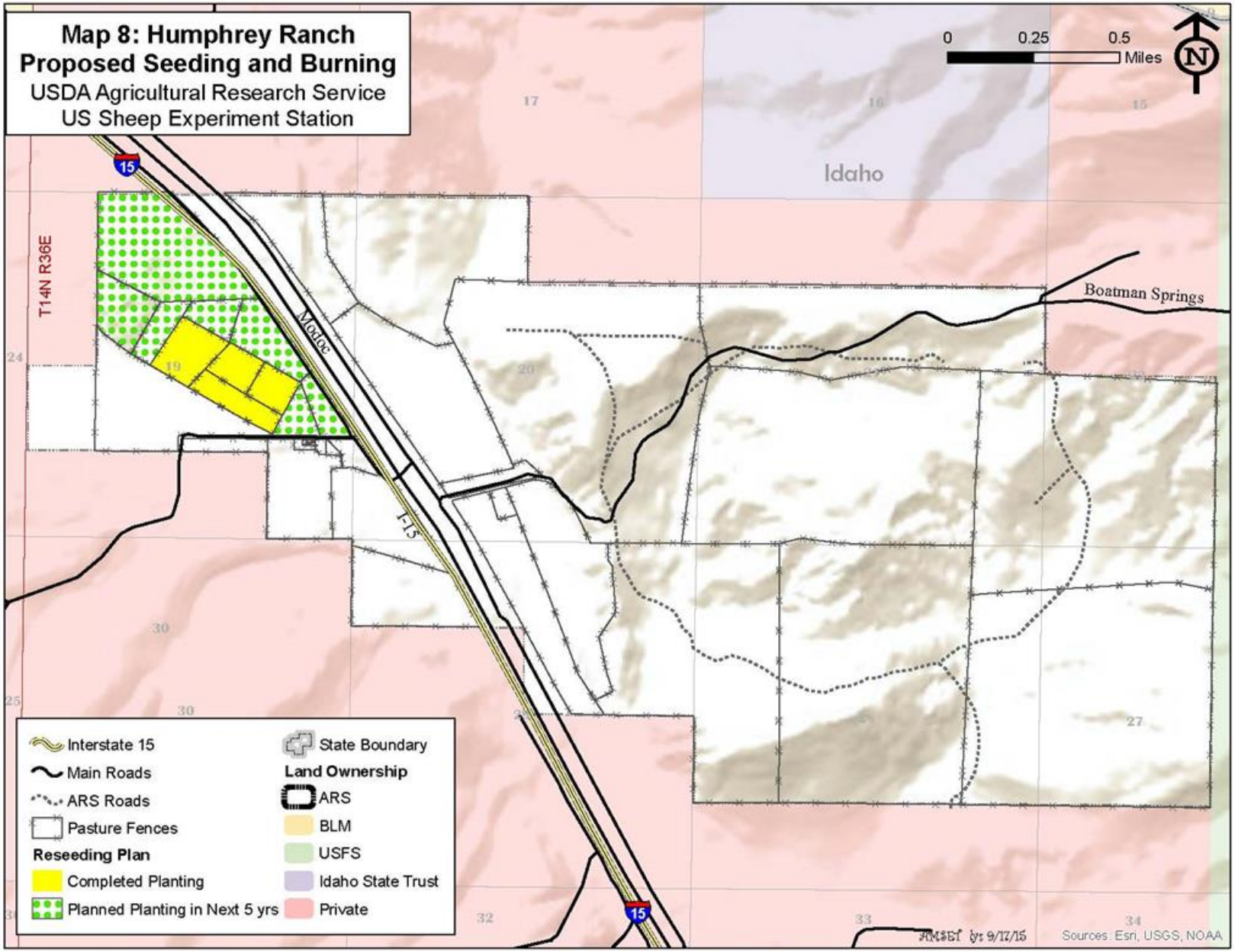
Map 5. Headquarters proposed treatments



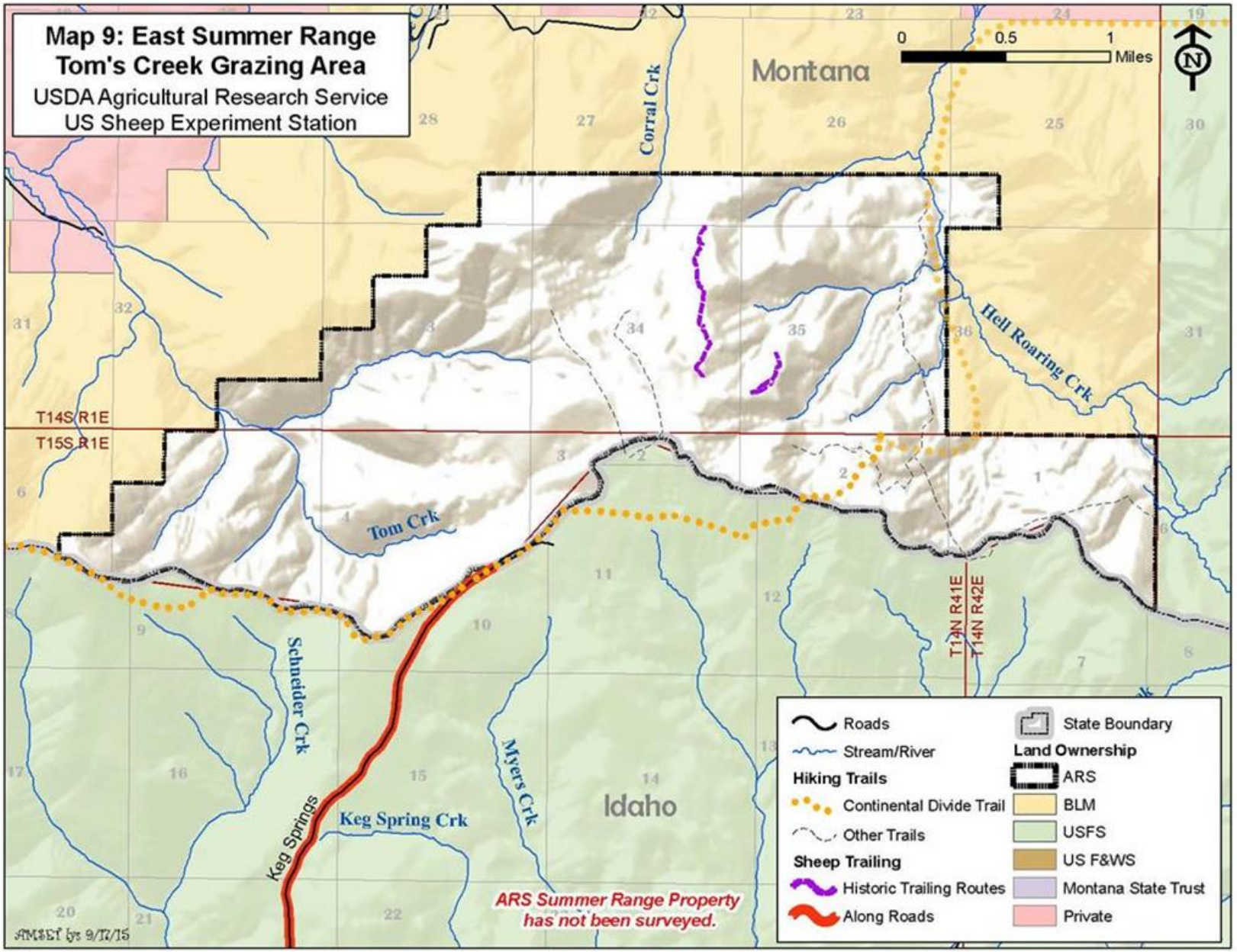
Map 6. Henninger Ranch streams and pasture irrigation



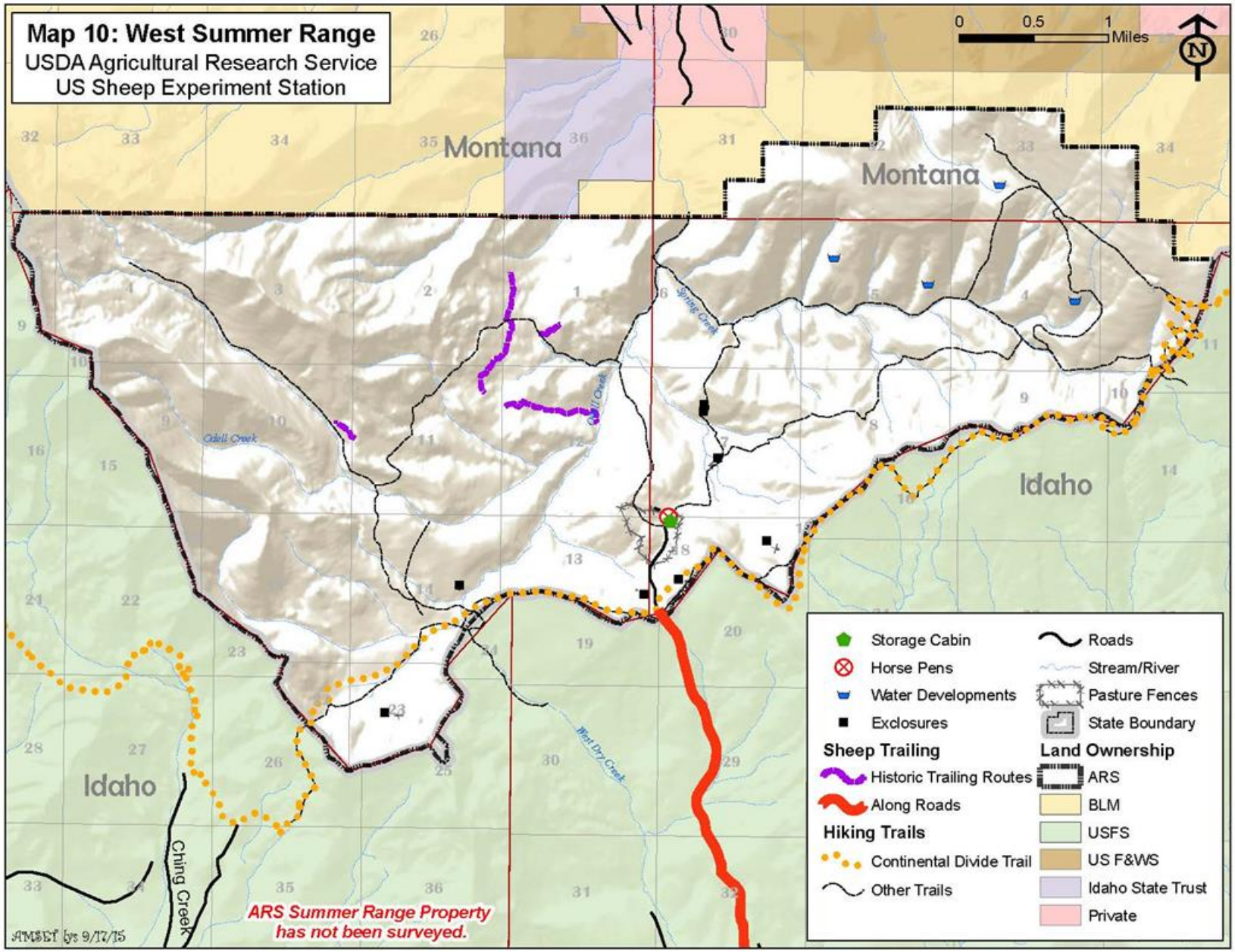
Map 7. Humphrey Ranch streams and irrigation



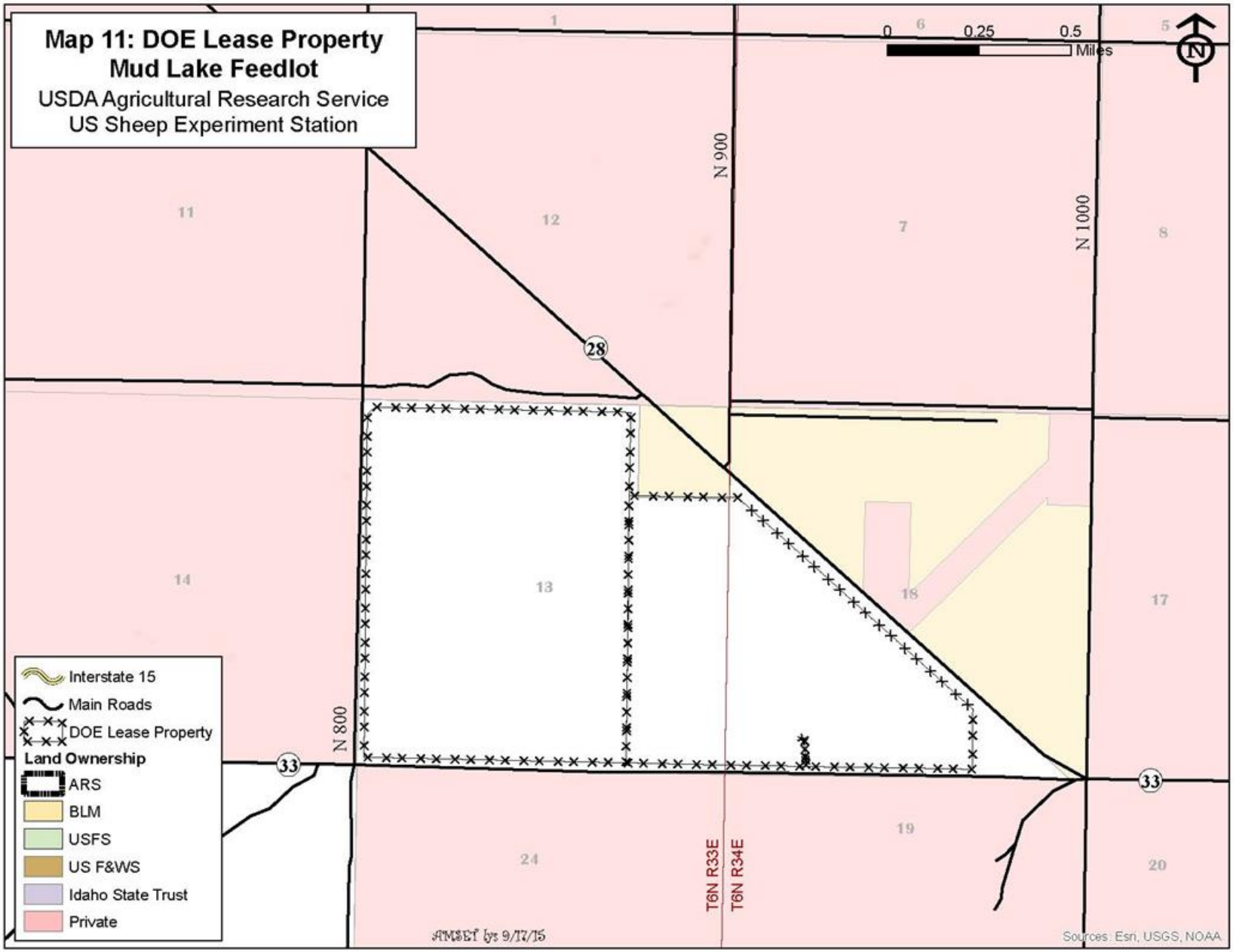
Map 8. Humphrey Ranch proposed seeding



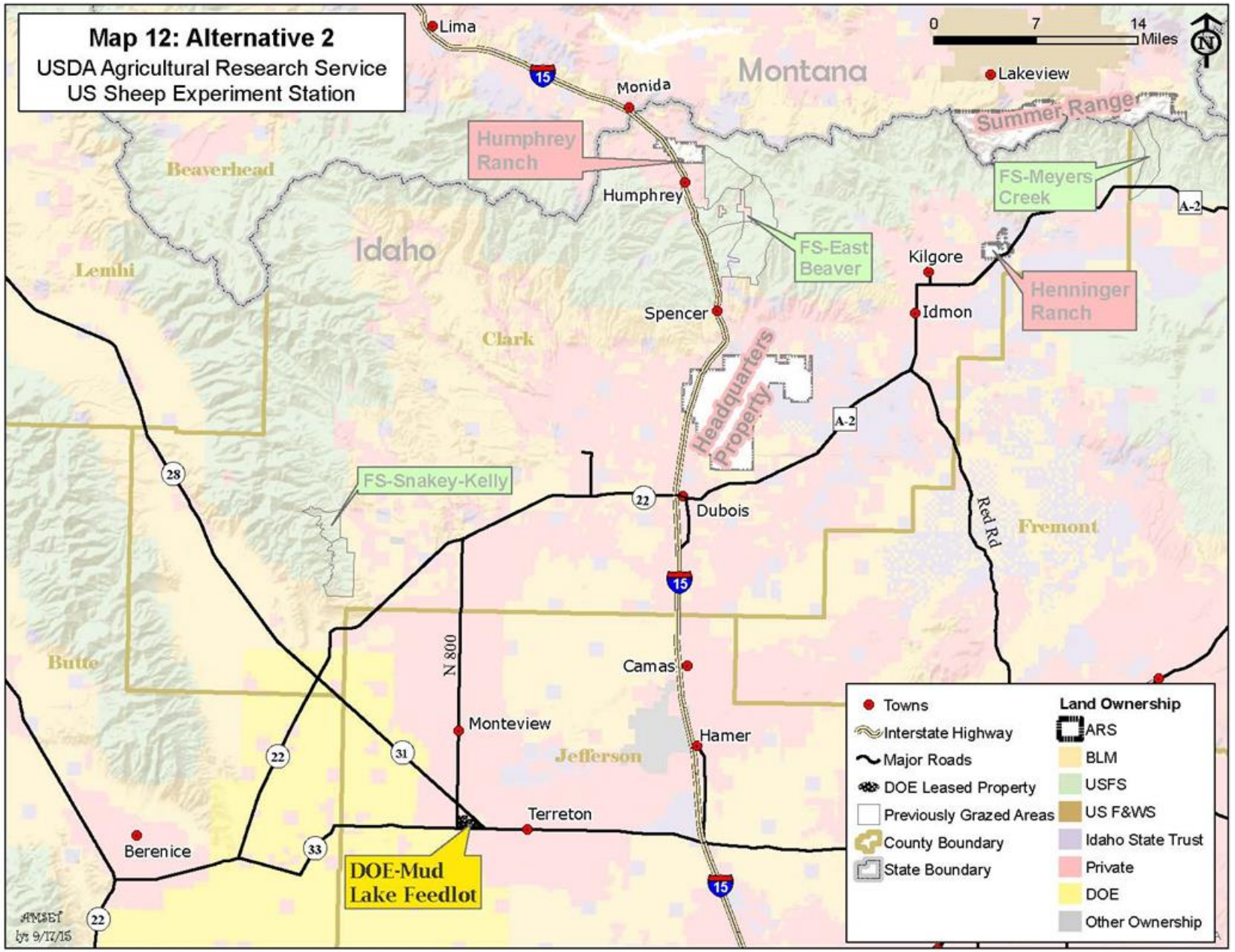
Map 9. East Summer Range streams, sheep trails, and features



