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

Rangeland Resource Report

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Dubois, Clark County, Idaho Date

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Abstract

This rangeland report describes sheep grazing operations and the rangeland resource for the U.S. Department of Agriculture, Agricultural Research Service (ARS), U.S. Sheep Experiment Station, Dubois, Idaho (Sheep Station). The report describes grazing history, current station operations, existing conditions and grazing effects for Headquarters property, Henninger and Humphrey Ranches and, East and West Summer Range. In 2009 an interdisciplinary team conducted a range condition field survey of each property. Survey results indicate stable soils and 'none', or 'slight to light' utilization (Table 1). Results also indicate sheep trailing, watering, and bedding areas, which comprise less than one percent of each pasture, display heavy use (USDA 2009). Surveys conducted between 1989 and 2009 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 more than 70 years), indicate no differences in all sample 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. Only portions of Henninger Ranch, where soils are stable with overall light utilization, were some species composition and rangeland condition concerns noted due to heavy browse species use.

Under alternative 2 and modified alternatives 3, 4 and 5, a variety of stocking rates, AUMs (animal unit months) used, grazing and non-grazing options (associated with ARS properties and grazing allotments) are provided. All alternative stocking rates (forage use) are within 1.2 to 25 percent of available AUMs.

General Summary of Range Conditions

Range condition surveys on ARS lands 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.

2009 ARS Sheep Station Rangeland Surveys

In 2009 ARS Headquarters, Henninger, Humphrey, East and West Summer Range were assessed by an interdisciplinary team consisting of rangeland management specialists, wildlife biologist, soil scientist, and hydrologist. Results of the 2009 range surveys indicate overall good range conditions (USDA 2009).

Headquarters soils are stable with desirable shrub, forb and grass diversity. Utilization is none to slight (Table 1). Rotational and deferred grazing systems, along with pasture rest during the primary growing season with light stocking rates have contributed to the current fair range conditions with static trend. Only small (less than 50 total acres) areas representing less than one percent of the area grazed (sheep trailing, watering and bedding) showed heavy use. The Headquarters property is grazed from late April to early July and late August to early December.

Humphrey soils are very stable with desirable forb, shrub, and grass diversity. Utilization is light (Table 1) with rams and small groups of sheep grazed here. Rotational and deferred grazing systems along with light stocking rates have contributed good range conditions with a static or slight upward trend. Only small (less than 50 total acres) areas, representing less than one percent of the area grazed, (sheep watering and bedding) showed heavy use. Humphrey Ranch is grazed early June to late October.

Henninger soils are stable with desirable forb, shrub, and grass diversity. Range condition is fair. Utilization is light on forbs and grasses (Table 1). The 2009 field surveys (visual) found moderate to

heavy use on browse. Early and late season deer and elk grazing may contribute to a downward trend on shrubs. Only small (less than 10 total acres) areas representing less than two percent of the area grazed (sheep watering and bedding) showed heavy use. Henninger Ranch is grazed mid-June to mid-July and late August to mid-September.

East Summer Range (Toms Creek) soils are stable with desirable diverse grass, forb, and shrub composition. Utilization is none to slight (Table 1). A rotational deferred grazing system with rest one year in three and light stocking rates have developed good range conditions with a stable or upward trend. Only small (less than 50 total acres) areas representing less than one percent of the area grazed (sheep driveways, trailing, watering and bedding) showed heavy use. East Summer Range is grazed mid July to early September.

West Summer Range (Odell/Big Mountain) soils are stable, desirable diversity of forbs, shrubs, and grasses. Utilization is none to slight (Table 1). A rotational/deferred grazing system with rest one year in three and light stocking rates have developed good range conditions with a stable or upward trend. Only small (less than 50 total acres) areas representing less than one percent of the area grazed (sheep driveway, trailing, watering and bedding) showed heavy use. West Summer Range is grazed early July to early September.

1994 Headquarters Property Surveys

In 1994 NRCS (Natural Resource Conservation Service) range conservationists conducted a field inventory on ARS Headquarters property to evaluate ecological site status or range condition of stratified plant communities. Ecological status or range condition is the present state of the vegetation of the ecological site in relation to the climax or natural potential plant community for the site. The primary purpose of determining ecological condition is to provide a basis for predicting the extent and direction of change that can result in the plant community from specific vegetation treatments or management actions (USDA 2005).

Range site or ecological site descriptions represent the site's natural potential plant community. Range condition or ecological status represents the present plant community status. Vegetation treatments, grazing or other management actions can direct plant communities toward or away from the natural site potential (ecological site description). The 1994 inventory collected data on 162 study plots to established relative range conditions on nine natural potential plant communities on ARS Headquarters property (NRCS 1995). The range site or ecological status evaluation determined that one percent of the sites sampled were in excellent condition, 63 percent in good condition, 31 percent fair condition and two percent in poor condition. Three percent were seeded (crested wheatgrass) and ecological status was not determined or rated for potential climax plant cover on seeded areas. Headquarters administrative site and feedlots were not inventoried for ecological status.

During the inventory process apparent trend was determined based on plant composition, presence of climax species seedlings, plant residue, plant vigor, and soil surface conditions. The 162 study plot data compiled indicated 32 percent of the sampled sites were in an upward trend, six percent were in a downward trend and 62 percent were static. Three percent of the stable or static site was seeded area, and not evaluated.

1991 Summer Range Surveys

In 1991 a team of Soil Conservation Service (SCS, name changed to NRCS) range conservationists conducted a field inventory on ARS summer range property to evaluate ecological status or range condition of the plant communities.

Summer range lands were type mapped by ecological range site description for each natural potential plant community. Major factors affecting natural plant communities include soil, climate, aspect, slope, and other environmental conditions that result in specific range production. Each range site is described on the bases of the climax or natural potential plant community it is capable of supporting. Each Ecological site was inventoried for percent canopy cover for grasses and grass like plants, forbs, cryptogams, shrubs and trees. Percent cover range was recorded for each grass and grass like species, forb species, shrubs and tree species, lichens and moss groups.

The 1991 inventory collected data, to established relative range conditions on eight natural potential plant communities (range site descriptions) on ARS summer range, was compiled and peer reviewed in 1992 (SCS 1991). The range site or ecological status was determined from field inventory worksheets for each specific site location. Site condition findings for each potential plant community include:

- South Slope Gravelly range site, good condition
- Mountain Meadow Loamy range site, good condition with one study point in excellent condition
- Windswept Mountain Ridge site, good condition
- Mountain Meadow Semiwet range site, excellent condition
- Mountain South Slope range site, predominantly in good condition with one study point in fair condition
- Steep Mountain Slope range site, predominantly in excellent condition with two study points in good condition and one in fair condition
- Mountain Slope range site, predominantly in good condition with one study point in excellent condition
- Riparian Wet Meadow range site, was in excellent condition

1989 Headquarters Property Surveys

In 1989 a team of SCS range conservationists conducted a field inventory on ARS US Sheep Experiment Station Headquarters property. Soil and range correlation and site condition inventories were conducted during the surveys. Frequency transects were established during this survey and read for the first time. Range site descriptions were revised or developed and peer reviewed in 1992. A complete plant species list was developed and plot locations mapped. Percent cover range (low to high) was recorded for each grass and grass like species, forb species, shrubs and tree species, lichens and moss group. Ecological site descriptions based on potential climax plant community, included range site production (AUMs) with stocking rates for excellent, good, fair and poor ratings and recommended grazing periods (SCS 1991).

As noted above, in 1994, ecological status or range condition is the present state of the vegetation of the ecological site in relation to the climax or natural potential plant community for the site. The primary purpose of determining ecological condition is to provide a basis for predicting the extent and direction of change that can result in the plant community from specific vegetation treatments or management actions. The 1989 plant community site conditions field inventory analysis determined present conditions.

- Shallow Loamy sites were predominantly good with one site excellent and four in fair condition.
- Loamy sites were predominantly good with two sites excellent and three in fair condition.
- Stony Loam sites were predominantly in good condition with one site in excellent condition.
- Shallow Stony sites were rated ½ good and ½ fair condition.

- Loamy Bottom sites were in good condition.

1997 Klement Research

Range surveys were conducted, data was collected and analyzed, on ARS Centennial Mountains summer range in 1959, 1978 and 1994 on 61 sites including tall forb, sagebrush, grass and open conifer vegetation types. Eight exclosures were also sampled in the same vegetative types. Results from both studies indicate improved range conditions with static trend. Tall forb and open conifer vegetation types showed the most increase in perennial forb composition indicating succession toward a tall forb climax condition. Grass composition declined with the increased composition of perennial forbs. Plant cover remained static or increased, except for a 10 percent decline in the tall forb vegetation type. All sample components were similar both inside and outside exclosures (Klement 1997). The focus of Klement's 1997 (three year) study was to determine trends from ground cover conditions, species composition, and biomass directed at tall forb, open conifer, and grass vegetation types. In 1989 rotational and deferred grazing systems were implemented. Light stocking rates use, 6.25 percent of available forage, has allowed low seral sites to improve since 1959 (Klement 1997). Three exclosures were established in 1960, five were added in 1978, after 14 years very little change was evident inside or outside exclosures. With light stocking, deferred and rotational grazing, any difference between vegetation species composition, ground cover or other differences were not an effect of grazing (Klement 1997).

2008 Klement and Moffet Study

In 1994, 25 perennial tall forb community sites were sampled, including three with grazing exclosures. These vegetation types were also surveyed in 1959, 1978, 1979 and 1994. In 2008 Klement and Moffet tested the hypotheses that site conditions such as biomass, taxonomic composition and richness, cover, bare ground and gopher mounding were constant among years and between levels of grazing on the grazed and ungrazed areas surveyed in 1959, 1978, and 1994. Results indicate sheep grazing on Sheep Station summer range had no effect on subalpine tall forb vegetation communities. Between 1964 and 1994 grazing had been light with less than 11 percent of available forage used. Analysis results indicated no difference or shift between perennial tall forb to grass for either plant community either inside or outside exclosures (Klement and Moffet 2009).

A long term fall and spring grazing study (started in 1924) at Dubois Sheep Station, with old exclosures established in 1940s and newer exclosures established in 1950 indicated sheep grazing cessation did not promote herb recovery any more than continued fall grazing (Bork 1997).

Conclusion

Surveys conducted on ARS properties in 2009, 2008, 1997, 1994, 1991, 1989 and continuing grazing effects studies indicate ecological sites are in good condition, functioning properly, with appropriate diverse species composition.

Introduction, Background and Regulatory Framework

The purpose of the rangeland resource report is to provide an analysis of the rangeland resource and respond to the Settlement Agreement (12-21-07) reached in the lawsuit the 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. The rangeland resource report will become part of the resource record and information contained within will support the National Environmental Policy Act (NEPA) documentation described in the settlement agreement.

The Phase 1 Interim USSES Grazing and Association Activities Project EA and associated project file are incorporated by reference for this analysis.

This rangeland resource report is incorporated as a portion of the Phase 2, environmental analysis that assesses long-term effects of sheep grazing and associated activities on ARS lands that have historically occurred and are ongoing in support of the Sheep Station research projects at Dubois, Idaho.

The 2010 rangeland resource report is updated, September 2015, to analyze and disclose effects of modified alternatives due to AUM use and grazing dates changes on Meyers Creek Allotment (national forest lands), no grazing on BLM Bernice allotment, and other new information to support the Revised Draft Environmental Impact Statement.

History

Establishment of the Station at Dubois

In the fall of 1915, the Bureau of Animal Industry 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.
2. The location must be accessible by railroad.

The Dubois Sheep Station was established in 1915. The Dubois location, approximately 28,000 acres, was selected, because it containing a solid block of public domain land of sufficient acreage adjacent to a railroad (McWhorter 1952). The U.S. Sheep Experiment Station (Sheep 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 ARS Sheep Station lands, which rests solely with the Secretary of Agriculture and the purpose of ARS lands, which are designated for "agricultural experiment purposes." There are no detailed records of land use prior to the Sheep Station establishment. Livestock grazing research under the ARS ownership, which dates from the 1900s, predates the county.

Addition of Summer Range

Summer rangeland in the Centennial Mountains was acquired to provide the natural resource base for sheep and grazing research. Between 1940 and 1942, ARS purchased the Humphrey and Henninger Ranches from the private sector. Prior to purchase, the Humphrey and Henninger Ranches were used for farming, some crop land and hay, for livestock production. Before transfer to the ARS, Henninger was grazed at heavier rates than current forage used by the Sheep Station.

Research at the Sheep Station, Dubois, Idaho

Since its research began, circa 1918, the Sheep Station is credited with developing three breeds of sheep (i.e., Columbia, Targhee, and Polypay) and has been making germplasm (i.e., breeding stock) available to sheep breeders in North America since the 1920s. Based on numbers of registrations, Columbia has been one of the 10 most popular breeds of sheep in the United States since 1965. Grazing and rangeland research at the Sheep Station has been ongoing since the 1930s, and the research has produced unmatched information on managing grazing on sagebrush steppe to preserve native ecosystems.

Current Sheep Station research is aimed at developing new or improving existing genetic lines of sheep that specialize in 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.

Sheep Station research involves at least 34 scientists at nine ARS locations in seven states and 10 universities in seven states, in addition to the scientists at the Sheep Station. Most of the research spans multiple years, and some of the long-term sheep genetics and rangeland research spans more than seven decades. In many cases, the Sheep Station has been the only location in North America with the land and animal resources to conduct the research, and the only location in North America able to establish direct linkages between new research and research conducted during the last 90 years to provide a clear understanding of the long-term consequences of various management strategies. Sheep Station 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 often rewritten for various trade magazines.

Sheep Station research has been 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;
- Preserve or improve rangeland ecosystems; and
- Preserve or improve wildlife habitat.

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

The Dubois United States Sheep Experiment Station (Sheep Station) is the only station in the USA conducting research with sheep in open range, high elevation extensive management systems. Research is done to develop animals with fitness traits or genetics suited to these extensive range conditions. The purposed of this research is to develop animals with genetics adapted to the high elevation environment.

Proposed Action

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 1 through Figure 3 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 1 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 1, 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.

