USDA Agricultural Research Service
www.ars.usda.gov

United States Department of Agriculture

Agricultural Research Service

Pacific West Area

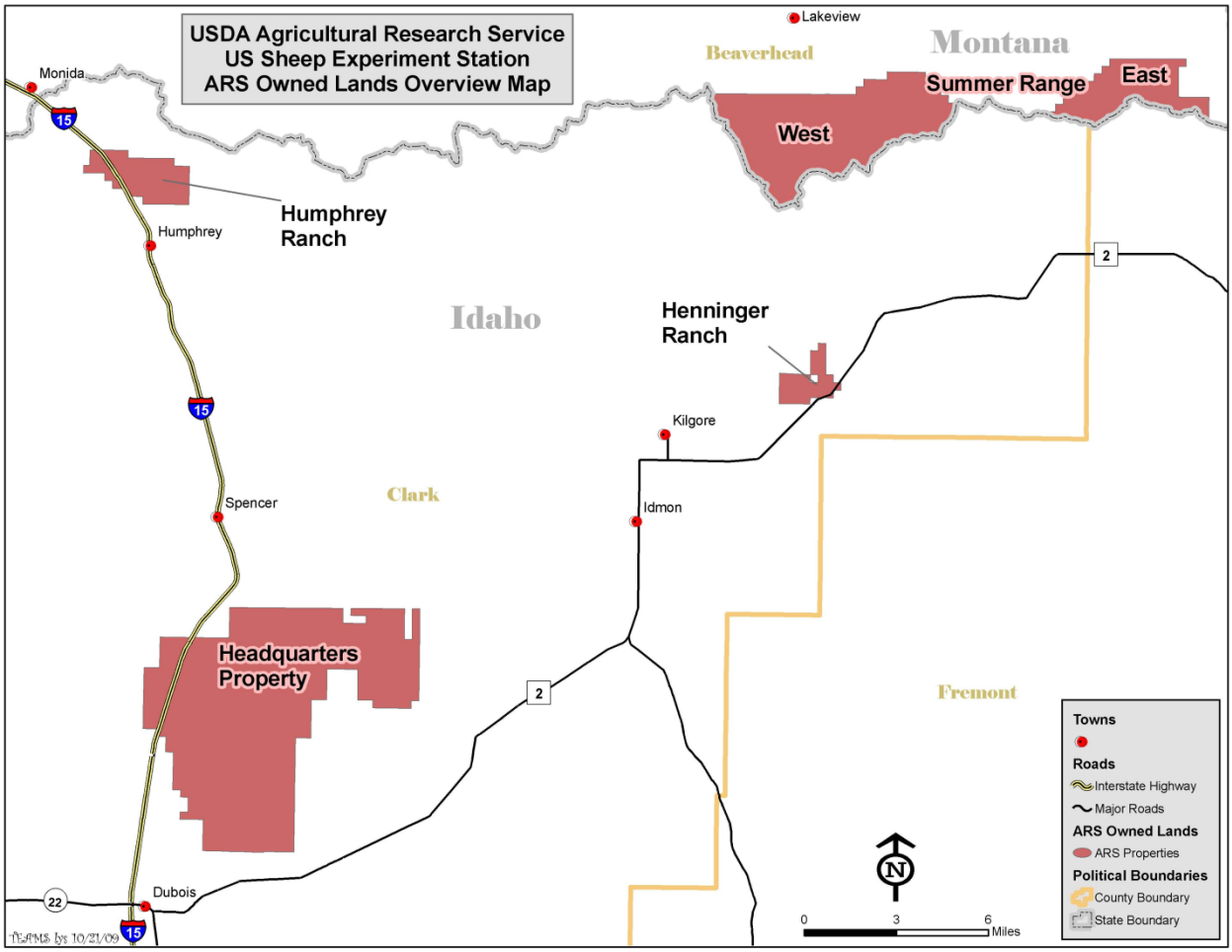
December 2009

Information for Public Comment

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

United States Sheep Experiment Station

Dubois, Clark County, Idaho



For More Information Contact:

Sue Wingate
Environmental Coordinator
TEAMS Enterprise Unit
USDA Forest Service
559-920-5235

Where is this project in the NEPA process?

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

_____ Step One - Need for a Project

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

_____ Step Two - Develop Project Proposal

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

_____ Step Three - Scoping (Public Input)

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

_____ Step Four - Develop Reasonable Range of Alternatives

Scoping determines need for an EA: Agricultural Research Service develops alternatives that meet the purpose and need identified for the project.

Step Five – Information for Formal Public Comment Period

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

_____ Step Six – Environmental Analysis & Decision

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

_____ Step Eight - Implementation

Agricultural Research Service implements the project.

_____ Step Nine - Monitor and Evaluate

Agricultural Research Service monitors and evaluates project results.

Table of Contents

List of Tables

List of Figures

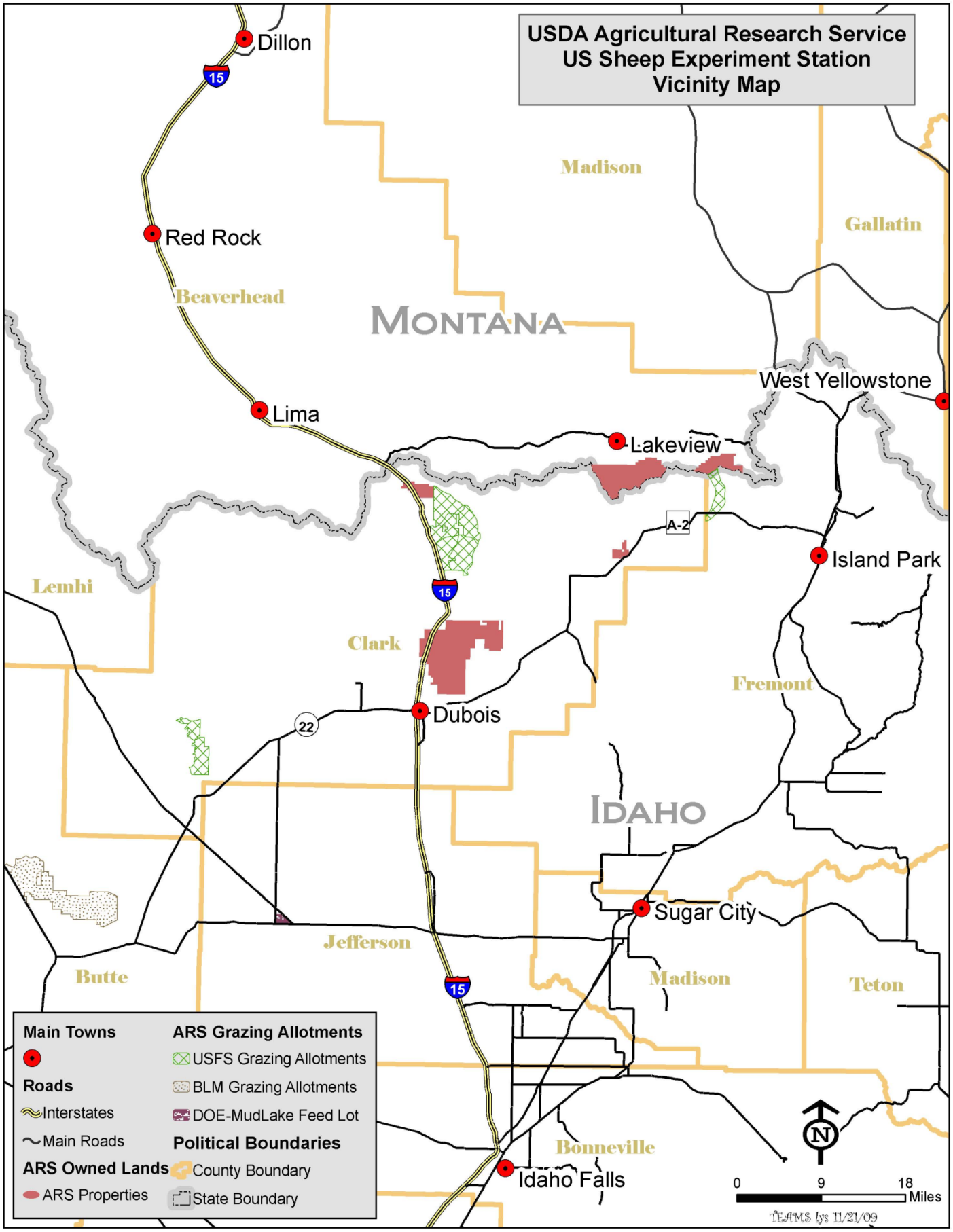


Figure 1. Vicinity Map

Proposed Action

Summary

The purpose of the proposed action is to achieve the research goals and objectives (to develop integrated methods for increasing production efficiency of sheep and to simultaneously improve the sustainability of rangeland ecosystems) described in the Purpose and Need section. The method to achieve those goals is to continue ongoing sheep grazing and associated activities that have been historically occurring (approximately 86 years) in conjunction with Agricultural Research Service, U.S. Sheep Experiment Station (USSES) research.

Operations

The U.S. Sheep Experiment Station currently has approximately 3,000 mature sheep, plus attendant young sheep. Including mature ewes and lambs, lambing rates are approximately 170 percent, and weaning rates are approximately 145 percent. The total number of sheep soon after the end of the lambing period is approximately 6,500. The numbers of mature and young sheep retained vary according to research needs. Sheep in excess of those needed for hypothesis-driven research are not retained. The U.S. Sheep Experiment Station sheep harvest most of their feed through grazing. Sheep numbers are kept below range carrying capacity to maintain favorable range conditions. Operations include traditional and on-going activities associated with sheep grazing research.

Appendix B, Table 1-B. Proposed action general sheep movement schedule (Grazing dates are approximate depending on range readiness; 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).) (Appendix C, page 25) displays average annual sheep[1] movement across the U.S. Sheep Experiment Station. Grazing dates are approximate depending on range readiness. Winter range allotments are grazed every year, and some areas within the winter grazed allotments are rested one in three years.

In Table 1-B, there are small groups, up to 200 head of sheep, grazed at Headquarters from mid October to early December for research purposes, while most sheep are at the Mud Lake facility. Also horse and cattle grazing may be done at Headquarters, Humphrey and Henninger during this period.

Two out of every three years sheep graze East Summer Range and the Meyers Allotment. During the third year these areas are rested.

Sheep graze across the landscape on a seasonal basis. Sheep numbers used to determine AUMs are based on a 10-year sheep inventory high of 3,331 head. Table 1-B displays grazing areas utilized by sheep throughout a typical season. Sheep numbers in Table 1-B are rounded to 3,300. Dates on and off each grazing area are average dates to display possible variations from year to year depending on weather and forage conditions.

Table 1 is based on calculations using the best available plant productivity estimates and the high from the last 10 yrs of sheep inventory data (Moffet, personal communication) and demonstrates the expected distribution of AUM utilization (sheep only) for the past 10 years, present, and future. AUMs used are based on days shown in Table 1. Actual days when sheep would be on the range vary from year to year

[1] 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)

depending on weather and plant conditions. Average days and rounded sheep numbers, for a typical year, when sheep are moved on and off each range are shown in Table 3.

Table 1. Proposed action: Annual AUM[a] utilized per property within the approximate[b] dates that are specified. The calculations are based on 3,331 sheep[c] (Taylor, personal communication, USSES 8/29/09).

Properties	AUM [a] Available	AUM [a] Utilized	Utilization Percent	Approximate [b] Grazing Dates
Agricultural Research Service (Agricultural Research Service)	**48,667**	**3,311**	**6.8 %**	
Headquarters	28,353	1,598	5.6 %	April 23 – June 25; September 1 – November 1
Humphrey	4,476	603	13.5 %	June 1 – October 20
Henninger	1,914	455	23.8 %	June 25 – July 9; August 31 – September 15
East Summer (Tom's Creek)	4,043	155	3.8 %	July 23 – August 31
West Summer (Odell Creek/ Big Mountain)	9,881	500	5.1 %	July 9 – August 31
Leased (DOE, USDA- Forest Service, DOI-Bureau of Land Management)	**26,087**	**1,516**	**5.8 %**	
Mud Lake	560	160	28.6 %	Mid January – Mid April Mid October – Mid November
Snakey-Kelly	1,756	421	24.0 %	November 8 – December 15
East Beaver	17,877	213	1.2 %	July 3 – September 1
Meyers Creek	3,076	71	2.3 %	July 5 – July 23
Bernice	2,808	650	23.2 %	December 15 – February 5

[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[c] are equivalent to one (1) AUM.

[b] Depending on climatic 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). Sheep numbers are rounded in the flow charts, for more specific sheep numbers see spreadsheets in Report Appendix B.

Forage used by sheep grazing is well below total available forage. Surveys indicate summer range forage use is very low, averaging 4.5 percent, with 95.5 percent available for elk, deer, moose and other wildlife food and cover. Unused forage provides soil and water protection.

Headquarters is grazed in spring and early summer, and in late summer and early fall each year at a total rate of 0.06 AUM per acre. Humphrey and Henninger are usually grazed in early summer and fall each year. The meadow pastures are grazed heavier than Sagebrush vegetation types, since they are more productive, but overall sheep are grazed on these ranches at a rate of 0.23 and 0.33 AUM per acre, respectively.

Sheep Trail and Driveway Use and Maintenance

Trails and driveways are used to move sheep between grazing areas.

Trails

Sheep are trailed along existing roads to move sheep from Headquarters and Henninger properties to other grazing areas. Table 2 displays the sheep trails used by the USSES annually to move sheep (Map 3).

Table 2. Annual sheep trails

Trail	Description
Headquarters to Henninger	Trailing from Headquarters to Henninger follows a private unnamed two-track road part way with 90 percent of trailing on county roads (Spencer-Idmon and County Road A2)
From Henninger to Meyers	Sheep are trailed on County Road A2, sheep are moved or trailed while grazing through, Meyers Allotment to the East Summer Range
From Henninger to West Summer Range	Sheep are trailed on County road A2, and National Forest East Dry Road 327
When returning from East Range to Henninger:	Sheep are trailed on Keg Springs National Forest Road 042 and County Road A2
When returning from West Summer Range to Henninger	Sheep follow National Forest Road 327 and County Road A2
When returning from Henninger to Headquarters	Sheep are trailed on County Road A2, Spencer-Idmon Road, and the unnamed two-track road on private land
Sheep are trucked to Humphrey and East Beaver Forest Service Allotment	At Humphrey, sheep are trailed through a gate to the adjacent National Forest East Beaver allotment.
Sheep are trucked and unloaded on National Forest Road 202.	Depending on snow depth, sheep are trailed along National Forest Roads 184, 279 and 202 to Snakey-Kelly National Forest Allotment. A temporary corral and mobile loading chute are set up on Road 202 for loading when sheep are moved off the Snakey-Kelly Allotment.

Driveways[2]

Sheep are moved along driveways (Figure 2) through timbered areas on East and West Summer ranges. Herders on horseback use working dogs (Figure 2) to herd sheep from one grazing location to another. There are about four miles of maintained sheep driveways through timbered areas on the West and East Summer Ranges. Sheep driveway locations are shown on Maps 14 and 16.

Figure 2. Sheep Driveway, Odell Creek (point OD5 on field map – jf 08/07/08

There only maintained driveways are through timbered areas in West Summer Range (Odell/Big Mountain) and East Summer Range (Tom's Creek). Annual driveway maintenance is done through the timbered areas. Small diameter downed wood across driveways is retained on site; some limbing may be done on retained downed trees. Any new or recently fallen trees (greater than 10 or 12 inches in diameter) are cut out and removed (pulled back into adjacent timber stands) from the driveways each year. Occasionally sheep driveway trails are rerouted, closed, and rehabilitated. Driveways may be rerouted when a better route is located or an alternate route is needed for research. Driveways through timber patches and across meadows are short, generally less than one half mile long. If adverse effects to soil or water occur, mitigation measures (cross drains with woody debris to divert overland flow) are implemented or a driveway segment maybe rerouted to avoid sensitive areas. Unneeded or unused old driveways and corral sites are closed and rehabilitated; seeded with native

[2] Driveway: Travel route used to move sheep from one grazing location to another in the summer ranges.

species, brush or woody debris if available returned to the site, and animals are kept off to restore the area.

At three to four week intervals, sheep are moved from grazing areas to staging areas for data collection. On these drives, sheep are spread out over larger areas in open terrain and moved slowly while grazing to reduce adverse effects on the travel routes.

Driveways are used only on years the pastures in the area are grazed, which is two out of three years. Each pasture is rested one year in three.

Table 3. Sheep numbers trailed on pastures as an average of last five years

Unit	Length (approximate miles)	Use Time (approximate hr)	Horse	Ewes	Lambs
West Summer Range					
Skyline Unit - used twice a year	1	2	2	785	1,165
Odell Unit 6 - usually used once a year	0.13	1	2	785	1,165
Odell Unit 4 - usually used twice a year	0.13	0.5	1	785	1,165
Little Odell - used once a year	0.25	1	1	785	1,165
Big Odell -- used once a year	0.25	1	1	785	1,165
Big Mountain - generally used only once a year	0.25	1.5	2	782	1,157
Corrals to Top - usually used 4 times a year	0.5	1.5	2	782	1,157
Canyon Unit – used once or twice a year	1.4	0.8	2	782	1,157
East Summer Range					
Tom's Units 5 & 6 – used once or twice a year	0.5	1.5	1	838	1,273
Tom's Units 6 & 7 - used once or less a year	0.5	2	1	838	1,273

Stock Water Operations

In areas where water is not readily accessible at the U.S. Sheep Experiment Station Headquarters, water is trucked to the sheep and unloaded into water troughs 12 feet long, 12 inches high, and 12 inches wide. Troughs are moved as grazing progresses across the pastures. The number of troughs used at each grazing area depends on the number of sheep to water; up to 25 troughs may be used for large bands, two troughs are adequate where 50-60 sheep are grazed. There are 70 pastures at low elevation where water is trucked; about 80 watering sites are used. Each band has one watering site. Six to eight groups graze at the same time so that six to eight sites would be in use at any given time. Watering sites are used for three to seven days and then moved. Areas up to ¼ acre in size are disturbed from sheep use around water troughs, and tend to have crested wheatgrass cover. Henninger and Humphrey pastures have surface water available for watering sheep. Summer Ranges have surface water available for sheep and horses with developed sites on Big Mountain pasture described below.

Water Developments

Humphrey and Henninger

Humphrey and Henninger Ranches have developed ditches (Figure 3) to divert water onto grazing pastures while sheep are grazing the areas. Flood irrigation water is used to water sheep. Irrigation ditch Locations and flood irrigated areas are located on Humphrey and Henninger pastures (Maps 11-12).

Irrigation was in place and ongoing before the Agricultural Research Service purchased the properties. Creek water is diverted with canvas dams into ditches to flood pastures at the time sheep graze in the area; from Modoc Creek at Humphrey, and from West Dry Creek at Henninger. Diverted irrigation water may be used annually. Acres watered for each ranch varies, depending on stream flow at time of use. In dry years, very little water is used. Diverted water is used for watering sheep, while irrigation provides more green forage longer during the dry season. The number of days water is applied varies from one year to the next depending on needs and water availability. When sheep are moved out of the pasture, the canvas dams are removed, and the diversion is shut off. There are about two miles of irrigation ditch at each ranch. The Humphrey pastures are grazed from May to October. Henninger ranch has water use rights from May 1 to October 31. Spring water use is prohibited until the water flow in Dry Creek no longer reaches Spring Creek in mid to late June. Diversion ditches are inspected and maintained annually.

Figure 3. Henninger ditch maintenance (jf)

West Summer Range

There are five water developments, in the West Summer Range in Montana on the Big Mountain area. Springs are developed with permanent troughs to collect water in low-flow areas needed to water 350 to 900 ewes and 1,250 to 1,400 lambs at one time (Figure 4). Water developments are also used by wildlife.