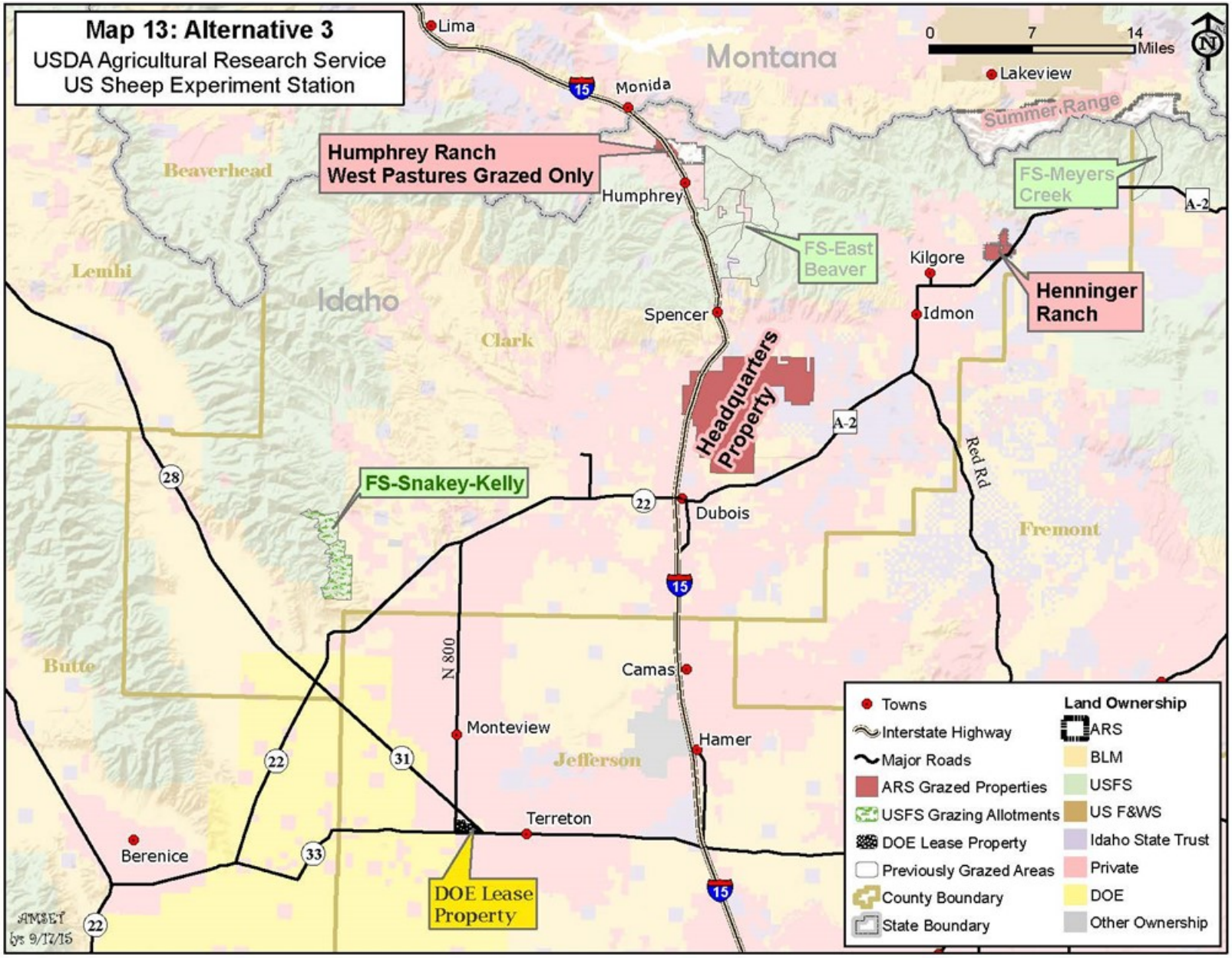
Map 10. West Summer Range streams, sheep trails, and features



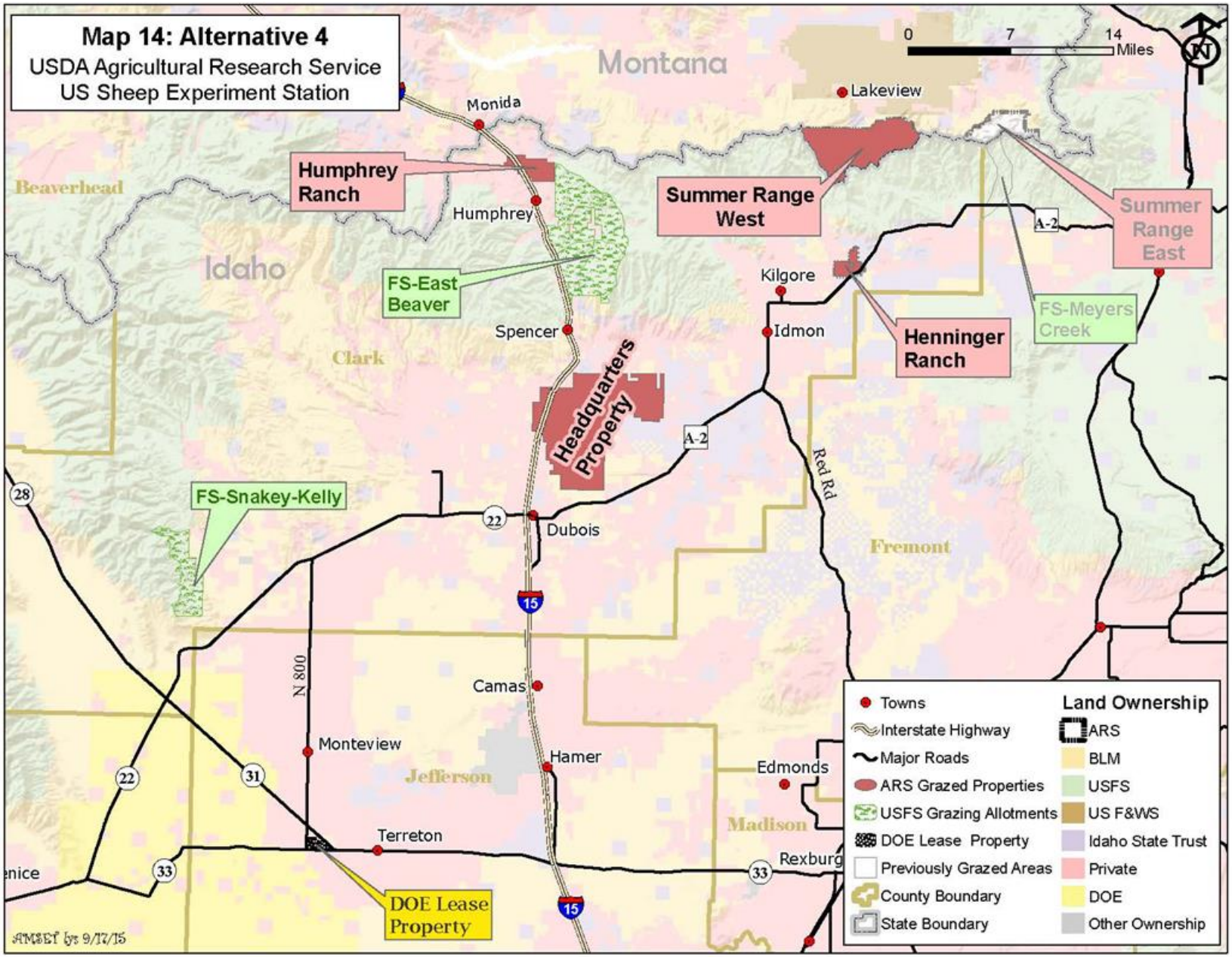
Map 11. Department of Energy Mudlake Feedlot



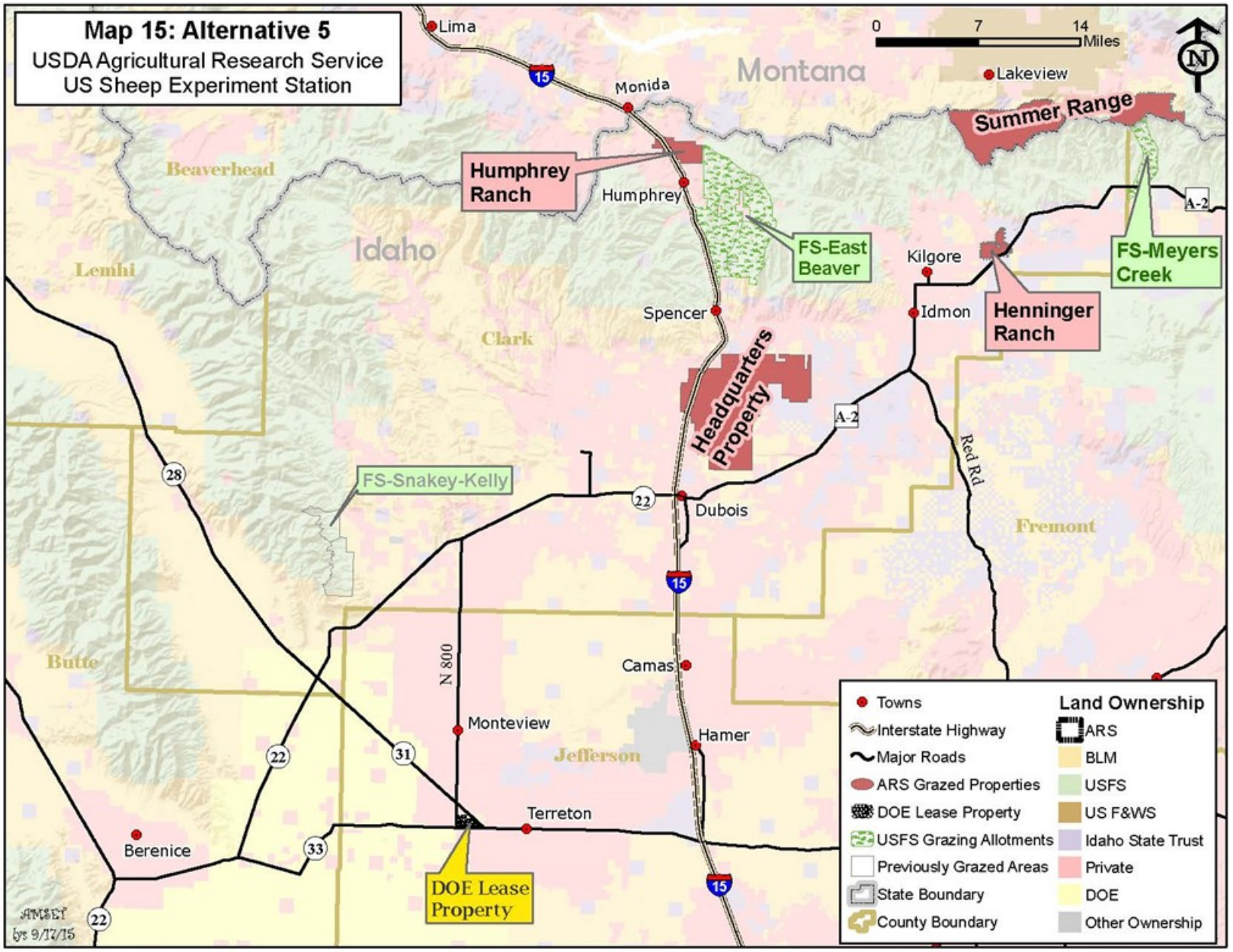
Map 12. Alternative 2 overview



Map 13. Alternative 3 overview



Map 14. Alternative 4 overview



Map 15. Alternative 5 overview

Appendix B – Average Annual Sheep Movement by Alternative

The following flow charts and tables display the movement of the Station's sheep among the various Sheep Station properties and Forest Service allotments.

Modified Alternative 1 - Proposed Action

3,000 sheep (4,337 AUM); current Sheep Station operations

Table 33. Proposed action sheep movement schedule (grazing dates are approximate depending on range readiness; a sheep is considered any sexually mature ewe or ram that is retained as a part of the core breeding flock).

Dates	Location: Activity/Animal numbers	ARS Lands
Early January – early March	3,000 sheep are maintained at DOE Mud Lake feedlot facility	No
Early March – late April	2,500 sheep are maintained at Headquarters feedlot facility for lambing; 500 rams and non-pregnant ewes remain at Mud Lake feedlot facility until late April	Yes
Late April – early July	1,600 to 3,000 sheep graze Headquarters Range; from early June thru early July groups (various sizes) of sheep are moved to other properties	Yes
Mid-June – late August	500 sheep graze FS-East Beaver allotment	No
Early June – early October	900 sheep graze Humphrey Ranch	Yes
Mid-June – mid-July	1,600 sheep graze Henninger Ranch	Yes
Early July – early September	1,600 sheep graze Summer West and East Ranges. Summer West is divided into two grazing units (Odell and Big Mountain), while Summer East is considered a single grazing unit. Grazing units are grazed for two years then rested for one year. In years when Summer East is rested (no grazing), sheep grazed both Summer West grazing units (800 sheep per unit). Therefore, Summer East will have 800, 800, and 0 sheep for the first, second, and third consecutive years, respectively. Consequently, Summer West will have 800, 800, and 1,600 for the first, second, and third corresponding years, respectively.	Yes
Early July	In coordination with East Summer Range grazing, 800 sheep are moved thru FS Meyers Creek allotment for 3 days or less.	No
Early September	In coordination with East Summer Range grazing, 800 sheep are moved thru FS Meyers Creek allotment for 3 days or less.	No
Early September – mid-September	1,600 sheep rest at Henninger Ranch for less than seven days when moving from summer to fall ranges	Yes
Late August – mid-October	500 to 3,000 sheep graze Headquarters Range	Yes
Mid-October – late November	2,500 sheep are maintained at Headquarters and Mud Lake feedlot facilities for breeding	Yes/No
Mid-October – mid-December	500 sheep graze Headquarters Range	Yes
Early November – early January	1,600 sheep graze FS – Snakey-Kelly allotments [a, b]	No

A - Snakey has 1,200 sheep permitted for the allotment, November 6 to January 2, dates move out of FS-Snakey-Kelly allotments is based on weather conditions, if there is early snow accumulation move out dates area earlier than permitted dates. Sheep would always be moved out of Snakey on or before January 12 and always moved out of Kelly on or before January 13. From Snakey and Kelly sheep re moved to Mud Lake feedlot facility.

B - Kelly has 1,000 sheep permitted for the allotment, November 20 to January 3. From Kelly sheep are moved to Mud Lake.