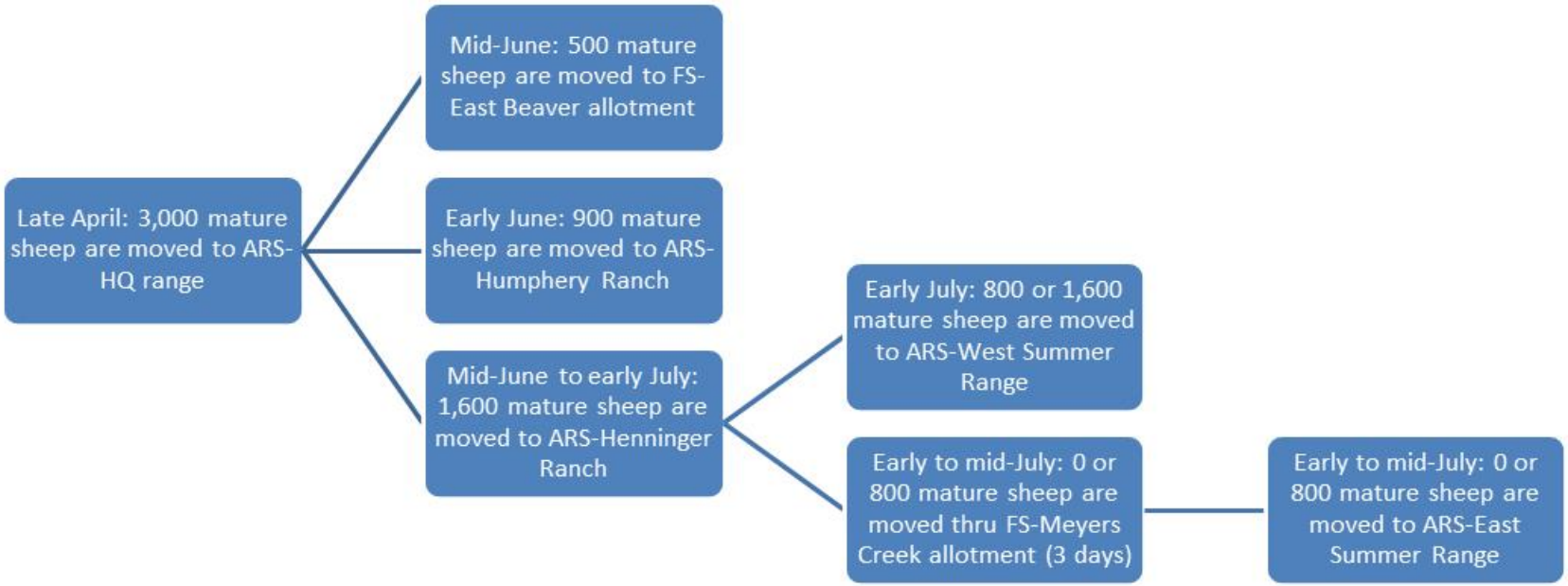

Figure 1. Proposed action for sheep movement out to spring and summer range. Mature sheep numbers are the approximate maximum, which may vary 0.5 to 1.1 times the approximate maximum.

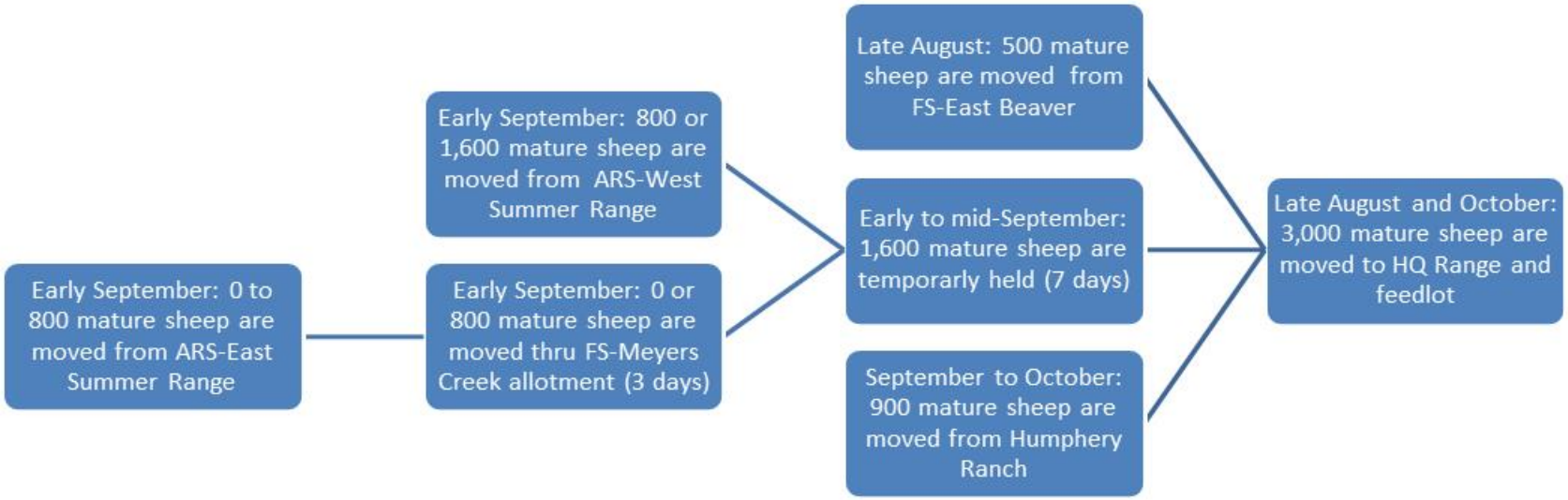

Figure 2. Proposed action for sheep movement from summer ranges to fall range. Mature sheep numbers are the approximate maximum, which may vary 0.5 to 1.1 times the approximate maximum.

Figure 3. 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[1], for a typical year, are shown in Table 1, 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 1. 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.

[1] 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 2).

Table 2. 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 3 displays the annual trailing routes on roads that are used by Sheep Station personnel (see also Map 2).

Table 3. 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 4. Sheep Driveway, Odell Creek

In timbered areas on East Summer Range and West Summer Range, sheep are moved along historical livestock trails (Figure 4). 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 4. 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 4. 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 5). Most secondary primitive roads are two-track with grass, forbs and low shrubs between tracks (Figure 5 and Figure 6). No new roads have been developed in at least 15 years.

Table 5. 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 5. Headquarters property displaying the firebreak and associated roads – See Map 4 appendix A

Figure 6. 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 7. 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 8. 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 8). 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

Figure 9. Camp herder trailer

Headquarters Range, Humphrey Ranch and Henninger Ranch are administered from existing roads. Herder camp trailers are 12-feet long by 7-feet wide (Figure 9). 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.

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 6 shows the number of camps in each summer range and season of use.

Table 6. 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 7 displays average AUMs from 2008 to 2014 for each property (Taylor 2015, personal communication).

Table 7. 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 10. 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 10): 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 8 displays the buffer widths used during the application of herbicide.

Table 8. 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.

Affected Environment

The U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS), U.S. Sheep Experiment Station Headquarters is located in the upper Snake River plain at the foothills of the Centennial Mountains, in Clark County, about six miles north of Dubois, Idaho. Agricultural Research Service, Sheep Station, Dubois station manages and grazes lands for research in Montana and Idaho. An overview of grazing areas is described below with overview displayed on Appendix A Map 2.

Headquarters Property, 27,930 acres of ARS land, includes office, laboratory, animals, 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. Headquarters pastures are located in T11N, R36E, sections: 1, 11, 12, 13, 14, 16, 22, 23, 24, 25, 26, 27, 34, 35, 36; Part of sections: 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 sections: 2, 3, 4, 11, 14, 20, 22, 23, 29, 30, 31. T10N, R36E, sections: 1, 2, 11, 12. T10N, R37E part of sections: 6, and 7 (Appendix A Map 3).

West and East Summer Range, 16,600 acres of ARS land, in the Centennial Mountains of Montana, are used for summer grazing and rangeland research. West Summer Range is located in: T15S, R2W, unsurveyed Sections: 1, 2, 3, 4; Part of sections: 5, 9, 10, 11, 12, 13, 14, 15, 16, 22, 23 T15SR1W sections: 4, 5, 6, 7; Part of sections 8, 9, 10, 18, 19. T14S, R1W Sections: Part of sections 31, 32, 33, 34. East Summer Range is located in T14S, R1E: 34; Part of unsurveyed sections 25, 26, 27, 28, 32, 33, 35. T15S, R1E sections: Part of sections 1, 2, 3, 4, 5, 6 (Appendix A Map 9 and Map 10).

Humphrey Ranch, 2,600 acres of ARS land north of Headquarters in Idaho, has animal facilities and equipment buildings, and is used for spring, summer, and autumn grazing and rangeland research, located in T14N, R36E: Part of sections 19, 20, 21, 22, 27, 28, 29 (Appendix A Map 7).

Henninger Ranch, 1,200 acres of ARS land near Kilgore, Idaho, has animal facilities and is used for summer, spring and fall grazing and rangeland research, located in T13N, R39E Section: 25 and Part of sections: 24, 36. T13N, R40E Sections: 19, 30 (Appendix A Map 6).

Throughout the year, sheep also utilize National Forest, and Department of Energy (Appendix A, 11) lands. These lands are included in this analysis as appropriate. However, effects (other than cumulative effects) from 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 1.

Spatial and Temporal Context for the Effects Analysis

The spatial boundary for range effects analysis is all ARS Sheep Station lands. Cumulative effects analysis includes ARS lands and allotments under MOUs (USDA Forest Service - National Forest, and DOE lands) used for grazing throughout each year. The temporal boundary represent resource impacts

that occur across timeframes of five or more years. The five-year or more timeframe allows for yearly fluctuations and is an appropriate timeframe to identify range condition and trend.

Existing Condition

Headquarters Property (Figure 11)

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.

Figure 11. Headquarters pasture - (tg 08/09)

Headquarters soils are stable, with desirable forb, shrub, and grass diversity. With rotational and deferred grazing and light stocking, utilization is none to slight (Table 1). Only small areas (sheep trailing, watering, bedding, herder camp sites) less than 50 total acres, showed heavy use.

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 2009 survey 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.

1994 Natural Resource Conservation Service Surveys

In 1994 Natural Resource Conservation Service (NRCS) range conservationists conducted a field inventory on ARS Headquarters property to evaluate ecological status or range condition of the plant communities. Ecological status or range condition is the present state of vegetation on the ecological site in relation to the climax or natural potential plant community for the site. The primary purpose of determining ecological condition is to provide a basis for predicting the extent and direction of change that can result in the plant community from specific vegetation treatments or management actions.

The range site ecological description represents the site's natural potential plant community. Range condition or ecological status represents the present plant community state. Vegetation treatments, grazing or other management actions can direct the plant community toward or away from the natural site potential (ecological site description). The 1994 inventory collected data on 162 study plots to established relative range conditions on nine natural potential plant communities (vegetation types) on the Headquarters property (NRCS 1995). The range site or ecological status determined that one percent of the sites sampled were in excellent condition, 63 percent good condition, 31 percent fair condition and 2 percent in poor condition. Three percent were seeded (crested wheatgrass) and ecological status was not determined or rated for potential climax plant cover on these seeded areas. Headquarters administrative site and feedlots were not inventoried for ecological status.

During the inventory process apparent trend was estimated based on plant composition, presence of climax species seedlings, plant residue, plant vigor, and soil surface conditions. The 162 study plot data compiled indicated 32 percent of the sampled sites were in an upward trend, 6 percent were in a downward trend and 62 percent were static. Three percent of the stable static area was seeded.

Crested wheatgrass was present on 14 of the 162 plots, 10 of the 14 plots had a trace, one plot had 1 percent, one plot 2 percent, one plot 69 percent and one plot had 80 percent crested wheatgrass cover. The two plots with 69 percent and 80 percent crested wheatgrass cover were in planted areas and were not evaluated for ecological status.

1989 Headquarters Property Surveys

In 1989 a team of SCS (Soil Conservation Service, now NRCS) range conservationists conducted a field inventory on ARS US Sheep Experiment Station Headquarters property. Soil and range correlation and site condition inventories were conducted during the surveys. Frequency transects were established during this survey and read for the first time. Range site descriptions were revised or developed and peer reviewed in 1992. A complete plant species list was developed and plot locations mapped. Percent cover range was recorded for each grass and grass like species, forb species, shrubs and tree species, and cryptogam (lichens and moss) group. Ecological site descriptions, used to evaluate existing conditions, were based on potential climax plant community. Evaluations included range site production (AUMs), stocking rates for excellent, good, fair and poor ratings and recommended grazing periods (SCS 1991).

The 1989, plant communities site conditions, field inventory analysis determined present conditions for Shallow Loamy sites were predominantly good with one site excellent and four in fair condition. Loamy sites were predominantly good with two sites excellent and three in fair condition. Stony Loam sites were predominantly good with one site in excellent condition. The ten Shallow Stony sites were rated ½ (five) good and ½ (five) fair condition, and Loamy Bottom sites were in good condition.

Henninger Ranch Pastures (Figure 12)

Figure 12. Henninger Ranch pasture - (tg 08/09)

Henninger Ranch pastures fair range condition appears to be static with a downward trend on browse species, is recovering from past cattle grazing and early agricultural practices. Current grazing from July 1 through July 15 and again August 31 through September 15 are 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 primarily grazed cattle until purchased by the ARS 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. The 2009 line intercept field survey data recorded smooth brome cover, 3.6 percent on study plot HE9, 22 percent on HE11 and 1.2 percent on HE11B.

Seeding

A successful seeding at Henninger was first done on about 30 acres in the West Meadow on October 22 and 23, 1981. The second no-till seeding on 35 acres, in East Meadow in 1986 failed. The same area was plowed in the fall of 1989 and successfully seeded to alfalfa, clover, brome and timothy in the spring of 1990.

Figure 13. Humphrey Ranch pasture - (tg 08/09)

Humphrey Ranch Pastures (Figure 13)

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.

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 (USDA 2009).

East Summer and West Summer Ranges (Figure 14)

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

Figure 14. 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 lands 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 15, 14 and 15 display grazing effects at fence-line at sheep exclosure in West Summer Range (Odell).

Figure 15. Fence-line along sheep exclosure

Figure 16. Same location away from exclosure

Figure 17. Same location inside exclosure - West Summer Odell Unit (grazed area) - (cj 08/09)

Figure 18. Driveway bottleneck West Summer - (cj 08/09)

Figure 18, 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 toe of slope (Figure 18). 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), none to slight utilization and light stocking (Table 1), adaptive management and best management practices have resulted in good range condition and slightly upward trend.

Visual review of the grazed pastures during 2009 field surveys supports Sheep Station grazing records (Table 1) that show grazing well below accepted utilization standard limits.

Sheep grazing effects visually contrasts 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 19 to Figure 21).

Figure 19. West Summer Range, Odell. Upslope -Left side is ungrazed while right demonstrates herd grazing

Figure 20. West Summer Range, Odell. Down-slope – Note ungrazed areas bordering grazed/herded area

Figure 21. Grazed area exhibits minimal exposed soil and excellent residual litter - (cj 08/09)

Figure 22. Below area of concern Toms Creek – 8/09

Figure 23. 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 22 and Figure 23 display the existing conditions for the area of concern in Toms Creek

that was noted in Scoping comments. A diversity of plants and good production indicate that this area is recovering.

Range surveys were collected and analyzed on ARS Centennial Mountains summer range in 1959, 1978, and 1994 on 61 sites including tall forb, sagebrush, grass and open conifer vegetation types. Eight exclosures were also sampled in the same vegetative types. Results from both studies indicate improved or static range conditions (Klement 1997). Tall forb and open conifer vegetation types showed the most increase in perennial forb composition indicating succession toward a tall forb climax condition. Grass composition declined with the increased composition of perennial forbs. Plant cover remained static or increased, except for a 10 percent decline in the tall forb vegetation type. All sample components were similar both inside and outside exclosures (Klement 1997). The focus of Klement's 1997 (three year) study was to determine trends from ground cover conditions, species composition, and biomass in tall forb, open conifer, and grass vegetation types. In 1989 rotational and deferred grazing systems were implemented. Light stocking rates now use 6.25 percent of available forage, this has allowed seral sites to improve since 1959 (Klement 1997). Three exclosures were established in 1960, five were added in 1978, after 14 years very little change was evident inside or outside exclosures. With light stocking, deferred and rotational grazing, any difference between vegetation species composition, ground cover or other differences were not an effect of grazing (Klement 1997).