Figure 4. Upland water trough (jf – 07/160/8)

The five water development sites on the West Summer Range include four metal and one rubber trough. Four of the 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.

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).

Schedule of proposed water development activities though 2014

Humphrey

- Continue cleaning the existing ditches with the ditching tool
- Install 2 new weir boxes into Modoc Creek (better measurement of water)

Henninger

- Continue cleaning the existing ditches with the ditching tool.
- Install new concrete diversion head gate on the National Forest System ground (once approved by U.S. Forest Service) - This will allow better measurement of the water usage and less erosion problems with the ditch.

Summer Range

- Replace 2 existing wooden water developments with metal developments.
- Continue annual spring (water) cleanings for water sources

Camp Tending

Sheep Herding Camps

Headquarters, Humphrey and Henninger Camps

Headquarters, Humphrey and Henninger are administered from existing roads. Herder camps on low elevation spring, fall and winter pastures are equipped with a 12-foot long by 7-foot wide, four-wheel living quarters trailer (Figure 5) and a tow-behind camp commissary to transport 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 ¼ acre or less at each site. Camp site equipment and activities include a horse trough, a horse picketed on a 20 to 30 foot chain, and dog feeding area. Camps at Headquarters, Humphrey and Henninger are visited by a camp tender at two day intervals. Crested wheatgrass provides the primary ground cover at the ¼ acre or less camp sites where camp activities remove or trample sagebrush and other vegetation. Total area affected by camp sites is a very small or negligible percentage of the total pasture area. Trash from herders' camps is transported back to U.S. Sheep Experiment Station Headquarters for proper disposal in a dumpster that is emptied at a legal landfill.

Figure 5. Camp herder trailer (sw 05/08)

Summer Range Camps

Summer camps include a seven foot by seven foot teepee tent, with no trough. Horses are watered at natural water sites, one horse is picketed, and one horse is loose. Camp areas affect about a 50 foot radius, less than ¼ acre. Camps are moved every three to four days to progress with sheep grazing. 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 U.S. Sheep Experiment Station Headquarters for proper disposal in a dumpster that is emptied at a legal landfill. Table 4 shows the number of camps in each Summer Range and season of use.

Table 4. Camps per pasture and season used

Range	Pasture	Camps per Pasture	Season Used
West Summer Range	Odell	9	July 10 – August 29
	Big Mountain	7	
East Summer Range	Tom's Creek	6	

Maintenance and repair of existing permanent fence

Fences

There are about 180 miles of permanent sheep fence on Headquarters, Humphrey, and Henninger ranches. All fences are inspected and repaired annually. Fence locations, including exclosures, are shown on each U.S. Sheep Experiment Station pasture area. Fence types are shown and described in the map legend.

Pasture Fences

Sheep proof fences at Headquarters, Humphrey, and Henninger are maintained to confine sheep. An eight foot high coyote proof fence is maintained at Headquarters (Figure 6) around, and subdividing, section 2, T10N, R36E. The eight-foot-high fence was constructed circa 1976 for coyote-sheep interaction research; the research project ended circa 1987, and the fence is maintained to provide a safe location for certain ewe-lamb studies

Figure 6. Example of coyote-proof fencing on Headquarters. (sw 05/08)

Horse Corral

The horse corral fence on 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 (See Map 15). The north and west part of the horse corral is sheep-proof net-wire with two strands of barbed wire above the net-wire. The south and east portion of

the corral is two-strand barbed wire. All of the corral fencing on Odell pasture is let-down type. The drop fence is let down each year after grazing operations are complete.

Exclosures

Exclosures at Headquarters are sheep proof, maintained to keep sheep from grazing excluded areas. The West Summer Range exclosures are drop fences, put up to exclude sheep when pastures in the exclosure areas are grazed. These drop fences are let down after sheep are removed from the pasture.

An eight-foot-high wildlife exclosure fence in section 7, T15N, R1W, West Summer Range, is maintained to exclude wild ungulates and sheep. An adjacent four-foot-high sheep proof exclosure is maintained to compare grazing effects. This wildlife and sheep exclosure includes a riparian area. These exclosures are located and designed to compare and evaluate domestic and wild ungulate grazing effects on willow and other riparian vegetation. The entire fenced area is less than 1/2 acre.

Schedule of proposed fence maintenance activities though 2014

Headquarters

- Replace four miles of existing fence with new fence materials
- Clean up nonfunctional research pens

Humphrey

- Replace three miles of existing fence with new fence (same location)
- Continue clean-up of old nonfunctional fence lines, equipment

Henninger

- Replace two miles of existing border fence with new fence, metal braces, etc.

Summer Range

- Replace two miles of old horse pasture fence with new fence, metal braces, etc.
- Remove old range exclosures
- Continue repairs on existing enclosures (new posts, wire)

Maintenance and repair of existing roads and fire breaks

Roads (Figure 7)

Annual road maintenance is done on main roads as needed. Road segments with ruts or other maintenance needs are bladed or improved for efficient motorized travel. Each year approximately 20 miles of road need maintenance improvements. Road maintenance is contained within the road right-of-way.

Figure 7 Example of road on Headquarters (sw 05/08)

Schedule of proposed road work activities though 2014

Headquarters

- Annual road maintenance (pulling up the shoulders and smoothing out potholes). All replacement gravel is hauled in from the State of Idaho gravel pits.
- Remove, clean, repair and reinstall six existing cattle guards
- Replace two existing culverts in the feedlot. Culverts are for runoff water in the spring, these two culverts are at the sheep pens and are not part of the road system

Henninger

- Continue to lightly grade existing roads (no new road construction is planned)

Firebreaks

Figure 8. Cleared firebreak –fy 2008

The firebreak around the headquarters area is maintained annually with a motor grader to provide a mineral soil break about 20 feet wide. Chemicals may be used to control noxious weeds on the Headquarters firebreak. Weed management is described in the pest control section below. Firebreaks 15 to 20 feet wide down to mineral soil are constructed around prescribed burn areas including blackline burn areas.

Prescribed burn firebreaks are constructed with a dozer and motor grader. Unit firebreak lines (Figure 8) and blackline firebreaks (Figure 9) are generally within 50 to 200 feet of each other. Cleared firebreaks around burn units are also used for vehicle and equipment access during burn operations and for research during and after the areas are burned. Shrub and grass debris removed from fuelbreaks is pulled back and spread over the cleared area on firebreaks not needed for research access after the burn, generally within the same season.

Fire breaks around prescribed burn areas are not maintained. They are not seeded and are left to revegetate with native species. Fire breaks not needed for motorized access for research are rehabilitated. Wind-rowed shrubs, grass, litter, and top soil are pulled back and spread over the firebreak with a motor grader. Invasive, noxious weeds have not been a problem on the cleared firebreaks. *Bromus tectorum L.* (cheatgrass), present since 1930s, shows up on some cleared areas but is not persistent at this elevation or environment.

Figure 9. Blackline – fy 2008

Range Improvement (NP215, Objective A.2)

Prescribed Burning

Agricultural Research Service plans to burn Headquarters pasture areas about every 30 years, this would equal about 900 acres each year. Actual burned area over the past 30 years, 13,867 acres, has been less than the planned average 900 acres per year. Burning, for research to improve forage production, provides wildlife habitat and other resources as secondary benefits. All burning completed in 2008 and spring 2009, was located on areas that had been previously prescribe burned. Total burn area for fall 2008 and spring 2009 is 474 acres. Burn unit locations are shown on Agricultural Research Service-Headquarters Prescribed, Fire History Map 8.

An 11,803 acre landscape area has been identified for future burn opportunities, about 2,000 acres within the identified area would be burned in the next five years (2015), an average 400 acres/year. Agricultural Research Service-Headquarters Prescribed Fire History Map 8, identifies the area where burning would be done. Specific locations for each burn unit would depend on research needs. Burn units are unlikely to have complete combustion; therefore there would be unburned areas within the burn unit perimeter. Prior to burning an individual burn plan would be prepared (see example in Interim U.S. Sheep Experiment Station Grazing and Associated Activities Project Environmental Assessment, Rangeland Specialist Report Appendix: Statement of Work – Prescribed Burns – Dubois, Idaho (2008).

Seeding

The following seeding activities are proposed for the Headquarters and Humphrey properties within the next five years (Maps 11 and 13):

- Revegetate a gravel pit in Pasture 4U/1U - 2011 - Entire area (~52 acres) will be seeded to a mix of antelope bitterbrush (*Purshia tridentata)*, forage kochia (*Kochia prostrata* (L.) Schrad), and crested wheatgrass (*Agropyron cristatum)*.
- Revegetation after fire in pastures 6, 7, and 8 - 2014 - A portion of the burned area (~120 acres) will be seed to different varieties of forage kochia (*Kochia prostrata* (L.) Schrad).
- Various forage kochia varieties are planned for planting on 240 acres in 2014.
- Eight (8) acres are planned for seeding at Humphrey in 2010 and nine acres are planned for 2011.

Cattle and Horse Grazing

Cattle and horse grazing with cooperative research is used periodically to maintain or improve sheep range conditions. 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 Humphrey Ranch and Headquarters ranges, with occasional cattle grazing on Henninger range. The number of animals used varies from year to year depending on research needs and vegetation conditions. Cattle or horse numbers used are based on the area and amount of vegetation that needs to be removed. For example, no cattle were grazed at any of the properties in 2007 due to drought conditions. Cattle have primarily been used with limited horse grazing in the past. Cattle and sheep grazing are used under three conditions: 1) grazing will not interfere with experiments, 2) forage availability is sufficient, and 3) the grazing objectives can't be met with sheep or the number of sheep available. Pastures are evaluated for forage removal needs and mapped to determine livestock stocking. Grazing bids are solicited and awarded to private livestock owners. Number of animals, number of days, and areas grazed are tracked with detailed yearly records included in the Dubois Station records.

November and December cattle and horse grazing use has been variable since 1997 when this practice was begun. Cattle and horse grazing at the Henninger Ranch has been minimal (7 AUM per year average between 1997 and 2007) and infrequent (2 years out of 11). Cattle and horse grazing at Headquarters and Humphrey Ranch is more consistent with average use of 1,723 AUM per year for Headquarters and 849 AUM per year for Humphrey (1997 to 2007). Cattle and horse grazing has occurred in 8 years out of the 11 between 1997 and 2007 for Headquarters and Humphrey Ranch.

Predator Avoidance and Abatement

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 lands, even though those species have inhabited Agricultural Research Service lands for a number of years. It can be expected that a limited number of encounters with carnivores will continue to occur. The primary methods of limiting encounters with predators include;

- Avoidance over a large-sized land base grazed with relatively few livestock;
- The presence of full time sheep herders, guard dogs, and herd dogs; and
- The 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 large carnivores 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, herders are instructed to harass (by shooting into the air) a depredating black bear. If problems persist, the appropriate State wildlife service is contacted to investigate and follow up with control actions if warranted.

For gray wolves, (currently de-listed), herders are instructed to harass gray wolves if observed in the vicinity of livestock. If research livestock are being maimed or killed, then shooting a depredating wolf is permitted. If the wolves become listed (currently under litigation, presumably could return to status as an experimental non-essential population), herders can harass but not kill a depredating wolf. Animal and Plant Health Inspection Services (APHIS) Wildlife Services would be contacted to investigate wolf

depredation/conflicts, and then contact state wildlife agencies (and or U.S. Fish and Wildlife Service) for authorization to implement control actions such as trapping, collaring, or lethal removal if necessary.

For grizzly bears, herders are instructed to do everything possible to avoid an encounter. Moving the sheep to other areas of the pasture may occur, and moving sheep to other pastures/locations is an option if problems persist. If a grizzly bear is threatening sheep, herders may discharge their rifle into the air if they think it will help frighten the bear (hazing). A herder may shoot directly at a grizzly bear only if his personal safety is threatened. However, this situation has not occurred with U.S. Sheep Experiment Station grazing and is not expected to occur.

- The proposed action (and alternatives) would not include options to trap and transport grizzly bears or to lethally control problem grizzly bears because:
- The species is currently federally listed as threatened,
- There have been only three encounters in the past, and
- None of those encounters required removal.

Grizzly bear trapping, transportation, or lethal removal is outside the scope of this project and thus, if needed, would require the U.S. Sheep Experiment Station to re-initiate consultation or conduct an emergency consultation, in order to consider the probability of incidental take (see US Fish and Wildlife Service consultation section on page30 and Grizzly Bear Biological Determination discussion on page 97).

Integrated Pest Management (NP215, Objective A.2)

Noxious Weeds

There are few weed problems on U.S. Sheep Experiment Station pasture lands. Weeds become established along roads; seeds are transported by vehicles. Where sheep graze, sheep keep weeds down. Weeds persist along roads where there is no sheep grazing. Some weed species are present on adjacent lands where cattle graze, and, over time, the adjacent weeds invade Agricultural Research Service lands. Invasive plant species infestations on Agricultural Research Service lands are GPS (Global Positioning System) mapped. Area or patch infestations are mapped as polygons and included in the U.S. Sheep Experiment Station records. Roadside noxious weed locations are identified on hard copy maps and recorded for treatment, as they are found.

Precautions are taken by U.S. Sheep Experiment Station to minimize weed spread from sheep. To accomplish this, weed areas are grazed in spring when there is little or no risk of spreading weed seeds. U.S. Sheep Experiment Station also quarantines animals for six days before moving sheep from weed infested areas or from feed with potential weed seeds to other grazing units. U.S. Sheep Experiment Station does not graze areas when weed seeds are developed and there is risk of spreading seeds to another area.

U.S. Sheep Experiment Station uses an adaptive management/integrated pest management approach for control and eradication of exotic, invasive weeds. This integrated approach is coupled with research on ecosystem functions and native plant communities and with research on weed seed production and spread with sheep grazing. 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 the spread of weeds. Other

biocontrol methods, such as specific species of beetles, alone or in combination with other biocontrol methods, are also used.

Herbicide application is used minimally on invasive weed species that are not consumed by sheep. Herbicides are sprayed annually along some roads and sheep pens with invasive weeds. Herbicides have been used to control weeds along roadsides, in feedlots and corrals, small pastures (< 10 ha), and near building structures for ~30 years.

Invasive weeds may establish anywhere, at any given time. Many newly established patches would be controlled using appropriate sheep grazing techniques. Other weed areas may be managed with herbicides, where spraying is more effective. In general, existing and potential problem areas have been identified; they are located mainly along other land ownership borders with Agricultural Research Service lands. Herbicide use is more effective in these weed invasion areas than sheep grazing.

Grazing to control *Euphorbia esula* (leafy spurge) and *Centaurea stoebe* (spotted knapweed) is done in spring or early summer when there is no or little risk of spreading weed seeds. Herbicides control for *Euphorbia esula* (leafy spurge), *Centaurea* stoebe (spotted knapweed), *Bromus tectorum L* (cheatgrass), *Cardaria draba* (L.) *Desv.*(globed-podded hoarycress), *Chenopodium album* L. (Lamb's-quarters), *Bassia scoparia* (L.) A.J. Scott (burningbush), *Cirsium* spp. (tall thistle) is also done. Occasional herbicide control is done for rare sightings *Hyoscyamus niger* L. (black henbane, hog's-bean, stinking-nightshade), *Arctium lappa* L. (greater burdock), *Isatis tinctoria* L. (dyer's woad), *Hieracium cynoglossoides Arv.-Touv* (houndstongue hawkweed P.). Herbicides used to control weeds include: clopyralid, triclopyr amine, imazapyr, diuron, picloram, bromacil, glyphosate, 2,4-D amine, and imazapic.

Herbicides application methods include: spot, handwand application to control weeds along roadsides, in dry-lots and corrals, and near building structures. Four-wheeler-mounted and tractor-mounted boom-sprayer application is done to control weeds in small pastures and large dry-lots. Aerial application is NOT used.

Curtail and 2-4-D amine mix (11.53 gallons) was applied on about 35 acres along roadsides on Headquarters property in 2009. Twelve pounds of Krovar was applied at six pounds/acre on Headquarters feedlots in 2009. Curtail and 2-4-D amine mix (6.3 gallons) was applied on about 10 acres along roadsides and fence lines on Humphrey Ranch in 2009. Three gallons of glyphosate, GLY 4, was applied at four pints/acre on 12 acres of pasture planned for reseeding in 2009.

Glyphosate (Gly 4) application is proposed for 12 acres at Humphrey Ranch in 2010. This is a one-time application in conjunction with planned seeding for 2010. Map 13 displays area and location planned for seeding.

Vegetation monitoring is conducted before and after grazing, which includes annual measurements of invasive weeds, native plant density, and frequency; collecting annual or biannual aerial (100 to 200 m above-ground-level), and on-the-ground (1 to 2 m) digital imagery of grazed and non-grazed areas. A description, target species and example of U.S. Sheep Experiment Station noxious weed strategy is included in appendix C.

Design Features, Best Management Practices, Monitoring

Wildlife Conservation Measures

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

- When creating research plans that include a sheep grazing component, consider potential livestock-bear conflicts and avoid areas where problems can be anticipated.
- Use good husbandry practices so that sheep are as healthy as possible, are suitable for research, and the number sick/stray animals is kept to a minimum. An institutional animal care and use committee evaluates research protocols and livestock management practices to ensure they are consistent with good animal husbandry, and comply with Federal laws that govern the use of agricultural animals in research. Protocols and practices that do not comply are not approved.
- Sheep herders, working dogs, and guard dogs are kept with the sheep full-time when on rangelands to reduce the likelihood of encounters, and to assist in efficient and prompt movement of animals when necessary.
- All unnatural attractants to bears are minimized. This includes treatment or removal of livestock carcasses, and proper storage of human foods, garbage, and dog food. Approved "bear-proof" containers are used, and damaged containers are repaired or replaced so that they work as designed. Camp tenders and managers make periodic visits to remove trash and/or dead animal carcasses in order to eliminate potential bear attractants.
- At least two formal training-orientation meetings are conducted annually with U.S. Sheep Experiment Station employees and herders to make sure they can identify grizzly bear, black bear, bighorn sheep, Canada lynx, mountain lions, etc. In addition, they discuss U.S. Sheep Experiment Station sanitation and garbage removal practices, nonlethal procedures to address livestock-wildlife encounters, and who to contact should encounters occur. Training and education are ongoing and not limited to formal meetings.
- Regarding grizzly bears, herders are instructed to do everything possible to avoid an encounter. Moving the sheep to other areas of the pasture may occur, and moving sheep to other pastures/locations is an option if problems persist. They are to report the sighting to their supervisor as soon as possible. Sheepherders carry guns for safety and to scare off inquisitive animals. If a grizzly bear is threatening sheep, herders may discharge their rifle into the air if they think it will help frighten the bear (hazing). A herder may shoot directly at a grizzly bear only if his personal safety is threatened, however this situation has not occurred with U.S. Sheep Experiment Station grazing, and is not expected to occur.
- When on Agricultural Research Service land, all existing and suspected bear activity and (or) conflicts are reported directly to APHIS Wildlife Services. APHIS Wildlife Services then contacts state and federal agencies as necessary.
- When on USDA, Forest Service, or on DOI, Bureau of Land Management land, all existing and suspected bear activity and(or) conflicts are reported directly to the Forest Service or Bureau of Land Management, respectively, as well as APHIS Wildlife Services.

- In an interagency agreement with the U.S. Forest Service (USDA Forest Service, 2007), the U.S. Sheep Experiment Station agrees they will comply with meeting grizzly bear management goals on the Myers Creek and East Beaver Allotments including notifying appropriate personnel of encounters, and temporarily stopping or modifying grazing as necessary, should bear conflicts arise with humans or livestock. Refer to the specific interagency agreement for details.

- Grizzly bear trapping, transportation, or lethal removal is outside the scope of this project and thus, if needed, would require the U.S. Sheep Experiment Station to re-initiate consultation or conduct an emergency consultation, in order to consider the probability of incidental take.