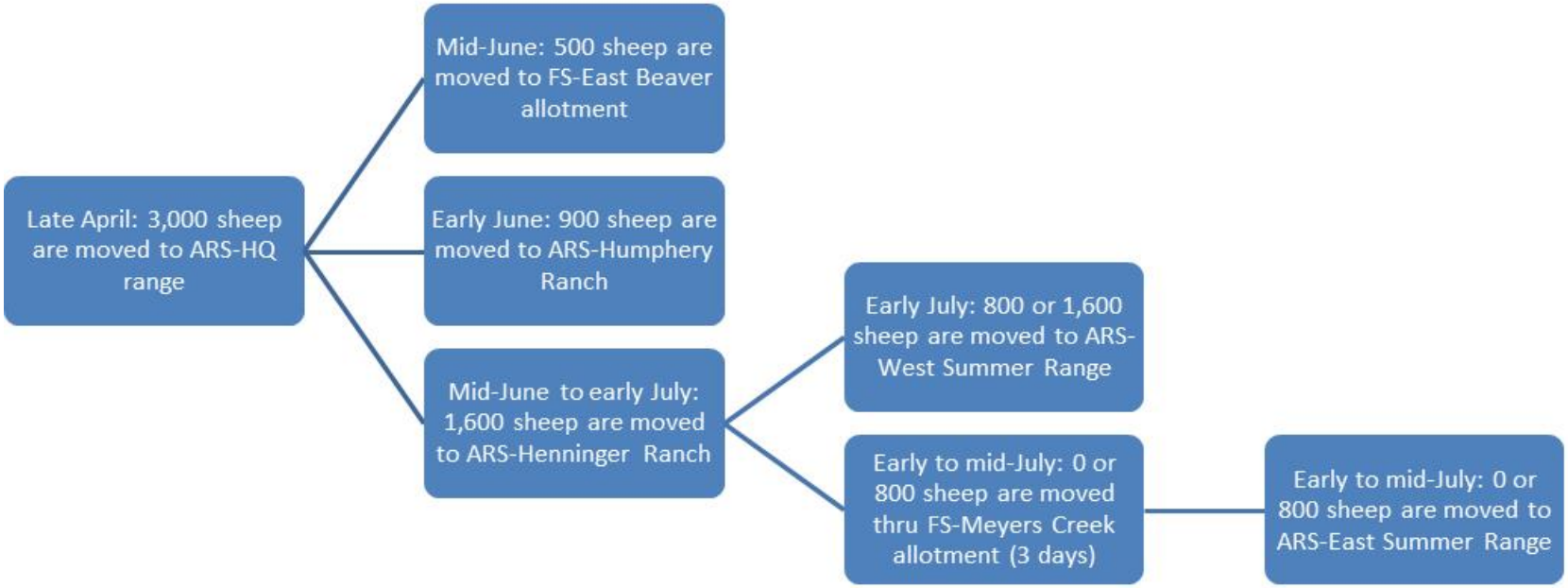


Figure 68. Proposed action for sheep movement out to spring and summer ranges. Mature sheep numbers are the approximate maximum, which may vary 0.5 to 1.1 times the approximate maximum.

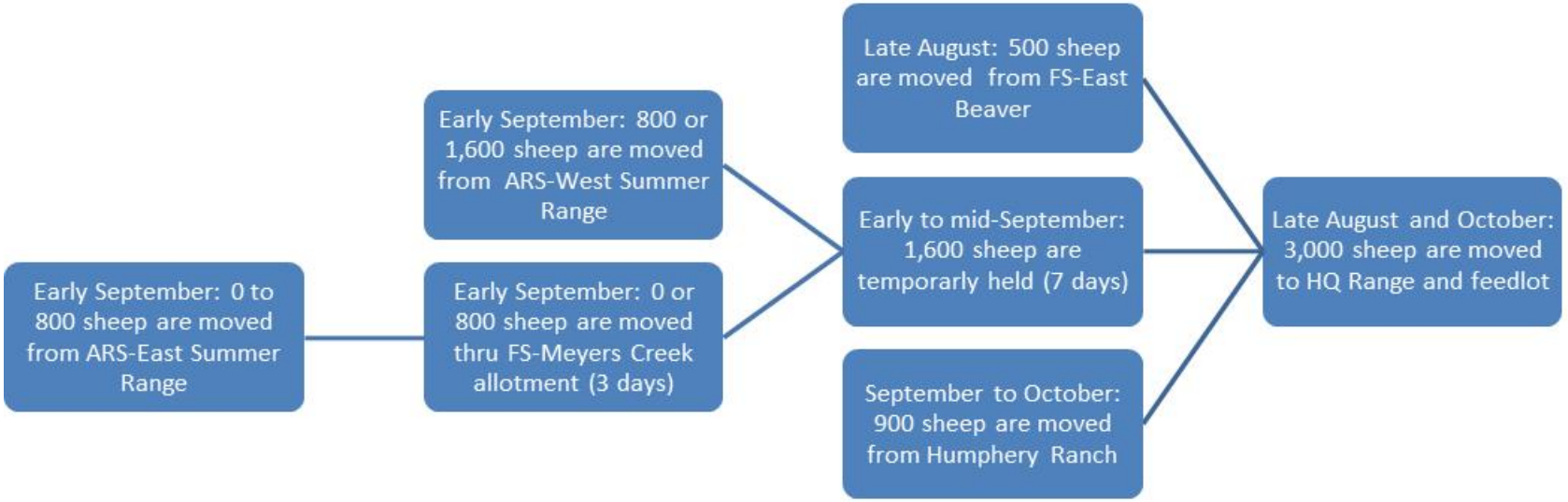


Figure 69. Proposed action for sheep movement from summer to fall ranges. Mature sheep numbers are the approximate maximum, which may vary 0.5 to 1.1 times the approximate maximum.

Figure 70. Proposed action for sheep movement to winter grazing and from winter range to feedlots. Mature sheep numbers are the approximate maximum, which may vary 0.5 to 1.1 times the approximate maximum.

Alternative 2

Alternative 2: 0 sheep (0 AUM), 100 percent reduction from alternative 1, University of Idaho would dispose of all sheep or seek alternative lands.

Modified Alternative 3

Modified alternative 3: 1,500 sheep (2,170 AUM), 50 percent reduction from alternative 1, No sheep grazing at Humphrey (east of Beaver Creek), East or West Summer ranges, East Beaver, or Meyers Creek allotment.

Table 34. Modified alternative 3 general sheep movement schedule (grazing dates are approximate depending on range readiness; a sheep is any sexually-mature ewe or ram that is retained as a part of the core breeding flock).

Dates	Location: Activity/Animal numbers	ARS Properties
Early January – early March	1,500 sheep are maintained at Mud Lake feedlot facility	No
Early March – late April	1,250 sheep are maintained at Headquarters feedlot facility for lambing; 250 rams and non-pregnant ewes remain at Mud Lake feedlot facility until late April	Yes
Late April – mid-September	250 to 1,500 sheep graze Headquarters Range; from early June thru mid-July groups (various sizes) of sheep are moved to other properties	Yes
Mid-June – mid-September	500 sheep graze Henninger Ranch	Yes
Mid-July – mid-September	750 sheep graze Humphrey Ranch (west of Beaver Creek)	Yes
Mid-September – mid-October	1,500 sheep graze Headquarters Range	Yes
Mid-October – late November	1,250 sheep are maintained at Headquarters and Mud Lake feedlot facilities for breeding	Yes/No
Mid-October – mid-December	250 sheep graze Headquarters Range	Yes
Mid-November – early January	1,000 sheep graze FS-Snakey-Kelly allotments[a, b]	No

A - Snakey has 1,200 sheep permitted for the allotment, November 6 to January 2, dates move out of FS-Snakey-Kelly allotments is based on weather conditions, if there is early snow accumulation move out dates area earlier than permitted dates. Sheep would always be moved out of Snakey on or before January 12 and always moved out of Kelly on or before January 13. From Snakey and Kelly sheep removed to Mud Lake feedlot facility.

B - Kelly has 1,000 sheep permitted for the allotment, November 20 to January 3. From Kelly sheep are moved to Mud Lake.

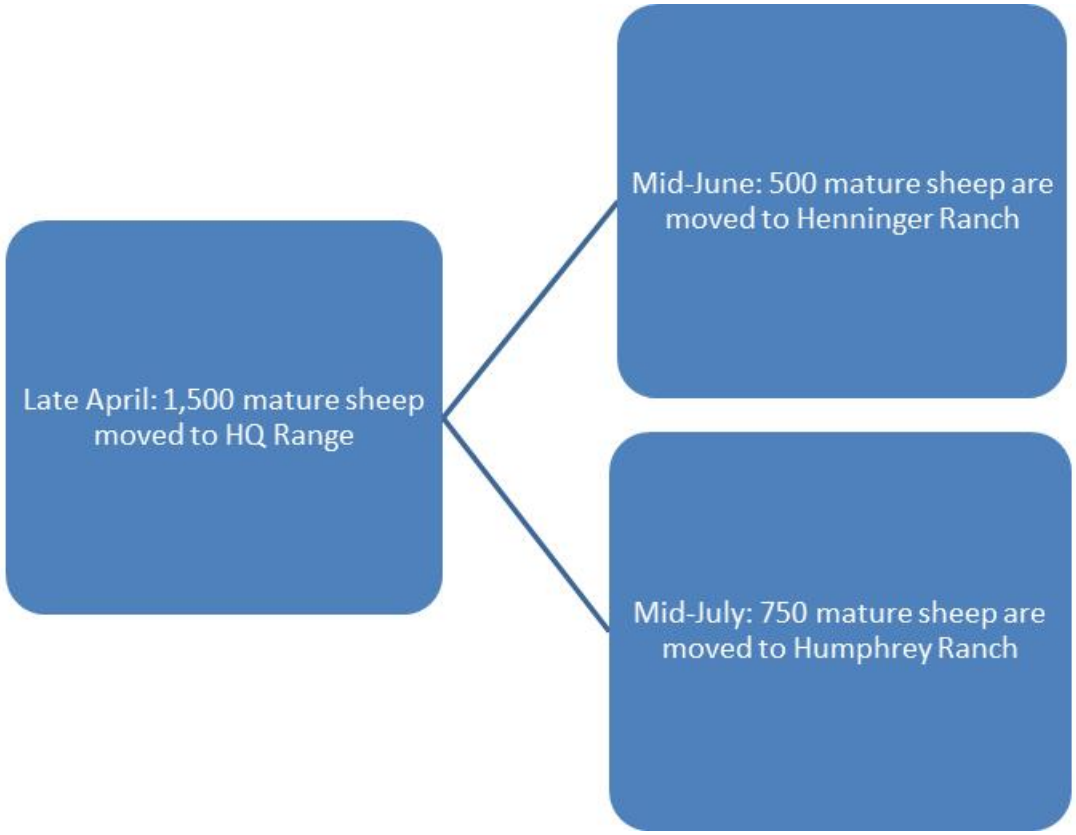


Figure 71. Modified alternative 3 sheep movement out to spring, summer, and fall ranges

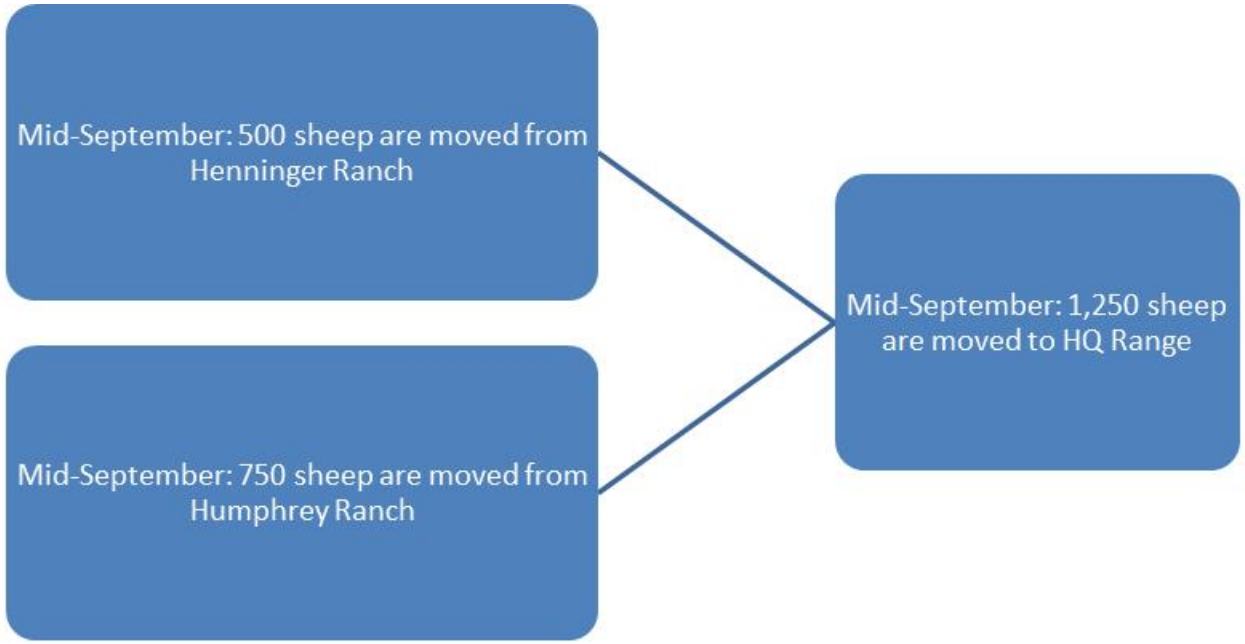


Figure 72. Modified alternative 3 sheep movement to fall range

Figure 73. Modified alternative 3 sheep movement to winter grazing and from winter range to feedlots

Modified Alternative 4

Modified Alternative 4: 3,000 sheep (4,415 AUM), no reduction from alternative 1, no grazing on East Summer range or Meyers Creek, shifting grazing to FS-East Beaver allotment, Humphrey and Henninger Ranches, and Headquarters Range.

Table 35. Modified alternative 4 general sheep movement schedule (grazing dates are approximate depending on range readiness; a sheep is any sexually-mature ewe or ram that is retained as a part of the core breeding flock).

Dates	Location: Activity/Animal numbers	ARS Lands
Early January – early March	3,000 sheep are maintained at Mud Lake feedlot facility	No
Early March – late April	2,500 sheep are maintained at Headquarters feedlot facility for lambing; 500 rams and non-pregnant ewes remain at Mud Lake feedlot facility until late April	Yes
Late April – early July	3,000 sheep graze Headquarters Range; from early June thru early July groups (various sizes) of sheep are moved to other properties	Yes
Mid-June – late August	500 to 800 sheep graze FS-East Beaver allotment. In years when a grazing unit is rested on West Summer Range, 800 sheep will graze.	No
Early June – late October	500 to 1,100 sheep graze Humphrey Ranch for varying lengths of time depending on rest status of West Summer Range and Henninger Ranch.	Yes
Mid-June – mid-September	500 to 1,600 sheep graze Henninger Ranch for varying lengths of time depending on rest status of West Summer Range. The majority of Henninger Ranch will be rested for one year following two consecutive grazing years. Even in years of grazing rest, 800 to 1,600 sheep will be temporarily held at Henninger Ranch for less than seven days when moving to and from summer and HQ ranges	Yes
Early July – early September	800 to 1,600 sheep graze West Summer Range. Summer West is divided into two grazing units (Odell and Big Mountain). Grazing units are grazed for two years then rested for one year. In years when one grazing unit is rested (no grazing), only 800 sheep will be on Summer West Range; the additional 800 sheep will graze FS-East Beaver allotment and Henninger and Humphrey Ranches.	Yes
Late August – mid-October	500 to 3,000 sheep graze Headquarters Range	Yes
Mid-October – late November	2,500 sheep are maintained at Headquarters and Mud Lake feedlot facilities for breeding	Yes/No
Mid-October – mid-December	500 sheep graze Headquarters Range	Yes
Early November – early January	1,600 sheep graze FS Snakey-Kelly allotments [a, b]	No

a - Snakey has 1,200 sheep permitted for the allotment, November 6 to January 2, dates move out of Snakey-Kelly is based on weather conditions, if there is early snow accumulation move out dates area earlier than permitted dates. Sheep would always be moved out of Snakey on or before January 12 and always moved out of Kelly on or before January 13. From Snakey and Kelly sheep removed to Mud Lake feedlot facility.

B - Kelly has 1,000 sheep permitted for the allotment, November 20 to January 3. From Kelly sheep are moved to Mud Lake.