In 1994, 25 perennial tall forb community sites were sampled, including three with grazing exclosures. These vegetation types (noted above) were also surveyed in 1959, 1978, 1979 and 1994. In 2008 Klement and Moffet tested the hypotheses that site conditions such as biomass, taxonomic composition and richness, cover, bare ground and gopher mounding were constant among years and between levels of grazing on the grazed and ungrazed areas surveyed in 1959, 1978, and 1994. Results indicate sheep on ARS, Sheep Station summer range had no effect on subalpine tall forb vegetation communities. Between 1964 and 1994 grazing had been light with less than 11 percent of available forage used. Analysis results indicated no difference or shift between perennial tall forb to grass for either plant community either inside or outside exclosures (Klement and Moffet 2009).

In 1991 a team of SCS range conservationists conducted a field inventory on ARS summer range property to evaluate ecological status of the plant communities. Ecological status or range condition is the present state of the vegetation of each ecological site in relation to the climax or natural potential plant community for that site. The primary purpose of determining ecological condition is to provide a basis for predicting the extent and direction of change that can result in the plant community from specific vegetation treatments or management actions.

Summer range lands were type mapped for each natural climax plant community. Major factors affecting natural plant communities include soil, climate, aspect, slope, and other environmental conditions that result in specific range production. Each range site is described on the bases of the climax or natural potential plant community it is capable of supporting. Each ecological site was inventoried and percent cover range was recorded for each grass and grass like species, forb species, shrubs and tree species, lichens and moss groups. Site descriptions included a discussion of what plants would be expected to increase or decrease with prolong degradation from over grazing that can be compared to existing low use favorable conditions.

The range site or ecological site description represents the site's natural potential plant community. Range condition or ecological status represents the present plant community status. Vegetation treatments, grazing or other management actions can direct the plant community toward or away from the natural site potential (compared to ecological site description). The 1991 inventory collected data to established relative range conditions on eight natural potential plant communities (range site descriptions). Data was

compiled and peer reviewed in 1992 (SCS 1991). The range site condition or ecological status was determined from field inventory worksheets for the following ecological sites:

- South Slope Gravelly range site, good condition
- Mountain Meadow Loamy range site, good condition with one site description area in excellent condition
- Windswept Mountain Ridge site, good condition
- Mountain Meadow Semi-wet range site, excellent condition
- Mountain South Slope range site, predominantly in good condition with one site description area in fair condition
- Steep Mountain Slope range site, predominantly in excellent condition with two site description areas in good condition and one site description area in fair condition
- Mountain Slope range site, predominantly in good condition with one site description area in excellent condition
- Riparian Wet Meadow range site was in excellent condition

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 Agricultural Research Service rangelands.

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 (NRCS 1999), Ecological Site Descriptions for Major Land Resource Area Bllb, Blla, B13 (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). The line intercept method used to obtain data consists of a horizontal, linear measurement of plant intercepts along the course of a line (tape measure). It is designed for measuring grass or grass-like plants, forbs, shrubs, and trees. The line point intercept method measures vegetation along a given distance and from those measurements plant composition is determined.

The Rangeland Assessment Report and associated project file are incorporated by reference for this analysis.

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

- There are no federal laws and regulations applicable to grazing or forage use on ARS rangelands. 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). Range condition ratings based on climax species percent cover are: excellent, 76 to 100; good, 51 to 75; fair, 26 to 50; poor, 0 to 25.
- 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 9) 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 9. Utilization

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

Flexibility and adaptive management is defined as flexibility in management options for where, when, and how long sheep graze a range. Increased options (where/when/duration) increase ability to practice adaptive management. Flexibility could be: no flexibility - poorly adaptive; some flexibility - moderately adaptive; or maximum flexibility - highly adaptive.

Rangeland condition is a function of rangeland forage: condition, trend and utilization. The focus of the rangeland resource effects analysis is on browse (shrubs) 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.

Anticipated regional trends in changing climate can be used to understand how climate change may influence the proposed range management activities at the Sheep Station in the future. 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). 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, as it always has been.

Environmental Consequences

Alternative descriptions below display the differences between alternatives 2 to 5 (modified alternatives 3, 4 and 5) and the Proposed Action (modified alternative 1). Table 10 displays the ARS properties and allotments where grazing would or would not occur under alternatives 1 to 5. When not grazing, sheep are maintained at the Mud Lake feedlot.

Table 10. Grazing properties by alternative

Properties	Modified Alternative 1	Alternative 2	Modified Alternative 3	Modified Alternative 4	Modified Alternative 5
ARS lands					
Headquarters	Grazing	No Grazing	Grazing	Grazing	Grazing
Humphrey	Grazing	No Grazing	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
Allotments under MOUs (USDA-FS)					
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.

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

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 its mission established by executive order and public law.

The Proposed Action is also considered the No Action alternative, because no new federal actions are proposed, this action is a continuation of historic and existing activities already occurring on ARS Sheep Station properties.

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 now and little room for improvement. 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 (less than 50 acres) areas representing less than one percent of Headquarters grazing area (trailing/watering/bedding/herder camp sites) would continue to show heavy use.

Associated activities (prescribed burning, seeding, invasive plant species control, road and 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 would be done on small areas and have little effect on percent of available forage use 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 noxious weeds. 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 and fuel reduction. 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

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 (trailing, watering, bedding) would continue to show heavy use.

Continued associated activities, seeding, fence maintenance, cattle and horse grazing, would contribute to good range condition. Invasive plant species control with sheep grazing and spot herbicide application would continue to keep undesirable plants 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. Road and fence maintenance would continue to control sheep grazing within units and prevent livestock trespass.

Henninger

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. Henninger Ranch primarily grazed cattle up until purchased by ARS 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. The 2009 line intercept field survey found 3.6 percent smooth brome cover, on study site HE9, 22 percent on HE11 and 1.2 percent on HE11B.

Only small bedding (less than 10 total acres) areas representing less than two percent of the area grazed showed heavy use. Season of use is mid-June to mid-July and late August to mid-September.

Associated activities (noxious weed control, road and 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 1/10 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 areas outside exclosures, showed no differences in plant species composition. Forb production in 2009 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 that 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.

Modified Alternative 1 - Summary Range Direct/Indirect Effects

Mature sheep numbers are an approximate maximum of 3,000; sheep numbers may range from 0.5 to 1.1 times the approximate maximum to support rangeland research and sheep research objectives.

Table 11. Modified Alternative 1 – percent of forage used, grazing period and grazing days by property[c]

Property	Available Forage AUMs[a]	AUMs Used[a]	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing Days[b]
Headquarters	28,353	1750	6.2	Late April – early July;	68
				Late August – early December	61
Humphrey	4,476	800	17.9	Early June – late October	142
Henninger	1,914	350	18.3	Mid June – mid July	15
				Late August – mid September	16
East Summer [d]	4,043	225	5.6	Mid July – early September	60
West Summer [d]	9,881	500	5.1	Early July – early September	54

[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.

[b] - Depending on weather conditions and day of the work week, these dates may shift ± 7 days.

[c] - A sheep is considered a lamb that is weaned, a yearling ram or ewe, a mature ram or ewe, or a pregnant or lactating ewe with a lamb(s).

[d] - East and West Summer Ranges would be rest rotation grazed two years out of three.

Table 11 displays available forage AUMs, AUMs used, percent of available forage used, grazing period used during the year and number of days grazed for each ARS property.

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

Alternative 2 (No grazing Agricultural Research Service Properties and Forest Service Allotments)

Direct and Indirect Effects

Alternative 2 is considered a 'no grazing' alternative, grazing on all ARS properties and Forest Service allotments would not occur.

Alternative 2 was developed to respond to the public suggestion that sheep grazing be eliminated from ARS lands and National Forest allotments. Animal units are based on a 100 percent reduction from Alternative 1 sheep inventory.

Table 12 displays available forage in AUMs, AUMs used, percent of available forage used, grazing period used during the year and number of days grazed by property. No sheep grazing is proposed under alternative 2.

Table 12. Alternative 2 - projected annual AUM utilization on each property with approximate grazing dates

Properties	AUM Available	AUM Utilized	Utilization, %	Approximate grazing dates	Approximate Grazing Days
Agricultural Research Service	**N/A**	**0**	**N/A**	**-**	**-**
Headquarters	N/A	0	N/A	N/A	N/A
Humphrey	N/A	0	N/A	N/A	N/A
Henninger	N/A	0	N/A	N/A	N/A
East Summer (Toms Cr.)	N/A	0	N/A	N/A	N/A
West Summer (Odell Cr./Big Mt.)	N/A	0	N/A	N/A	N/A
Allotments under MOUs (DOE, USDA-FS)	**N/A**	**0**	**N/A**	**-**	**-**
Snakey-Kelly	N/A	0	N/A	N/A	N/A
East Beaver	N/A	0	N/A	N/A	N/A
Meyers Creek	N/A	0	N/A	N/A	N/A

Headquarters/Humphrey/East Summer /West Summer

Grazing cessation 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, roads etc.) would not be maintained. Prescribe burning would not be done to retain fire as an ecological process on the landscape (Headquarters) and invasive plant control would not continue.

No grazing across all Agricultural Research Service lands 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 plant species are not a problem although small patches of noxious weeds do exist on these lands. 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. Road and fence maintenance on Headquarters and Humphrey properties would not continue.

Long term effects of alternative 2 on current ARS lands would depend on what the lands would be used for after ARS sheep grazing for research was terminated.

Henninger

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 species 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 lands would be used for after ARS sheep grazing for research was terminated.

Alternative 2 - Summary Range Direct/Indirect Effects

Alternative 2 would preclude the U. S. Sheep Station from meeting program objectives 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 and programs applicable to the Intermountain West. No grazing on Headquarters property, Henninger and Humphrey Ranches and East and West Summer Ranges would not provide range conditions necessary for U. S. Sheep Experiment Station to continue its current and ongoing research mission.

Modified Alternative 3 (No grazing on Agricultural Research Service Properties, East and West Summer Ranges)

Direct /Indirect Effects

Modified alternative 3 was developed in response to the public scoping suggestion that grazing be eliminated in the Centennial Mountains. Under modified alternative 3, ARS properties East Summer Range, West Summer Range, the Humphrey Ranch area east of Beaver Creek, and USDA 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 modified alternative 3 is based on available forage (AUMs) on Headquarters property, Henninger Ranch 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 under modified alternative 1 to 16 percent of available AUMs under modified alternative 3 with expected improved range conditions (Appendix A Map 6). Forage use on Humphrey Ranch west 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 be done east of Beaver Creek, effects for this portion of Humphrey Ranch would be similar to alternative 2.

Table 13 displays modified alternative 3 scheduled sheep grazing inclusive dates and sheep numbers for each property.

Table 13. Modified alternative 3 general sheep grazing schedule

Dates	Activity (Grazing dates are approximate depending on range readiness)	ARS Lands
Early Jan – Mid Jan	1500 sheep at Mud Lake	No
Mid-Late January - Late April to Early May	Sheep are maintained at the Mud Lake feedlot facility under MOU from DOE and in the feedlot facilities at ARS Sheep Station Headquarters (this is where the lambs are born during this period of the year)	Yes / No
	1500 sheep	
Late April to Early May	1500 Sheep are turned out onto ARS Sheep Station Headquarters lands in Idaho	Yes
	1500 sheep	
Late April - Late May	1500 sheep Grazing on ARS Sheep Station Headquarters lands in Idaho – 1500 sheep	Yes
Early June – Mid Sept	1500 The sheep are moved from ARS Sheep Station Headquarters lands in Idaho to ARS lands at the Henninger Ranch property in Idaho[a]	Yes
	1500 sheep graze at Henninger	Yes
Mid Sept	1500 sheep moved from Henninger to Headquarters	Yes
Mid Oct – Late Oct	750 sheep moved to feed lots at Mud Lake	No
	750 sheep graze at Headquarters	Yes
Early Nov	600 sheep moved to Mud Lake feedlots	No
	150 sheep remain, graze, at Headquarters	Yes
Mid - Late Nov[d]	600 sheep at Mud Lake feedlots	No
	750 moved to Snakey, FS allotment[b]	No
	150 sheep graze (weather permitting) at Headquarters	Yes
Late Nov – Mid Dec		No
	750 sheep at Snakey allotment	No
	750 sheep at Kelly allotment[c]	No
Mid Dec – Mid Jan	1500 sheep at Mud Lake feedlots	No

a - Rams are not with ewes and lambs (used 1280 ewes and about 220 rams, this number is not exact and varies from year to year)

b - Snakey has 1200 sheep permitted for the allotment, Nov 6 to Jan 2, dates move out of Snakey/Kelly is based on weather conditions, if there is early snow accumulation move out dates are 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 would be moved to Mud Lake feedlots.

c - Kelly has 1000 sheep permitted for the allotment, Nov 20 to Jan 3. From Kelly sheep would be moved to Mud Lake feedlots.

d – Some rams and ewe lambs would be retained at Mud Lake when sheep are moved in mid-November to graze at FS allotments

Table 14 displays modified 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.

Table 14. Modified alternative 3 - projected annual AUM utilization on each property with approximate grazing dates

Properties	AUM Available	AUM Utilized	Utilization, %	Approximate grazing dates	Approximate Grazing Days
ARS properties	**31,387**	**1950**	**6.2**	**-**	**-**
Headquarters	28,353	1343	4.7	Late April – early December	193
Humphrey	1120	305	27.2	Mid July – mid September	60
Henninger	1,914	302	15.8	Mid June – mid September	142
Summer East (Toms Cr.)	4,043	0	-	N/A	N/A
Summer West (Odell Cr./Big Mt.)	9,881	0	-	N/A	N/A
Forest Service Allotments	**1756**	**220**	**12.5**	**-**	**-**
Snakey-Kelly	1,756	220	12.5	Early November – late December	38
East Beaver	NA	0	-	NA	N/A
Meyers Creek	NA	0	-	NA	N/A

a - About 1,340 AUMs would be fed at Mud Lake from mid-December to April 23.

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 30 – 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, road and fence maintenance, cattle and horse grazing, predator avoidance and abatement described under proposed action, operations above) would continue, but with higher use under modified alternative 3, results 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 off set with continued prescribed burning described under operations. Invasive plant 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 would be done for a shorter period with less available forage. Road and fence maintenance would continue to facilitate sheep grazing within units.

Henninger

Forage use would be reduced from 18 percent in modified alternative 1 to 15.8 percent under 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. Road and 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 plant 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 3 - Summary Range Direct/Indirect Effects

No sheep grazing and associated activities on East and West Summer Ranges and on Humphrey Ranch east of Beaver Creek would have some beneficial effects on range conditions discussed under modified alternative 1. However, no grazing on East and West Summer Ranges and on the east part of Humphrey Ranch, would not provide conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.

Modified Alternative 4 (No Grazing East Summer Range, Meyers Creek Allotment)

Direct /Indirect Effects

Modified alternative 4 was developed in response to the public scoping suggestion that grazing be eliminated adjacent and within the grizzly bear primary conservation area (PCA). Under modified alternative 4, ARS Sheep Station East Summer Range and USDA 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 ARS Sheep Station West Summer Range (Appendix A Map 10).

Table 15 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.