For additional information on this topic, refer to the effects analysis summary for grizzly bear starting on page 87, and the wildlife report, and US FWS consultation documentation located in the project record.

Road to Blair Lake

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

- Blair Lake M1: Close road to all motorized use on Agricultural Research Service lands. Close road effectively where slope begins to increase, shortly after road crosses on to U.S. Sheep Experiment Station property. Selectively drop trees such that off-road vehicle traffic cannot detour around closure.

- Blair Lake 2: From crest of hill down to first meadows: 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 re-vegetation from adjacent sources. If vegetation is not established within three years consider re-seeding.

- Blair Lake 3: 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) 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 4: 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 ft into adjacent hillside along contour or at a slight angle to the slope gradient. Place small diameter (4 inches or less) 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 5: Blair Lake 5: 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 30-50 feet of the road and place a water bar at the road end to divert surface run-off. This would minimize or eliminate surface runoff and sediment from entering the creek at the road end.

Sheep Crossings

Mitigations are recommended at sheep crossings at points OD 4 and OD 5, found on the North and South Forks of O'Dell Creek. At the North Fork Creek (OD 4/T15S, R2W, Section 11, SW ¼) these mitigations apply to the main and secondary crossings. The following measures are recommended:

- North Fork of O'Dell Creek M1: 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 3-45 degrees across the driveway to ensure water is diverted off this area.
- North Fork of O'Dell Creek M2: At the secondary and smaller crossing, harden the stream banks with rock to prevent further degradation due to sheep crossing the stream.
- South Fork of O'Dell Creek (OD 5/T15S, R2W, Section 14, SW ¼) 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. However, mitigation is recommended to prevent the development of an adverse situation.
- South Fork of O'Dell Creek M1: 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 has been compiled to ensure the protection of cultural resources. The foundation of this outline is three fold: provide Section 106 services, 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 (BMPs) would be implemented for herbicide application. BMP measures have been proven effective across the country in managing non-point sources of pollution, and their implementation is required in both Idaho and Montana as part of the Clean Water Act (Seyedbagheri, 1996, Schuler and Briggs, USDA Forest Service, 2002)

BMPs for Herbicides

Table 5 Summary of buffer widths by herbicide

Herbicide	Recommended Buffer Width	Comment
2, 4 D amine	25 ft [a]	If using ester form, toxic to fish
Imazapyr	Up to Edge[b]	Low toxicity to fish and algae; Mobility pH dependent;
Picloram	25 ft[a] 164 ft	Known surface and groundwater contaminant; 25 ft buffer applies to surface water drainages; 164 ft buffer applies if herbicide applied near Station groundwater wells
Bromacil	25 ft[a] 164 ft	Known groundwater contaminant; 25 ft buffer applies to surface water drainages; 164 ft buffer applies if herbicide applied near Station groundwater wells
Clopyralid	25 ft[a] 164 ft	Considered moderately toxic to fish; 25 ft buffer applies to surface water drainages; 164 ft buffer applies if herbicide applied near Station groundwater wells
Triclopyr amine	Up to Edge[b]	If ester form used, can be persistent in aquatic environment
Diuron	25 ft[a] 164 ft	Known groundwater contaminant; Moderately toxic to fish and highly toxic to aquatic plants; 25 ft buffer applies to surface water drainages; 164 ft buffer applies if herbicide applied near Station groundwater wells
Non-aquatic Glyphosate	100 ft	Relatively low toxicity to birds, mammals and fish.

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

- A contingency plan, or emergency spill plan, will document notification requirements, time requirements for notification, spill management, and parties responsible for clean up. 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 would be taken into consideration: beneficial water uses, adjacent land use, rainfall, temperature, wind speed and direction, terrain, soils, vegetative type and aquatic life. Other consideration would be type of application, persistence on-site, foliage, spray pattern and droplets and carrier.

Monitoring

For design criteria prescribed at the sheep crossings, road to Blair Lake, and for the drainage at the mine pond exit, inspections would be conducted after high precipitation events and at the beginning of each season of use. Maintenance would be conducted as needed, based on inspections. It is recommended to establish key photo points for annual monitoring and writing a short description of recovery conditions. If monitoring indicates, further work is needed address issues through additional study to enhance restoration.

Project Location and Descriptions

The project area consists of the Agricultural Research Service lands as described below (see appendix A - Maps).

Properties (Agricultural Research Service, U.S. Sheep Experiment Station Owned Land Areas)

- Headquarters Property (Maps 4-11): 11N36E Sections: 1, 11, 12, 13, 14, 16, 22, 23, 24, 25, 26, 27, 34, 35, 36; Part of: 2, 9, 10, 15, 17, 20, 21, 28, 33. T11N37E Sections: 5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 19; Part of: 2, 3, 4, 11, 14, 20, 22, 23, 29, 30, 31. T10N36E Sections: 1, 2, 11, 12. T10NR37E Sections: Part of: 6, 7.
- Henninger Ranch (Map 12): T13N39E Sections: 25; Part of: 24, 36. T13N40E Sections: 19, 30.
- Humphrey Ranch (Maps 13-14): T14NR36E Sections: Part of 19, 20, 21, 22, 27, 28, 29
- Summer Range - split into East Summer Range and West Summer Range (Map 15 and Maps 16-17)

Grazing Areas (Subdivisions of the properties)

- Summer Range
  - West Pasture (broken into 2 units: West Odell Grazing Area and Big Mountain Grazing Area): T15SR2W Sections: 1, 2, 3, 4; Part of: 5, 9, 10, 11, 12, 13, 14, 15, 16, 22, 23. T15SR1W Sections: 4, 5, 6, 7; Part of 8, 9, 10, 18, 19. T14SR1W Sections: Part of 31, 32, 33, 34
  - East Pasture (also referred to as Tom's Creek Grazing Area): T14S1E: 34; Part of 25, 26, 27, 28, 32, 33, 35. T15S1E Sections: Part of 1, 2, 3, 4, 5, 6.
- Areas on Headquarters: Well Field and Crater Field

Grazing Units

- Summer Range includes: Each grazing area has grazing units and these are numbered
  - Odell Creek: 1 to 9;
  - Big Mountain: 1 to 5; and
  - Tom’s Creek: 1 to 11.
  - There are three inaccessible areas on summer range that are not numbered and are not grazed because of timber cover and steep slopes.
- Headquarters Property includes Grazing Units (All Headquarters pastures are also grazing units):
  - Rim Rock
  - Northwest Tank
  - Bird Bath
  - Northeast Tank
  - Burning Bush
  - Dipping Vat
  - Last Camp
  - Rocky Bluff
  - West Camp
  - Northwest Reservoir
  - Pole Line
  - Wagon Wheel
  - Rubber Tire
  - Enclosure
  - Bed Springs

Pastures

Pastures (Figure 10) are fenced areas on any properties used for grazing

- Pastures can be as large as a grazing area (e.g., Well Field and Crater Field) or as small as a grazing unit (e.g., all grazed pastures south of the Crater Field on the Headquarters property).
- They are independent of grazing areas and grazing units. They don't necessarily follow the grazing area or grazing unit boundaries.
- Headquarters - Well Field (eastern most pasture divided into several grazing units) and Crater Field (just west of the Well Field is also subdivided into several grazing units). All other grazing units at Headquarters are pastures.
- West summer range has two pastures used for horse grazing.

Exclosures

Exclosures (Figure 11) are not pastures. Grazing is excluded from exclosures.

Figure 10. East Summer Range - variety and amount of broad-leafed plants (cj 08/09)

Figure 11. Exclosure fence, West Summer, Odell Unit (cj 08/09)

Other Areas Used by U.S. Sheep Experiment Station Operation

Throughout the year, sheep utilize Bureau of Land Management (Map 2), Forest Service (Map 2), and Department of Energy (Map 2and 17) lands (see Cooperating Agencies, page 26). These lands will be included in this analysis as appropriate. However, use of these allotments for the allowed AUMs and grazing inclusive dates is covered under separate agreements with those agencies and are covered by the appropriate NEPA. Alternatives analyzed in this project are within the forage use decisions for the allotments.

Allotments or Grazing Allotments

- Bureau of Land Management grazed lands are allotments
- Forest Service grazed lands are allotments

Mud Lake Feedlot

Department of Energy land used by Agricultural Research Service is developed into a feedlot. It is referred to as Mud Lake Feedlot.

Purpose and Need

The purpose and need for this project is to provide for the continuation of historic and ongoing grazing and associated activities at the U.S. Sheep Experiment Station in support of the mission of the Agricultural Research Service, U.S. Sheep Experiment Station in Dubois, Idaho.

Agricultural Research Service

The Agricultural Research Service is the intramural research agency for the U.S. Department of Agriculture (USDA), and is one of four agencies that make up the Research, Education, and Economics mission area of the department. The Agricultural Research Service budget is allocated to research conducted in 22 national program areas. Research is conducted in 108 laboratories by ~2,200 full-time scientists within a total workforce of ~8,000 Agricultural Research Service employees. Their job is finding solutions to agricultural problems that affect Americans every day, from field to table. Agricultural Research Service conducts research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to: ensure high-quality, safe food, and other agricultural products. Unlike the Forest Service or Bureau of Land Management, Agricultural Research Service is not a land management agency, and is not subject to the Federal Land Management Policy Act or the Forest Service Organic Act. Agricultural Research Service is solely a research agency. As a research agency, Agricultural Research Service (in this instance, the U.S. Sheep Experiment Station) is not required to, nor does it manage its lands for multi-purpose public use.

Mission Statement, U.S. Sheep Experiment Station, Dubois, Idaho

The mission of the U.S. Sheep Experiment Station, Dubois, Idaho is to develop integrated methods for increasing production efficiency of sheep and to simultaneously improve the sustainability of rangeland ecosystems.

To contribute to USDA, Agricultural Research Service, National Programs; and to accomplish the Agricultural Research Service mission at the U.S. Sheep Experiment Station, Agricultural Research Service scientists address problems defined in the NP 101 and NP 215 (Formerly 205) Action Plans. Because of the connectivity among the National Programs and their components, a single experiment at the U.S. Sheep Experiment Station may contribute to multiple components of NP 101 and NP 215. This feature of the National Programs and U.S. Sheep Experiment Station programs will lead to an understanding of the interactions between sheep and the environments in which they are produced that can be used to improve sheep production systems and ensure the sustainability of grazing land ecosystems.

NP 101 Action Plan[3]:

Understanding, improving, and effectively using animal genetic and genomic resources; preserve and curate livestock and poultry genetic resources; develop and implement genome-enabled genetic improvement programs; enhancing animal adaptation, well-being and efficiency in diverse production systems; reducing reproductive losses; improving efficiency of nutrient utilization and conversion to animal products.

Component 1: Understanding, Improving, and Effectively Using Animal Genetic and Genomic Resources

Problem Statement 1B: Identify functional genes and their interactions.

Problem Statement 1D: Develop and implement genome-enabled genetic improvement programs.

[3] http://www.ars.usda.gov/SP2UserFiles/Program/101/2007-2012ActionPlan/101ActionPlan2007-2012FINAL.pdf (08/28/09)

Activities linked with this component: Sheep grazing, prescribed burning, seeding, cattle and horse grazing, predator avoidance and abatement

Proposed activities linked with Component 1 affect the production environment of sheep. Genetic improvement programs are needed to enhance adaptability, productivity, and suitability of sheep that are grazing western U. S. rangelands, and to enable the U.S. Sheep Experiment Station to develop and evaluate environmentally adapted breeds and genetic lines of sheep. Production environment affects the expression of functional genes linked to important production traits. Prescribed burning, seeding, and cattle and horse grazing are activities that influence availability of nutrients on western U.S. rangelands and, thus, the production environment of sheep. Predation influences grazing behavior and, thus, the amount of nutrients that sheep consume, retain, and excrete. Predator avoidance and (or) abatement, depending upon species, maintains safe and productive environments for research sheep. Understanding the effects of environmental conditions on gene function facilitates genetic improvement of sheep that graze western U. S. rangelands. Stakeholder acceptance of genetic improvement programs depends on these programs being tested in production environments similar to theirs.

Component 2: Enhancing Animal Adaptation, Well-Being and Efficiency in Diverse Production Systems

Problem Statement 2A: Enhance animal well-being and reduce stress in livestock and poultry production systems.

Problem Statement 2B: Reducing reproductive losses.

Problem Statement 2C: Improving efficiency of nutrient utilization and conversion to animal products.

Activities linked with this component: Sheep grazing, prescribed burning, seeding, cattle and horse grazing, predator avoidance and abatement, and integrated pest management

Proposed activities linked with Component 1 affect sheep well-being. Management strategies are needed to enhance sheep well-being in diverse production environments and ensure efficient reproduction and conversion of nutrients from rangelands to sheep products (milk, meat, and fiber). Environmental stressors influence animal well-being. Stress is inversely related to adaptability; when sheep readily adapt to an environment, stress is low. Nutrient harvesting (grazing) and utilization (digestion and retention) are related to adaptability; sheep adapted to an environment, efficiently seek, find, and consume adequate nutrients to support growth, health, and reproduction. Prescribed burning, seeding, and cattle and horse grazing are activities that influence availability of nutrients on western U.S. rangelands and, thus, the well-being of sheep. Excessive predator presence compromises the ability of sheep to adapt, which results in increased stress and reduced state of well-being. Predator avoidance and (or) abatement, depending upon species, maintains productive environments for grazing sheep. Understanding sheep adaptability to diverse environments facilitates development of management strategies that enhance the well-being of sheep that graze western U.S. rangelands. Stakeholder acceptance of sheep management strategies depends upon these strategies being tested in production environments similar to theirs.

Component 3: Measuring and Enhancing Product Quality

Problem Statement 3A: Developing systems for reducing variation in product quality and yield.

Activities linked with this component: Sheep grazing, prescribed burning, seeding, cattle and horse grazing, predator avoidance and abatement, and integrated pest management

Proposed activities linked with Component 1 affect quality of products (milk, meat, and fiber) from sheep. Production systems are needed to improve quality and consistency of products from sheep that are grazing diverse rangeland environments of the western U.S. Environment influences expression of product-linked genes and state of well-being in grazing sheep. Prescribed burning, seeding, and cattle and horse grazing are activities that influence nutrient availability, which directly affects production efficiency and quality of sheep products. Excessive predator presence influences sheep well-being. Predator avoidance and (or) abatement, depending upon species, maintains productive environments where genetic improvements in product quality can be realized. Sheep grazing is a component of integrated pest management systems that are designed to control invasive plant species, such as leafy spurge, by conducting this activity we can determine the effects of systems that focus grazing on these invaded communities on product quality and yield. Understanding expression of product-linked genes in sheep grazing diverse environments facilitates development of production systems that result in high-quality, consistent sheep products for consumers. Stakeholder acceptance of sheep production systems depends upon these systems being tested in production environments similar to theirs.

NP 215 (Formerly 205) Action Plan[4]:

Develop and transfer economically viable and environmentally sustainable production and conservation practices, technologies, plant materials and integrated management strategies, based on fundamental knowledge of ecological processes, that conserve and enhance the Nation's diverse natural resources found on its range, pasture, and hay and turf lands.

NP215: Objective A.2

Ecosystems and their sustainable management; rangeland management systems to enhance the environment and economic viability; grazing management; livestock production and the environment; and integrated management of weeds and other pest's components.

Beneficiaries of the Program:

> Many entities will benefit from this national program, which addresses such an important and pervasive natural resource base. It will benefit the Nation's livestock producers who utilize both harvested and grazed forages in their agricultural operations and the action agencies such as the Natural Resource Conservation Service and Cooperative Extension that provide technologies and knowledge to these producers. This program also will benefit federal land stewardship agencies such as the Bureau of Land Management, Forest Service, National Park Service, Fish and Wildlife Service, Bureau of Indian Affairs, and U.S. Geological Survey (USGS), that are responsible for almost a billion acres of publicly owned lands. Beneficiaries include state land management agencies responsible for state-owned grazing lands and resource managers, policymakers, and both rural and urban community organizations that need information and technologies to evaluate and manage their rangeland resources. Finally, the public at large will benefit through improved management of the Nation's range, pasture, forage and turf

[4] http://www.ars.usda.gov/SP2UserFiles/Program/205/215ActionPlan_Jan07.pdf (08/28/09)

lands through greater economic opportunities, access to high quality food, fiber and recreational opportunities, and enhanced environmental services.

Component 1: Rangeland Management Systems to Enhance the Environment and Economic Viability.

Problem Statement A: Need for economically viable rangeland management practices, germplasm, technologies and strategies to conserve and enhance rangelands ecosystems.

Problem Statement B: Need for improved livestock production systems for rangelands that provide and use forages in ways that are economically viable and enhance the environmental sustainable.

Problem Statement C: Need for improved rangeland restoration, rehabilitation and mitigation practices, germplasm, tools and strategies to restore rangeland integrity in a manner that is economically feasible and environmentally acceptable.

Activities linked with this component: Sheep grazing, prescribed burning, seeding, cattle and horse grazing, predator avoidance and abatement, and integrated pest management

Proposed activities are linked with Component 1. These activities are necessary for developing management practices that enhance viability and productivity of western U.S. grazing lands. Prescribed burning and integrated pest management (IPM) activities allow us to determine the effect of these management activities on environment and rangeland productivity. Effects of sheep grazing as an IPM component on sheep productivity are being evaluated, thus IPM and sheep grazing activities are required. Cattle and horse grazing are required to manage decadent forage, maintain range condition, and reduce the risk of fire on research lands. Seeding is required to evaluate restoration, rehabilitation, and mitigation activities to manage disturbed sites (e.g., road sides, firebreaks, historical borrow pits, and mines) that may be susceptible to weed invasion or erosion. Sheep grazing, prescribed burning, seeding, cattle and horse grazing, and IPM are components necessary to developing rangeland monitoring tools. Seeding, prescribed burning, and sheep grazing activities are needed to evaluate plant species that are developed for rangeland improvement programs. Predator avoidance and (or) abatement, depending upon species, is necessary to maintain sheep grazing density and duration at levels specified by research objectives.

Component 2: Pasture Management Systems to Improve Economic Viability and Enhance the Environment

Problem Statement D: Need for appropriate plant materials to improve the economic viability and enhance the environment in pasture-based livestock systems.

Problem Statement J: Need for economically viable, energy efficient and environmentally enhancing production systems for establishing, growing, maintaining, harvesting, treating, storing and transporting forages for livestock, bioenergy, bioproducts and conservation objectives.

Activities linked with this component: Sheep grazing, seeding, and integrated pest management

The proposed activities are required to plant, establish, maintain, and evaluate forages, collected or developed by collaborating scientists, on improved pasture in a sheep grazing system.

Background

U.S. Sheep Experiment Station is using a phased approach to achieve NEPA compliance for its research activities. Phase I, an interim EA (*Interim U.S. Sheep Experiment Station Grazing and Associated Activities Project* (http://www.ars.usda.gov/SP2UserFiles/Place/53640000/20081126-Agricultural Research Service-USSES-EA.pdf)), was completed on November 28, 2008 and covered:

- The sheep grazing and associated activities on the Agricultural Research Service lands that have historically occurred and are ongoing in support of research projects currently being conducted.
- The time necessary (through March 2010) to complete an environmental analysis (Phase 2) to consider the long-term effects of sheep grazing and associated activities needed to facilitate research at the U.S. Sheep Experiment Station

Phase II consists of completion of a NEPA document which analyzes the long-term impacts of the historic grazing and associated activities that support the research at the U.S. Sheep Experiment Station.