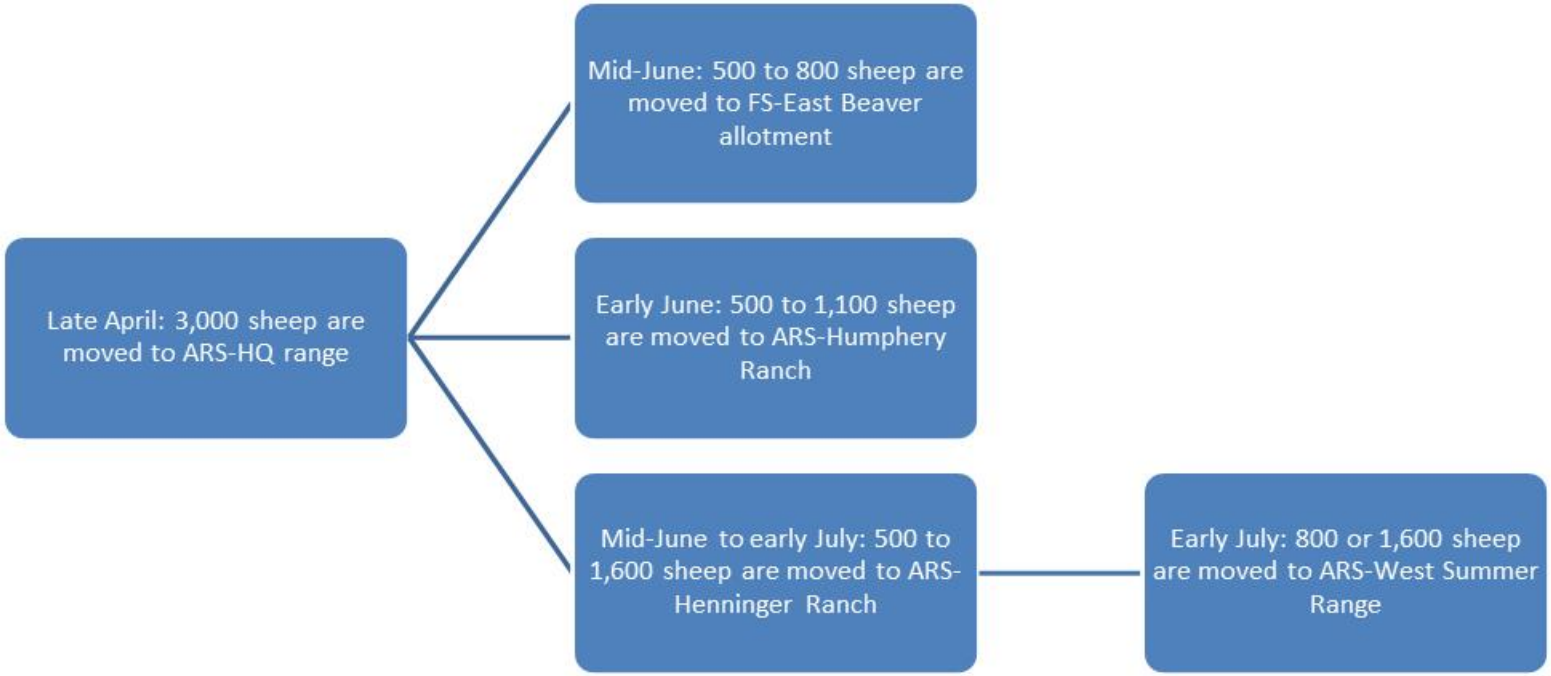


Figure 74. Modified alternative 4 sheep movement out to spring and summer ranges.

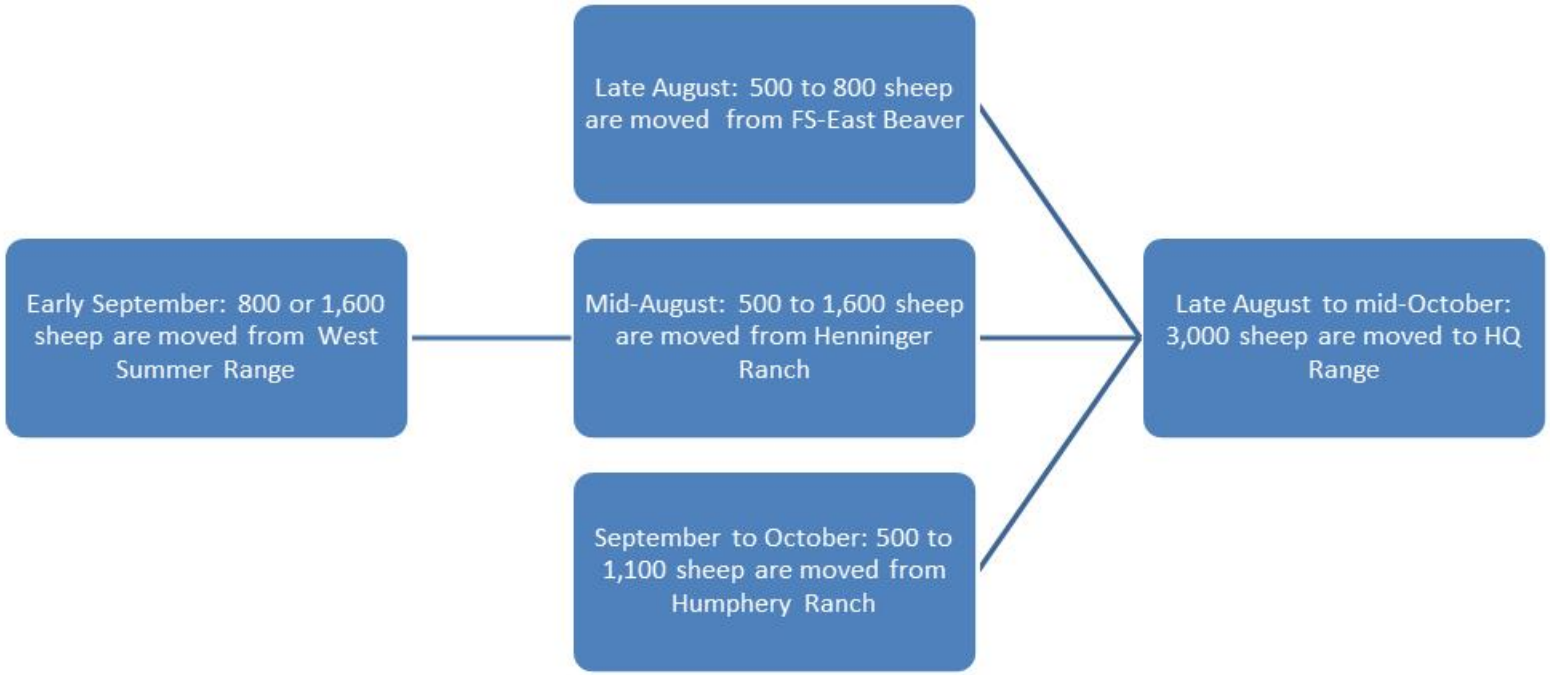


Figure 75. Modified alternative 4 sheep movement to fall range

Figure 76. Modified alternative 4 sheep movement to winter grazing and from winter range to feedlots

Modified Alternative 5

Modified alternative 5: 1,800 sheep (2,338 AUM), 40 percent reduction from alternative 1, No grazing on Snakey-Kelly allotments.

Table 36. Modified alternative 5 - general sheep movement schedule; grazing dates are approximate depending on range readiness. A sheep is any sexually-mature ewe or ram that is retained as a part of the core breeding flock.

Dates	Location: Activity/Animal numbers	ARS Lands
Mid-December – early March	1,800 sheep are maintained at Mud Lake feedlot facility	No
Early March – late April	1,500 sheep are maintained at HQ feedlot facility for lambing; 300 rams and nonpregnant ewes remain at Mud Lake feedlot facility until late April	Yes
Late April – early July	1,800 sheep graze HQ Range; from early June thru early July groups (various sizes) of sheep are moved to other properties	Yes
Mid-June – late August	300 sheep graze FS-East Beaver allotment	No
Early June – early October	540 sheep graze Humphrey Ranch	Yes
Mid-June – early-July	960 sheep graze Henninger Ranch	Yes
Early July – early September	960 sheep graze Summer West and East Ranges. Summer West is divided into two grazing units (Odell and Big Mountain), while Summer East is considered a single grazing unit. Grazing units are grazed for two years then rested for one year. In years when Summer East is rested (no grazing), sheep grazed both Summer West grazing units (480 sheep per unit). Therefore, Summer East will have 480, 480, and 0 sheep for the first, second, and third consecutive years, respectively. Consequently, Summer West will have 480, 480, and 960 for the first, second, and third corresponding years, respectively.	Yes
Early July	In coordination with East Summer Range grazing, 460 sheep are moved thru FS Meyers Creek allotment for 3 days or less.	No
Early September	In coordination with East Summer Range grazing, 460 sheep are moved thru FS Meyers Creek allotment for 3 days or less.	No
Early September – mid-September	960 sheep temporarily held at Henninger Ranch for less than seven days when moving from summer to fall ranges	Yes
Late August – mid-October	300 to 1,800 sheep graze HQ Range	Yes
Mid-October – late November	1,500 sheep are maintained at HQ and Mud Lake feedlot facilities for breeding	Yes/No
Mid-October – mid-December	300 to 1,800 sheep graze HQ Range	Yes

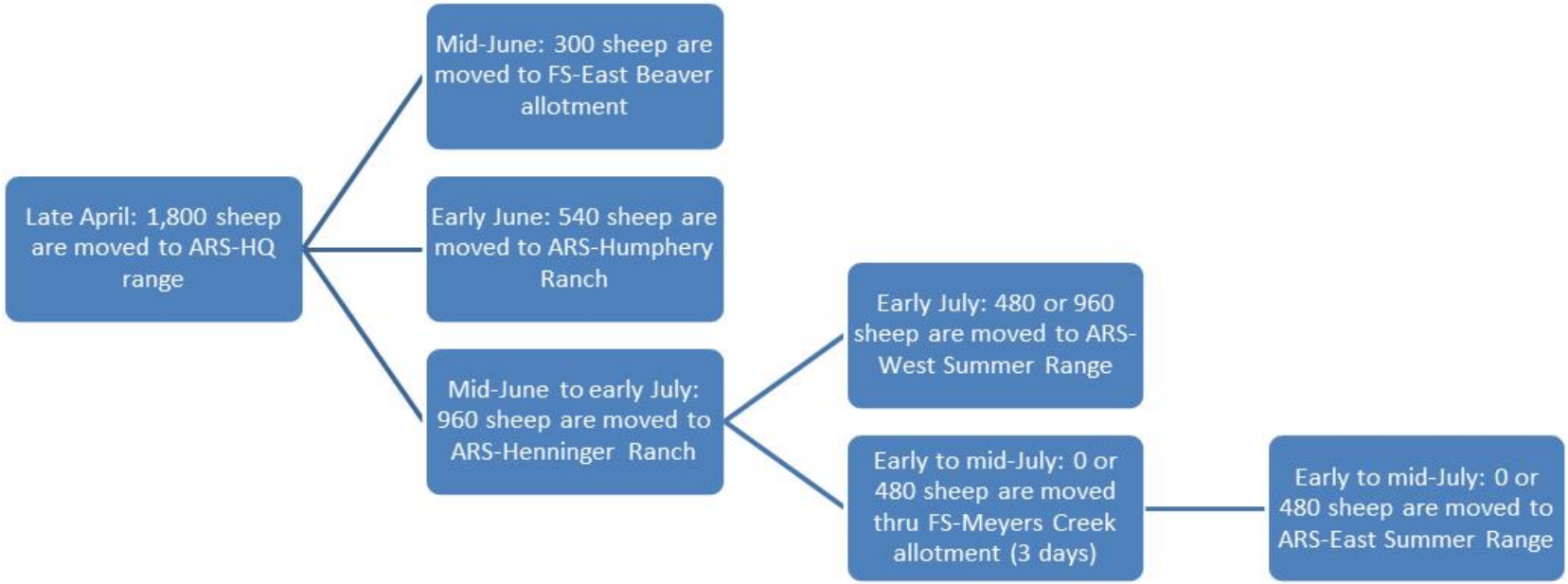


Figure 77. Modified alternative 5 sheep movement out to spring and summer ranges

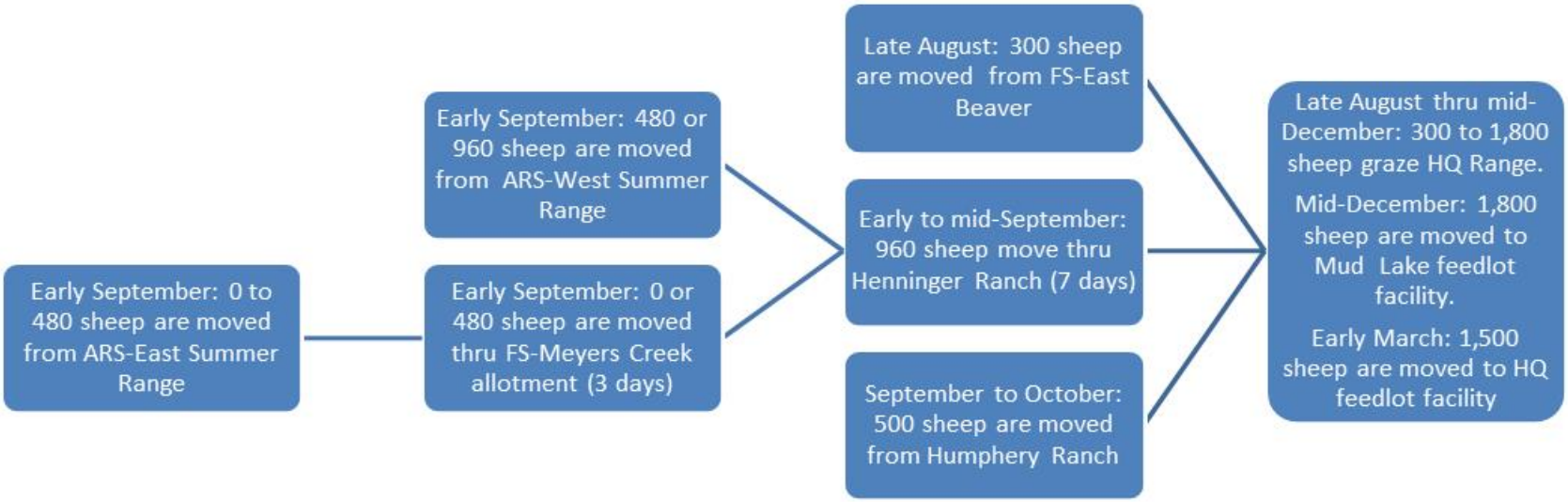


Figure 78. Modified alternative 5 sheep movement to winter grazing and from winter range to feedlots

Appendix C – ARS Sheep Station Herbicide Use Protocols

The Sheep Station uses herbicides as a tool to manage vegetation for meeting land management and experimental goals and for invasive plant control. Herbicide use is minimal and only used when other vegetation management tools are either too destructive to the range or not sufficient to achieve the desired goal.

Shrub Management

Shrubs are necessary and important components of sagebrush ecosystems. Recently, the Secretaries of Agriculture and Interior have issued directives to suppress rangeland wildfires in order to protect shrub-dense areas that provide critical sage grouse habitat. Such fire suppression is resulting in large contiguous, old-growth shrub communities that are vulnerable to wildfire or becoming heavily dominated with non-sagebrush shrub species, such as bitterbrush. To reduce these impacts to healthy sagebrush ecosystems, the Sheep Station would conduct experimental strip and spot treatments of herbicides on the Headquarters properties. These treatments would use herbicides to reduce shrub density (i.e., volatile fuel loads) along long narrow strips (less than 150 feet wide; see Map 5) through shrub-dense areas. These narrow strips will reduce the likelihood that wildfires would advance at an uncontrolled and destructive rate through contiguous shrub-dense habitats for sage grouse.

This herbicide application would be conducted via aerial application, which does not disturb the ground surface. Comparably, other fire-break methods, such as grading and brush beating, break the ground surface and create an environment that may be susceptible to exotic invasive weeds. As addressed elsewhere, methods that break the ground surface are limited to when fire is imminent and drastic measures are needed to halt fires.

If needed, in order to curtail bitterbrush domination of old-growth sagebrush stands, the Sheep Station proposes strategic spot-treatment use of herbicide on dense bitterbrush stands that were formerly dominated with sagebrush. This would be conducted as needed following strip treatments.

Exotic and Invasive Plants

The Sheep Station uses an adaptive management/integrated pest management approach for control and eradication of exotic, invasive weeds. Precautions are taken by the Sheep Station to minimize weed spread from sheep, such as quarantines to reduce the spread of weed infestations to other areas. Strategic sheep grazing (as demonstrated in Table 37) is used to reduce the spread of certain invasive species in pasture lands. In addition, biocontrol methods, such as specific species of beetles, alone or in combination with other biocontrol methods, are also used to control invasive species.