Table 15. Modified alternative 4 - projected annual AUM utilization on each property with approximate use days and dates

Properties	AUM Available	AUM Utilized	Utilization %	Approximate grazing dates	Approximate Grazing Days
Agricultural Research Service	**44,624**	**3625**	**8.1**	**-**	**-**
Headquarters	28,353	1825	6.4	Late April – early July; late August – early December	147
Humphrey	4,476	900	20.1	Early June – late October	142
Henninger	1,914	470	20.9	Mid June – mid July; Late August – mid September	32
East Summer (Toms Cr.)	N/A	N/A	N/A	N/A	N/A
West Summer (Odell Cr./Big Mt.)	9,881N/A	500	5.15.1	Early July – early September	54
Forest Service Allotments	**19,633**	**790**	**4.0**	**-**	**-**
Snakey-Kelly	1,756	440	25.1	Early November – late December	45
East Beaver	17,877	350	2.0	Mid June – late August	61
Meyers Creek	NA	0	0	NA	N/A

a - About 650 AUMs of harvested feed would be fed at the Mud Lake feedlots from about Dec. 15 to Feb. 5, for about, 53 days. About 2,750 AUMs would be fed from mid-December to April 23.

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

Headquarters/Humphrey/Henninger

Under modified alternative 4, grazing effects on Headquarters and Henninger would be similar to modified alternative 1 with slightly higher, 20.9, 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

Same effects as alternative 2 (no grazing).

West Summer (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. Cessation of grazing on East Summer Range would result in grazing West Summer Range (Odell/Big Mountain) each year. Rest rotation would be done on grazing units and good range conditions with a static or slight upward trend would continue. Small (less than 50 acres) areas on sheep trails, watering sites, bedding areas and herder camps would receive higher use. These high use areas would be a very small (less than 1 percent) percent of the total grazing area.

Table 16. Modified alternative 4 general sheep grazing schedule

Dates	Activity (Grazing dates are approximate depending on range readiness)	ARS Lands
Late Nov - Early February (based on allotment dates and weather conditions) - Late April to Early May	3000 Sheep are maintained on harvested feeds at the Mud Lake feedlot facility under MOU from DOE and in the feedlot facilities at ARS Sheep Station Headquarters (this is where the lambs are born during this period of the year)	Yes / No
Late April to Early May	3000 Sheep moved to ARS Sheep Station Headquarters lands in Idaho	Yes
Late April to Early May - Late June	3000 sheep graze on ARS Sheep Station Headquarters lands in Idaho	Yes
Early June – Early Sept	650 sheep moved from Headquarters to Humphrey Ranch	Yes
Early July – Early Sept	650 sheep moved from Headquarters to East Beaver	No
Late June - Early July	2000 sheep moved from HDQ to Henninger [a]	Yes
Early July - Early Sept	2000 Sheep herded from the Henninger Ranch to summer grazing in the Odell Creek and Big Mountain areas of USSES lands in Montana.	Yes/no
	1000 sheep at Odell and 1000 sheep at Big Mt, no rest rotation	
	650 sheep moved from Headquarters to graze at E. Beaver; 650 sheep continue grazing at Humphrey (1300 sheep, includes 400 rams at Humphrey)	
Early Sept – Mid Sept	2000 sheep moved to Henninger from W Summer Range	
	650 sheep moved from E Beaver to Headquarters	
Mid Sept – Mid Oct	2000 sheep moved from Henninger to Headquarters	
	250 sheep moved from Humphrey to Headquarters	
Mid Sept - Mid Oct	2900 Sheep return to graze at ARS Sheep Station Headquarters lands in Idaho -	Yes
	(2,000 from Henninger, 650 from E. Beaver; 250 from Humphrey)	
Mid Oct – Late Oct	400 sheep (rams) moved from Humphrey to Headquarters	
	3000 sheep at Headquarters	
Late-Oct - Early Nov	1370 Sheep are maintained at the Mud Lake feedlot facility under MOU from DOE (this is when the ewes are mated)	
	1230 sheep graze at Headquarters	
Early Nov – Mid Nov	3000 sheep at Mud Lake	No
Early Nov - Mid Nov	2100 sheep are moved from Mud Lake to Snakey and Kelly allotments. 1200 sheep, (including Rams and ewe lambs) are retained at Mud Lake[d]	No
Early November - Mid-Jan (based on allotment dates and or weather conditions)	2100 Sheep graze on Snakey and Kelly FS allotments	No
	1100 sheep to Snakey [b] 1000 sheep to Kelly [c]	
Late Nov - Early February (based on allotment dates and weather conditions)	2100 Sheep are moved from Snakey and Kelly allotments to Mud Lake feedlot[d]	No

a - Rams are not with ewes and lambs (2600 ewes and 400 rams, this number is not exact and varies from year to year)

b - Snakey has 1200 sheep permitted for the allotment, Nov 6 to Jan 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 would be moved to Mud Lake feedlot.

c - Kelly has 1000 sheep permitted for the allotment, Nov 20 to Jan 3. From Kelly sheep are moved to Mud Lake Feedlot.

d – 400 Rams and 800 ewe lambs are retained at Mud Lake when 2100 sheep are moved in mid-November to graze at FS allotments.

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.

Table 16 displays modified alternative 4 scheduled sheep grazing inclusive dates and sheep numbers for each property.

Modified Alternative 4 - Summary Range Direct/Indirect Effects

Ending grazing and associated activities on the East Summer Range would have some favorable effects on range conditions as discussed under modified alternative 2. However, with no grazing on East Summer Range, U. S. Sheep Experiment Station would not have suitable range conditions necessary to continue its current and ongoing research mission on seasonal high elevation pastures.

Modified Alternative 5 (No Grazing – Snakey and Kelly Allotments)

Direct and Indirect Effects

Modified alternative 5 was developed in response to the public suggestion that grazing be eliminated to protect bighorn sheep populations. AUMs used and the 1,800 sheep retained for research are based on a 40 percent reduction from modified alternative 1 sheep inventory. Under modified alternative 5, USDA Forest Service Snakey-Kelly allotments (National Forest lands) would not be grazed. Remaining sheep would be maintained at the Mud Lake Feedlot where harvested feeds would be fed daily to meet nutrient needs of the sheep. Under modified alternative 5 sheep inventory reduction was necessary to remain within available funds for purchasing harvested feeds and maintaining a feedlot facility (Appendix A Map 11).

Table 17 displays modified alternative 5 scheduled sheep grazing inclusive dates and sheep numbers for each property.

Table 17. Modified alternative 5 general sheep grazing schedule

Dates [a]	Activity (Grazing dates are approximate depending on range readiness)	ARS Lands
Early January - Late April	1800 sheep are maintained at the Mud Lake feedlot facility under MOU from DOE and in the feedlot facilities at ARS Sheep Station Headquarters (this is where the lambs are born during this period of the year) [b]	Yes / No
Late April - Late May	1800 Sheep are moved to graze on ARS Sheep Station Headquarters lands in Idaho	Yes
Early June - Late June	460 sheep moved to Humphrey (rams and some ewes) [c]	Yes
	1340 sheep continue grazing at Headquarters	
Late June - Early July	460 sheep graze at Humphrey	Yes
	1340 sheep trialed from Headquarters to Henninger	
	470 ewes trucked from Headquarters to East Beaver FS allotment	
Early July – Mid July	460 sheep at Humphrey	Yes
	1340 sheep (average number) sheep moved to W Summer Range and/or East Summer Range 2 out of 3 years)	Yes
	470 sheep continue at East Beaver allotment	no

Dates [a]	Activity (Grazing dates are approximate depending on range readiness)	ARS Lands
Early August	1340 sheep trailed to Henninger Ranch from East or West Summer Range	Yes
Mid-August	630 sheep trucked to Headquarters from East Beaver and Humphrey	Yes
	1340 sheep continue to graze at Henninger	Yes
Late Aug – Mid Oct	1800 sheep moved to graze at Headquarters	Yes
	280 sheep remain at Humphrey	Yes
Mid Oct – Late Oct	1310 sheep moved from Headquarters to Mud Lake feedlots	No
	880 sheep continue grazing at Headquarters	Yes
	140 rams remain at Humphrey	Yes
Early Nov – Late Dec	1800 sheep at Mud Lake feedlots	No

a Grazing dates are approximate depending on range readiness.

b A sheep is considered a lamb that is weaned, a yearling ram or ewe, a mature ram or ewe, or a pregnant or lactating ewe with a lamb(s).

c- Rams are not with ewes and lambs (1600 ewes and about 200 rams), this number is not exact and varies from year to year)

Table 18 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.

Table 18. Modified Alternative 5 - Projected annual AUM utilization by property, with approximate use dates and days

Properties	AUM available	AUM Utilized	Utilization, %	Approximate grazing dates	Approximate Grazing Days
Agricultural Research Service	**48,667**	**2,175**	**4.5**	**-**	**-**
Headquarters	28,353	1,050	3.7	Late April – early July; Late August – early December 1	160
Humphrey	4,476	480	10.7	Earl June – late October	142
Henninger	1,914	210	11.0	Mid June – mid July; Late August – mid September	31
East Summer (Toms Cr.)	4,043	135	3.3	Mid July – early September	60
West Summer (Odell Cr./Big Mt.)	9,881	300	3.0	Early July – early September	54
Allotments under MOUs (DOE, USDA-FS)	**20,953**	**163**	**0.8**	**-**	**-**
Snakey-Kelly	0	0	-	NA	N/A
East Beaver	17,887	150	0.8	Mid June – late August	61
Meyers Creek	3,076	13	0.4	Mid July 20 – early September	6

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

Headquarters/Humphrey/Henninger/East Summer/West Summer

With a 40 percent reduction in sheep under modified alternative 5, grazing effects on Headquarters, Humphrey, Henninger, East and West Summer Range would be less than modified alternative 1.

Modified Alternative 5 - Summary Range Direct/Indirect Effects

With no grazing on Snakey, Kelly allotments under modified alternative 5, U. S. Sheep Experiment Station would not have suitable late season grazing necessary to continue its current and ongoing research mission.

Range Cumulative Effects

The spatial boundary for range cumulative effects for this analysis includes ARS, Sheep Station properties (Headquarters, Humphrey, Henninger, East and West Summer Ranges) and allotments under MOUs with USDA 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 (Appendix A Map 2).

ARS Properties

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 1920s, crested wheatgrass planting and forage production tests began in 1940s. Grazing exclosures were established in 1940s, 1950s (Bork 1997), 1960s and 1970s (Klement 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.

East and West Summer Range lands 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. Records indicate exclosures were constructed in 1960s on vegetative types where range conditions studies were done in the 1950's. Klement and Moffet's 2008 study, analyzed the range survey data collected 1959, 1978, and 1994 and concluded there was no difference or shift between perennial tall forb to grass for either plant community either inside or outside exclosures (Klement and Moffet 2009).

In 1991 a team of SCS range conservationists conducted a field inventory on ARS summer range property to evaluate ecological status or range condition of the plant communities. The primary purpose of this field inventory was to determine ecological conditions and to provide a basis for predicting the extent and direction of change that can result in the plant community from specific vegetation treatments or management actions.

In 1994, 25 perennial tall forb community sites on ARS summer range were sampled, including three with grazing exclosures. These vegetation types were also surveyed in 1959, 1978, 1979 and 1994. In 2008, Klement and Moffet tested the hypotheses that site conditions such as biomass, taxonomic composition

and richness, cover, bare ground and gopher mounding were constant among years and between levels of grazing on the grazed and ungrazed areas surveyed in 1959, 1978, and 1994. Results indicated sheep grazing on ARS summer range had no effect on subalpine tall forb vegetation communities. Between 1964 and 1994 grazing had been light with less than 11 percent of available forage used. Analysis results indicated no difference or shift between perennial tall forb to grass for either plant community either inside or outside exclosures (Klement and Moffet 2009). Summer range surveys done in 2009 to determine range health (condition) and trend had similar findings (USDA 2009).

Humphrey and Henninger Ranches were purchased in 1940 and 1942, and added to the Dubois Sheep Station 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.

Historic information, current range studies and future surveys would continue to evaluate range health and provide information for future management actions.

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 would not adversely affect the range resource.

USDA Allotments and DOE Feedlot

Modified Alternative 1 – Proposed Action

Mud Lake Feedlot

Mud Lake property 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 (Appendix A Map 11).

Snakey Kelly

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. Under this agreement, 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 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 range condition. Only small areas (sheep trailing/watering/bedding, less than 0.1 percent of area) would continue to display grazing use effects. A desirable good to fair range condition with upward or static trend 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. Continued use would not adversely affect the range resource.

Table 19 displays available forage in AUMs, AUMs used, percent of available forage used, grazing period and number of days available for grazing for each allotment.

Table 19. Modified alternative 1 – percent of forage used, grazing period and grazing days by allotment

Allotment [a]	Available Forage AUMs[e]	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Snakey-Kelly [b], [c]	1,756	440	25.1	Early Nov – late Dec	45
East Beaver	17,887	250	1.4	Mid June – late Aug	61
Meyers Creek	3,076	22	0.7	Mid July – early Sept	6

a - Grazing units within allotments are rest rotation grazed.

b - Snakey has 1200 sheep permitted for the allotment, Nov 6 to Jan 2, date move out of Snakey/Kelly is based on weather conditions, early snow accumulation would require move out dates 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.

c - Kelly has 1000 sheep permitted for the allotment, Nov 20 to Jan 3.

d – 400 Rams and 700 ewe lambs are retained at Mud Lake when 2230 sheep are moved in mid-November to graze at FS allotments

e - 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.

Modified alternative 1 would continue to provide range conditions necessary for the U. S. Sheep Experiment Station to continue its mission of current and ongoing research.

Alternative 2 (No grazing Agricultural Research Service Properties and Forest Service Allotments)

Mud Lake Feedlot

No grazing is proposed at mud Lake.

Snakey, Kelly

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 noted 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. Invasive plant species could increase without current control efforts implemented by ARS.

East Beaver Allotment

Sheep grazing cessation 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 1 with low forage use (1.4 percent) has very little effect on vegetation conditions.

The residual effects from past disturbances would continue to 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.

Alternative 2 – Summary Cumulative Effects

All properties would be eliminated from grazing. With no grazing on all properties, higher on-site fuel loading would develop, wildfire risk would increase with potential for uncharacteristic wildfire effects under dry conditions.

Table 20 displays available forage in AUMs, AUMs used, percent of available forage used, grazing period during the year and number of days available for grazing by allotment.

Table 20. Alternative 2 – percent of forage used, grazing period and grazing days by allotment

Allotment	Available Forage AUMs	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Snakey-Kelly	NA	0	NA	NA	NA
East Beaver	NA	0	NA	NA	NA
Meyers Creek	NA	0	NA	NA	NA

Elimination of grazing on Agricultural Research properties and Forest Service (National Forest lands) allotments would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.

Modified Alternative 3 (No grazing Agricultural Research Service Properties Humphrey Ranch east of Beaver Creek, East and West Summer Ranges)

East Beaver and Meyers Creek Allotments

No grazing would have the same effects as alternative 2.

Mud Lake/Snakey Kelly

Grazing effects on Snake-Kelly 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

Loss of East Beaver and Meyers Creek allotments for sheep grazing would eliminate ARS 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. However, the unavailability of Humphrey Ranch east of Beaver Creek, East and West Summer Ranges, East Beaver and Meyers Creek allotments for grazing would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.

Table 21 displays available forage in AUMs, AUMs used, percent of available forage used, available grazing period during the year and approximate number of days available for grazing by allotment.