Historical Background, U.S. Sheep Experiment Station, Dubois, Idaho

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

The U.S. Sheep Experiment Station was established as a sheep breeding and rangeland grazing research facility. To provide the natural resource base for sheep and grazing research, lands were withdrawn from the public domain in 1915, 1916, 1919, and 1922. Presidents Woodrow Wilson and Warren G. Harding withdrew the lands with Executive Orders 2268, 2491, 3141, 3165, and 3767. Public Law 97-98-Dec. 22, 1981, clarified administrative jurisdiction of Agricultural Research Service lands, which rests solely with the Secretary of Agriculture, and the purpose of Agricultural Research Service lands, which are designated for "agricultural experiment purposes." There are no detailed records of land use prior to the U.S. Sheep Experiment Station establishment. Livestock grazing research under the Agricultural Research Service ownership, which dates from circa 1918, predates the county. High elevation summer ranges were probably used for sheep grazing, which was a common practice at that time (possibly cattle but more likely sheep).

Addition of Summer Range

Between 1940 and 1942, the U.S. Sheep Experiment Station purchased the Humphrey and Henninger Ranches from the private sector. Prior to purchase, the Humphrey and Henninger Ranches were used

primarily for livestock production, but also for farming, crop land, and hay. Before transfer to the Agricultural Research Service, Henninger was grazed at much heavier rates than it is today.

Research at the U.S. Sheep Experiment Station, Dubois, Idaho

Since its research began, circa 1918, the U.S. Sheep Experiment 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 U.S. Sheep Experiment Station has been ongoing since the 1920s, and the research has produced unmatched information on managing grazing on sagebrush steppe to preserve native ecosystems.

Current U.S. Sheep Experiment Station research is aimed at:

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

U.S. Sheep Experiment Station research involves at least 34 scientists at nine Agricultural Research Service locations and 10 universities in seven states, in addition to the scientists at the U.S. Sheep Experiment 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 U.S. Sheep Experiment 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. U.S. Sheep Experiment 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 is often rewritten for various trade magazines.

U.S. Sheep Experiment 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 U.S. Sheep Experiment 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 U.S. Sheep Experiment Station each year to learn more about the research or ask for comments on various issues associated with sheep production and rangeland management.

Cooperating Agencies

In addition to Agricultural Research Service lands, National Forest, Snakey – Kelly, East Beaver, and Meyers Creek Allotments, Bureau of Land Management: Bernice Allotment, and Department of Energy, Mud Lake Feedlot are also used for sheep research and grazing operations. When not being grazed, the sheep are maintained at the Mud Lake feedlot facility and in the feedlot facilities at U.S. Sheep Experiment Station headquarters. Mud Lake facilities includes sheep pens, water stations, feed storage facilities, feed mixing and delivery equipment, tractors to power feed mixing and delivery equipment, and pen cleaning equipment. Harvested feeds (e.g., alfalfa hay, barley straw, small grains, corn, and various coproducts) are used to formulate balanced diets to feed the sheep when they are in the Mud Lake feedlot (Moffet, 2008).

United States Department of Agriculture

Separate NEPA documentation covering these permits and agreements was completed by the U.S. Forest Service and Bureau of Land Management (see project file document T1).

U.S. Forest Service, Caribou-Targhee National Forest

Forest Service Agreement 07-IA-11041561-025: This agreement documents the coordination and authorization of the use of National Forest Service Land administered by the Caribou-Targhee National Forest by the U.S. Sheep Experiment Station for research purposes. The intention is that "the research and investigation work shall be for the benefit of the entire sheep and range industry in Idaho and adjacent states, and for the general benefit of the People of the United States.[5]" This document authorizes the U.S. Sheep Experiment Station to graze sheep at no cost on Forest Service land administered by the Dubois and Island Park Ranger districts as follows (Table 6; Map 2):

Table 6. Sheep grazing authorized on Forest Service System lands

Number	Class	Period	Allotment
933	Ewe/Lamb	07/03 – 09/06	Meyers Creek (Island Park Ranger District)
1,210	Dry	06/16 – 09/15	East Beaver Creek (Dubois Ranger District)
1,200		11/06 – 01/02	Snakey Canyon (Dubois Ranger District)
1,000		11/20 - 0103	Kelly Canyon (Dubois Ranger District)

[5] USDA, Forest Service/Agricultural Research Service, USSES. July 2007. Forest Service Agreement 07-IA-11041561-025

Forest Service Agreement 58-5364—6-142N: The objectives of this cooperative project are to 1) determine the effects of the Continental Divide National Scenic Trail on ecosystem processes on USDA, Agricultural Research Service, Agricultural Research Service lands in the Centennial Mountains of Montana and Idaho and 2) to create a mechanism for completing the construction and accomplishing the maintenance of the trail through the Centennial Mountains.[6] The agreement coordinates trail condition and maintenance activities by the Forest Service on the portion of the trail on Agricultural Research Service lands (see Maps 14-16, Figure 12).

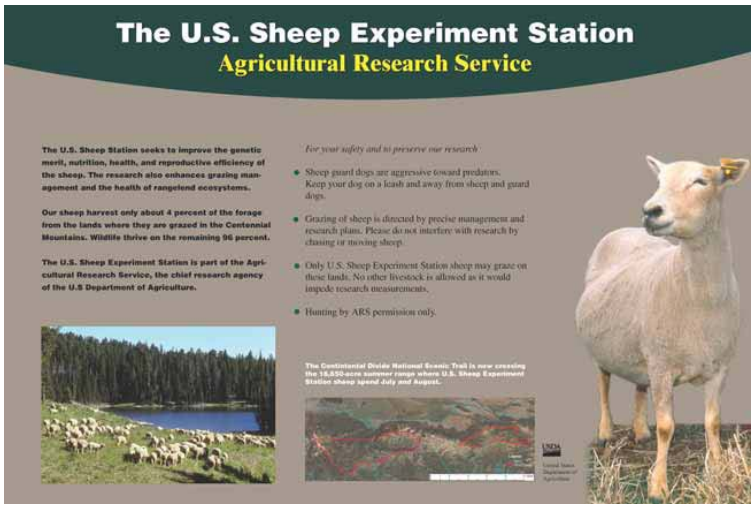


Figure 12. U.S. Sheep Experiment Station informational signs posted along the Continental Divide National Scenic Trail

United States Department of the Interior

Bureau of Land Management – 2007

Memorandum of Understanding Between USDI Bureau of Land Management, Upper Snake Field Office and the USDA Agricultural Research Service, U.S. Sheep Experiment Station: The purpose of this Memorandum of Understanding is to document, coordinate and authorize the use of public lands known as the Bernice Allotment, administered by the Bureau of Land Management, upper Snake Field Office for research purposes. Research is allowed for the mutually-desired purpose of managing the Bernice Allotment for scientific research while maintaining or improving the ecological condition of the native vegetative communities within the allotment. Research shall be conducted by the U.S. Sheep Experiment Station for the benefit of the entire sheep and range industry in Idaho and adjacent state, and for the general benefit of the People of the United States. [7] The Memorandum of Understanding authorizes the U.S. Sheep Experiment Station to graze sheep at no cost on public lands within the Bernice Allotment, managed by the Upper Snake Field Office under the terms and conditions previously analyzed in Environmental Assessment #ID -70-00-010 as follows (see Map 2):

Table 7. Sheep grazing authorized on the Bernice Allotment

Livestock Number	1,050 Sheep for each grazing period	
Grazing Begin	11/23	12/06
Period End	02/01	02/05
Type Use	Active	
AUM [a]	490	428

[a] AUM as expressed above is = amount of forage a 1,000 pound cow or equivalent would consume in one month, based on an average 26 pounds of dry forage per day. (From the Society of Range Management Glossary)

[6] , Forest Service/Agricultural Research Service. January 2006. Forest Service Agreement 58-5364-6-142N.
[7] USDI, BLM/USDA, Agricultural Research Service, USSES. December 2007. Memorandum of Understanding Between USDI Bureau of Land Management, Upper Snake Field Office and the USDA Agricultural Research Service, U.S. Sheep Experiment Station.

United States Department of Energy

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

Atomic Energy Commission Contract No. AT (10-1)-1154: The purpose of this Memorandum of Understanding is for the US Atomic Energy Commission represented by its Idaho Operations Office to grant a license to the USDA, Agricultural Research Service to allow the Agricultural Research Service to occupy, use and maintain a winter feeding area for experimental sheep on its premises called the "Range" within the Commission's National Reactor Testing Station (see Maps 2 and 17).[8]

Current Status

The U.S. Department of Agriculture (USDA), Agricultural Research Service, U.S. Sheep Experiment Station is located in the upper Snake River plain at the foothills of the Centennial Mountains, approximately six miles north of Dubois, Idaho, which is the Clark County seat. Clark County contains 1,765 square miles of land and has a population of approximately 980 persons, approximately 500 of whom live in Dubois. The U.S. Sheep Experiment Station is the second largest employer in Clark County.

Headquarters for the U.S. Sheep Experiment Station is located within a two-hour drive of Grand Teton and Yellowstone National Parks. The Continental National Scenic Divide Trail crosses U.S. Sheep Experiment Station land in the Centennial Mountains of Montana.

The U.S. Sheep Experiment Station has research land in two states (See Cover Page Map and Maps 1 and 2):

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

The lands range in elevation from approximately 4,800 feet to nearly 10,000 feet, with average annual precipitation that ranges from approximately 10 inches in the Snake River plain to about 45 inches in the Centennial Mountains. Because of its diverse geography, Agricultural Research Service lands contain subalpine meadow, foothill, sagebrush steppe, and desert shrubland ecosystems. This diversity provides unparalleled research opportunities within Agricultural Research Service.[9]

[8] DOE, AEC/USDA, Agricultural Research Service. February 1963. Memorandum of Understanding Between The United States Atomic Energy Commission and the United States Department of Agriculture, Agricultural research Service, Animal Husbandry Research Division

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

Decisions to Be Made

An environmental analysis will evaluate the site-specific issues the public has with the proposed action, consider alternatives to the proposed action, and analyze effects of the proposed action and alternatives on the environment. Based on the purpose and need identified for the U.S. Sheep Experiment Station Grazing and Associated Activities Project, the scope of the project is limited to decisions concerning activities within the U.S. Sheep Experiment Station Grazing and Associated Activities Project Area. The environmental analysis will provide the deciding official with the information to make the following decisions with regard to the Interim U.S. Sheep Experiment Station Grazing and Associated Activities Project:

- Which actions, if any, will be approved, and
- What additional mitigation measures and monitoring requirements may be needed to protect resources?

The deciding official is Andrew C. Hammond, Agricultural Research Service Pacific West Area Director.

Public Involvement

Scoping

A scoping document was posted on the USDA, Agricultural Research Service, U.S. Sheep Experiment Station, Dubois, Idaho website (http://www.ars.usda.gov/News/docs.htm?docid=17878) and mailed to approximately 100 individuals, organizations, and agencies on April 9, 2009. Approximately 17,500 comments were received. These included 17,397 form letter emails from one organization and approximately 66 additional form letter emails. Complete details of scoping comments received can be found in the project file.

Observers

Field surveys were conducted by USDA Forest Service, TEAMS Enterprise specialists during the following dates in 2009:

- June 21 through June 26
- July 6 through July 14
- August 4 through August 6
- August 17 through
- August 28 through September 2

Observers on the various trips included representatives from Western Watersheds and Defenders of Wildlife.

Consultation

US Fish and Wildlife Service

2008 – Interim U.S. Sheep Experiment Station and Associated Grazing Activities. The project biologist met informally several times with United States Fish and Wildlife Service (FWS) staff in Chubbuck, Idaho (personal communication, Arena). The initial meeting conducted on May 6, 2008 familiarized the FWS biologist with the project location and description of proposed activities. At that time, the project biologist and FWS biologist reviewed a list of species in or near the project area having federal status. A preliminary discussion of species occurrences in the area and potential project effects indicated that Canada lynx was the only federally-listed species and that effects are unlikely or minimal. Ute's Ladies'-tresses (*Spiranthes diluvialis*) was also reviewed and found that habitat was not present. Regarding the Northern Rocky Mountain Gray Wolf Distinct Population Segment, a court injunction restored federal listing status as a nonessential experimental population on July 18th, 2008. Additional phone calls and email exchanges occurred in September and October, 2008 to review potential effects to species, clarify procedural questions, and agree that USSES would work with the Chubbuck, ID FWS office as the lead contact. On December 9, 2008, the Fish and Wildlife Service concluded the consultation process for the interim grazing activities by providing written concurrence with the biologists determination of effects on listed species which included "Not Likely to Adversely Affect" Canada lynx (USDI Fish and Wildlife Service, 2008). Similarly, they acknowledged the biologists determination that the project was "Not Likely to Jeopardize the Continued Existence of Gray Wolf".

2009 - U.S. Sheep Experiment Station and Associated Grazing Activities. On August 14, 2009, the biologist met with the Fish and Wildlife Service in Chubbuck, ID to again start the process of consultation. This phase of the project is the same as the interim phase, but activities and effects are considered over a longer time period, and with more extensive scoping and public review. At the time of this meeting, (USDI Fish and Wildlife Service, 2009) Canada lynx was the only listed species in the project area. The northern Rocky Mountain distinct population segment of gray wolf had been delisted on May 4, 2009. Litigation is underway regarding Northern Rocky Mountain DPS of gray wolf, which could change its current status from delisted, and return it to its previous status as a nonessential experimental population.

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

Based on pending litigation and/or status reviews for Greater sage-grouse, pygmy rabbit, and northern Rocky Mountain gray wolf, there is a possibility that one or all the species could become federally listed. These species occur on USSES properties and should they become listed, the USSES would need to initiate (or reinitiate) consultation on the potential effects the proposed activities may have on these newly listed species. In light of the potential listing of these species, the wildlife analysis performed for the current EA considered whether continued operation of the proposed action would make any irreversible or

irretrievable commitment of resources to these three species, vis-à-vis effects analysis, and found that continued operations would not make such a commitment. For the wolf, USSES activities were analyzed in the 2008 Wildlife report when the wolf was designated as a nonessential experimental population. The biologist's analysis and "No Jeopardy" determination was reviewed and recognized by the USFWS. Since the activities and effects of the current project are the same as analyzed in 2008 but over a longer period of time, the previous determination would be applicable until the need to reinitiate consultation is considered and/or completed. Should sage-grouse or pygmy rabbit become listed or critical habitat designated within the project area, prescribed burning activities would be deferred until consultation is completed. The current project proposal would not hinder or prevent (foreclose) the USSES from implementing reasonable and prudent alternatives to protect those species (such as delaying prescribed fire treatments or modifying grazing strategies) until the consultation process is completed.

State Historic Preservation Officer

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

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

Informal communication has begun with both Montana and Idaho State Historic Preservation Offices. A draft of the Heritage Management Plan outline has been shared with both offices. This outline discloses the process by which Section 106 will be completed. Formal consultation with both State Historic Preservation Offices will begin with the initiation of the Section 106 process. Currently data is being collected to begin a pre-field analysis, with surveys scheduled in the Spring of 2010.

Tribal Consultation

Letters were sent to representatives of the Shoshone-Bannock Tribes.

A letter was received from the Shoshone-Bannock Tribes (Alonzo A. Coby) on November 25, 2009. The tribe's comments have been considered in the analysis. The Agricultural Research Service and the Fort Hall Business Council of the Shoshone-Bannock Tribes are currently involved in discussions to establish a Government – to Government relationship.

Alternatives

Seven alternatives were considered in the development of this analysis:

- One (1) Proposed Action (same as No New Federal Action)
- Six (6) alternatives eliminated from detailed study

- Four (4) alternatives to the Proposed Action studied in detail

Alternatives to the Proposed Action may come from several sources:

1. Developed in response to unresolved issues with the Proposed Action;
2. Developed in response to new information; and
3. Suggestions from the public during scoping.

As there were no unresolved issues from scoping comments, there was no need to develop issue-driven alternatives. There was no new information that would result in development of an alternative to the proposed action.

There were numerous alternatives suggested by the public during scoping, many of which were iterations of similar suggestions. A number of alternatives suggested by the public were considered but eliminated from detailed study for various reasons (Alternatives eliminated from Detailed Consideration).

The remaining alternatives suggested by the public had four main themes:

1. Elimination of sheep grazing all together;
2. Elimination of sheep grazing in the Centennial Mountains to eliminate potential carnivore/livestock conflict in the wildlife corridor along the Centennials between Yellowstone and the central Idaho ecosystem;
3. Elimination of sheep grazing adjacent and within in the grizzly bear primary conservation area (PCA) to eliminate potential carnivore/livestock conflict with the grizzly bear and sheep (Note: Agricultural Research Service lands are not within the grizzly bear primary conservation area.); and
4. Elimination of domestic sheep grazing that is a potential threat to big horned sheep populations.

Alternatives to be considered in detail were developed in response to these public suggestions (Alternatives Considered in Detail).

Alternatives Eliminated From Detailed Consideration

1. Terminate the existence of the Sheep Experiment Station, restore all public lands currently used by the Sheep Experiment Station back to usage by the ecosystem's native wildlife, and end all Congressional appropriations that might perpetuate the Sheep Experiment Station

The United States sheep industry depends on research data from the U.S. Sheep Experiment Station, Dubois, ID and its collaborators, to improve the genetic potential of the nation's maternal and paternal breeds or composite lines of sheep, improve nutritive and reproductive efficiency of sheep, improve sheep grazing practices, and improve land and ecosystem management. The majority of the sheep in the U.S. are produced west of the 100th meridian, which represents the historical boundary between the moist east and the arid west. U.S. Sheep Experiment Station, Dubois, ID research is more applicable to the nation's sheep flock, and lands on which the majority of the nation's sheep are grazed, than is research conducted east of the 100th meridian. The U.S. Sheep Experiment Station, Dubois, ID is the only USDA, Agricultural Research Service location that is focused solely on sheep research, and the only USDA, Agricultural Research Service location that can address sheep and sheep grazing issues that are focused on the region where most of the nation's sheep are produced.

The USDA, Agricultural Research Service, U.S. Sheep Experiment Station occupies a tiny portion of the federal land in Idaho and Montana. Wildlife in the region is permitted to cross USDA, Agricultural Research Service lands. Based on the available evidence, the results of implementing this alternative would not be expected to change wildlife populations or movements or improve rangeland health. However, implementing this alternative would prevent the USDA, Agricultural Research Service from conducting research aimed at improving the genetic potential of the nation's maternal and paternal breeds or composite lines of sheep west of the 100th meridian, improve nutritive and reproductive efficiency of sheep west of the 100th meridian, improve sheep grazing practices west of the 100th meridian, and improve land and ecosystem management west of the 100th meridian.

Thus, this alternative was eliminated.

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

See response to #1 above.

Moreover, the USDA, Agricultural Research Service does not have other lands that would support research that is focused on improving sheep productivity and grazing land and ecosystem management west of the 100th meridian. Based on the available evidence, the results of implementing this alternative would not be expected to change wildlife populations or movements or improve rangeland health. The results of implementing this alternative would prevent the USDA, Agricultural Research Service from conducting research aimed at improving the genetic potential of the nation's maternal and paternal breeds or composite lines of sheep west of the 100th meridian, improve nutritive and reproductive efficiency of sheep west of the 100th meridian, improve sheep grazing practices west of the 100th meridian, and improve land and ecosystem management west of the 100th meridian.

Thus, this alternative was eliminated.

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

This alternative was eliminated because there are no lands in the vicinity of USDA, Agricultural Research Service, U.S. Sheep Experiment Station Headquarters that are comparable, in terms of research opportunities and forage quantity and quality, to the East and West Summer Ranges. In addition, the proximity of the East and West Summer Ranges to U.S. Sheep Experiment Station Headquarters, where U.S. Sheep Experiment Station scientists and technicians are housed, is ideal for the efficient execution of research projects.