Table 37. Target species for grazing control of range invasive species infestations

Target Species Scientific/Common Name	General Location	Season to Graze
Euphorbia esula (leafy spurge)	along I 15 and scattered plants along Headquarters pastures that border non-ARS properties	Grazing in weed areas is done in spring or early summer when there is no or little risk of spreading weed seeds.
Centaurea stoebe (spotted knapweed)		

However, when these measures alone are not sufficient herbicides maybe applied for the treatment of invasive species either in pasture infestations or along roadsides, fences and other structures throughout the ARS properties (Headquarters, Humphrey Range, Henninger Ranch).

For range weed infestations: There are few invasive species problems on Sheep Station pasture lands. The minimal infestations that are present are located in sheep pens and along roads where there is no grazing. Some weed species are present on adjacent lands where cattle graze, and, over time, the adjacent weeds invade ARS lands. Invasive plant species infestations on ARS lands are GPS (Global Positioning System) mapped. Area or patch infestations are mapped as polygons and included in the Sheep Station records. Sheep Station personnel report potential exotic weed infestations to the operation supervisor. Range and(or) animal scientists inspect the site, and if the presence of exotic weeds are confirmed, the scientist documents the location (GPS), weed species, and size/density of infestation; prescribes appropriate grazing strategies to mitigate the weed presence; and schedules seasonal and annual monitoring measures (on-ground sample and/or aerial imagery).

For roadside, working facility, dry-lot and corral, and small pasture weed infestations: Sheep Station personnel report potential exotic weed infestations to the operation supervisor. The technician assigned to noxious weed management investigates the site. If presence of exotic weeds is confirmed, the technician documents the location (traditional name and/or GPS), weed species, and size/density of infestation, and treats the weed(s) with appropriate herbicide(s). The technician records this information in the “Pesticide Records: Noxious Weed Control” log.

Herbicides are sprayed semiannually along some roads and in sheep pens where invasive weeds are present. Herbicides have been used to control weeds along roadsides, in feedlots and corrals, small pastures (less than 25 acres), and near building structures for about 30 years. In these small confined areas, herbicide use is more effective in these weed invasion areas than sheep grazing.

Herbicides control is most often used for *E. esula* (leafy spurge), *C. stoebe* (spotted knapweed), *B. tectorum* (cheat grass), *Cardaria draba* (L.) Desv. (whitetop), *Chenopodium album* L. (lamb’s quarters), *Bassia scoparia* (L.) A.J. Scott, *Cirsium* spp. (thistle). Occasional herbicide control is conducted for rare sightings of *Hyoscyamus niger* L. (stinging nightshade), *Arctium lappa* L. (greater burdock), *Isatis tinctoria* L. (dyer’s woad), *Hieracium cynoglossoides* (Arv.-Touv) P (hounds tongue hawkweed).

For noxious weed management, herbicides application methods include: spot, handwand application to control weeds along roadsides, in feedlots and corrals, and near building structures. Four-wheeler-mounted and tractor-mounted boom-sprayer application is conducted to control weeds in small pastures and in large feedlots.

Herbicides used to control weeds include, but are not limited to: clopyralid, diuron, picloram, bromacil, glyphosate, 2,4-D amine, and triisoproponal ammonium salt. Historically, herbicides are applied to less than 60 acres annually. Approximately 90 percent of the application is along roadsides.

Herbicide Use Protocols

The following table provides the types of plant species targeted for exotic weed infestations and the herbicide control methods used.

Table 38. Herbicides used for vegetation management and control of exotic weeds on US Sheep Station properties

Herbicide/Herbicide combinations	Treatment types	Location	Frequency	Application Method
Clorpyralid	Roadside, fence line, and pasture invasive species treatment	HQ, Humphrey, Henninger	Annual; once	spot or broadcast
Aminopyralid	Roadside, fence line, and Pasture invasive species treatment	HQ, Humphrey, Henninger	Annual; once	spot or broadcast
2, 4 D amine	Roadside, fence line, and pasture invasive species treatment	HQ, Humphrey, Henninger	Annual; once	spot or broadcast
Bromacil plus Diuron	Feedlot surfaces	HQ	Annual	spot or broadcast
Non-aquatic glyphosate	Roadside, fence line, and pasture invasive species treatment	HQ, Humphrey, Henninger	Annual; once	spot or broadcast
Tebuthiuron	Selective shrub management in pastures	HQ	One time	Primarily aerial, spot or broadcast
Picloram	Pasture invasive species management	HQ, Humphrey, Henninger	One. time	primarily broadcast

- Sheep Station personnel report potential exotic weed infestations to the operation supervisor.
- If presence of exotic weeds is confirmed, the technician documents the location (traditional name and/or GPS), weed species, and size/density of infestation, and treats the weed(s) with appropriate herbicide(s). The technician records this information in the “Pesticide Records: Noxious Weed Control” log.
- Only herbicide formulations (active and inert ingredients) and additives registered by EPA and approved by the Forest Service are applied.
- Herbicides and application methods are chosen to minimize risk to human and wildlife health and the environment
- Herbicides are applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human (NRC 1983) and wildlife health (EPA 1986a). Application rate and work time must not exceed typical levels (Appendix A, tables 4-4 to 4-6) unless a supplementary risk assessment shows that proposed rates do not increase risk to human or wildlife health or the environment beyond standards
- Method and timing of application are chosen to achieve project objectives while minimizing effects on non-target vegetation and other environmental elements.
- Weather is monitored and the project is suspended if temperature, humidity, or winds become unfavorable.
- A certified pesticide applicator supervises application.
- Workers who handle herbicides must wear a long sleeved shirt and long pants made of tightly woven cloth that must be cleaned daily. They must wear a hard hat with plastic liner, waterproofed boots and gloves, and other safety clothing and equipment required by labeling. They must bring a change of clothes to the field in case their clothes become contaminated.

- Employees applying herbicides must take soap, wash water separate from drinking water, eyewash bottles, and first aid equipment to the field.
- During transport, herbicides, additives, and application equipment are secured to prevent tipping or excess jarring and are carried in a part of the vehicle totally isolated from people, food, clothing, and livestock feed.
- Only the amount of herbicide needed for the day's use is brought to the site. At day's end, all leftover herbicide is returned to storage.
- Herbicide mixing, loading, or cleaning areas in the field are not located within 200 feet of private land, open water or wells, or other sensitive areas.
- During use, equipment to store, transport, mix, or apply herbicides is inspected daily for leaks.
- Containers are reused only for their designated purpose. Empty herbicide containers are disposed of according to 40 Code of Federal Regulations (CFR) 165.9 Group I & II Containers.
- Accident preplanning is done in each site-specific analysis. Emergency spill plans are prepared. In the unlikely event of a spill, the spill is quickly contained and cleaned up, and appropriate agencies and persons are promptly notified.
- During pesticide application, an untreated buffer will be left alongside surface waters, wetlands and riparian areas. In determining buffer width the following factors would be taken into consideration: beneficial water uses, adjacent land use, rainfall, temperature, wind speed and direction, terrain, soils, vegetative type and aquatic life. Other consideration would be type of application, persistence on-site foliage, spray pattern and droplets and carrier.
- BMPs for herbicide use would be implemented. These measures have been proven effective across the country in managing non-point sources of pollution, and their implementation is required in both Idaho and Montana as part of the Clean Water Act (Seyedbagheri, 1996, Schuler and Briggs, USDA Forest Service, 2002, State of Idaho, 1999, State of Montana, 2007).
- Tebuthiuron would not be used when the ground is frozen or saturated with water (http://www.keystonepestsolutions.com/tebuthiuron-80wg-herbicide-4-pounds-brush-killer-replaces-spike-80wg-spike-80df-281.html).
- The granular form of Tebuthiuron would not be applied when wind speeds exceed 10 mph. Herbicides will not be applied when conditions stated on the herbicide label cannot be met and when air turbulence significantly affects the desired spray pattern (Bureau of Land Management 2010).
- Buffers would be used adjacent to streams, ponds or wetlands. Buffer width would be a function of the herbicide used. Recommended buffer widths are listed in Table 39. However, during pesticide application the following factors would be taken into consideration in case buffer widths would need to be increased: beneficial water uses, adjacent land use, rainfall, temperature, wind speed and direction, terrain, soils, vegetative type and aquatic life. Other consideration would be type of application, persistence on-site foliage, spray pattern and droplets and carrier. Buffers have been proven effective across the country in managing non-point sources of pollution, and their implementation is required in both Idaho and Montana as part of the Clean Water Act (Seyedbagheri, 1996, Schuler and Briggs, USDA Forest Service, 2002, State of Idaho, 1999, State of Montana, 2007, Thornton 2001). Buffers have proven effective in are effective at reducing the movement of herbicide to streams (Bureau of Land Management 2010).

Table 39. List of herbicides and recommended buffer widths to reduce potential for groundwater contamination

Herbicide	Recommended Buffer Width	Comment
2, 4 D amine	25 feet [a]	Most formulations of 2,4-D do not bind tightly with soils and, therefore, have the potential to leach down into the soil column and to move off-site in surface or subsurface water flows[b.] .
Imazapyr	Up to Edge [b]	Low toxicity to fish and algae; Mobility pH dependent
Picloram	25 feet [a] 164 feet	Known surface and groundwater contaminant; 25 foot buffer applies to surface water drainages; 164 foot buffer applies if herbicide applied near Station groundwater wells
Bromacil	25 feet [a] 164 feet	Known groundwater contaminant; 25 foot buffer applies to surface water drainages; 164 foot buffer applies if herbicide applied near Station groundwater wells
Clopyralid	25 feet [a] 164 feet	Considered moderately toxic to fish; 25 foot buffer applies to surface water drainages; 164 foot buffer applies if herbicide applied near Station groundwater wells
Triclopyr amine	Up to Edge [b]	The water-soluble salt is degraded in the water column through photolysis and hydrolysis[b]
Diuron	25 feet [a] 164 feet	Known groundwater contaminant; Moderately toxic to fish and highly toxic to aquatic plants; 25 foot buffer applies to surface water drainages; 164 foot buffer applies if herbicide applied near Station groundwater wells
Non-aquatic Glyphosate	100 feet [b]	Relatively low toxicity to birds, mammals, and fish.
Aminopyralid	0 feet [c]	Given its high mobility, and moderate persistence in soil, aminopyralid is likely to leach to ground water irrespective of soil type; slightly non-toxic (or a low potential for adverse effects) to fish and aquatic organisms [d]
Tebuthiuron	100 feet[e]	A minimum buffer zone of 100 feet wide will be provided for aerial application.

Herbicide Hazard Quotients and Effects to Human Health

An inventory of herbicides is maintained. Herbicides are stored according to the manufacture label, which is displayed in the storage room. All human health and environmental related issues are managed according to the most current material safety data sheet, which is displayed in the storage room.

Chemical Hygiene Plan

Requirements for use of caustics, corrosive, flammable, and pesticide materials.

Introduction

The intent of the Dubois, Idaho, Research Unit Chemical Hygiene Plan is to:

1. Protect laboratory employees from health hazards associated with the use of various chemicals found in the laboratory.
2. Aid in assuring that our laboratory employees are not exposed to substances in excess of the permissible exposure limits as defined by OSHA in 29 CFR 1910 subpart Z.

This plan is part of the Dubois, Idaho Agricultural Research Service Safety Manual which is readily available to all employees and it is their responsibility to be aware of its contents.

The location research leaders are to immediately notify their chemical hygiene officer if there are any changes in procedures or chemicals used within their employee's workplace. It is then the responsibility of the chemical hygiene officers and the location safety committee to make corrections to the Chemical Hygiene Plan.

The name of the Chemical Hygiene Officer for each research unit can be found in the appropriate appendix in this manual.

Standard operating procedures address the safety concerns of the research leader in charge of that work area. A compilation of workplace standard operating procedures can be found in appropriate appendix of this manual. Work specific standard operating procedures may be found at the respective worksite.

The following information covers the general chemical hygiene policy for Agricultural Research Service Dubois, Idaho.

Training sessions on laboratory safety are held at designated intervals. Annual safety and occupational health training is also provided by the Agricultural Research Service Northern Cluster Environmental Protection Specialist.

All employees will be required to read and become familiar with safety guidelines and procedures established in this manual (each employee is required to sign a document stating that they have read and understand those requirements specified within the safety manual). This document is kept on file in the Main Agricultural Research Service Office.

Reading of MSDS

As there is no standard procedure for writing material data sheets the employee may find several different formats available. It is imperative that all employees familiarize themselves with the material safety data sheets used in their laboratory. For additional training and information contact the Chemical Hygiene Officer, or consult with the Northern Cluster Environmental Protection Specialist.

Labeling/Secondary Labels

All chemical shipments will be inspected by the person who submitted the requisition for the chemical purchase to determine that all containers in the shipment are properly labeled. Any container that is not properly labeled as required will be refused and returned to the supplier by the Administrative Officer.

All containers received in chemical shipments that are properly labeled will not have the label removed or defaced.

Existing containers of hazardous chemicals, excluding containers present for use in laboratory work areas or stored for use in laboratory operations, that are not properly labeled will have an in-house label prepared and affixed to the container by the Chemist.

Secondary labeling must contain:

- The name of the product
- The hazard of the product, such as, irritant, respiratory toxicant
- A source to contact for further information about the product
- Secondary labeling is required on all containers holding products which will not be completely used by the end of the work day

Location

Action must begin immediately following an accident. Therefore, it is important that everyone at the location be familiar with hazards that may accompany their work and with the emergency plan developed as a safeguard in case of an accident. Supervisors are responsible for notifying employees accordingly.

Additional personnel should be designated in each research unit to accompany medics and/or paramedic and patient (s) being transported to the first aid station/emergency room.

Laboratory

Each laboratory at this location will develop a contingency plan that will cover emergencies that may arise from use of hazardous materials. This information can be found in the appropriate appendix in this manual.

Each laboratory supervisor is responsible for the safety of all individuals present in their laboratory; employees and visitors and building service personnel. When work is hazardous, employees must be well trained in carrying out the emergency plan, visitors must be assured that the laboratory is safe for them to enter and do their work. If the laboratory is not safe at the end of each day, signs must be posted prohibiting entry. If needed, protective equipment will be provided i.e. safety goggles etc.

Procedure

Because a detailed course of action cannot be developed that is applicable in all situations, the Safety Manual and the Chemical Hygiene Plan are general and provide a foundation for each laboratory to develop specific operating procedures. Specific standard operating procedures are found in individual laboratories and by Laboratory room number in the Appendix of this manual. Each individual is responsible for being familiar with the location of the standard operating procedures, material safety data sheet, and hazards in any given lab.

If assistance or additional information is needed, the project leader/scientist or members of the safety Committee may be contacted.

If accidents occur that may contaminate an area with dangerous chemicals or infectious agents, it is important that the following be done:

1. Get everyone out of the affected area; do not reenter until the extent of the hazard is determined
2. Obtain immediate help.
3. Determine the necessity for treating persons exposed to the dangerous agents.
    a. Everyone must KEEP OUT of the affected area until there is no doubt concerning the safety to reenter. The employee must immediately notify the supervisor of the problem.
    b. If infectious agents are involved, at least one hour should be allowed for aerosols to be carried away and heavier particles to settle.
    c. Chemical spills may evaporate and be swept away rapidly, or remain for a long time. Probability of fire or explosion is high when flammable solvents are spilled and ignition sources are present.
4. In addition to the usual first aid/emergency measures:
    a. Post warning signs as needed.
    b. Limit the damage due to chemicals or to terminate exposure to pathogenic organisms.
    c. Decontaminate exposed personnel.
    d. Restrict contamination to the smallest area.

5. Supervisors are responsible for referring persons exposed to a pathogen (s) to a medical facility, or to another appropriate medical authority. The immediate supervisor of the person being treated is responsible for submitting appropriate forms and for ensuring that all information regarding the specific agent or isolate involved in the exposure is made available to the physician when the patient is admitted to the medical facility.
6. Decontaminate the affected area. This may be carried out by the laboratory staff, or it may require special equipment and personnel. The laboratory supervisor is responsible for requesting needed assistance. The supervisor must request assistance if there is any doubt regarding the extent of the hazard or if there is any reason to believe that those persons doing the decontamination and clean-up will be placed in a hazardous situation.

Standard Operating Procedures:

The standard operating procedures for each work area are found in the appropriate appendix of this manual. A compilation of all standard operating procedures for this location can be found in the Main Agricultural Research Service Office.

Requirements for use of Caustics, Corrosives, Flammables

Transportation

All caustic, corrosive (strong acids and bases), or flammable chemicals are to be stored and transported in suitable, approved carrying devices. When transporting caustic or corrosive chemicals by cart, all material must be placed in approved carrying devices; furthermore, all carts used to transport these materials must have sides high enough to retain the containers and wheels large enough to prevent the carts from being caught in cracks and crevices.