Table 21. Modified alternative 3 – percent of forage used, grazing period and grazing days by allotment

Allotment	Available Forage AUMs	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Snakey-Kelly	1756	220	12.5	Early Nov – late Dec	38
East Beaver	NA	0	NA	NA	NA
Meyers Creek	NA	0	NA	NA	NA

Modified Alternative 4 (No Grazing East Summer Range, Meyers Creek Allotment)

Snakey, Kelly, and East Beaver Allotments

Modified alternative 4 would have the 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 would 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 on Meyers Creek forage would be the same as alternative 2.

Modified Alternative 4 – Summary of Cumulative Effects

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

Table 22 displays modified alternative 4 available forage in AUMs, AUMs used, percent of available forage used, grazing period and number of days available for grazing for each allotment.

Table 22. Modified alternative 4 – percent of forage used, grazing period and grazing days by allotment

Allotment	Available Forage AUMs	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Snakey-Kelly	1,756	440	25.0	Early Nov – late Dec	45
East Beaver	17,887	350	2.0	Mid June – late Aug	61
Meyers Creek	NA	0	NA	NA	NA

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. However, the unavailability of East Summer Ranges and Meyers Creek allotment for grazing would not provide range conditions necessary for the Sheep Station to continue its current and ongoing research mission.

Modified Alternative 5 (No Grazing – Snakey, Kelly Allotments)

Meyers Creek and E. Beaver

With 40 percent sheep reduction and lower AUM use (0.4 percent on Meyers Creek and 0.8 percent on East Beaver), grazing effects would be less than modified alternative 1.

Snakey – Kelly

Same effects as alternative 2, no grazing, no AUMs 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.

Table 23 displays modified alternative 5 available forage in AUMs, AUMs used, percent of available forage used, grazing period and number of days available for grazing by allotment.

Table 23. Modified alternative 5 – percent of forage used, grazing period and grazing days by allotment

Allotment	Available Forage AUMs	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Snakey-Kelly	NA	0	NA	-	-
East Beaver	17,887	150	0.8	Mid June – late Aug	61
Meyers Creek	3,076	13	0.4	Mid July – early Sept	6

Ending grazing and associated activities on Snakey-Kelly allotments would provide some benefits to plant cover, mainly at the small areas affected by trailing, bedding, and watering sites. However, the unavailability of Snakey-Kelly allotments for late season grazing would not provide range conditions necessary for the Sheep Station to continue its current and ongoing research mission.

Transmission Line Upgrade

The existing transmission line across Headquarters property is scheduled to be upgraded. Cumulative effects of upgrading the existing transmission line would be similar for (modified) Alternatives 1, 2, 3, 4, and 5.

With transmission line upgrade or reconstruction accessed by existing roads (no new road construction) and no new towers constructed (no additional tower sites disturbance), 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 spicing 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 plant species seeds introduced along roads, and to any disturbed areas, from additional vehicle and equipment travel during upgrading operations. Invasive plant species would be mitigated or controlled under existing ARS invasive plant species management practices.

Range Effects Summary

Table 24 displays available AUMs for each property and allotment and percent of available AUMs used under each alternative.

Table 24. Available AUMs and percent AUMs used by alternative for each property

Property	Percent of Available AUMs Used[a]				
	Alt1	Alt2	Alt3	Alt4	Alt5
All Agricultural Research Service	**7.5**	**-**	**5.9**	**8.1.5**	**4.5**
Headquarters	6.2	-	5.0	6.4	3.7
Humphrey	17.9	-	27.2	20.1	10.7
Henninger	18.3	-	15.5	20.9	11.0
Summer East (Toms Cr.)	5.6	-	-	-	3.3
Summer West (Odell Cr./Big Mt.)	5.1	-	-	5.1	3.0
All allotments under MOU (DOE, USDA-FS)	**3.1**	**-**	**12.5**	**4.0**	**0.8**
Snakey-Kelly	25.1	-	12.5	25.1	-
East Beaver	1.4	-	-	2.0	0.8
Meyers Creek	0.8	-	-	-	0.4

a – Alt 1, 3, 4 and 5 are modified alternatives.

Modified alternative 1 would continue to provide range conditions necessary for the U. S. Sheep Experiment Station to continue its mission of current and ongoing research. While grazing cessation on various Agricultural Research properties and U.S. Forest Service allotments would affect some changes in range conditions, the unavailability of those various parcels in alternative 2, modified alternatives 3 and 4 and alternative 5 would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.

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

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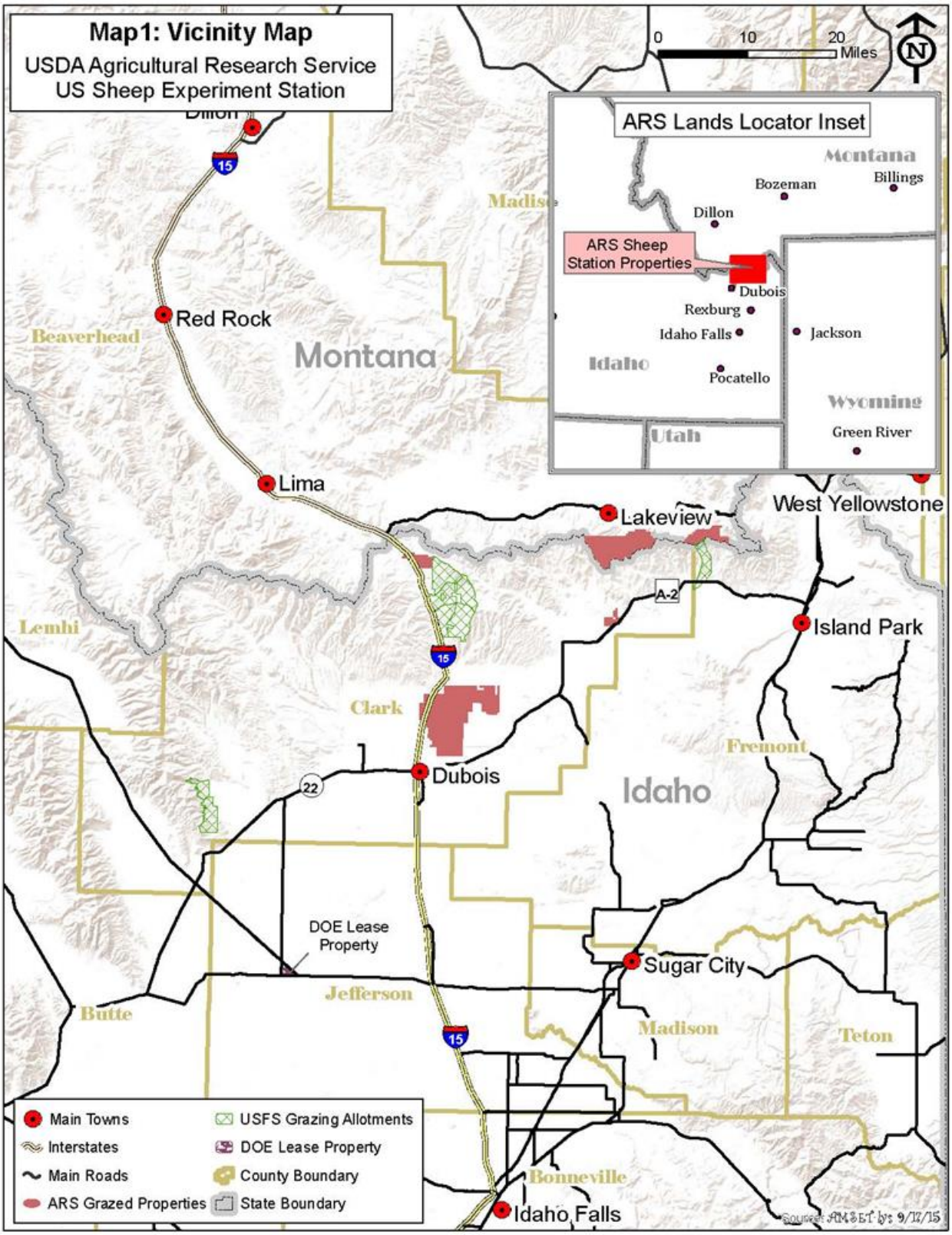
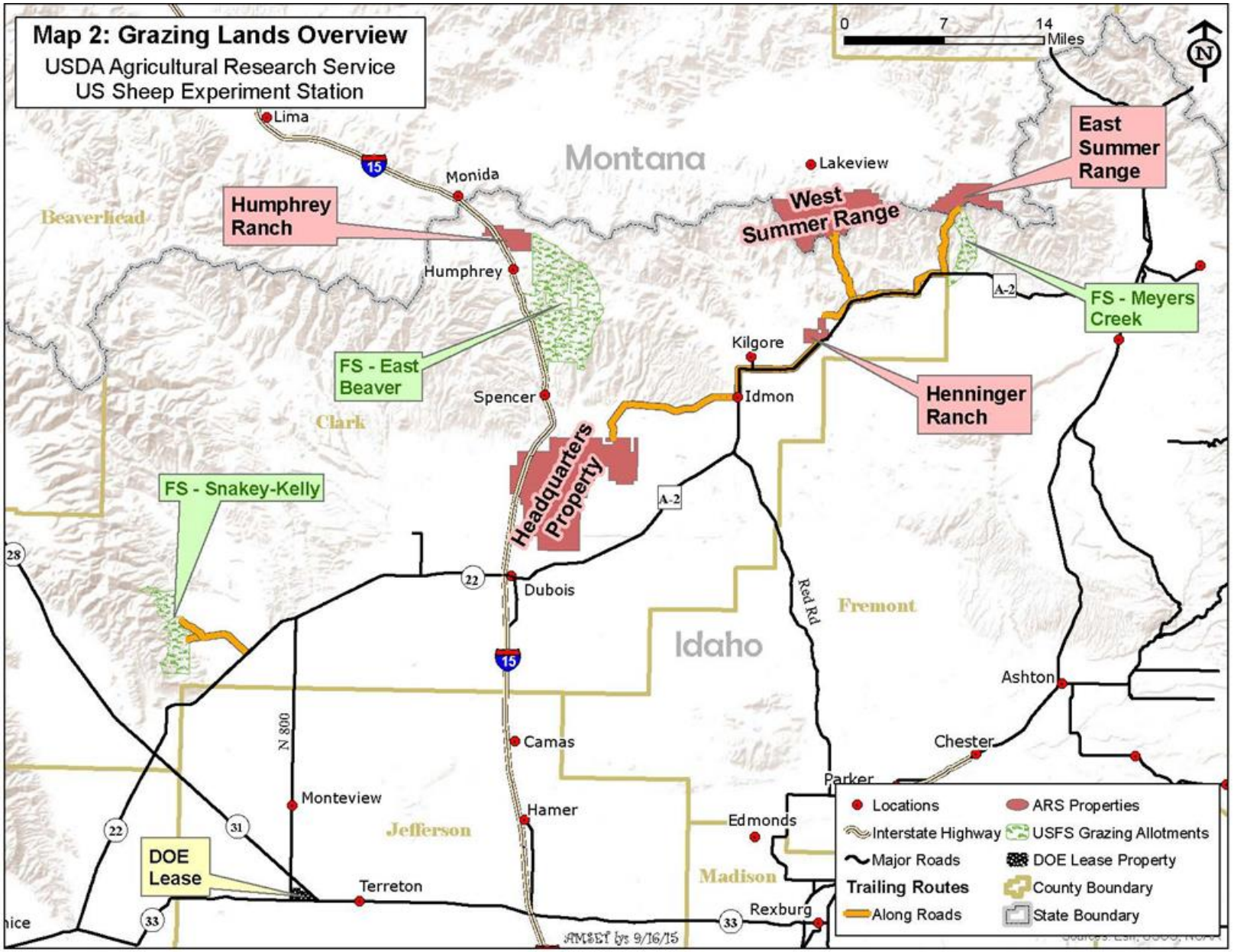
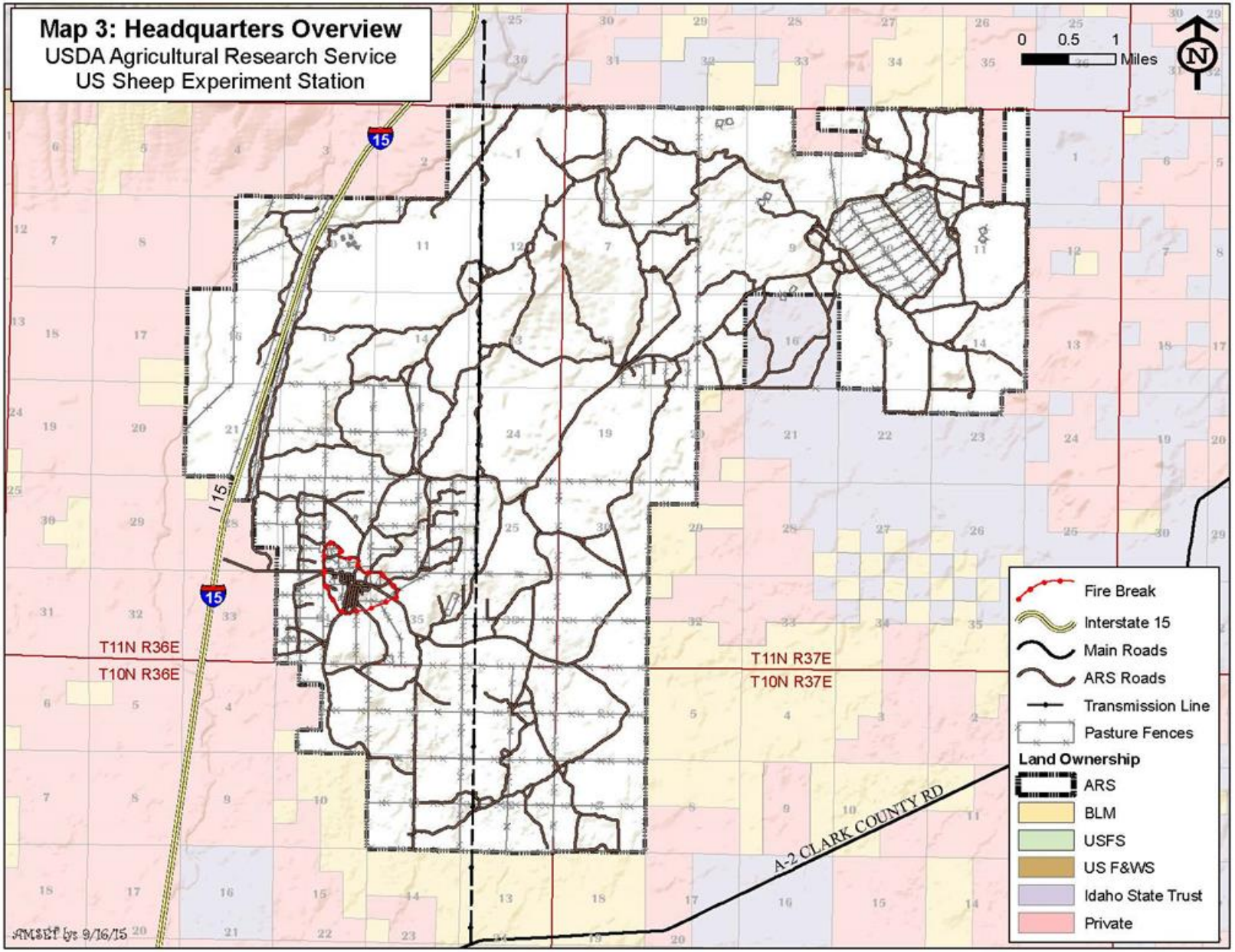
Appendix A: Maps