4. *Phase out existing sheep allotments and limit grazing of U.S. Sheep Experiment Station sheep to Agricultural Research Service lands*

USDA, Agricultural Research Service, U.S. Sheep Experiment Station grazing on USDA, National Forest Service system lands and DOI, Bureau of Land Management land permits the U.S. Sheep Experiment Station to minimize the grazing pressure on all of the lands. Based on the available evidence, the results of implementing this alternative would not be expected to change wildlife populations or movements or improve rangeland health. If U.S. Sheep Experiment Station grazing on Forest Service and DOI lands were eliminated, the U.S. Sheep Experiment Station would have no access to winter grazing, because snow depth on U.S. Sheep Experiment Station land exceeds the ability of sheep to reach forage, and sheep would have to be kept in feedlots. Keeping U.S. Sheep Experiment Station in feedlots would preclude meaningful genetic evaluation of sheep that are

intended for lands west of the 100th meridian. Eliminating summer grazing on one portion of Forest Service land would create serious animal welfare issues because ewes and their lambs would be forced to compress a one- to two-week trail into one day. A number of ewes and lambs would die from such trailing stress, and this would violate the Animal Welfare Act. Eliminating summer grazing on another portion of National Forest Service system lands would force the U.S. Sheep Experiment Station to increase grazing pressure on U.S. Sheep Experiment Station Headquarters land.

Thus, this alternative was eliminated.

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

Based on the evidence, U.S. Sheep Experiment Station actions are compatible with the landscape and wildlife in the area, and implementing this alternative would not be expected to benefit wildlife populations or the landscape. Grazing and research that requires a grazing component are the only uses of USDA, Agricultural Research Service lands that are relevant to Agricultural Research Service national programs because the land is not suitable for cultivation.

Thus, this alternative was eliminated.

6. *Use bison when supplemental grazing is needed*

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

Thus, this alternative was eliminated.

7. *Require the use of temporary electric fencing around domestic sheep in grizzly habitat*

The suggestion to use temporary electric fence to contain U.S. Sheep Experiment Station sheep on open-grazing lands in the Centennial Mountains is not feasible.

Because the comment about using temporary electric fence was not specific, three scenarios were considered. Each scenario would force the U.S. Sheep Experiment Station to graze considerably more heavily than they have historically, and each scenario would cause a dramatic increase in human and horse traffic and land disturbance. It was concluded that the increased grazing pressure and human and horse traffic would have immediate and long-lasting negative effects on the land. Also, the increased grazing pressure would compromise the value of U.S. Sheep Experiment Station research to determine the effects of herded sheep on subalpine ecosystems and to develop improved methods for sustaining or enhancing subalpine ecosystems.

a. In Scenario 1 (i.e., keeping sheep behind electric fence at night), the U.S. Sheep Experiment Station calculated that approximately five acres of fenced land per band per night would be required to provide the amount of space and feed per animal to protect animal health and security and meet Agricultural Research Agency, Institutional Animal Care and Use requirements for ensuing the welfare of the station sheep, all of which are used solely for research. However, the practice of curtailing grazing early in the evening to drive sheep into corrals for the night is likely to increase animal distress, alter grazing behavior and feed consumption, and reduce animal performance. In addition, temporary electric fence in a remote location is not likely to be adequate to accomplish the goals (i.e., safely contain sheep and effectively deter predators) for a predator-resistant fence (see, http://ufdcweb1.uflib.ufl.edu/ufdc/?m=hd1J&i=176976).

   Because the U.S. Sheep Experiment Station has a bed-as-you-go policy, which means that sheep are bedded when they voluntarily stop grazing for the day and only use a bed ground for one night, a new five-acre fenced bed ground area would have to be constructed every day for each of band of sheep. The ewes and lambs are divided into two bands, and each band is managed independently. Thus, two five-acre fenced areas would be required each night, and approximately 1,900 feet of fence would be required to enclose each five-acre bed ground. Because of the time and labor required to construct, remove, move, and reconstruct each fenced area each day, it was, determined that two sets of fencing materials would be required for each band of sheep so that fences are in place and fully operational one day in advance of use. For two bands of sheep, that would include approximately 7,600 feet of fence, at least 150 posts, clips to attach the fence to the posts, at least four fence chargers, at least eight large storage batteries, enough solar panels to keep all of the batteries charged, warning signs, and string trimmers to clear a path for the fence to prevent vegetation from providing a path for the current to go to ground.

   Based on manufacturers' specifications, materials for each 5-acre fenced area would weigh approximately 2,200 pounds. To protect the health and welfare of our horses, the U.S. Sheep Experiment Station limits the load per horse to approximately 150 pounds. Because the station use saddle and pack horses, and not motorized vehicles on Agricultural Research open range in the Centennial Mountains, approximately 19 horses would be used each day to transport supplies and people to remove and reconstruct fence. This equates to approximately 133 horse-use days per week to remove and reconstruct fence, compared with the current requirement of zero horse-use days per week to remove and reconstruct fence. Currently, approximately 35 horse-use days per week are required to herd the sheep, quantify grazing activities, and take supplies to and remove trash from the sheep herders. The U.S. Sheep Experiment Station determined that a four-person fencing crew (i.e., approximately 50 percent of the U.S. Sheep Experiment Station operations staff) would require approximately 10 hours each day to travel from U.S. Sheep Experiment Station Headquarters to fence sites, remove and reconstruct fence, and return to U.S. Sheep Experiment Station Headquarters.

   To provide adequate feed and proper care for the horses, the size of the horse corrals and pastures in the Centennial Mountains would have to be approximately five times as large as the current corrals and pastures. This would cause a proportionate increase in vegetation, water, and land use.

b. In Scenario 2 (i.e., fence all of the land that we expect to be grazed during one day), the U.S. Sheep Experiment Station calculated that it would need to fence two areas of approximately 50 acres per area each day. This would require five times more equipment and supplies, plus a proportionate increase in horse-use days and time, than Scenario 1.

c. In Scenario 3 (i.e., fence all of the land that would be grazed during a 50-day grazing season), the U.S. Sheep Experiment Station calculated that they would need to fence approximately 4,500 acres

each year, maintain the fence during the grazing season, and then remove the fence at the end of the grazing season. This would require 90 times more equipment and supplies than Scenario 1. In addition, predators would have to be moved to the outside of the fence, so that predators are not fenced in with the sheep. Such a fence would prevent the free movement of wildlife across USDA, Agricultural Research Service, U.S. Sheep Experiment Station lands in the Centennial Mountains.

None of the scenarios are feasible because they limit the ability of the U.S. Sheep Experiment Station to use its adaptive management procedures, which have enhanced the value of U.S. Sheep Experiment Station research programs and improved the management of grazing lands. Moreover, the logistics of using temporary electric fencing, while remaining in compliance with Agricultural Research Service animal care and use regulations, is untenable, and the U.S. Sheep Experiment Station was unable to find any objective evidence that temporary electric fencing is an effective method for deterring grizzly bears. All of the scenarios would compromise the ability of the U.S. Sheep Experiment Station to accomplish research objectives and our mission, have negative effects on the natural resources, including soils and vegetation, and have negative effects on the aesthetic value of the landscape. In addition, fencing the large areas in Scenarios 2 and 3 would impede the movement of wildlife in the area.

Alternatives (1-5) Considered in Detail

Descriptions of alternatives 2-5 display the differences between the alternative and the proposed action (Alternative 1). Table 8 displays the properties where grazing would or would not occur under alternatives 1-5. When not being grazed, sheep are maintained at the Mud Lake feedlot (see Table 1 page 2).

Table 8. Grazing properties by alternative

<table>
<tr><th rowspan="2">Properties</th><th>Alternative 1</th><th>Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternative 5</th></tr>
<tr><td>proposed action / no new federal action</td><td>No grazing would occur on the Headquarters, East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, Bernice, and Meyers Creek allotment</td><td>No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.</td><td>No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment</td><td>No grazing would occur on Snakey Kelly and Bernice Allotments</td></tr>
<tr><td colspan="6">Agricultural Research Service (Agricultural Research Service)</td></tr>
<tr><td>Headquarters</td><td rowspan="5">Grazing</td><td rowspan="5">No Grazing</td><td>Grazing</td><td rowspan="3">Grazing</td><td rowspan="5">Grazing</td></tr>
<tr><td>Humphrey</td><td>No Grazing</td></tr>
<tr><td>Henninger</td><td>Grazing</td></tr>
<tr><td>East Summer</td><td rowspan="2">No Grazing</td><td>No Grazing</td></tr>
<tr><td>West Summer</td><td>Grazing</td></tr>
<tr><td colspan="6">Leased (DOE, USDA- Forest Service, DOI-Bureau of Land Management)</td></tr>
<tr><td>Mud Lake Feedlot</td><td rowspan="4">Grazing</td><td>Grazing</td><td rowspan="2">Grazing</td><td rowspan="2">Grazing</td><td>Grazing</td></tr>
<tr><td>Snakey-Kelly</td><td rowspan="3">No Grazing</td><td>No Grazing</td></tr>
<tr><td>East Beaver</td><td rowspan="2">No Grazing</td><td rowspan="2">Grazing</td></tr>
<tr><td>Meyers Creek</td><td>No Grazing</td></tr>
<tr><td>Bernice</td><td>Grazing</td><td>Grazing</td><td>No Grazing</td></tr>
</table>

Alternative 1 - Proposed Action – No New Federal Action

The proposed action is also the no new federal action alternative, because no new federal actions are proposed, merely a continuation of the historic and existing activities already occurring on the U.S. Sheep Experiment Station, Dubois, Idaho. The proposed action would continue ongoing sheep grazing and associated activities that have been historically occurring in conjunction with U.S. Sheep Experiment 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 U.S. Sheep Experiment Station to carry out the mission for which it was established by executive order and public law (see page 24). Details of the proposed action and mitigations are found beginning on page 1.

Alternative 2 (Map 18)

Alternative 2 is considered a 'no grazing' alternative.

There would be 1,166 sheep retained at Mud Lake. Only 158 AUMs are grazed at Mud lake; sheep are maintained in feedlots.

Table 9. Alternative 2: Projected annual AUM[a] utilization per property within the approximate[b] that are specified. The calculations are based on 1,166 sheep[c]; a 65% reduction in Alternative 1 sheep inventory (Taylor pers. comm. 2009).

Properties	AUM [a] Available	AUM [a] Utilized	Utilization Percent	Approximate [b] Grazing Dates
Agricultural Research Service (Agricultural Research Service)	**48,667**	**0**	**-**	
Headquarters	28,353	0	NA	NA
Humphrey	4,476	0	NA	NA
Henninger	1,914	0	NA	NA
East Summer (Tom's Creek)	4,043	0	NA	NA
West Summer (Odell Creek/ Big Mountain)	9,881	0	NA	NA
Leased (DOE, USDA- Forest Service, DOI-Bureau of Land Management)	26,087	158	0.6 %	
Mud Lake	560	158	28.2 %	April - September
Snakey-Kelly	1,756	0	NA	NA
East Beaver	17,877	0	NA	NA
Meyers Creek	3,076	0	NA	NA
Bernice	2,808	0	NA	NA

[a] Animal Unit Month. By definition, one (1) AUM represents 790 lbs of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. For the purposes of this table, five (5) sheep[c] are equivalent to one (1) AUM.

[b] Depending on climatic 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).

Alternative 2 was developed to respond to the public suggestion that sheep grazing be eliminated completely from the U.S. Sheep Experiment Station operation (suggestion #1, page 32). See Table 8 for properties used for grazing. Animal units are based on a 65 percent reduction from Alternative 1 sheep inventory, which resulted in 1,166 head retained for research purposes. Table 9 demonstrates the expected distribution of AUM utilization (sheep only). Until new grazing lands are obtained, all sheep would be

maintained at the Mud Lake Feedlot where harvested feeds would be fed daily to meet the nutrient needs of the sheep. The reduction in sheep inventory was necessary to remain within available funds for purchasing harvested feeds and maintaining a feedlot facility. There are a few grazeable acres at the Mud Lake facility. A small contingent of sheep (~130 head) would graze the lands surrounding Mud Lake Feedlot from April to September.

Alternative 3 (Map 19)

Alternative 3 was developed in response to the public suggestion that grazing be eliminated in the Centennial Mountains (suggestion #2, page 33). See Table 8. Grazing properties by alternative for pastures used for grazing. Animal units are based on a 20 percent reduction from Alternative 1 sheep inventory, which resulted in 2,640 head retained for research purposes. Table 10 demonstrates expected distribution of AUM utilization (sheep only). According to Alternative 3, U.S. Sheep Experiment Station properties Humphrey, East Summer, and West Summer, and USDA, Forest Service allotments Meyers Creek and East Beaver would not be grazed. The majority AUM s needed would be taken from U.S. Sheep Experiment Station Headquarters property. Because of lower water availably and reduced forage quality of this property, the sheep inventory was reduced.

Table 10. Alternative 3: Projected annual AUM[a] utilization per property within the approximate[b] dates that are specified. The calculations are based on 2,640 sheep[c]; a 20% reduction in Alternative 1 sheep inventory.

Properties	AUM [a] Available	AUM [a] Utilized	Utilization Percent	Approximate [b] Grazing Dates
Agricultural Research Service (Agricultural Research Service)	**48,667**	**2,873**	**5.9 %**	
Headquarters	28,353	2,577	9.1 **%**	April 23 – November 1
Humphrey	4,476	NA	NA	N/A
Henninger	1,914	296	15.5 **%**	June 1 – Oct 20
Summer East (Tom's Creek)	4,043	NA	NA	N/A
Summer West (Odell Creek/ Big Mountain)	9,881	NA	NA	N/A
Leased (DOE, USDA- Forest Service, DOI-Bureau of Land Management)	26,087	1,015	3.9 %	
Mud Lake	560	158	28.2 **%**	April 1 – June 15
Snakey-Kelly	1,756	337	19.2 **%**	November 8 – December 15
East Beaver	17,877	NA	NA	N/A
Meyers Creek	3,076	NA	NA	N/A
Bernice	2,808	520	18.5 **%**	December 15 – February 5

[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[c] 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).

Forage available and AUMs used for Alternative 3 shown in Table 10 is based on a 20 percent reduction in Alternative 1 (proposed action) sheep numbers the best available plant productivity estimates and the high from the last 10 yrs of sheep inventory data (Moffet, personal communication) and demonstrates the expected distribution of AUM utilization (sheep only) for the past 10 years, present, and future. AUMs used are based on days shown in Table 10. Actual days when sheep would be on the range vary from year to year depending on weather and plant conditions. Average days and rounded sheep numbers, for a

typical year, when sheep would be moved on and off each range are shown in Table 2-B (Alternative 2 - general sheep movement schedule; appendix B, page 32).

Alternative 4 (Map 20)

Alternative 4 was developed in response to the public suggestion that grazing be eliminated adjacent and within in the grizzly bear primary conservation area (PCA) (suggestion #3, page 20) (Note: Agricultural Research Service lands are not within the grizzly bear primary conservation area.). See Table 8 for pastures used for grazing. Animal units are based on a 10-year sheep inventory high of 3,331 head. Table 11 demonstrates expected distribution of AUM utilization (sheep only). No reduction in sheep inventory would be required. According to Alternative 4, USSES properties East Summer and USDA-Forest Service property Meyers Creek would not be grazed. The majority AUM needed would be taken from U.S. Sheep Experiment Station West Summer Range.

Table 11 is based on calculations using the best available plant productivity estimates and the high from the last 10 yrs of sheep inventory data (Moffet, personal communication) and demonstrates the expected distribution of AUM utilization (sheep only) for the past 10 years, present, and future. AUMs used are based on days shown in Table 11. Actual days when sheep would be on the range vary from year to year depending on weather and plant conditions.

Alternative 4 is similar to Alternative 1, but there would be no grazing on East Summer Range and no grazing on Meyers Forest Service allotment. Average days and rounded sheep numbers, for a typical year, when sheep are moved on and off each range are shown in Table 3-B (Alternative 4 - general sheep movement schedule; Appendix B, page 37).

Table 11. Alternative 4: Annual AUM[a] utilized per property within the approximate[b] dates that are specified. The calculations are based on 3,330 sheep[c]; no reduction in Alternative 1 sheep inventory is necessary.

Properties	AUM [a] Available	AUM [a] Utilized	Utilization Percent	Approximate [b] Grazing Dates
Agricultural Research Service (Agricultural Research Service)	**48,667**	**3,382**	**7.0 %**	
Headquarters	28,353	1,598	5.6 %	April 23 – June 25; September 1 – November 1
Humphrey	4,476	603	13.5 %	June 1 – October 20
Henninger	1,914	470	24.6 %	June 25 – July 9; August 31 – September 15
Summer East (Tom's Creek)	4,043	0	0 %	N/A
Summer West (Odell Creek/ Big Mountain)	9,881	711	7.2 %	July 9 – August 31
Leased (DOE, USDA- Forest Service, DOI-Bureau of Land Management)	**26,087**	**1,445**	**5.5%**	
Mud Lake	560	160	28.6 %	April 1 – June 1
Snakey-Kelly	1,756	421	24.0 %	November 8 – December 15
East Beaver	17,877	213	1.2 %	July 3 – September 1
Meyers Creek	3,076	0	0 %	N/A
Bernice	2,808	650	23.2 %	December 15 – February 5

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[c] 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).

Alternative 5 (Map 21)

Alternative 5 was developed in response to the public suggestion that grazing be eliminated to protect big horned sheep populations (suggestion #4, page 20). See Table 8 for pastures used for grazing. Animal units are based on a 30 percent reduction from Alternative 1 sheep inventory, which resulted in 2,332 head retained for research purposes. Table 12 demonstrates expected distribution of AUM utilization (sheep only). According to Alternative 5, USDA-Forest Service and DOI-Bureau of Land Management properties Snakey-Kelly and Bernice, respectively, would not be grazed. Until new winter grazing lands are obtained, sheep would be maintained at Mud Lake Feedlot where harvested feeds would be fed daily to meet the nutrient needs of the sheep. The reduction in sheep inventory was necessary to remain within available funds for purchasing harvested feeds and maintaining a feedlot facility.

Table 12. Alternative 5: Annual AUM[a] utilized per property within the approximate[b] dates that are specified. The calculations are based on 2,332 sheep[c]; a 30% reduction in Alternative 1 sheep inventory is necessary (Taylor Pers. Comm. 2009).

Properties	AUM [a] Available	AUM [a] Utilized	Utilization Percent	Approximate [b] Grazing Dates
Agricultural Research Service (Agricultural Research Service)	**48,667**	**1967**	**4.0 %**	
Headquarters	28,353	1119	3.9 %	April 23 – June 25; September 1 – November 1
Humphrey	4,476	422	9.4 %	June 1 – October 20
Henninger	1,914	318	16.6 %	June 25 – July 9; August 31 – September 15
Summer East (Tom's Creek	4,043	108	2.7 %	July 23 – August 31
Summer West (Odell Creek/ Big Mountain	9,881	350	3.5 %	July 9 – August 31
Leased (DOE, USDA- Forest Service, DOI-Bureau of Land Management)	26,087	365	1.4 %	
Mud Lake	560	166	29.6 %	April 1 – June 1
Snakey-Kelly	1,756	0	0 %	N/A
East Beaver	17,877	149	0.8 %	July 3 – September 1
Meyers Creek	3,076	50	1.6 %	July 5 – July 23
Bernice	2,808	0	0 %	N/A

[a] Animal Unit Month. By definition, one (1) AUM represents 790 lbs of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. For the purposes of this table, five (5) sheep[c] 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).

Table 12 is based on calculations using the best available plant productivity estimates and the high from the last 10 yrs of sheep inventory data (Moffet, personal communication) and demonstrates the expected distribution of AUM utilization (sheep only) for the past 10 years, present, and future. AUMs used are based on days shown in Table 12. Actual days when sheep would be on the range vary from year to year depending on weather and plant conditions. Average days and rounded sheep numbers, for a typical year, when sheep are moved on and off each range are shown in Table 4-B (Alternative 5 - general sheep movement schedule; Appendix B, page 44).

Associated Activities for Alternatives 2-5

Table 13 on the following page displays the differences between alternatives 2-5 and the proposed action (Alternative 1) for the following associated activities.