Storage

The following items will be stored in approved solvent storage cabinets:

1. All containers of flammable solvents larger than half gallon
2. All flammable solvent supplies, when cumulative amounts greater than two gallons are kept in one laboratory room.
3. Working surfaces of hoods are not to be used as storage areas.
4. Long-term storage (2 weeks or longer) is not allowed in the laboratory. If it is necessary to store large amounts of solvents which are not frequently used, it must be done in the chemical storage room.
5. All chemicals (reagents, solvents, acids, bases, pesticides, etc.) are to show a receipt date.
6. A chemical-spill clean-up kit is available in the chemical storage room and is to be used where there is spillage of combustible chemicals, volatile liquids, mercury globules, acids, and bases.
7. Requirements for use of carcinogens, mutagens and teratogens
    a. Policy: Users of carcinogens, mutagens, or teratogens are referred to the Agricultural Research Service Safety Manual 230.0. This document states policy, authority, and responsibilities for use of potentially carcinogenic chemical agents which are too numerous to list.
8. Each laboratory identifies and compiles a list of all highly toxic and hazardous compounds in their possession. These compounds are appropriately labeled and in suitable containers. A running inventory of compounds and quantities is kept at all times.

9. Removal and transport of any compound within the research facilities is done by placing glass vials or bottles in unbreakable containers. Under no circumstances are individuals to transport highly hazardous chemicals in glass containers only. Distribution of chemicals from one laboratory to personnel of another laboratory is to be made only to qualified, responsible personnel and these distributors must be noted on the inventory.
10. Knowledge of safety precautions, medical treatment and/or literature will be available and distributed to all personnel who are or who will be using the toxic or hazardous chemicals in a research laboratory. This will assure that correct and immediate medical treatment of individuals in emergency situations is possible. This also dictates that individuals working with toxic compounds inform their immediate supervisor or some other predesignated individual prior to the obtainment and/or use of toxic substances in the laboratory. This guideline becomes a mandate with those toxic compounds not covered in the current research protocols. Investigators must review the appropriate standard operating procedures and material safety data sheet prior to using all chemicals.
11. Before work is begun on toxic, potentially toxic, or hazardous materials, clean-up and disposal procedures will be defined in case of spills or contamination. This will include designated trained personnel, protective clothing, and disposal systems for contaminated materials.
12. In the event a spill should occur, immediate notification of proper personnel is required by the supervisor in the area. Clean up is to be initiated by authorized persons. Analytical monitoring of spills should be implemented to assure that clean up procedures have reduced contaminants to safe levels.

Use and care of fume hoods and other laboratory equipment:

1. Fume hoods will be inspected annually by the Agricultural Research Service Northern Cluster Environmental Protection Specialist.
2. Research staff is required to maintain other laboratory equipment functioning properly and safely as determined in the standard operating procedures or manufactures operation manual.

Medical Surveillance:

1. By law individuals working around or with certain chemicals must be placed in a medical surveillance program. This program consists of a physical exam performed by a qualified physician (The qualification may vary with the type of chemical to which an individual is exposed; i.e. a "B" reader is required to interpret chest X-rays of asbestos workers.)
    a. A volunteer program has been provided by this location for all qualified Agricultural Research Service employees.
    b. Qualification of an employee is determined by an evaluation of his or her work area by their supervisor, the location coordinator and the Northern Cluster Environmental Protection Specialist.
2. A guide to medical surveillance is available from the Agricultural Research Service Northern Cluster Environmental Protection Specialist.
3. Arrangements for a physical exam can be made through the location Administrative Office.

Workplace Monitoring

1. Industrial Hygiene/Environmental Health monitoring is provided by the Agricultural Research Service Northern Cluster Environmental Protection Specialist.
    a. Monitoring is done:

i. When requested by the location. Any employee may request an evaluation of their workplace. The type of monitoring and procedure to use will be determined in conference with the Agricultural Research Service Northern Cluster Environmental Protection Specialist.
ii. As requested by the Environmental Protection Specialist.
iii. When requested by the Area Office or Headquarters.

2. Records of all safety inspections and workplace monitoring activities can be found in this facilities Safety Manual located in the Main Agricultural Research Service Office.

a. Identification of chemical hazards
i. Labeling
1. Primary Labeling: All chemicals entering this facility are examined for proper labeling. The label must contain the following information:
The name of the product
The name of the manufacture
The known hazards of the product
An emergency phone number, usually of the manufacture where further information can be obtained about the chemical. (This phone must be answered 24 hours a day).

2. Secondary Labeling: All chemicals that are removed from their original package and placed in another container must have the same labeling information as required on the primary labels.
3. All non-labeled chemicals shall be chemically classified and appropriately destroyed/discarded.

Appendix D – Draft ARS Sheep Station Heritage Management Plan

This document serves as a preliminary Heritage Management Plan developed by the USDA Forest Service TEAMS Enterprise Unit, for operations at the Agricultural Research Service, U.S. Sheep Experimental Station (Sheep Station), Dubois, ID. This preliminary management plan provides direction regarding Section 106 services; recording and managing Sheep Station historic properties; and implementing a survey strategy for the Sheep Station, Dubois, Idaho properties in the states of Idaho and Montana.

Section 106 Compliance

The Section 106 process will be completed for all known undertakings with the potential to affect cultural resources. All undertakings will follow appropriate State Historic Office Preservation standards and guidelines and will be in accordance with the State Historic Preservation Offices of Idaho and Montana procedures and forms.

Principal Investigators will meet the Secretary of Interiors Professional Qualification Guidelines.

Archeology

The minimum professional qualifications in archeology are a graduate degree in archeology, anthropology, or closely related field plus:

- At least one year of full-time professional experience or equivalent specialized training in archeological research, administration or management;
- At least four months of supervised field and analytic experience in general North American archeology, and
- Demonstrated ability to carry research to completion.

Architectural History

The minimum professional qualifications in architectural history are a graduate degree in architectural history, art history, historic preservation, or closely related field, with coursework in American architectural history; or a bachelor's degree in architectural history, art history, historic preservation or closely related field plus one of the following:

- At least two years of full-time experience in research, writing, or teaching in American architectural history or restoration architecture with an academic institution, historical organization or agency, museum, or other professional institution; or
- Substantial contribution through research and publication to the body of scholarly knowledge in the field of American architectural history.

Architecture

The minimum professional qualifications in architecture are a professional degree in architecture plus at least two years of full-time experience in architecture; or a State license to practice architecture.

Historic Architecture

The minimum professional qualifications in historic architecture are a professional degree in architecture or a State license to practice architecture, plus one of the following:

- At least one year of graduate study in architectural preservation, American architectural history, preservation planning, or closely related field; or
- At least one year of full-time professional experience on historic preservation projects.

Such graduate study or experience shall include detailed investigations of historic structures, preparation of historic structures research reports, and preparation of plans and specifications for preservation projects.

Summary of Activities Proposed

All activities determined to be undertakings will be subject to intensive inventory. It is recommended that prescribed burns (in Idaho only) be monitored for potential effects as part of the Sampling Survey Procedures. These burns will likely be of short duration with little potential to affect prehistoric sites. Standing structures or artifacts with a low burn threshold may still be affected. Pre burn survey and consultation, partnered with post burn monitoring will help determine best mitigation methods to protect historic structures or artifacts.

Table 40. Potential effects of the proposed activities over the next five years for ARS properties in Idaho (Headquarters, Humphrey, and Henninger)

Proposed/Potential Activity (description)	Undertaking with the potential to effect and comments	Activity Location
Annual maintenance and periodic repair of existing pasture and exclosure fences	Potential for Effect	Headquarters, Humphrey, Henninger Range
Remove nonfunctional fence lines	Potential for Effect	Headquarters, Humphrey, Henninger
Build fences for new exclosures and pastures	Potential for Effect	Headquarters, Humphrey, Henninger
Annual maintenance and periodic repair of existing water developments	Potential for Effect	Headquarters, Humphrey, Henninger
Annual use and maintenance of established water-access, camp, and livestock congregation sites	Potential for Effect	Headquarters, Humphrey, Henninger
Annual maintenance of established irrigation systems, which includes canal cleanout, diversion repair, and culvert replacement	Potential for Effect	Humphrey, Henninger Ranches
Modification or new installation of irrigation systems (includes wiers, diversions, and canals) and water-access/crossing sites	Potential for Effect	Humphrey, Henninger Ranches
Short-duration, low-intensity grazing, which includes sheep, cattle, and horse grazing at various times throughout the year	Potential for Effect	Headquarters, Humphrey, Henninger

Proposed/Potential Activity (description)	Undertaking with the potential to effect and comments	Activity Location
Annual maintenance of established roads, which involves surface repair, erosion mitigation, repair of cattle guards, and replacement of culverts	Potential for Effect	Headquarters, Humphrey, Henninger
Annual maintenance of existing buildings and structures, which includes exterior and interior repairs	Potential for Effect	Headquarters, Humphrey, Henninger
Annual maintenance of existing outdoor livestock housing drylot pens, alleys, and roads	Potential for Effect	Headquarters, Humphrey, Henninger
Remove nonfunctional pens in drylot livestock-housing areas	Potential for Effect	Headquarters, Humphrey, Henninger
Prescribed burning, annual average of 190 acres	Potential for Effect	Headquarters Property
Range/Pasture revegetation seeding	Potential for Effect	Headquarters, Henninger
Predator avoidance and abatement	Potential for Effect	Headquarters, Humphrey, Henninger
Integrated Pest Management	Potential for Effect	Headquarters, Humphrey, Henninger

Table 41. Potential effects of the proposed activities over the next five years for ARS Properties in Montana (East and West Summer Ranges)

Proposed/Potential Activity (description)	Undertaking with the potential to effect and comments	Activity Location
Annual maintenance and periodic repair of existing pasture or exclosure fences	Potential for Effect	East Summer, West Summer
Annual maintenance and periodic repair of existing water developments	Potential for Effect	East Summer, West Summer
Annual use and maintenance of established water-access, camp, and livestock congregation sites	Potential for Effect	East Summer, West Summer
Short-duration, low-intensity grazing, which includes sheep grazing at various times throughout the year	Potential for Effect	East Summer, West Summer
Annual maintenance of established roads, which involves surface repair and erosion mitigation	Potential for Effect	West Summer
Predator avoidance and abatement	Potential for Effect	East Summer, West Summer
Integrated Pest Management	Potential for Effect	East Summer, West Summer

Field Methods

Field methodology will be determined and documented prior to surveys during a pre-field examination. For surveys to be conducted in Montana, existing survey data or reports older than 10 years will receive significant scrutiny to determine if the previously collected data is still valid. In instances where the Cultural Resources Specialist or Archaeologist can determine that data is valid, they will provide a justification in the report to MTSHPO, following the guidelines established in Montana SHPO Planning Bulletin #21. Pre-field examinations for lands to be surveyed in Idaho will follow IDSHPO guidelines. It

is acceptable to contact either SHPO prior to survey to review the proposed methods. These methods can be modified in the field to ensure a comprehensive and successful survey and report. For projects including historical architectural assessments or impacts, the Idaho SHPO will be contacted for guidance prior to assessment (there is no historical architecture on the Montana properties).

Survey strategy

Surveys will be conducted at intervals of 30 meters or less. Intensive survey will be 10-15 meter transect intervals, and will be used based on site probability and/or field conditions.

Personnel

All fieldwork must be conducted by or supervised in the field by a person meeting Secretary of Interior's qualifications (48 FR 44738-44739). Resumes of supervising personnel should be submitted with the report or already be on file at the SHPO office.

Areas examined and type of coverage

Describe the transect intervals used and mark transect routes on an attached map that relates their location to the topography of the area. If more than one transect interval is used, indicate these changes and where they occur. If an interval wider than 30 meters is used, a rationale must be included. Survey methods should be explained so that others using the field data can understand how it was obtained, and any limitations or biases. All survey information must be dated.

Ground surface conditions

Any environmental conditions that may have affected survey results should be described. Note any vegetation or snow obscuring visibility. Provide the specific percentage of visible surface. Photographs may be helpful.

Areas not examined

Any areas that are not examined need to be described, including the rationale for not surveying. Generally, all project areas undergoing 106 Review are expected to be surveyed unless access is denied.

Problems encountered in the field

Describe any problems that may have hindered the investigation. If access to an area was impaired or denied, describe any otherwise visible or known properties and provide your perceptions of their presence and condition.

Modifications to requirements

The agency official, in consultation with the MT and ID State Historic Preservation Officers and Indian tribes as appropriate, may modify or waive field survey requirements when any one of the following conditions is present:

- Past natural or human-caused ground disturbance has modified the surface so extensively that the likelihood of finding evidence of cultural resources is negligible.
- Existing inventory data and landscape-sensitivity-predictive models are sufficient to indicate that the specific environmental situation did not support human occupation or use to a degree that would make further field survey information useful or meaningful.

- The type of undertaking or the environmental setting is exempted from field survey under the terms of a programmatic agreement. Protocols in programmatic agreements may require some type of documentation for projects where field survey has been waived for any specified reason.

Assessment of effects

The Sheep Station has offered their proposed undertakings for the next five years. Table 42 assesses these effects.

Historic Structures (Idaho only)

Historic Buildings Survey

Two ranch complexes and a research center are associated with ARS lands in Idaho. Both these complexes require a historic buildings survey following the Secretary of the Interior's Standards for Architectural and Engineering Documentation. Currently there are no historic buildings associated with the Sheep Station located in Montana. Should the Sheep Station acquire any, MTSHPO will be consulted for guidance regarding historic building survey.

Standard I. Documentation shall adequately explicate and illustrate what is significant or valuable about the historic building, site, structure or object being documented.

The historic significance of the building, site, structure or object identified in the evaluation process should be conveyed by the drawings, photographs and other materials that comprise documentation. The historical, architectural, engineering or cultural values of the property together with the purpose of the documentation activity determine the level and methods of documentation. Documentation prepared for submission to the Library of Congress must meet the Historic American Buildings Survey / Historic American Engineering Record (HABS/HAER) Guidelines.

Standard II. Documentation shall be prepared accurately from reliable sources with limitations clearly stated to permit independent verification of the information.

The purpose of documentation is to preserve an accurate record of historic properties that can be used in research and other preservation activities. To serve these purposes, the documentation must include information that verifies its reliability.

Standard III. Documentation shall be prepared on materials that are readily reproducible, durable and in standard sizes.

The size and quality of documentation materials are important factors in the preservation of information for future use. Selection of materials should be based on the expected duration storage, anticipated frequency of use and a reasonable size for storage.

Standard IV. Documentation shall be clearly and concisely produced.

In order for documentation to be useful for future research, written materials must be legible and understandable, and graphic materials must include scale and location references.

Idaho SHPO additional direction

Structure surveys will be documented on Idaho SHPO historical structure assessment forms following the SHPO guidelines.

In addition to following the specifications for recording sites on Intermountain Antiquities Computer System (IMACS) forms, historic buildings will be recorded onto a Building Description Form.

Photographs of structures will include opposite corner photos, and any other photos needed to adequately record all relevant details of a structure, and evaluate its significance.

Each structure will need a floor plan; drawn to scale with appropriate distances noted. The floor plan should at minimum show all walls, windows, and doors.

In consultation with the Idaho State Historic Preservation Officer, evaluate structures for eligibility to the National Register of Historic Places.

Structure Management Plan

Determine the future use of Sheep Station structures including activities associated with yearly maintenance, safety inspections, modifications, or demolition.

In cooperation with the Idaho State Historic Preservation Officer, develop a plan for any modification or change to exteriors to ensure they meet State of Idaho Health and Safety Standards and Sheep Station needs. Idaho SHPO recommends using in-kind or historically accurate materials following Secretary of Interior and Idaho SHPO standards and guidelines. This may include siding, paint, windows, shingles, additions, or other changes.

Summary

The historic structures at the Sheep Station have not been assessed for historical integrity. The staff at the Sheep Station would like to continue using the structures under standard operating procedure and maintain them as necessary. A historical buildings assessment and structure management plan will lay the groundwork for continued use and habitation of these structures; establish and preserve the historical integrity of the structures and compound; and provide the framework for consulting with the Idaho State Historic Preservation Officer regarding changes or undertakings. Interior modifications may be necessary to meet the Sheep Station mission and research needs. Preservation of historic fabric should be considered with any interior modifications.

Sampling Survey Procedures for ARS USSES property

Sampling survey procedures will comply with the respective Montana or Idaho State Historic Preservation Office standards and guidelines.

A statistically based sampling survey procedure for less than 100 percent of an area of potential effect will be developed for a project to:

- Aid in characterizing the probable density, diversity, and distribution of cultural resources;
- Develop and test predictive models; and
- Answer appropriate research questions.