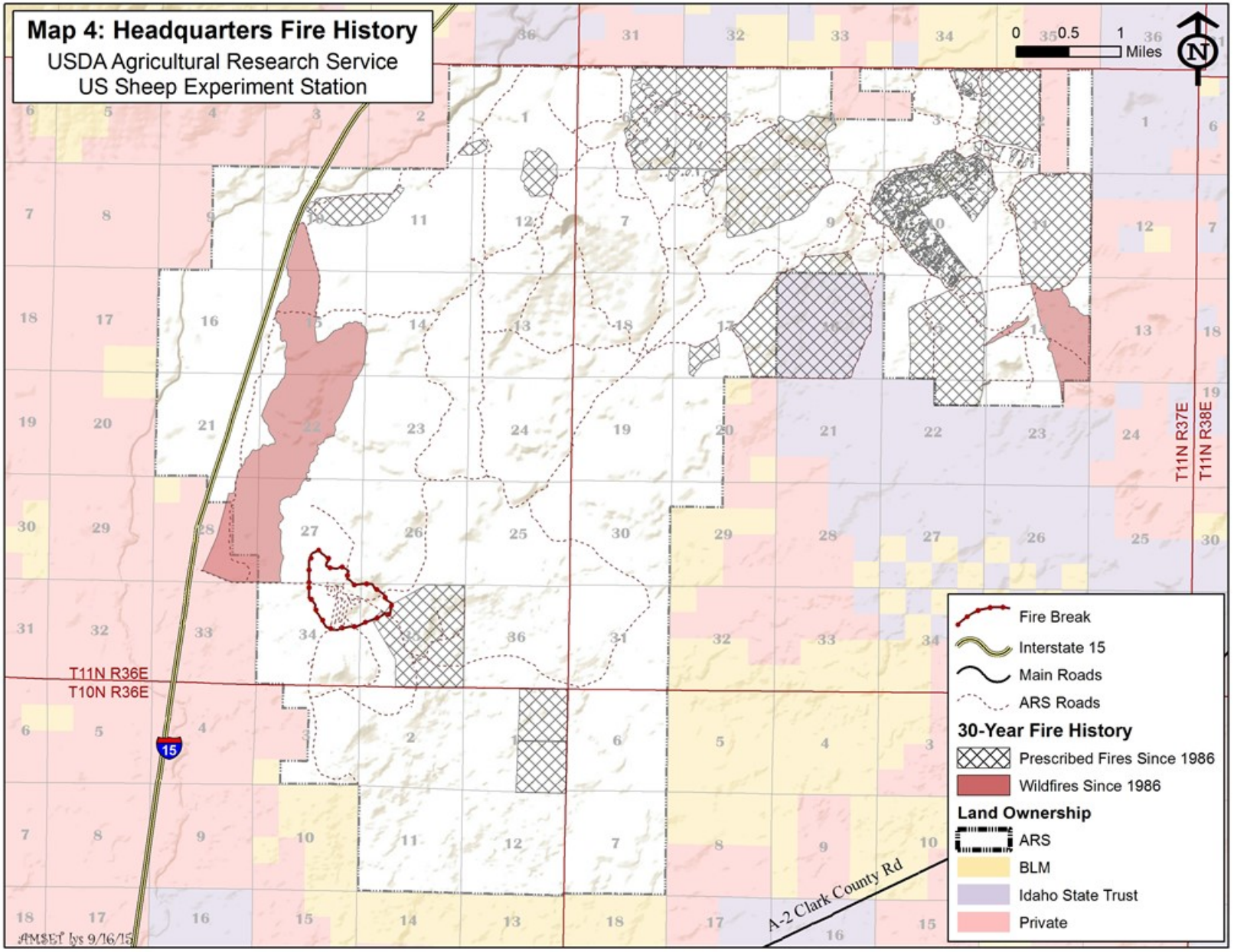
Map 1. Vicinity map



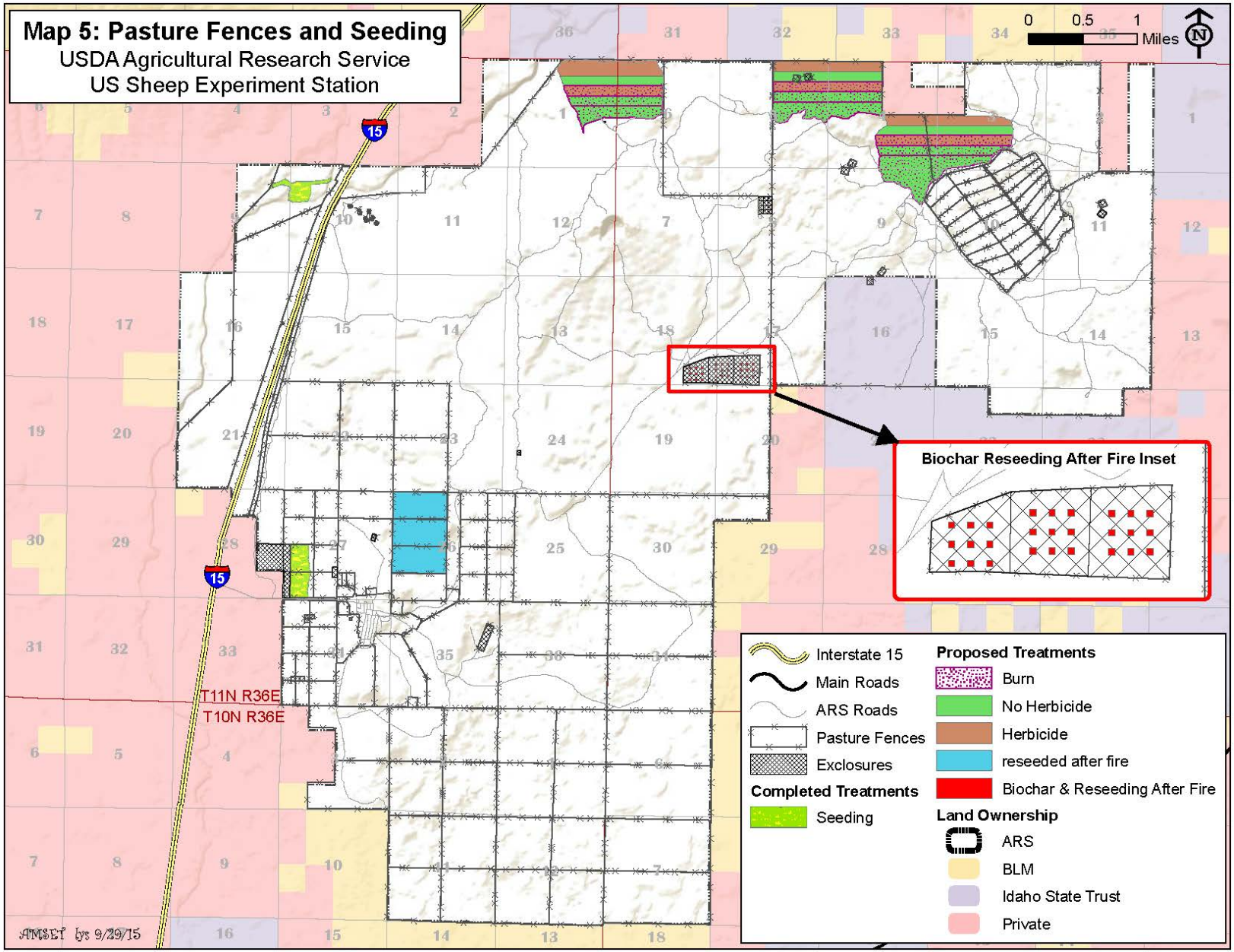
Map 2. Proposed Action (alternative 1) overview with allotments and sheep trails