Table 13. Alternatives 2-5 associated activities for Alternatives 2-5 (details of Alternative 1 discussed in detail in the Proposed Action (page 1)

Activity/Mitigation	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	No grazing would occur on the Headquarters, East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, Bernice, and Meyers Creek allotment	**No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey Kelly and Bernice Allotments**
Sheep Trail and Driveway Use and Maintenance				
Trails	None used	No trailing to Humphrey and East Beaver	No trail beyond the Dry Creek road to the Meyers Creek allotment or back off East Summer range.	No trailing to Snakey Kelly
Driveways	None used	None used	Tom's units 5-7 not used	Same as Alternative 1
Stock Water Operations - Water Developments				
Headquarters, Humphrey and Henninger	None used	No water troughs used on Humphrey No water diversion on Humphrey	Same as Alternative 1	
West Summer Range		Would not use		
Camp Tending - Sheep Herding Camps				
Headquarters, Humphrey and Henninger Camps	None Used	No camps at Humphrey	Same as Alternative 1	
		No camps	No camps on East Summer	Same as Alternative 1
Fences				
Pasture Fences		None on West Summer	Same as Alternative 1	
Horse Corral				
Exclosures				
Maintenance and repair of existing roads and fire breaks				
Roads	None created or maintained	No road maintained in West Summer	Same as Alternative 1	
Firebreaks				
Range Improvement				
Prescribed Burning	No activities	Same as Alternative 1		
Seeding		No seeding on Humphrey	Same as Alternative 1	

Activity/Mitigation	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	No grazing would occur on the Headquarters, East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, Bernice, and Meyers Creek allotment	**No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey Kelly and Bernice Allotments**
Cattle and Horse Grazing	None	No supplemental grazing on Humphrey	Same as Alternative 1	
Predator Avoidance and Abatement	Same as Alternative 1, use as needed			
Integrated Pest Management – Noxious weeds	Ability to monitor is severely limited on properties where herders, camp tenders, etc. are not riding over the land.			
Grizzly Bear	Not needed	Same as Alternative 1		
Sheep Driveway	Not needed		No Driveways On East Summer	Same as Alternative 1
Heritage	Same as Alternative 1			

Comparison of Alternatives

Mission and Purpose and Need

The United States sheep industry depends on research data from the U.S. Sheep Experiment Station, Dubois, ID and its collaborators, to improve the genetic potential of the nation's maternal and paternal breeds or composite lines of sheep, improve nutritive and reproductive efficiency of sheep, improve sheep grazing practices, and improve land and ecosystem management. The majority of the sheep in the U.S. are produced west of the 100th meridian, which represents the historical boundary between the moist east and the arid west. U.S. Sheep Experiment Station, Dubois, ID research is more applicable to the nation's sheep flock, and lands on which the majority of the nation's sheep are grazed, than is research conducted east of the 100th meridian. The U.S. Sheep Experiment Station, Dubois, ID is the only USDA, Agricultural Research Service location that is focused solely on sheep research, and the only USDA, Agricultural Research Service location that can address sheep and sheep grazing issues that are focused on the region where most of the nation's sheep are produced.

The U.S. Sheep Experiment Station, Dubois, ID is the only station in the US doing research with sheep in extensive management systems – open range, high elevations. Research is done to develop animals with fitness traits or genetics suited to the extensive range conditions. Research purpose is to develop animals with genetics adapted to that environment.

Keeping U.S. Sheep Experiment Station sheep in feedlots (Alternative 2) and/or eliminating the high-elevation summer grazing (Alternatives 2and 3) would preclude meaningful genetic evaluation of sheep that are intended for lands west of the 100th meridian. Production environment affects the expression of functional genes linked to important production traits. Under Alternative 5; the loss of the winter grazing component would affect the genetic evaluation component of the research goals and objectives.

As the U.S. Sheep Experiment Station is the only sheep experiment station west of the 100th meridian with research focused on grazing extensive high elevation ranges for sheep production, elimination of summer grazing on the East and/or West Summer ranges (alternatives 2-4) in whole or part would mean that the objectives of studies or research at high elevation (summer range pastures) would not be met. It would also preclude research into predator avoidance and abatement.

- Studies are done with domestic stock grazing plants detrimental to livestock and wild ungulates; larkspur (*Delphinium andersonii*), lupine (*Lupinus perennis*), and Senecio (*Senecio* spp.). Agricultural Research Service, Dubois, is conducting research in conjunction with the Poisonous Plant Research Station, Agricultural Research Service, Logan, Utah.

- Genetic test or development of animals adapted to high elevation extensive ranges are done to determine what animals perform best under these environmental conditions.

- Additional research includes:

  - Bed ground nutrient movement

  - Stream crossings on sheep driveways

  - Plant community diversity of grazed lands at high elevations

Table 14 displays a comparison of alternatives by how well they allow the U.S. Sheep Experiment Station, Dubois, Idaho to fulfill their research commitments under the National Programs 101 and 215.

For a full description of how the U.S. Sheep Experiment Station activities relate to the components of the National programs, please refer back to the Mission Statement, U.S. Sheep Experiment Station, Dubois, Idaho section at the beginning of this document.

Table 14. Comparison of alternatives by National Program 101 and 215 applicable components and purpose and need

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	No grazing would occur on the East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, Bernice, and Meyers Creek allotment	No grazing would occur on the East Summer, West Summer Ranges, and Humphrey Ranch as well as on the following allotments: East Beaver and Meyers Creek allotments.	No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment	No grazing would occur on Snakey-Kelly and Bernice Allotments
U.S. Sheep Experiment Station National Action Plans 101 and 215 (See pages 10 - 14)				
NP 101 Action Plan **Component 1: Understanding, Improving, and Effectively Using Animal Genetic and Genomic Resources** Problem Statement 1B**:** Identify Functional Genes and Their Interactions. Problem Statement 1D**:** Develop and Implement Genome-Enabled Genetic Improvement Programs. Activities linked with this component**:** Sheep grazing, prescribed burning, seeding, cattle and horse grazing, predator avoidance and abatement **Component 2: Enhancing Animal Adaptation, Well-Being and Efficiency in Diverse Production Systems** Problem Statement 2A**:** Enhance Animal Well-Being and Reduce Stress in Livestock and Poultry Production Systems. Problem Statement 2B**:** Reducing Reproductive Losses. All activities linked with this component would occur, and the research associated with this component would continue Problem Statement 2C**:** Improving Efficiency of Nutrient Utilization and Conversion to Animal Products. Activities linked with this component**:** Sheep grazing, prescribed burning, seeding, cattle and horse grazing, predator avoidance and abatement, and integrated pest management **Component 3: Measuring and Enhancing Product Quality** Problem Statement 3A**:** Developing Systems for Reducing Variation in Product Quality and Yield. **Activities linked with this component**: Sheep grazing, prescribed burning, seeding, cattle and horse grazing, predator avoidance and abatement, and integrated pest management				

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
NO IMPACT; MEETS: All activities linked with these components would occur, and the research associated with these components would continue	GREATEST IMPACT TO PROGRAM; DOES NOT MEET: Sheep numbers available for research would be reduced by 65% over the current numbers of research animals. Grazing would be limited to 158 AUMs for part of the year at the Mud Lake Feedlot, and the rest of the sheep would remain in the Mud Lake Feedlot. Reduction in sheep numbers would adversely affect some existing research. Would preclude genetic evaluation of sheep that are intended for lands west of the 100th meridian. Would preclude research necessary to the development of genetic improvement programs needed to enhance adaptability, productivity, and suitability of sheep that are grazing western U. S. rangelands, and to enable the U.S. Sheep Experiment Station to develop and evaluate environmentally adapted breeds and genetic lines of sheep. Production environment affects the expression of functional genes linked to important production traits. Would preclude research to develop management strategies needed to enhance sheep well-being in diverse production environments and	MEETS SOMEWHAT: Sheep numbers available for research would be reduced by 20% over the current numbers of research animals. Grazing would be eliminated from East Summer, West Summer Ranges, and Humphrey Ranch as well as on the following allotments: East Beaver and Meyers Creek allotments. Reduction in sheep numbers could adversely affect some existing research. Would preclude genetic evaluation of sheep that are intended for lands west of the 100th meridian. Would preclude research into predator avoidance and abatement Would preclude research necessary to the development of genetic improvement programs needed to enhance adaptability, productivity, and suitability of sheep that are grazing western U. S. rangelands, and to enable the U.S. Sheep Experiment Station to develop and evaluate environmentally adapted breeds and genetic lines of sheep. Production environment affects the expression of functional genes linked to important production traits. Would preclude research to develop management strategies needed to enhance	MEETS SOMEWHAT: Sheep numbers available for research would not be reduced over the current numbers of research animals. Grazing would be eliminated from East Summer Range as well as on the Meyers Creek allotment. Reduction in sheep numbers could adversely affect some existing research. Would preclude or limit genetic evaluation of sheep that are intended for lands west of the 100th meridian. Would limit genetic evaluation of sheep that are intended for lands west of the 100th meridian. Could limit research into predator avoidance and abatement. And would limit predator avoidance and abatement that maintains safe and productive environments for research sheep. Would somewhat limit research necessary to the development of genetic improvement programs needed to enhance adaptability, productivity, and suitability of sheep that are grazing western U. S. rangelands, and to enable the U.S. Sheep Experiment Station to develop and evaluate environmentally adapted breeds and genetic lines of sheep. Production environment affects the	MEETS SOMEWHAT: Sheep numbers available for research would be reduced by 30% over the current numbers of research animals. Grazing would be eliminated from Snakey-Kelly and Bernice Allotments. Reduction in sheep numbers could adversely affect some existing research. Would limit genetic evaluation of sheep that are intended for lands west of the 100th meridian. Would preclude or limit research necessary to the development of genetic improvement programs needed to enhance adaptability, productivity, and suitability of sheep that are grazing western U. S. rangelands, and to enable the U.S. Sheep Experiment Station to develop and evaluate environmentally adapted breeds and genetic lines of sheep. Production environment affects the expression of functional genes linked to important production traits. Would preclude or limit research to develop management strategies needed to enhance sheep well-being in diverse production environments and ensure efficient reproduction and conversion of nutrients

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	ensure efficient reproduction and conversion of nutrients from rangelands to sheep products Would preclude research involving prescribed burning, seeding, and cattle and horse grazing activities that influence availability of nutrients on western U.S. rangelands and, thus, the well-being of sheep.	sheep well-being in diverse production environments and ensure efficient reproduction and conversion of nutrients from rangelands to sheep products Would limit research involving seeding and cattle and horse grazing activities that influence availability of nutrients on western U.S. rangelands and, thus, the well-being of sheep	expression of functional genes linked to important production traits. Would somewhat limit research to develop management strategies needed to enhance sheep well-being in diverse production environments and ensure efficient reproduction and conversion of nutrients from rangelands to sheep products	from rangelands to sheep products

NP 215 (Formerly 205) Action Plan

Component 1: Rangeland Management Systems to Enhance the Environment and Economic Viability.

Problem Statement A**:** Need for economically viable rangeland management practices, germplasm, technologies and strategies to conserve and enhance rangelands ecosystems.

Problem Statement B**:** Need for improved livestock production systems for rangelands that provide and use forages in ways that are economically viable and enhance the environment sustainable.

Problem Statement C**:** Need for improved rangeland restoration, rehabilitation and mitigation practices, germplasm, tools and strategies to restore rangeland integrity in a manner that is economically feasible and environmentally acceptable.

Activities linked with this component**:** Sheep grazing, prescribed burning, seeding, cattle and horse grazing, predator avoidance and abatement, and integrated pest management

Component 2. Pasture Management Systems to Improve Economic Viability and Enhance the Environment

Problem Statement D**:** Need for appropriate plant materials to improve the economic viability and enhance the environment in pasture-based livestock systems.

Problem Statement J**:** Need for economically viable, energy efficient and environmentally enhancing production systems for establishing, growing, maintaining, harvesting, treating, storing and transporting forages for livestock, bioenergy, bioproducts and conservation objectives.

Activities linked with this component**:** Sheep grazing, seeding, and integrated pest management

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
NO IMPACT; MEETS: All activities linked with these components would occur, and the research associated with these components would continue	GREATEST IMPACT TO PROGRAM; DOES NOT MEET Sheep numbers available for research would be reduced by 65% over the current numbers of research animals. Grazing would be limited to 158 AUMs for part of the year at the Mud Lake Feedlot, and the rest of the sheep would remain in the Mud Lake Feedlot. Reduction in sheep numbers would adversely affect some existing research. Would preclude research involving economically viable rangeland management practices, germplasm, technologies and strategies to conserve and enhance rangelands ecosystems. Would preclude activities necessary for developing management practices that enhance viability and productivity of western U.S. grazing lands. Would preclude cattle and horse grazing required to manage decadent forage, maintain range condition and reduce the risk of fire on research lands Would preclude seeding Required to evaluate restoration, rehabilitation, and mitigation activities to manage disturbed sites (e.g., road sides, firebreaks, historical borrow pits, and mines) that	MEETS SOMEWHAT: Sheep numbers available for research would be reduced by 20% over the current numbers of research animals. Grazing would be eliminated from East Summer, West Summer Ranges, and Humphrey Ranch as well as on the following allotments: East Beaver and Meyers Creek allotments. Reduction in sheep numbers could adversely affect some existing research. Would limit research involving economically viable rangeland management practices, germplasm, technologies and strategies to conserve and enhance rangelands ecosystems. Would preclude or limit activities necessary for developing management practices that enhance viability and productivity of western U.S. grazing lands. Would preclude or limit cattle and horse grazing required to manage decadent forage, maintain range condition and reduce the risk of fire on research lands Would preclude or limit seeding required to evaluate restoration, rehabilitation, and mitigation activities to manage disturbed sites (e.g., road sides, firebreaks, historical borrow pits, and mines) that may be susceptible to weed	MEETS SOMEWHAT: Sheep numbers available for research would not be reduced over the current numbers of research animals. Grazing would be eliminated from East Summer Range as well as on the Meyers Creek allotment. Research currently involving these areas and some sheep grazing and predator avoidance and abatement could not occur Would limit research involving economically viable rangeland management practices, germplasm, technologies and strategies to conserve and enhance rangelands ecosystems. Would preclude or limit activities necessary for developing management practices that enhance viability and productivity of western U.S. grazing lands. Would preclude or limit cattle and horse grazing required to manage decadent forage, maintain range condition and reduce the risk of fire on research lands Would or limit predator avoidance and (or) abatement, depending upon species, that is necessary to maintain sheep grazing density and duration at levels specified by research objectives.	MEETS SOMEWHAT: Sheep numbers available for research would be reduced by 30% over the current numbers of research animals. Grazing would be eliminated from Snakey-Kelly and Bernice Allotments. Research currently involving these areas could not occur. Reduction in sheep numbers could adversely affect some existing research.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	may be susceptible to weed invasion or erosion. Would preclude sheep grazing, prescribed burning, seeding, cattle and horse grazing, and integrated pest management components necessary to developing rangeland monitoring tools. Seeding, prescribed burning, and sheep grazing activities are needed to evaluate plant species that are developed for rangeland improvement programs. Would preclude predator avoidance and (or) abatement, depending upon species, that is necessary to maintain sheep grazing density and duration at levels specified by research objectives. Would preclude activities required to plant, establish, maintain, and evaluate forages.	invasion or erosion. Would preclude or limit sheep grazing, prescribed burning, seeding, cattle and horse grazing, and integrated pest management components necessary to developing rangeland monitoring tools. Seeding, prescribed burning, and sheep grazing activities are needed to evaluate plant species that are developed for rangeland improvement programs. Would preclude or limit predator avoidance and (or) abatement, depending upon species, that is necessary to maintain sheep grazing density and duration at levels specified by research objectives. Would preclude or limit activities required to plant, establish, maintain, and evaluate forages.		

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Purpose and Need To provide for the continuation of historic and ongoing grazing and associated activities at the USSES in support of the mission of the Agricultural Research Service, USSES in Dubois, Idaho.				
NO IMPACT; MEETS: Continuation of historic and ongoing grazing and associated activities at the USSES Station in support of the mission of the Agricultural Research Service, USSES in Dubois, Idaho would occur.	GREATEST IMPACT TO PROGRAM; DOES NOT MEET: Historic and ongoing grazing and associated activities at the USSES would not occur. Sheep numbers available for research would be reduced by 65% over the current numbers of research animals. Grazing would be limited to 158 AUMs for part of the year at the Mud Lake Feedlot, and the rest of the sheep would remain in the Mud Lake Feedlot. Because sheep numbers would be decreased by 65% and essentially all grazing and supporting activities would be eliminated, research would essentially be terminated.	MEETS SOMEWHAT Historic and ongoing grazing and associated activities at the USSES would not occur at the existing levels. Sheep numbers available for research would be reduced by 20% over the current numbers of research animals. Grazing would be eliminated from East Summer, West Summer Ranges, and Humphrey Ranch as well as on the following allotments: East Beaver and Meyers Creek allotments. Because sheep numbers would be decreased by 30% and all grazing at high elevations, grazing elsewhere, and supporting activities would be eliminated or altered, research would be severely limited.	MEETS SOMEWHAT: Historic and ongoing grazing and associated activities at the USSES would not occur at the existing levels. Sheep numbers available for research would not be reduced over the current numbers of research animals. Grazing would be eliminated from East Summer Range as well as on the Meyers Creek allotment. Because some grazing at high elevations, grazing elsewhere, and supporting activities would be eliminated or altered, research could be limited.	MEETS SOMEWHAT: Historic and ongoing grazing and associated activities at the USSES would not occur at the existing levels. Sheep numbers available for research would be reduced by 30% over the current numbers of research animals. Grazing would be eliminated from Snakey-Kelly and Bernice Allotments. Because sheep numbers would be decreased by 20% some grazing, and supporting activities would be eliminated or altered, research could be limited.

Comparison of Resource Effects

Table 15 displays the summary of resource effects by alternative. For detailed analyses, see the individual resource sections in the Environmental Effects section of this document or the individual specialist reports found in the project file.