Minimal-intensity (i.e., rotational short-duration) grazing with sheep, cattle, and horses has been occurring on ARS lands for 90 years. Impacts of such grazing are expected to be negligible. Impacts are more likely to be associated with grazing-support activities that may cause noticeable disturbance, such as enclosures, livestock congregation areas, stock driveways, and herder campsites.

A predictive model has been developed to determine areas of high probability using the following parameters:

- **Distance to water** - 1/2 kilometer of perennial waters is weighted 1 versus other areas 0.
- **Slopes** - areas under 10 percent will have greatest weight of 4 and decreasing weight values with categories of 3 is 10-20, 2 is 20-30, and 1 is greater than 30 percent.
- **Aspect** - areas with southern exposure, 112.5-247.5 degrees, will be weighted 1 versus areas with other aspects have a value of 0.

There are six levels of probability, values 1-6, in the outcome of the model for the five grazing areas. A value of 1 is the lowest probability and a value of 6 is the highest probability. The highest probability areas, value of 6, would be those within ½ kilometer of perennial water, have slope of less than 10 percent, and a southern aspect.

Overlaying the results of the predictive model with the designated pastures generates maps of varying probabilities within each pasture, which in turn provides the basis on which to develop effective sampling procedures (see maps 1-6).

Table 42 displays site probability by pasture.

Table 42. Site probability in acres and percent by pasture

Pasture	Acres	*Lowest*	Site Probability				*Highest*
		1	2	3	4	5	6
		acres (percent)					
Headquarters	27373	11 (<1%)	73 (<1%)	237 (1%)	7686 (28%)	14195 (52%)	5171 (19%)
Humphrey	2420	<1 (<1%)	34 (1%)	155 (6%)	522 (22%)	1209 (50%)	500 (21%)
Henninger	1364	0 (0%)	3 (<1%)	36 (3%)	148 (11%)	672 (49%)	505 (37%)
Summer W.	11875	168 (1%)	3006 (25%)	3461 (29%)	2927 (25%)	1886 (16%)	427 (4%)
Summer E.	3981	205 (5%)	1462 (37%)	1199 (30%)	782 (20%)	285 (7%)	48 (1%)

Breakdown of site probability across ARS lands

ARS Administered Pastures

While Henninger has the highest percentage of area with a probability of 6 (37 percent); Headquarters has the most area with a probability of 6 (5,171 acres). The two summer grazing units have the least area with a probability of 6 (427 and 48 acres).

Trails

Drive trails are found on the two summer grazing pastures.

The trails in the East Summer Grazing Pasture cover 0.53 miles. Only 0.02 miles are covered by probability level 4. The rest of the trails are in probability levels 2 and 3.

The trails in the West Summer Grazing Pasture cover 2.55 miles. Approximately 0.61 miles cross probability levels 5 and 6. Approximately 0.71 miles cross probability level 4. The final 1.23 miles cross the three lowest probability levels 1-3.

Missing data

There are no GIS data available for watering locations, other stock congregating areas, and sheep herder camps. So they cannot be compared to the predictive model.

Implementation of heritage surveys

A percentage of the high probability areas identified by overlaying the predictive model on the grazing areas Table 41 will be subjected to stratified sampling procedures. In general, three percent of high probability areas (acres) in the grazing units will be sampled over the next three years. All other features identified above will be intensively surveyed.

Surveys are scheduled to begin in the spring of 2015.

Results will be reported in standard Section 106 format following Montana and Idaho State Historic Preservation Officers guidelines and procedures.

After an agreed upon timeline, review the stratified sampling results with the Idaho and Montana SHPOs. If no or minimal effects are found within the grazing units, discontinue the stratified sampling procedures and continue with basic Section 106 surveys for proposed undertakings.

Summary

In most cases, grazing unit boundaries will be the Area of Potential Effect. Because these areas are usually extremely large, the focus of analysis will be limited to livestock congregation areas and their intersection with areas known or likely to contain cultural resources.

Grazing has been occurring on the Sheep Station for 90 years and across 33,300 acres. On average 3,300 AUMs (animal unit months) are used of the 48,667 AUMS available. A survey strategy based on high probability locations will quickly and efficiently facilitate the collection of data associated with cultural resources, determine past, present, and future potential effects, contribute to the knowledge of sites in the area, comply with Section 106, and identify areas for future survey.

Timing and prioritization

Priority 1

Inventory of structures on Headquarters, Henninger, and Humphrey property (Idaho) to determine eligibility and develop a structural management plan in order to:

- Maintain existing buildings and structures annually, which includes exterior and interior repairs

Priority 2

Following the structural inventory should be surveys to cover any improvements to the facilities on Headquarters, Henninger, and Humphrey property (Idaho). These surveys should be done per scheduled event in order to:

- Remove nonfunctional fence lines
- Build fences for new exclosures and pastures
- Establish new livestock congregation and camp sites
- Conduct prescribed burning, annual average 190 acres (only on Headquarters property, Idaho)

- Seed range and pasture for revegetation (only on Headquarters, Henninger Ranches, Idaho)

Priority 3

Conduct a general survey of 3 percent of high probability areas on all properties where there is (Idaho and Montana):

- Annual use and maintenance of water-access, camp, and livestock congregation sites

The Sheep Station will provide a list and location of all proposed undertakings by March of each year, to be reviewed by a professional archaeologist for Section 106 compliance procedures. Then follow the timing recommended for the three priorities listed above.

Results of the heritage surveys will be provided to the appropriate State Historic Preservation Offices by March of the following year.

Funding

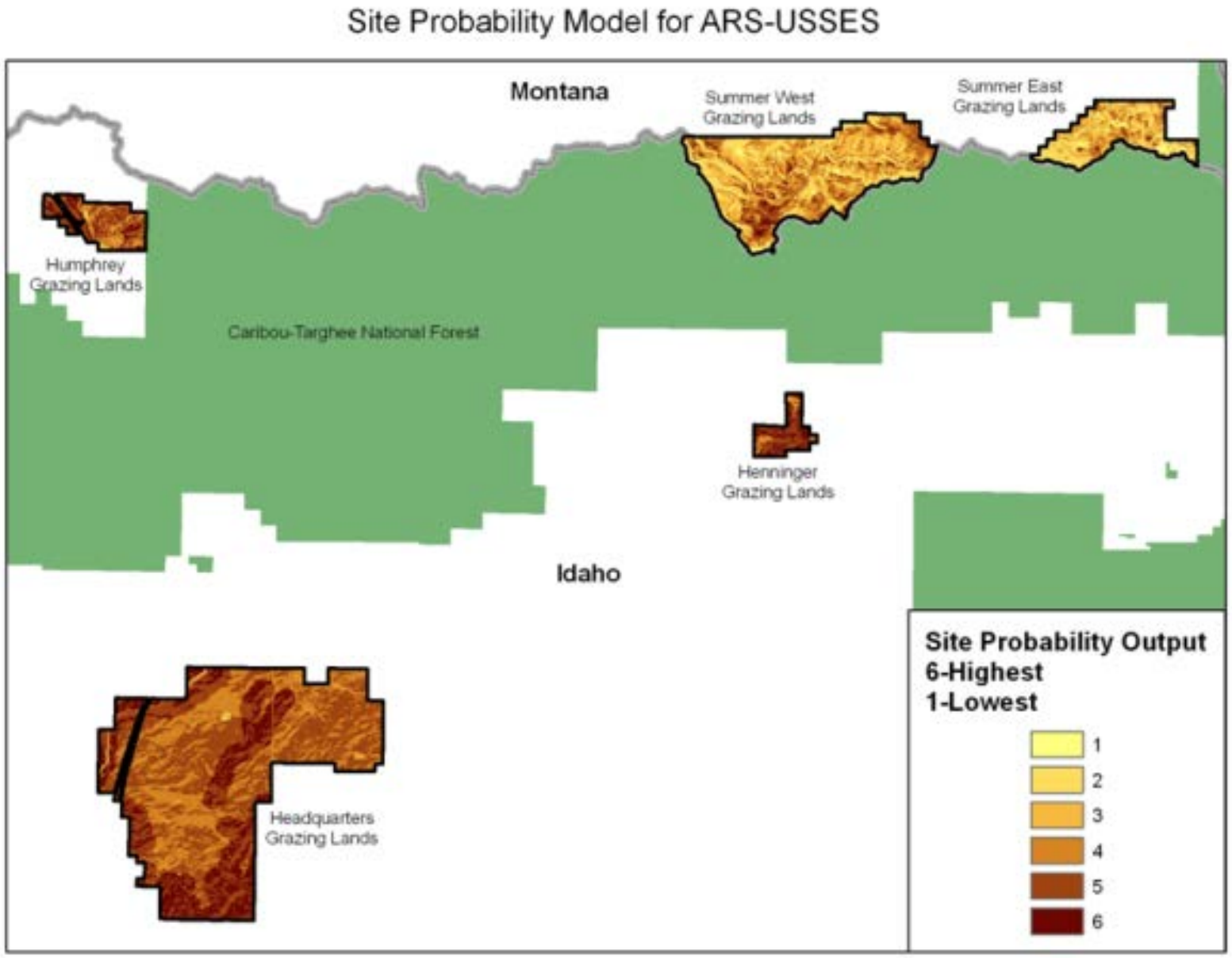
The USDA Agricultural Research Service will ensure adequate funding exists to support the plan as described. The USDA Agricultural Research Service will also identify at this time the proposed agency or consulting firm needed for the surveys and reports, or may elect to conduct the surveys in-house by hiring USDA Agricultural Research Service professional staff.

Curation

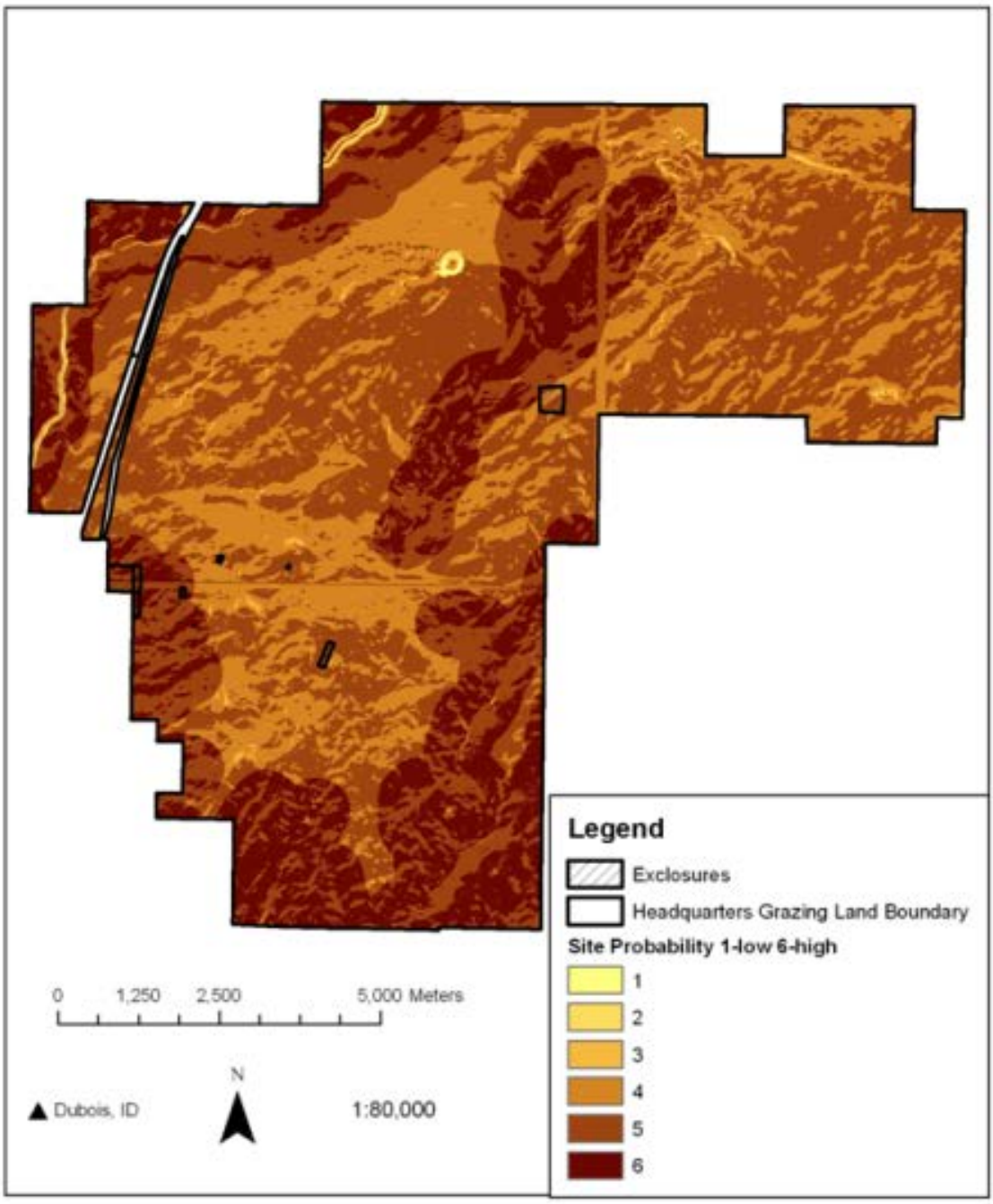
The USDA Agricultural Research Service lacks adequate curation facilities. No artifacts will be collected unless directed by the appropriate SHPO, which will be responsible for any collected or curated objects. An agreement must be developed between USDA Agricultural Research Service and the SHPOs regarding curation.

Tribal Consultation

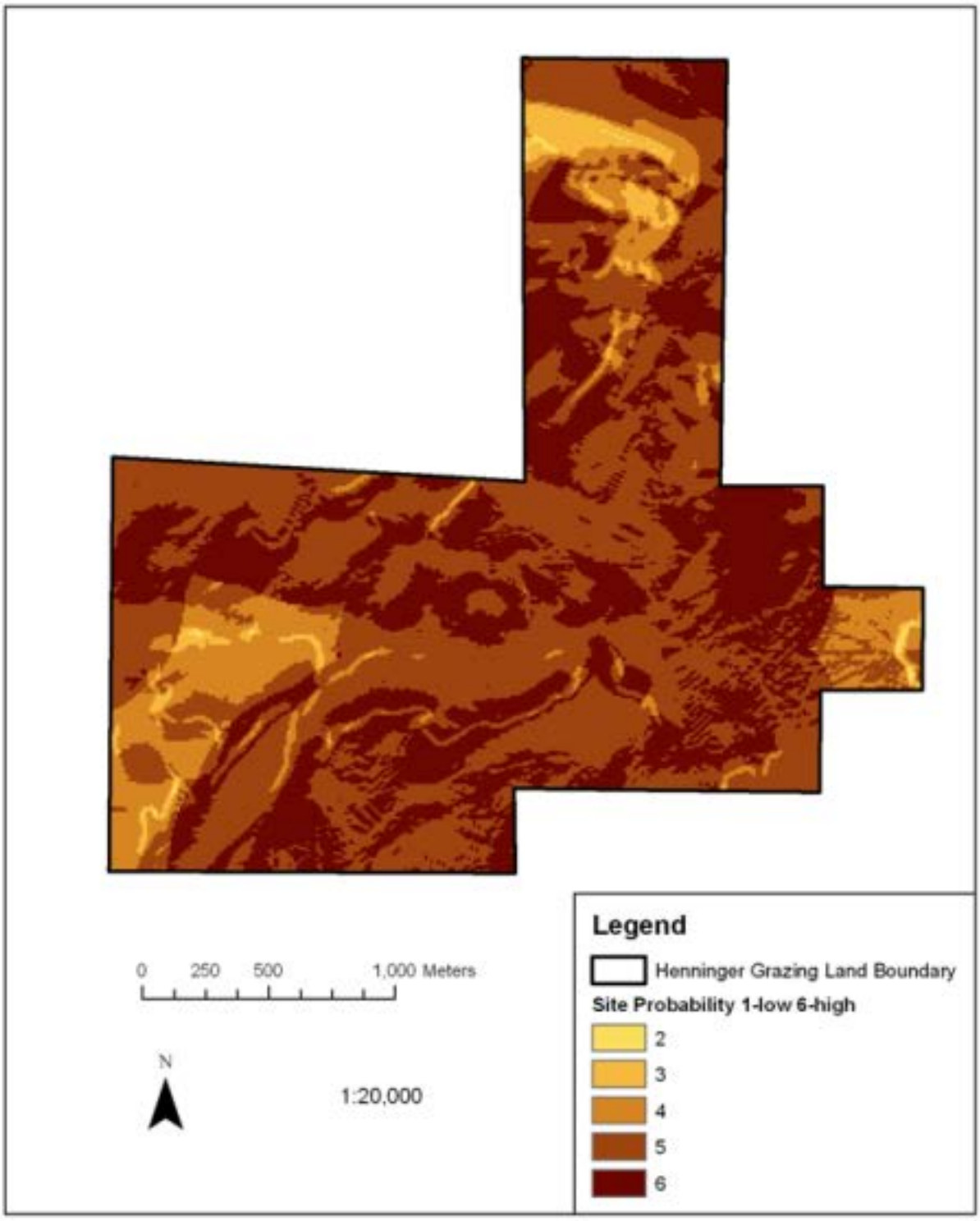
Establishing and maintaining tribal consultations is the responsibility of the USDA Agricultural Research Service.