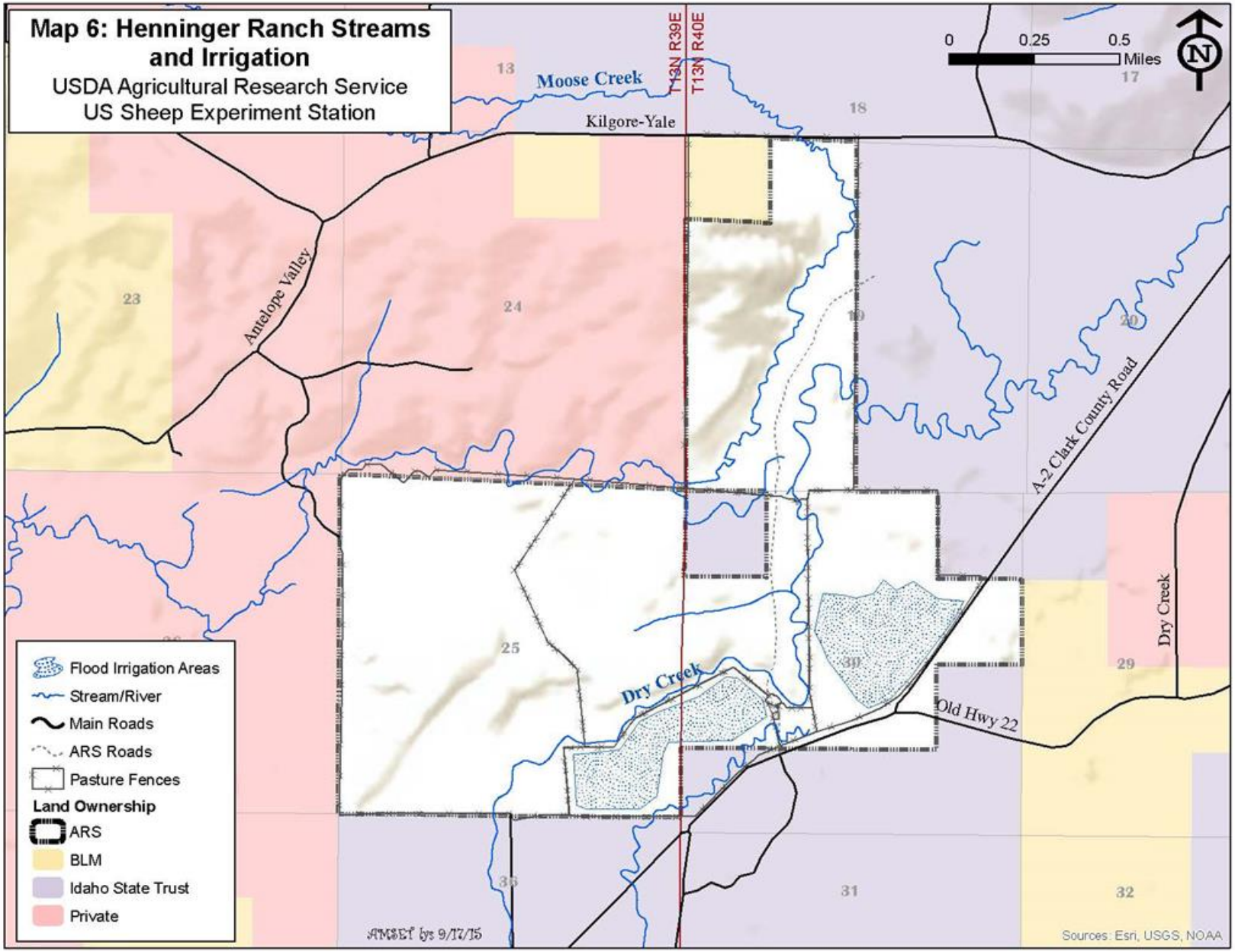
Map 3. Headquarters pasture overview



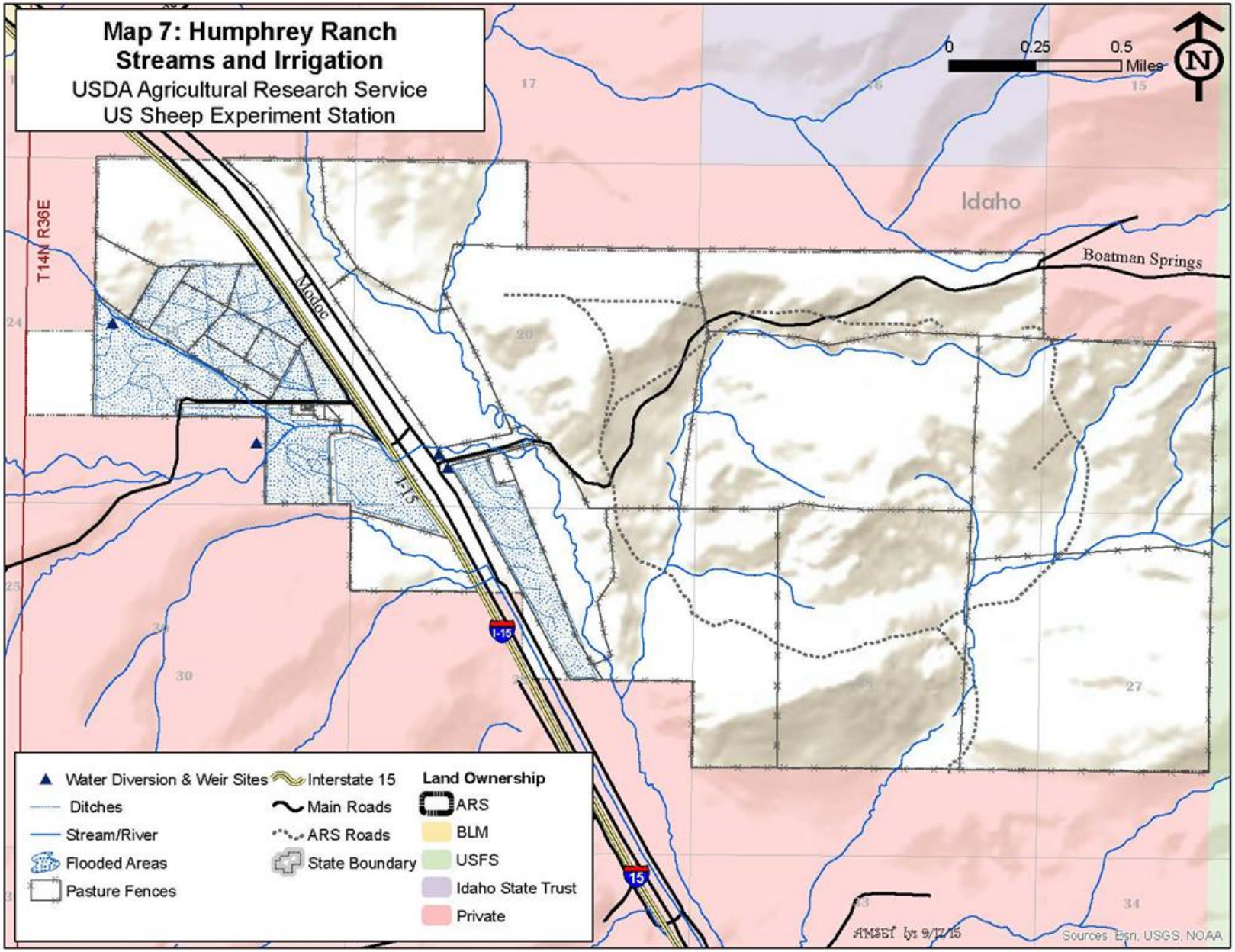
Map 4. Headquarters wildfire history



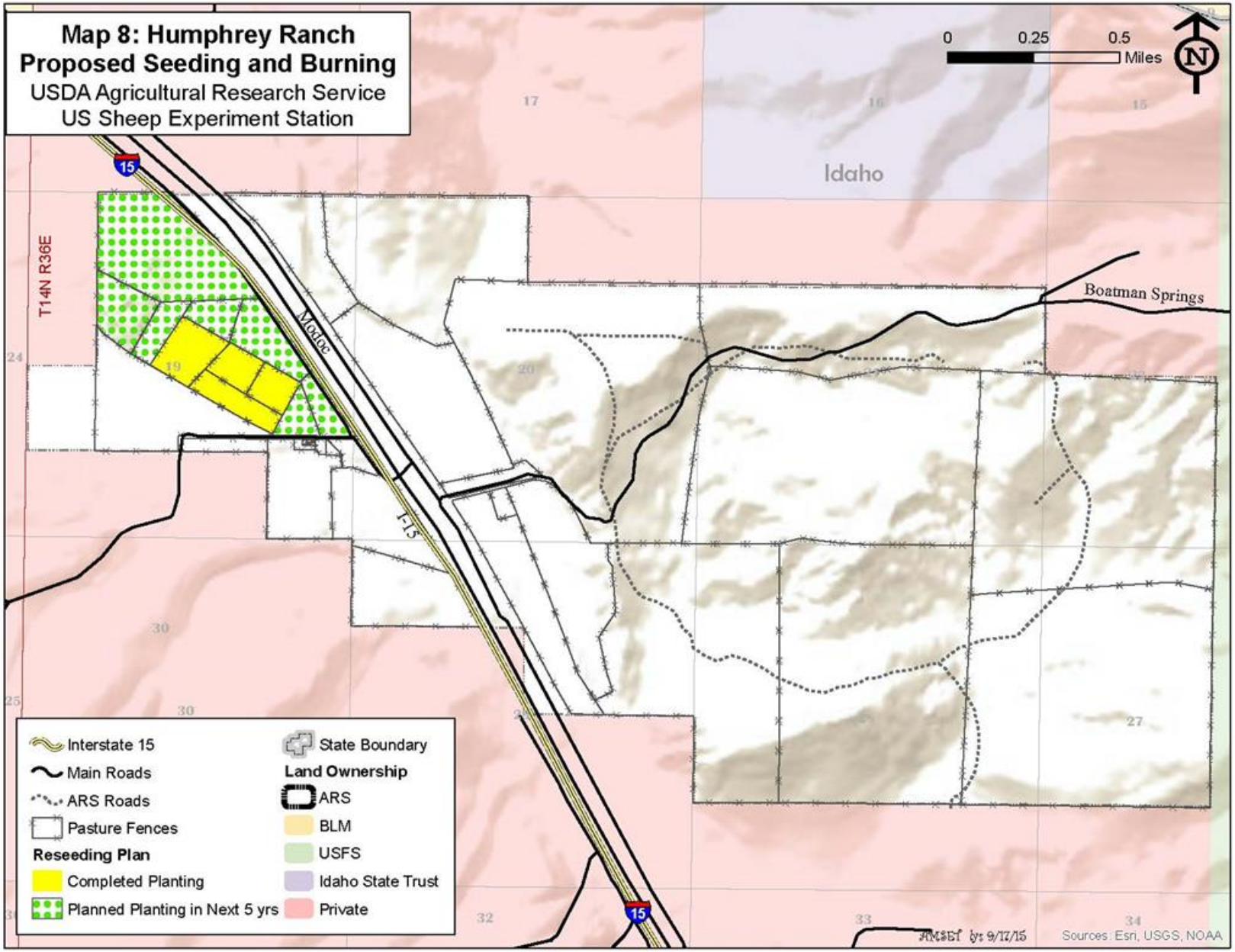
Map 5. Headquarters proposed treatments



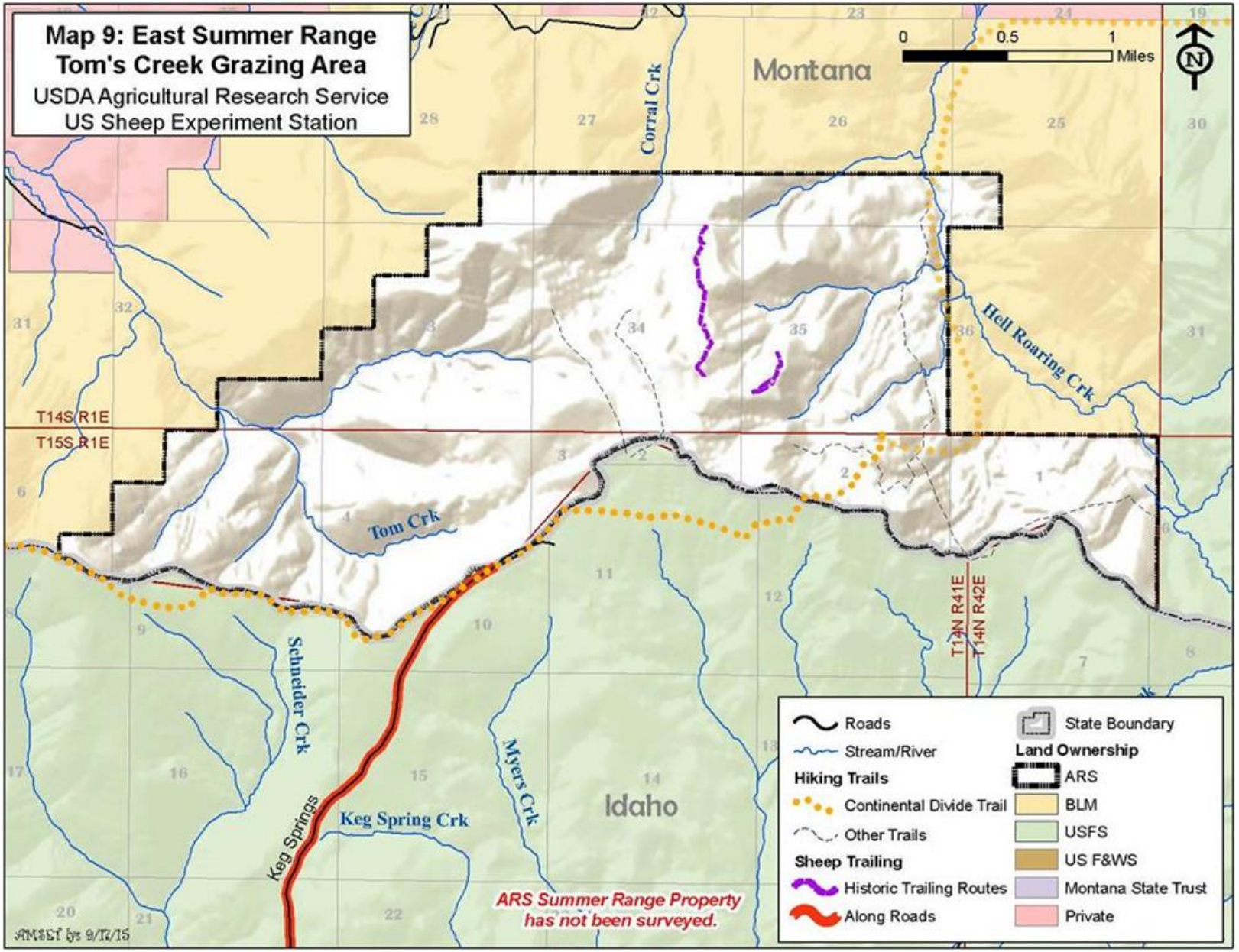
Map 6. Henninger Ranch streams and pasture irrigation



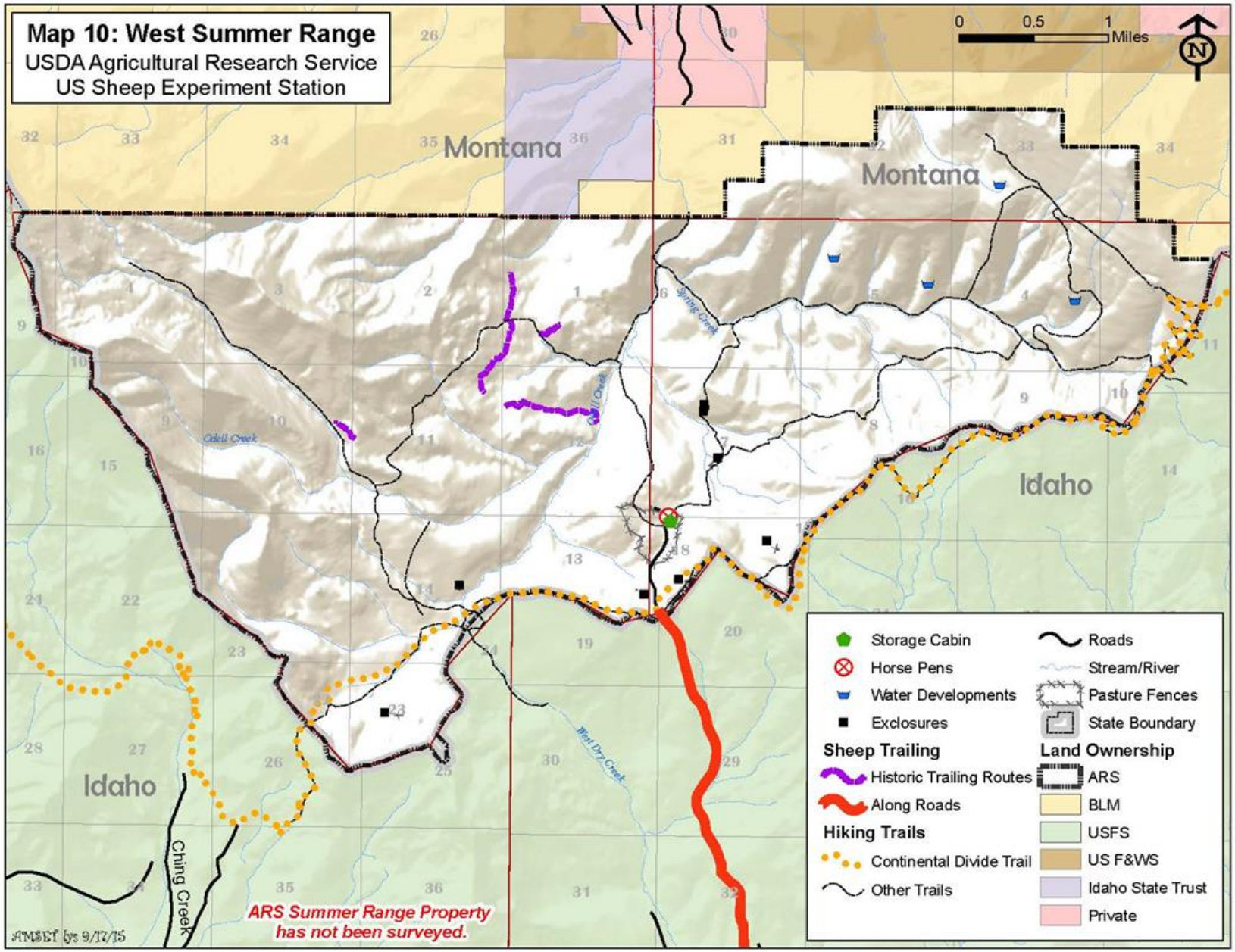
Map 7. Humphrey Ranch streams and irrigation