Table 15. Comparison of alternatives by resource effects

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed action / no new federal action	**No grazing would occur on the East Summer, West Summer, Henninger, and Humphrey Pastures as well as on the following allotments: Snakey Kelly, East Beaver, Bernice, and Meyers Creek allotment**	**No grazing would occur on the East Summer, West Summer, and Humphrey Pastures as well as on the following allotments: East Beaver and Meyers Creek allotments.**	**No grazing would occur on the East Summer Range as well as on the Meyers Creek allotment**	**No grazing would occur on Snakey Kelly and Bernice Allotments**
Range				
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	Elimination of grazing on Agricultural Research properties as well as Bureau of Land Management/ Forest Service allotments would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.	Cessation of grazing and associated activities on Humphrey Ranch and the East and West Summer Ranges and East Beaver and Meyers Creek allotments would have some changes to range conditions. However, the overall unavailability of Humphrey Ranch and the East and West Summer Ranges and 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.	Cessation of grazing and associated activities on the East Summer Ranges and Meyers Creek allotment would have some changes to range conditions. However, the overall unavailability of the East Summer Range and Meyers Creek allotment for grazing would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.	Cessation of grazing and associated activities on the Snakey-Kelly and Bernice allotments would have some changes to range conditions. However, the overall unavailability of Snakey-Kelly and Bernice allotments for grazing would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Federally-Listed Wildlife Species				
***Canada Lynx (Lynx canadensis)* - U. S. Sheep Experiment Station Grazing and Associated Activities Project 2009, "may affect, but is not likely to adversely affect Canada lynx." The project would have "No Effect" on critical habitat as none is present or proposed within the project area.**				
For all alternatives there is a very low probability of Canada lynx occurrences on Agricultural Research Service lands				
Minimal, if any, effects would occur with regard to Canada lynx, both to individuals as well as to habitat. No effects would occur to designated critical habitat as none is present, and none is being proposed or considered in the area.	Elimination of all grazing and associated activities in the Centennial Range would eliminate the potential effects	Elimination of all grazing and associated activities in the Centennial Range would eliminate the potential effects	Minimal, if any, effects would occur with regard to Canada lynx, both to individuals as well as to habitat. No effects would occur to designated critical habitat as none is present, and none is being proposed or considered in the area.	Minimal, if any, effects would occur with regard to Canada lynx, both to individuals as well as to habitat. No effects would occur to designated critical habitat as none is present, and none is being proposed or considered in the area.
***Grizzly Bear* (*Ursus arctos horribilis*)**				
"May affect, but is not likely to adversely affect the Yellowstone Distinct Population of grizzly bear"	"No Effect" on the Yellowstone Distinct Population Segment of grizzly bears	"No Effect" on the Yellowstone Distinct Population Segment of grizzly bears	"May affect, but is not likely to adversely affect the Yellowstone Distinct Population of grizzly bear"	"May affect, but is not likely to adversely affect the Yellowstone Distinct Population of grizzly bear"
Gray Wolf (Canis lupus) Northern Rocky Mountain Distinct Population Segment. Currently not a listed species. Determination applies if returned to previous federal status of nonessential experimental population)				
"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"	"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"	"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"	"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"	"Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat"
Other Wildlife Species				
Rocky Mountain Bighorn Sheep (Ovis canadensis canadensis) Not a federally listed species. State game species with controlled hunts in some areas				
Not directly affected by grazing on any of the U.S. Sheep Experiment Station properties	Removal of U.S. Sheep Experiment Station grazing on the Bernice and Snakey/Kelly allotments would reduce one potential vector of respiratory disease transmission. It is speculative that this alternative would result in an observable change in the existing bighorn sheep herds' condition, health, or population.	Not directly affected by grazing on any of the U.S. Sheep Experiment Station properties	Not directly affected by grazing on any of the U.S. Sheep Experiment Station properties	Removal of U.S. Sheep Experiment Station grazing on the Bernice and Snakey/Kelly allotments would reduce one potential vector of respiratory disease transmission. It is speculative that this alternative would result in an observable change in the existing bighorn sheep herds' condition, health, or population.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Greater Sage-grouse (currently not a listed species, details included in the Wildlife Report)				
Benefits to habitat derived from increased mosaic of shrubs, forbs, grasses, and maintained lek sites. Small temporary displacement from grazing sheep during early brood rearing. Overall balance between positive and negative effects are neutral.	Eliminates direct disturbance and displacement of grouse, but also eliminates benefit that maintain leks and improves habitat mosaic between forbs, grasses, and shrubs.	Larger number of sheep on headquarters and Henninger for longer duration increase disturbances to sage-grouse.	Benefits to habitat derived from increased mosaic of shrubs, forbs, grasses, and maintained lek sites. Small temporary displacement from grazing sheep during early brood rearing. Overall balance between positive and negative effects are neutral.	Benefits to habitat derived from increased mosaic of shrubs, forbs, grasses, and maintained lek sites. Small temporary displacement from grazing sheep during early brood rearing. Overall balance between positive and negative effects are neutral.
Pygmy Rabbit (currently not a listed species, details included in the Wildlife Report)				
Pygmy rabbits would persist with population numbers and trends similar to the current condition. Prescribed or wildland fires would temporarily reduce portions of pygmy rabbit habitat until shrub cover returns to a mature state.	Pygmy rabbits would persist with population numbers and trends slightly increased from the current condition. Eliminates any sheep interaction with or displacement of pygmy rabbits.	Pygmy rabbits would persist with population numbers and trends slightly reduced from the current condition. Longer temporal disturbances from sheep with additional displacement of pygmy rabbits.	Pygmy rabbits would persist with population numbers and trends similar to the current condition. Prescribed or wildland fires would temporarily reduce portions of pygmy rabbit habitat until shrub cover returns to a mature state.	Pygmy rabbits would persist with population numbers and trends similar to the current condition. Prescribed or wildland fires would temporarily reduce portions of pygmy rabbit habitat until shrub cover returns to a mature state.
Connectivity habitat for wide- ranging carnivores (Concern brought up during public scoping). Details included in the Wildlife Report				
Carnivore use of the Centennial Mountain range would continue similar to the current condition. Would not reduce connectivity in the Centennial Range. Large carnivores travel through and/or occupy habitat mostly without disturbance because of the large scale of available habitat, and sheep bands occupy only a small acreage for short duration. Lethal control actions would remain minimal and at levels similar to past actions. Lethal control would not occur for grizzly bears.	Carnivore use of the Centennial Mountain range would continue similar to the current condition, with additional potential for black bears and wolves to more fully utilize the current habitat within a given homerange. Changes in the effectiveness of the Centennial Range as a wildlife migration corridor remain speculative, but are unlikely since evidence suggests that USSES activities have a minimal effect to wide ranging carnivore use of the habitat.	Carnivore use of the Centennial Mountain range would continue similar to the current condition, with additional potential for black bears and wolves to more fully utilize the current habitat within a given homerange. Changes in the effectiveness of the Centennial Range as a wildlife migration corridor remain speculative, but are unlikely since evidence suggests that USSES activities have a minimal effect to wide ranging carnivore use of the habitat.	Carnivore use of the Centennial Mountain range would continue similar to the current condition. Would not reduce connectivity in the Centennial Range. Large carnivores travel through and/or occupy habitat mostly without disturbance because of the large scale of available habitat, and sheep bands occupy only a small acreage for short duration. Lethal control actions would remain minimal and at levels similar to past actions. Lethal control would not occur for grizzly bears.	Carnivore use of the Centennial Mountain range would continue similar to the current condition. Would not reduce connectivity in the Centennial Range. Large carnivores travel through and/or occupy habitat mostly without disturbance because of the large scale of available habitat, and sheep bands occupy only a small acreage for short duration. Lethal control actions would remain minimal and at levels similar to past actions. Lethal control would not occur for grizzly bears.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Fish and Amphibians - Details included in the Wildlife Report				
No effects would occur to arctic grayling, westslope cutthroat trout, or Yellowstone cutthroat trout. Effects to spotted frogs, boreal western toads, chorus frogs, and other amphibians would be rare and limited to the loss of a few individual animals (adult amphibians or larvae) in localized areas associated with watering activities in springs and lakes. Interdisciplinary review of current aquatic conditions found stable stream channels, non-erosive banks, functioning flood plains, dense willows, and vigorous riparian vegetation is the dominant characteristic in all of the fish-bearing streams and lakes and where amphibians are expected to occur.	Vacated stream crossings and watering areas would rehabilitate naturally. Downstream effects to fisheries and amphibian habitats from U.S. Sheep Experiment Station activities would remain negligible.	No effects would occur to arctic grayling, westslope cutthroat trout, or Yellowstone cutthroat trout. Effects to spotted frogs, boreal western toads, chorus frogs, and other amphibians would be rare and limited to the loss of a few individual animals (adult amphibians or larvae) in localized areas associated with watering activities in springs and lakes. Interdisciplinary review of current aquatic conditions found stable stream channels, non-erosive banks, functioning flood plains, dense willows, and vigorous riparian vegetation is the dominant characteristic in all of the fish-bearing streams and lakes and where amphibians are expected to occur.	No effects would occur to arctic grayling, westslope cutthroat trout, or Yellowstone cutthroat trout. Effects to spotted frogs, boreal western toads, chorus frogs, and other amphibians would be rare and limited to the loss of a few individual animals (adult amphibians or larvae) in localized areas associated with watering activities in springs and lakes. Interdisciplinary review of current aquatic conditions found stable stream channels, non-erosive banks, functioning flood plains, dense willows, and vigorous riparian vegetation is the dominant characteristic in all of the fish-bearing streams and lakes and where amphibians are expected to occur.	No effects would occur to arctic grayling, westslope cutthroat trout, or Yellowstone cutthroat trout. Effects to spotted frogs, boreal western toads, chorus frogs, and other amphibians would be rare and limited to the loss of a few individual animals (adult amphibians or larvae) in localized areas associated with watering activities in springs and lakes. Interdisciplinary review of current aquatic conditions found stable stream channels, non-erosive banks, functioning flood plains, dense willows, and vigorous riparian vegetation is the dominant characteristic in all of the fish-bearing streams and lakes and where amphibians are expected to occur.
Infrastructure				
There would be no changes to the activities associated with the infrastructure.	The only activities that would continue would be: maintenance of roads to the headquarters area and the Mud Lake Feedlot; trucking between the Mud Lake Feedlot and Headquarters feedlot facility; and maintenance of the firebreak around the headquarters area.	Roads, fences, and firebreaks would continue to be maintained as necessary; sheep would continue to be transported to winter ranges and Mud Lake Feedlot by truck; sheep would continue to be trailed to Henninger and Snakey-Kelly;	Roads, fences, and firebreaks would continue to be maintained as necessary; sheep would continue to be transported to winter ranges and Mud Lake Feedlot by truck; sheep would continue to be trailed to Henninger, Snakey-Kelly, and West Summer; driveways in West Summer would continue to be used	Same as Alternative 1, with the exception that trailing would only take place to Henninger and East and West Summer
Sheep				
There would be no change from the existing sheep herd (3,300 sheep)	35% of herd retained (1,155 sheep); 65% of sheep disposed of (2,145 sheep)	80% of herd retained (2,640 sheep); 20% of sheep disposed of (660 sheep)	There would be no change from the existing sheep herd (3,300 sheep)	70% of herd retained (2,310 sheep); 30% of sheep disposed of (990 sheep)

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soils				
Soils stable and productive except for low veg/soil state at Henninger. Maintains active noxious weed abatement program, though uses Krovar at feedlots. Maintains natural fire cycle at Headquarters.	Soils stable, possible increased leaf litter at Headquarters, Henninger, and Summer Range. Improved riparian soils on Beaver Creek willow tributary. Less potential weed dispersal from sheep, but less active weed control measures.	Soils stable, except continued low veg/soil state at Henninger. Improved riparian soils at Beaver Creek willow tributary. Possible increased leaf litter at Summer range. Maintains active noxious weed abatement program, though uses Krovar at feedlots. Maintains natural fire cycle at Headquarters.	Soils stable at Headquarters and Humphrey. Improved riparian soils at Beaver Creek willow tributary; Possible decreased plant vigor, litter production at Henninger and West Summer pasture. Decreased risk of invasive plants, though use of Krovar in feedlots; Maintains natural fire cycle at Headquarters.	Soils stable, possible increased leaf litter at Henninger and Summer Range. Decreased risk of invasive plants, though use of Krovar in feedlots. Maintains natural fire cycle at Headquarters.
Hydrology				
All proposed alternative would meet the intent of the Clean Water Act and the Executive Orders for wetlands and floodplains.				
No Change from present	No Change from present	No Change from present	No Change from present	No Change from present
Botany				
There would be no impacts to federally listed plant species from any alternatives proposed because no species occur and no habitat for federally listed plant species is present within Agricultural Research Service lands. All alternatives proposed within this environmental assessment would be in compliance with threatened and endangered plants according to the Endangered Species Act.				
Heritage				
Selection of any alternative would require Heritage review and compliance				
Socioeconomics				
No change in social or economic conditions	There would be no change in total amount of salary paid due to change in staff positions. Research scientist positions would replace technicians and herders not needed for operations under Alt 2 and 3.	There would be no change in total amount of salary paid due to change in staff positions. Research scientist positions would replace technicians and herders not needed for operations under Alt 2 and 3.	No change to employment and income conditions, and consequently no effect on household migration patterns and public services	No change to employment and income conditions, and consequently no effect on household migration patterns and public services
Environmental Justice				
No change in the current economic conditions, and would not have any impact on minority or low income populations	Total impact to environmental justice populations would be limited by the structure of Clark County's economy, but any local spending lost may have some adverse affect on low income populations	Total impact to environmental justice populations would be limited by the structure of Clark County's economy, but any local spending lost may have some adverse affect on low income populations	No change in the current economic conditions, and would not have any impact on minority or low income populations	No change in the current economic conditions, and would not have any impact on minority or low income populations

Environmental Effects

The U.S. Sheep Experiment Station operates on Agricultural Research Service lands that were set aside as a sheep-breeding and rangeland grazing research facility. As a research facility, its management is governed by research goals and objectives in support of the U.S. Sheep Experiment Station mission to develop integrated methods for increasing production efficiency of sheep and to simultaneously improve the sustainability of rangeland ecosystems. Because the U.S. Sheep Experiment Station is s research facility, the only standards that must be adhered to are those set forth in federal laws and regulations (i.e. Endangered Species Act; Executive Order 11990, Protection of Wetlands). Where there are no laws or regulations applicable to a resource (i.e. soils, range), the existing condition of that resource is used as the baseline for analysis of effects. The existing condition of resources currently meets the needs of the U.S. Sheep Experiment Station to conduct its research.

For more detailed analysis of environmental effects can be found in the individual specialist reports in the project file.

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

Additional Activities Contributing to Cumulative Impacts

Mountain States Transmission Intertie (MSTI) 500 kilovolt (kV) transmission line (http://www.msti500kv.com/projectdesign/projecttimeline.html; 09/01/2009)

NorthWestern Energy (NWE) proposes to construct, operate and maintain the Mountain States Transmission Intertie (MSTI) 500 kilovolt (kV) transmission line to address the requests for transmission service from customers and to relieve constraints on the high-voltage transmission system in the region. The new transmission line would begin at the new Townsend Substation, which would be constructed in southwestern Montana about five miles south of the town of Townsend. The line would proceed south into southeastern Idaho connecting to Idaho Power Company's (IPCO) existing Midpoint Substation, 10 miles north of Jerome, Idaho (see Figure 13). The preferred route would cross Headquarters property and the East Beaver Forest Service allotment (see Figure 14). Expected decision date is late 2009-early 2010, and construction is to begin sometime in early 2010.

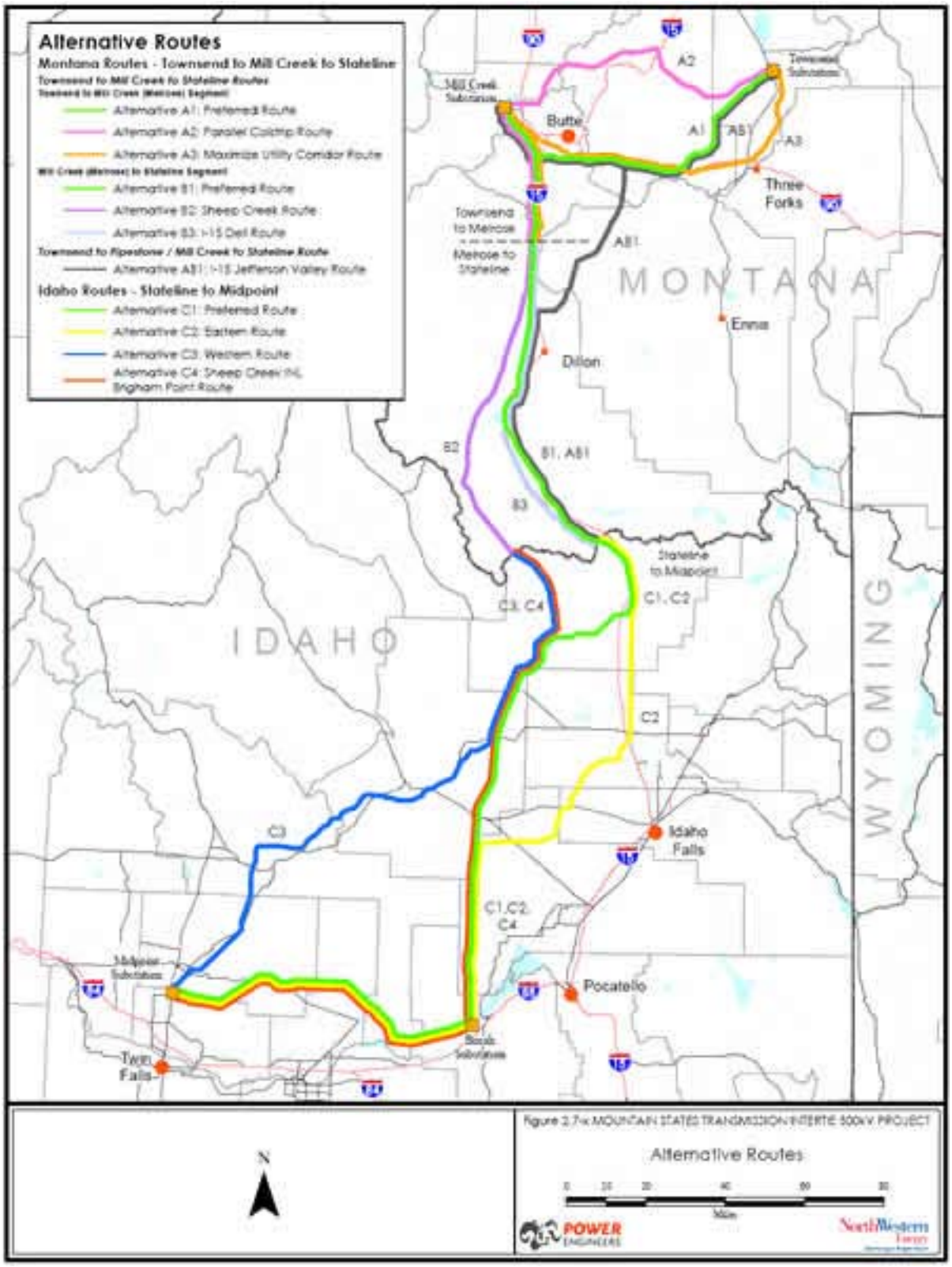


Figure 13. Mountain States Transmission Intertie (MSTI) 500 kilovolt (kV) transmission line alternative routes.

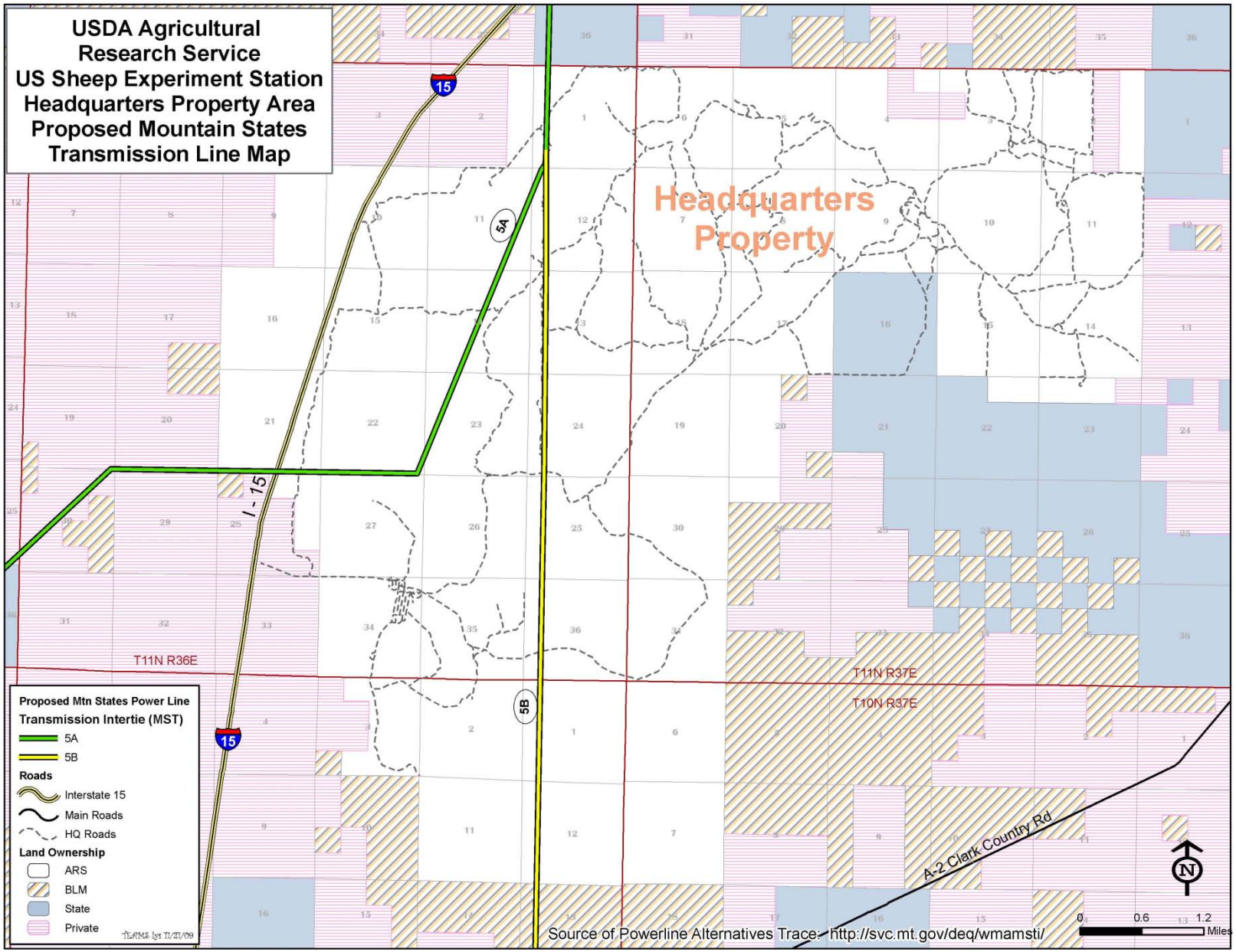


Figure 14. States Transmission Intertie (MSTI) 500 kilovolt (kV) transmission line preferred route as it Crosses the U.S. Sheep Experiment Station Grazing Project Area.