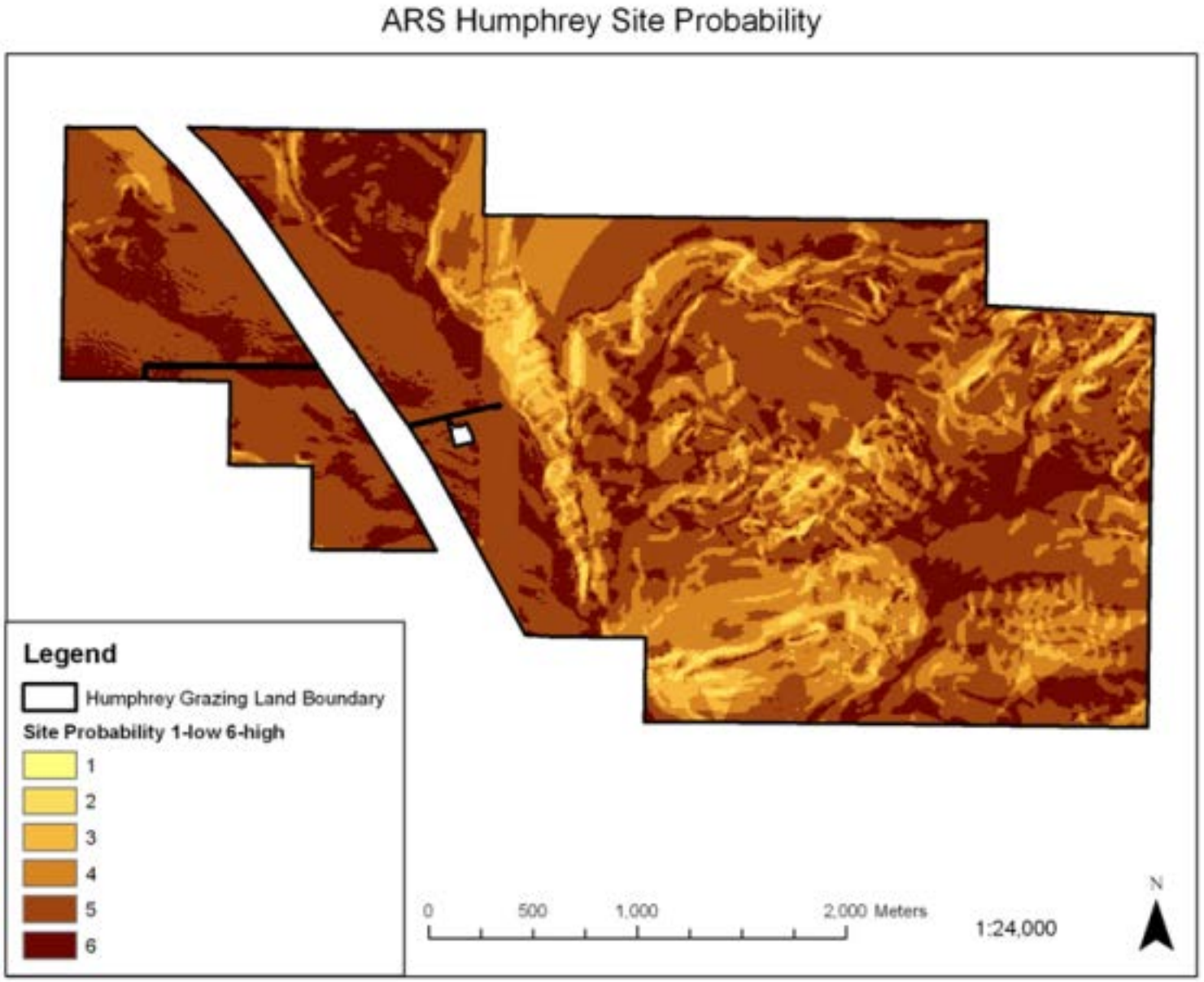

Site Probability Model for ARS-USSES
Montana
Summer West
Grazing Lands
Summer East
Grazing Lands
Humphrey
Grazing Lands
Caribou-Targhee National Forest
Henninger
Grazing Lands
Idaho
Site Probability Output
6-Highest
1-Lowest
1
2
3
4
5
6
Headquarters
Grazing Lands

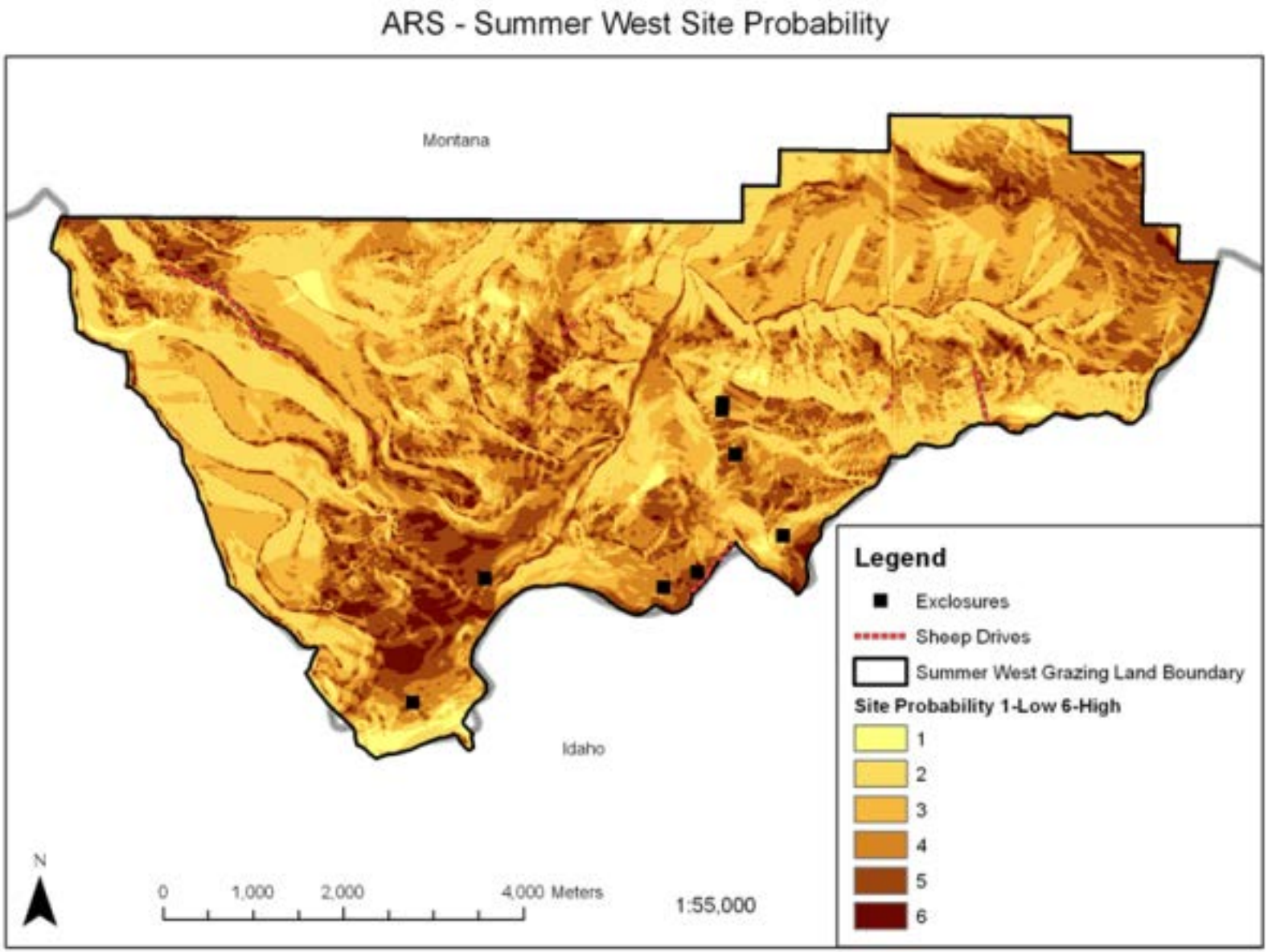
ARS Headquarters Site Probability

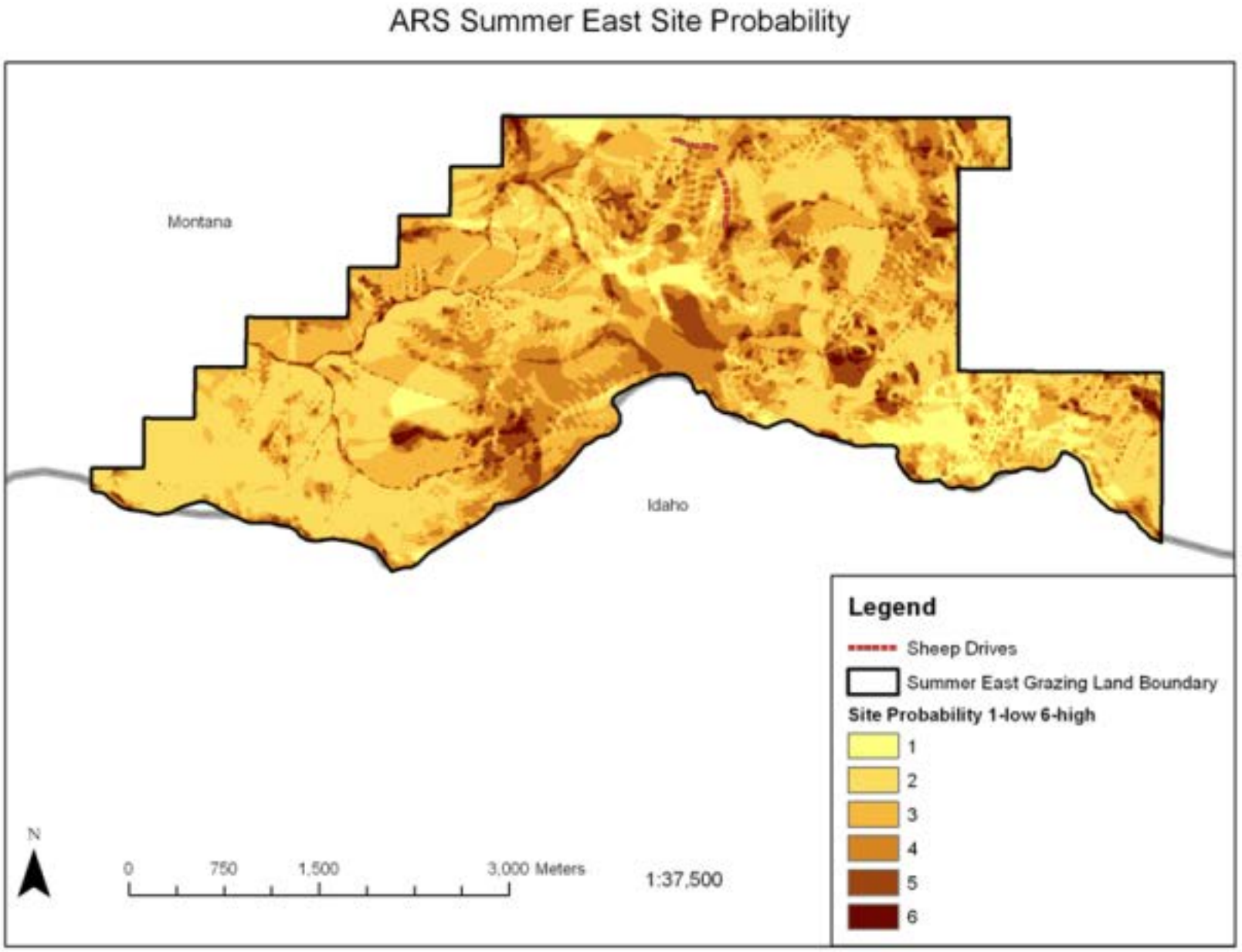


ARS Henninger Site Probability




ARS Humphrey Site Probability
Legend
Humphrey Grazing Land Boundary
Site Probability 1-low 6-high
1
2
3
4
5
6
0
500
1,000
2,000 Meters
1:24,000
N


ARS - Summer West Site Probability
Montana
Idaho
Legend
Exclosures
Sheep Drives
Summer West Grazing Land Boundary
Site Probability 1-Low 6-High
1
2
3
4
5
6
N
0
1,000
2,000
4,000 Meters
1:55,000


ARS Summer East Site Probability
Montana
Idaho
Legend
Sheep Drives
Summer East Grazing Land Boundary
Site Probability 1-low 6-high
1
2
3
4
5
6
N
0
750
1,500
3,000 Meters
1:37,500

Appendix E – Collaborative Research at the Agricultural Research Service U.S. Sheep Experiment Station

The United States Sheep Experiment Station (Sheep Experiment Station) of the Agricultural Research Service, USDA is a critical western hub generating research-based solutions for (1) population limiting infectious diseases in wildlife and domestic animals, (2) state of the art genomics research providing markers for improved food/fiber production and resistance to disease, (3) critical rangeland use and sustainability research and (4) research partnerships.

1) The Sheep Experiment Station continues to play a central role in infectious disease research concerning the prion disease scrapie, malignant catarrhal fever virus and *Anaplasma ovis* (see References Cited at the end of this appendix). Malignant catarrhal fever virus and Anaplasma species infections are found in wildlife and domestic animals. Currently the Sheep Experiment Station is collaborating on research involving transmission of the respiratory pathogens, ovine progressive pneumonia virus (OPPV) and *Mannheimia haemolytica (Mh)*. Ovine progressive pneumonia virus is a lentivirus in the same genus as human immunodeficiency virus (HIV) and shares many of the same pathological properties with HIV. Current collaborative research efforts have yielded new information that OPPV is predominantly transmitted horizontally (86-90 percent) and not maternally (Broughton-Neiswanger et al. 2010). Other recent collaborative research includes a quantitative bacterial survey in nasal swabbings of domestic sheep at the Sheep Station. Most importantly, in terms of current needs for scientifically based policy development, the risk of pathogen transmission between wildlife and between wildlife and domestic animals can only truly be assessed under the conditions of concern. The Sheep Experiment Station represents the only location capable of conducting such studies.

2) The Sheep Experiment Station is central to collaborative genomics research aimed at understanding the role of sheep genetics in everything from disease susceptibility to efficient production. This collaborative research was the first to show breed differences in proviral concentration of OPPV-infected animals, implying a genetic component in control of viral replication. The Sheep Experiment Station collaboration demonstrated some of the first specific gene associations with OPPV. Recent collaborative research with the Sheep Experiment Station has yielded the first validated genetic marker set for reducing OPPV infection in domestic sheep. This marker set significantly associates with a three-fold reduction in OPPV infection in every animal group tested. This should enable genetic selection of animals with reduced susceptibility to OPPV, and has great potential to reveal new research avenues for human medicine. A key to this research is the ability to work in large, statistically well-defined populations under natural conditions.

Further, current sire breeds with the best lamb production records also confer undesirable wool characteristics including dark wool fibers. These darker fibers are more difficult to process into high quality clothing and other products, but ongoing research at the Sheep Experiment Station aims to continue past success in developing widely used sheep breeds to solve producer problems. Specifically, a new sire breed is under development to combine high lamb productivity with excellent white wool fibers for highly efficient range production systems.

3) The future of wildlife populations and food/fiber production systems are dependent on rangelands. There are numerous rangeland issues which require Sheep Experiment Station research and solution, including vegetation composition as impacted by fire, grazing, weather, and other environmental factors.

Other important issues include wildlife interaction with rangelands and with domestic livestock. The Sheep Experiment Station is uniquely equipped and placed to lead this research.

4) Based in part on a meeting with Ralph H. Crawford at the USDA Forest Service Headquarters in Washington D. C., ARS is exploring ways to enter into collaborative research with the Forest Service. This collaboration with the Forest Service would examine the risk of contact between domestic and bighorn sheep. The Sheep Experiment Station is a critical component of this research effort. Grazing lands for the Sheep Experiment Station flock through the Bureau of Land Management and USDA Forest Service include bighorn habitat, and this is a unique feature of the Sheep Experiment Station location. In addition, the availability of over 3000 mature ewes and their lambs allows for statistically valid research. No other research unit in the U.S.A. provides this unique environment and the numbers of animals to conduct risk assessments in the context of the domestic and bighorn sheep interface (Knowles, personal communication 2011).

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