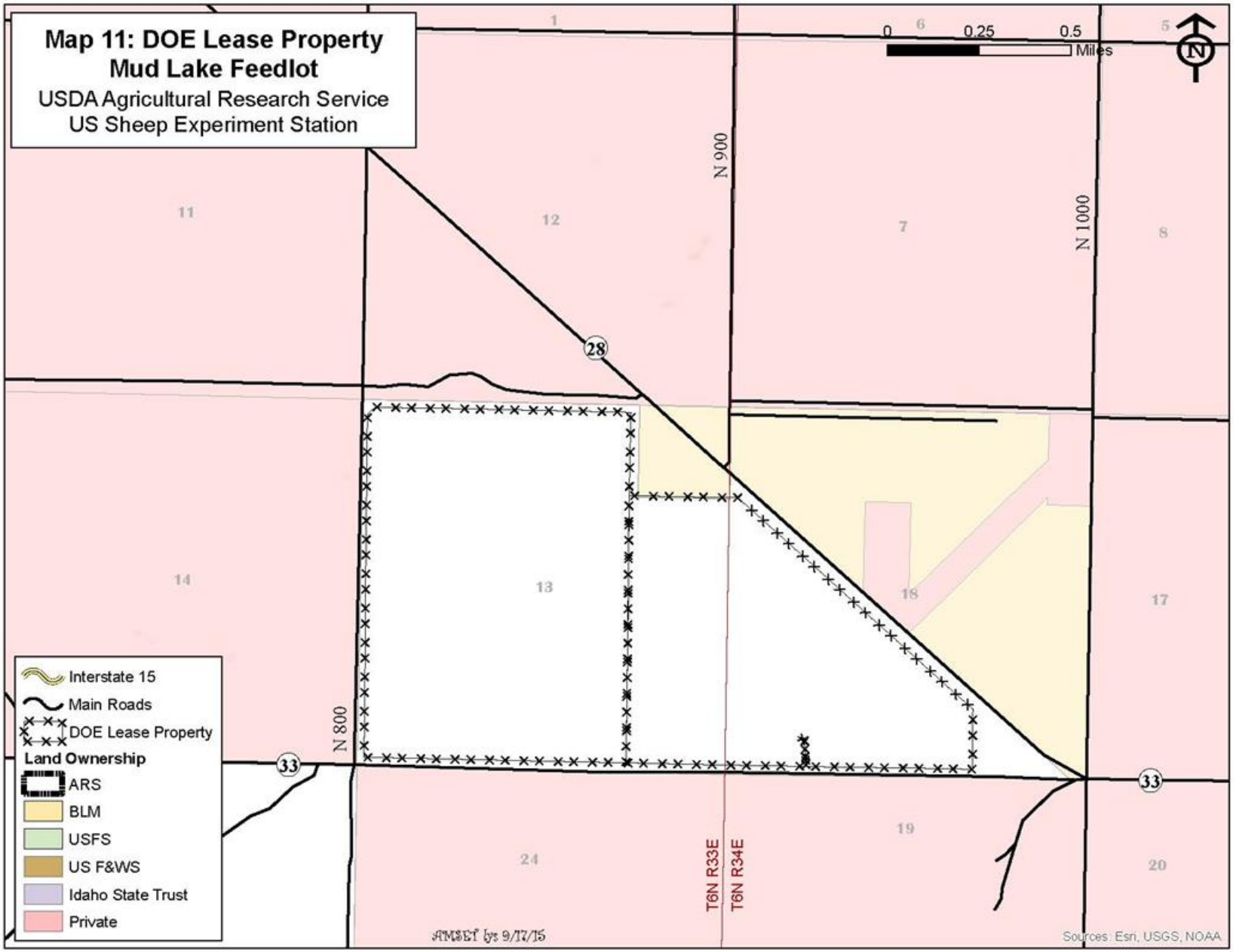
Map 8. Humphrey Ranch proposed seeding



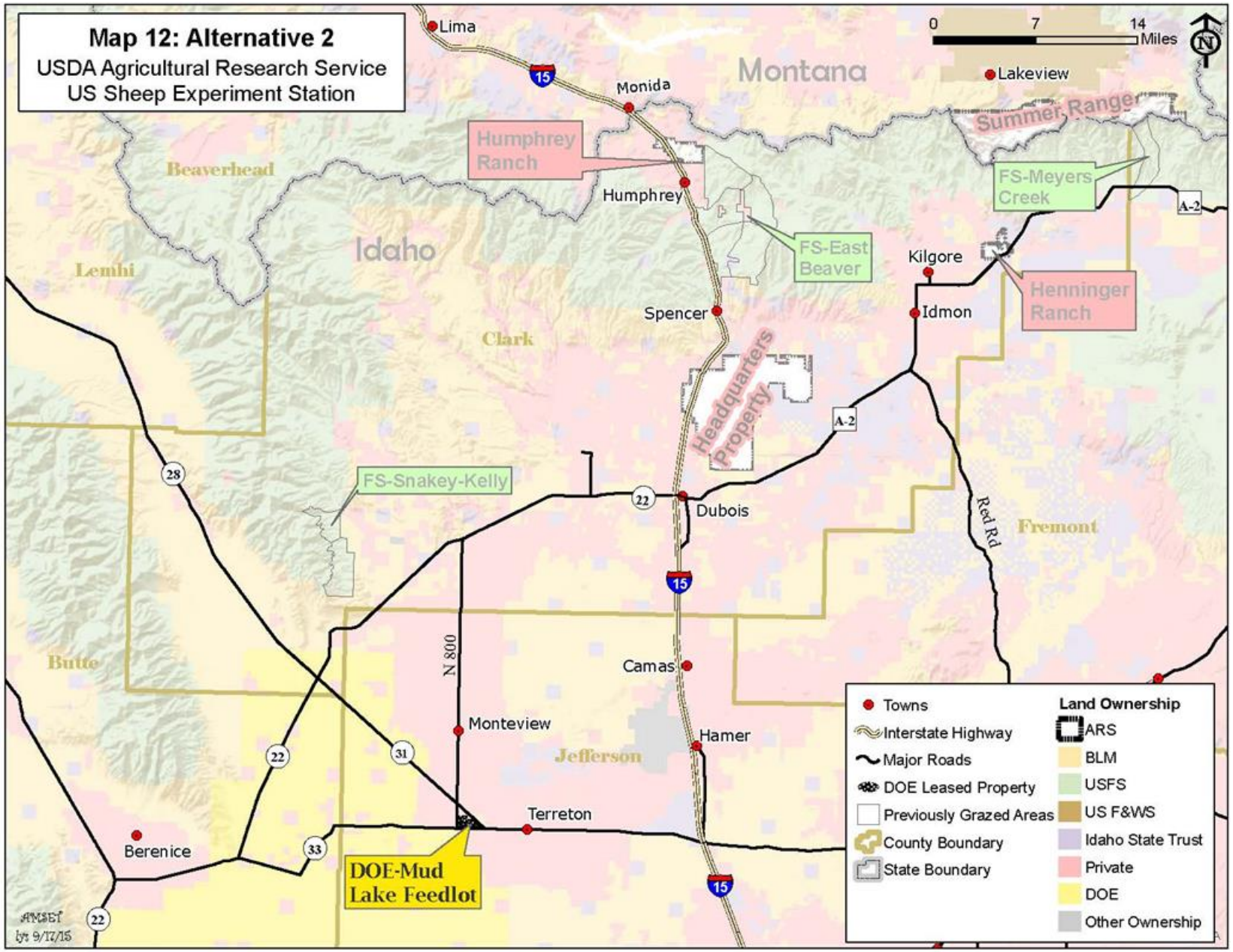
Map 9. East Summer Range streams, sheep trails, and features



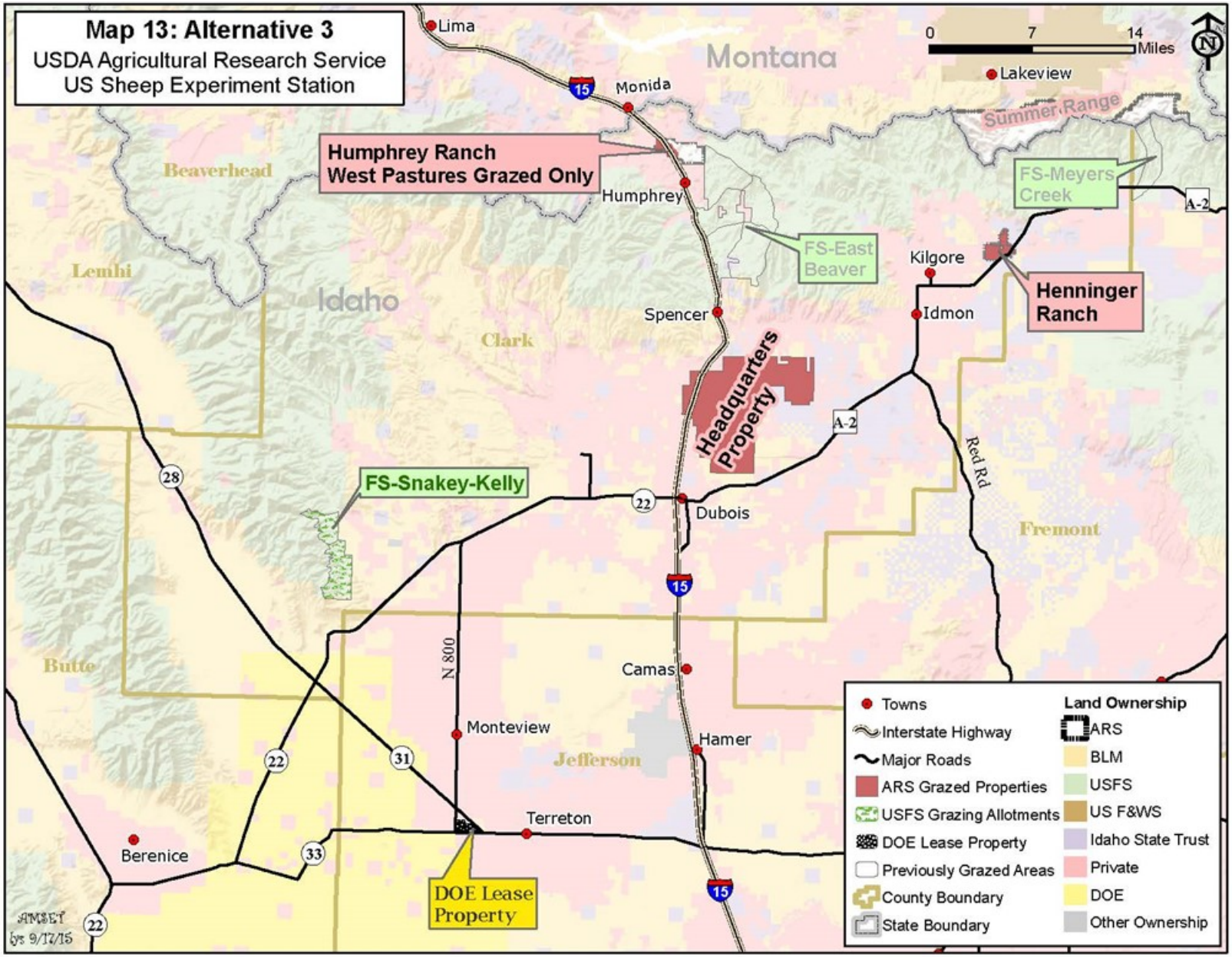
Map 10. West Summer Range streams, sheep trails, and features



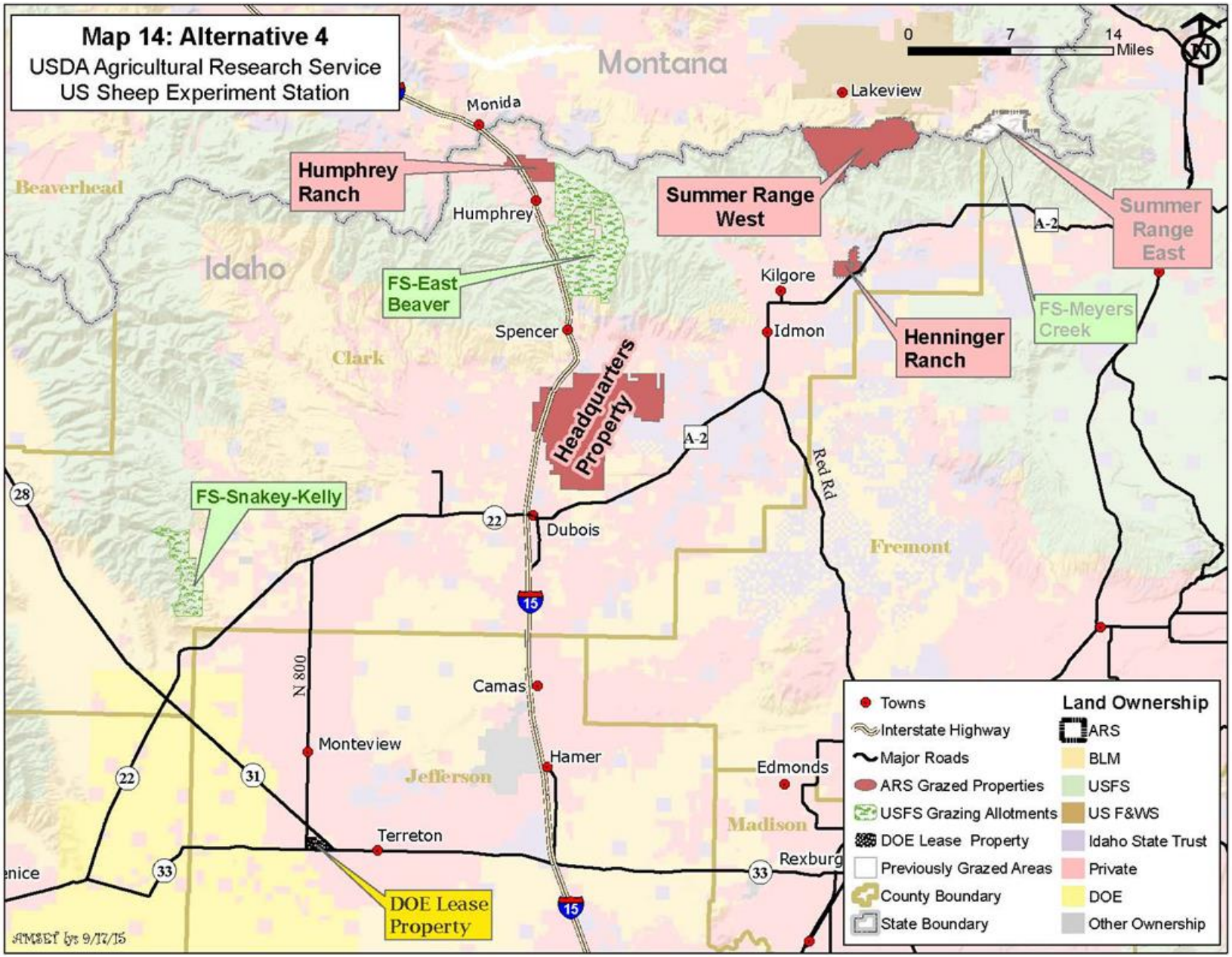
Map 11. Department of Energy Mudlake Feedlot



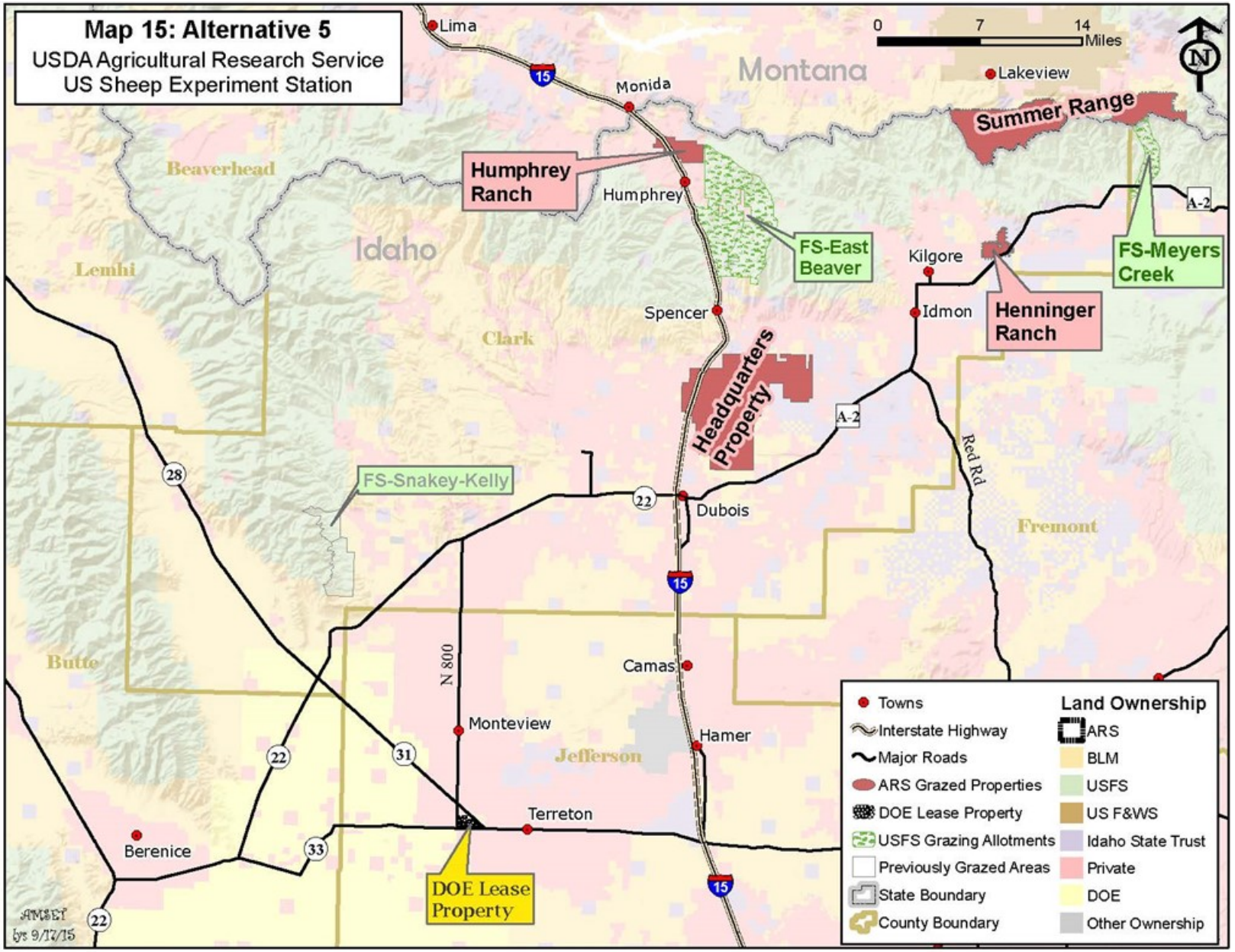
Map 12. Alternative 2 overview



Map 13. Alternative 3 overview



Map 14. Alternative 4 overview



Map 15. Alternative 5 overview