The resources most directly affected by the alternatives are range and wildlife that are detailed below. Following that the Other Resources section will detail analysis of effects to other resources. For detailed analyses of effects, please refer to the specialist reports in the project file.

Range

There are no federal laws and regulations applicable to range. 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.

Vegetation condition can be: Excellent Up, Down, or Static, Good Up, Down, or Static, Fair Up or Static, Fair Down, Poor Up, Down, or Static, Very Poor Up, Down, or Static.

Forage Utilization (Table 16) is defined as amount of vegetation grazed at the end of the grazing season. Percentage figures apply to current year's growth of key forage species on a site.

Table 16. 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 analysis of effects to the rangeland resource is on browse and forbs, which are the primary forage types used by sheep. Effects to these forage types determine long-term sustainability of the rangeland resource. Therefore, they are a key factor to take into consideration for this analysis of effects.

Range Effects Summary

Table 17 displays available AUMs for each property and allotment and percent used under each alternative.

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 cessation of grazing on various Agricultural Research properties and U.S. Forest Service and Bureau of Land Management allotments would have some changes in range conditions, the unavailability of those various parcels in Alternatives 2-5 would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission availability.

Table 17. Available AUMs and percent AUMs used by alternative.

Percent utilization	AUM	Existing	Alternatives with varying degrees of no grazing			
Properties	**Available**	**Alt1**	**Alt2**	**Alt3**	**Alt4**	**Alt5**
All Agricultural Research Service	48,667	6.8	-	5.9	7	4
Headquarters	28,353	5.6	-	9.1	5.6	3.9
Humphrey	4,476	13.5	-	-	13.5	9.4
Henninger	1,914	23.8	-	15.5	24.6	16.6
Summer East (Toms Cr.)	4,043	3.8	-	-	-	2.7
Summer West (Odell Cr./Big Mt.)	9,881	5.1	-	-	7.2	3.5
All Leased (DOE, USDA-FS, DOI-BLM)	26,087	5.8	0.6	3.9	5.5	1.4
Mud Lake	560	28.6	28.2	28.2	28.6	29.6
Snakey-Kelly	1,756	24	-	19.2	24	-
East Beaver	17,887	1.2	-	-	1.2	0.8
Meyers Creek	3,076	2.3	-	-	-	1.6
Bernice	2,808	23.2	-	18.5	23.2	-

Range Affected Environment

The rangelands were assessed for the Headquarters Property, Henninger and Humphrey Ranches, and East and West Summer ranges by a U.S. Forest Service Enterprise Team interdisciplinary team consisting of rangeland management specialists, wildlife biologist, soil scientist, and hydrologist. Field surveys were conducted while assisting in data collection for Rangeland Assessment (Grooms 2009). The interdisciplinary team used field surveys, literature reviews, and rangeland monitoring, visual observations, personal communications with U.S. Sheep Experiment Station scientists and professional observations, and photographs to assess rangeland.

Dates given for grazing are approximate and vary depending on weather conditions.

Headquarters Pastures

The Headquarters rangelands are currently in a state of transition with sagebrush range sites converting to woody dominated sites with a diminishing herbaceous understory; which is a natural seral condition. The current seral state overall for the Headquarters pastures is late mid seral. The historical climax plant community for a majority of the rangeland sites should favor grasses over sagebrush.

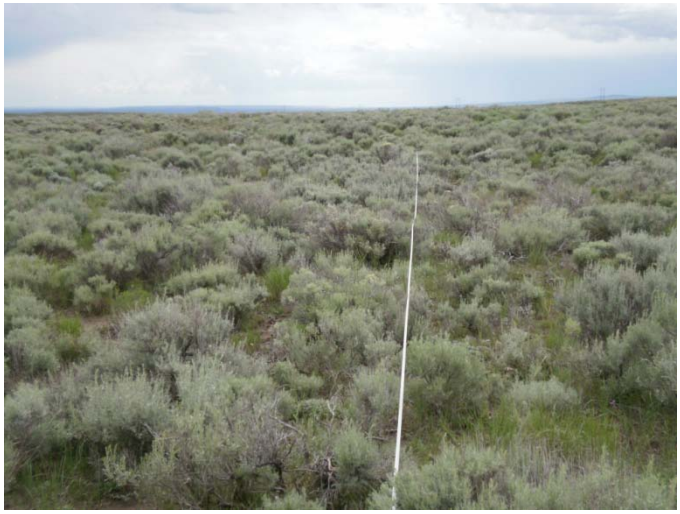


Figure 15. Headquarters pasture example – 8/09

Headquarters soils are stable, with an appropriate diversity of forbs, shrubs, and grasses. With rotational and deferred grazing and light stocking, utilization is none to slight. Only small areas (sheep driveway, trailing, watering, bedding) less than 50 total acres, showed heavy use.

Yearly growing season rest across a majority of Headquarter 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 in Headquarters improves forage by reducing amount of sagebrush cover and increasing forbs and grasses.

The Natural Resource Conservation Service conducted a range survey on Headquarters property in 1994. Survey findings by percent of property area were: excellent condition one percent, good condition 63 percent, fair condition 31 percent (NRCS 1995). These are in agreement with 2009 visual survey results.

Humphrey Ranch Pastures

The Humphrey Rangeland site is thriving in an early mid seral state. This site is very stable and has an appropriate diversity of forbs, shrubs, and grasses. Fire has historically occurred on this site at intervals of 20-50 years. There has been no fire on the site within 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.

Figure 16. Humphrey Ranch pasture example – 8/09

Henninger Ranch Pastures

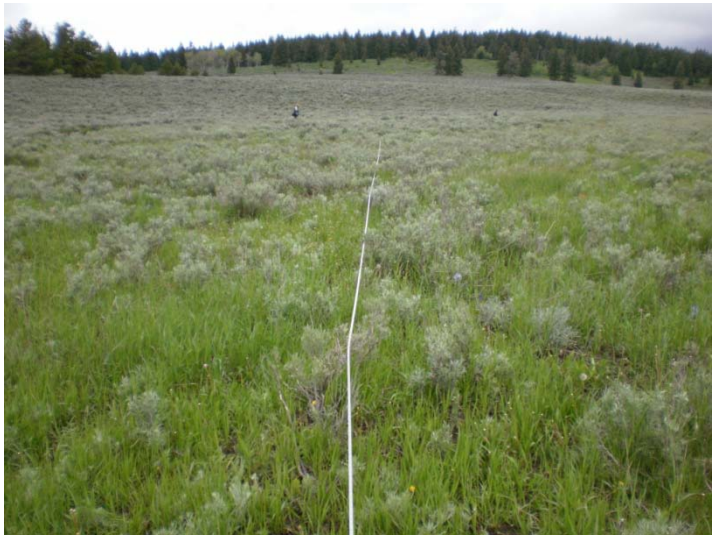


Figure 17. Henninger Ranch pasture example – 8/09

The Fair range condition appears to be static; recovering from past cattle grazing and early agricultural practices. Current grazing from June 25 through July 29 and again August 31 through September 15 are assisting with recovery. Moderate to Heavy browse species use may be from deer and elk grazing.

Field surveys, 2009, indicated Moderate to Heavy browse species use was observed and may be from deer and elk grazing.

Historically, the ranch primarily grazed cattle up until purchased by the U.S. Sheep Experiment Station in the early 1940s. The presence of smooth brome (*Bromus inermis)* in pastures indicates that it was planted to purpose cattle feed. Smooth brome is not preferred by sheep and is spreading into native vegetation areas and increasing in density.

East Summer and West Summer Ranges

In 2009, Summer Ranges displayed a high diversity of forbs, grasses, and shrubs due to the high precipitation received in the form of snow and rain (Figure 18).

Figure 18. West Summer and East Summer range – 8/09

Sheep grazing takes place during the summer only and is rotated between East Summer (Tom's Creek) and West Range (Big Mountain and Odell) grazing units which results in a pasture receiving rest one year in three. Line intercept cover data collected at both sites indicates that major grass and forb species are present. Recent fires on Agricultural Research Service lands that occurred during the fall would favor forb growth. Above average precipitation, and below average temperatures in 2009, gave forbs a boost in production. Exclosures in East and West Summer Ranges showed no visual difference in composition, vigor, or production over areas grazed. This is consistent with Klement's 1997 findings. All sampled components were similar both inside and outside of exclosures. Figure 19 - Figure 21 display fence-line sheep exclosure in West Summer Range (Odell).

Figure 19. Fence-line along sheep exclosure – 8/09

Figure 20. Same location looking away from exclosure – 8/09

Figure 21. Same location inside exclosure - West Summer Odell Unit (grazed area) – 8/09

Some areas of heavier sheep use were observed during 2009 field data collection. These areas were small less than 50 total acres, and occurred in areas where sheep driving was bottlenecked due to terrain. East Summer soils are stable, with an appropriate diversity of forbs, shrubs, and grasses. Utilization is light (Table 16). Rotation grazing with rest one year in three, and light stocking have allowed for good range conditions with stable or upward trend. West Summer (Odell/Big Mountain) soils are stable, with an appropriate diversity of forbs, shrubs, and grasses. Utilization is light (Table 16).

Figure 22. Driveway bottleneck West Summer – Big Mountain - cj 08/09

Figure 22, West Summer – Big Mountain, is 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. Note willows (brush) are vigorous and are protecting intermittent stream course at toe of slope (Figure 22). Impacts of this nature are not characteristic of the Summer Ranges or grazing units within them, where light stocking grazing activities are spread across the large landscape with minimal effects. Rotational and deferred grazing (rest one in three years), none to slight stocking rate and utilization (Table 17), commitment to 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 U.S. Sheep Experiment Station records (Table 1) of grazing well below accepted utilization standards.

Sheep grazing impacts visually contrast with cattle use. As sheep are continually herded 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 23 - Figure 25).

Figure 23. West Summer Range, Odell. Upslope -Left side is ungrazed while right demonstrates herd grazing – 8/09

Figure 24. West Summer Range, Odell. Down-slope – Note ungrazed areas bordering grazed/herded area – 8/09

Figure 25. Grazed area exhibits minimal exposed soil and excellent residual litter – 8/09

A comment received during scoping indicated that the head of Tom's Creek is a concern. Current condition is related to past grazing, wildfire less than 50 years ago, and harsh site location (aspect/slope/elevation/soil), all of which combine for a slow site recovery. Bare soil and sparse vegetation are not tied to current grazing practices. Figure 26 and Figure 27 display the existing conditions for the area of concern in Tom's Creek that was noted in the scoping comments. A diversity of plants and good production indicate that this area is recovering.

Figure 26. Below area of concern Tom's Creek. – 8/09

Figure 27. Area of Concern Tom's Creek – 8/09

Prescribed Burning

Prescribed burning to improve range land has been conducted on U.S. Sheep Experiment Station land since 1936. The U.S. Sheep Experiment Station plans to burn mountain big sagebrush communities on Headquarters property on a 30 year rotation, or about 900 acres each year. Actual burn area including wildfire is about 580 acres. This is less than planned for the average 30-year rotation acres. Burn records show the following acres burned:

- Past 30 years, 1978 to 2007, 5,400 acres prescribed fire and 13,867 acres wildfire
- Past 10 years, 1998 to 2007, 2,672 acres prescribed fire and 1,208 acres wildfire

The total area burned by wildfire and prescribed fire in the past 40 years is 23,147 acres (approximately 580 acres per year). The Headquarters Prescribed Burn Map 8 displays prescribed burn areas and years burned. Headquarters Wildfire History Map 6 displays wildfires and year burned. In the past 30 years, burns have been conducted primarily in fall, with minor amounts of spring and late summer burning. Wildfire burn areas are evaluated and included when planning prescribed burns. Burning is conducted on 200-acre average size units, primarily in spring and fall. Burning, conducted for research to improve forage production, provides secondary benefits for wildlife habitat and other resources.

After 1990, burn-effects research has been the main objective of prescribed burns. Prior to 1990 burning was done to increase forage production and improve range conditions. Burn research, to determine species composition and range health and productivity, dates back to 1936. Research with statistically valid replicated plots of unburned areas is conducted within the larger fire area. Burning is conducted to simulate wildfire frequency and approximate natural fire cycles with a burned/unburned mosaic. Prescribed burning research includes effects on vegetation recovery with sheep grazing before and after the burn and on rangeland ecosystems.

Burns are designed to remove 95 percent of the vegetation. Remote sensing is used to evaluate fire intensity and to determine if objectives have been met. The main adverse effect of burning is temporary loss of vegetation and ground cover litter for soil protection. Within two years after burning, forb and grass cover returns to replace pre-burn shrubs. Shrub cover returns and again replaces grass and forbs after several decades. Current burn effects monitoring is being done to determine wind-caused soil transport on burn areas (Moffet 2008).

All burning completed in 2008 and in the spring of 2009, was located on areas that had been previously prescribe burned. The total burn area for fall 2008 and spring 2009 is 474 acres, plus 29 acres of black line burn. The 2008/2009 burn plan is attached in appendix 3 of the Interim EA. Burn unit locations are shown on Headquarters Prescribed Fire History Map 8.

Seeding

Crested wheatgrass was planted on Agricultural Research Service lands about 1940 (National Wool Growers, 1947 and 1948, photo of planting results is dated 8-22-1941). Plantings were at 5,800-feet elevation, 12- inch precipitation. Plantings produced forage for eight sheep months per acre. Large areas were planted with *Agropyron cristatum* (crested wheatgrass) on Headquarters property in the 1960s (Jacobson 09-2009 personal communication). Recent plantings include 52 acres of the 2001 burn area at Headquarters with a mixture of native and introduced species in April 2002.

A successful seeding at Henninger was first done on about 30 acres in the West Meadow on October 22 and 23, 1981. In 1986 there was a failed second seeding, which was a no-till effort at Henninger East Meadow. The same area was plowed in the fall of 1989 and successfully seeded in the spring of 1990.

Occasional reseeding has been done on Humphrey Ranch; 11 acres were reseeded in 2005, and 20 acres were seeded about 1988. Forty-eight (48) acres of the 2000 wildfire burn area were seeded in spring 2001. A native seed mix, an introduced mix, and a mix with natives and introduced species were applied to test results. Eleven and one half (11.5) acres were planted to *Triticum sp.* (spring wheat) at Humphrey in 2008 and in 2009, 11.5 acres where planted to *hexaploide Lart.* (Triticale). Eight (8) acres are planned for seeding at Humphrey in 2010 and nine acres are planned for 2011. Specific acres and planned species to be planted are included in the Range Resource Report.

Eighteen (18) acres on the Big Mountain grazing area (West Summer Range) were seeded with a mix of *Thinopyrum intermedium* (Luna pubescent wheatgrass), *Agropyron intermedium/Elytrigia intermedia* (Tekmar/Rush intermediate wheatgrass), *Festuca ovina L.* (Covar sheep fescue), and *Melilotus officinalis* (yellow sweet clover) in 2002, this planting failed.

Complete seeding records are available at the Dubois Headquarters office.

Range Direct/Indirect Effects

Short-term effects represent impacts that occur year to year, or for this analysis, across a time-span of up to five years (short-term monitoring should generally occur on an annual basis or at least once in every three years). Long-term effects for this analysis represent resource impacts that occur across timeframes for five years or more (generally, long-term monitoring occurs every five to ten years). For this analysis, sheep grazing effects are discussed for Agricultural Research Service rangelands.

The Rangeland Assessment (Grooms, 2009) evaluated and assessed Headquarters, Henninger, Humphrey properties and East and West Summer Ranges using an interdisciplinary team consisting of rangeland management specialists, wildlife biologist, soil scientist, and 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-Bureau of Land Management et al. 2000), Sampling Vegetation Attributes (USDI-Bureau of Land Management et al. 1996), and the National Range and Pasture Handbook (USDA-NRCS 1997). A complete list of references is included in the Range Specialist Report (2009) found in the project file. The line intercept method was used to collect data, which measures distance on a line (measuring tape) occupied by different plant species, and from that, species composition and frequencies are extrapolated. It is designed for measuring grass or grass-like plants, forbs, shrubs, and trees.

Direct and indirect effects, from grazing and associated activities, by alternative are discussed for Headquarters, Humphrey, Henninger, East Summer, and West Summer properties.

Alternative 1 - Proposed Action (No New Federal Action)

Alternative 1, the proposed action would continue ongoing sheep grazing and associated activities that have been historically occurring in conjunction with Agricultural Research Service, U.S. Sheep Experiment 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 U.S. Sheep Experiment Station to carry out the mission it was established for by executive order and public law. Details of the proposed action and mitigations are found beginning on page 1.

The proposed action is also considered the no action alternative, because no new federal actions are proposed, merely a continuation of the historic and existing activities already occurring on the U.S. Sheep Experiment Station, Dubois, Idaho.

Headquarters

Continuation of current grazing would have little effect on this range. Based on available data, there is little or no difference between the 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 season of use would continue to provide growing season deferment across the majority of this unit each year. This range would continue to perform its natural ecological function. Soils would continue to be stable, and there would be an appropriate diversity of forbs, shrubs, and grasses. Only small (less than 10 acres) areas representing less than three percent of Headquarters property (trailing, watering, bedding) would continue to show heavy use.

Associated activities (prescribed burning, seeding, noxious weed control, fence maintenance, cattle and horse grazing, stock watering) would continue. These activities would contribute to good range condition. The continuation of prescribed burning would contribute the most towards keeping shrubs (sagebrush,

Artemesia ssp) from increasing. With no prescribed burning, grasses and forbs would decrease as shrub (sagebrush) densities increase. Weeds are not a problem; continued grazing and periodic spot herbicide application would keep weeds from establishing. Cattle and horse grazing during the non-growing season would continue to contribute by removing last-season grass growth. This removal by infrequent light cattle and horse stocking would continue to enhance grass growth. Fence maintenance would continue to control sheep grazing within units and prevent livestock trespass from surrounding private lands. Stock watering would continue to move sheep by varying water sites to little-used areas.

Humphrey

Continuing current grazing would have little effect on this range. Based on 2009 range surveys there is little or no difference between grazed and ungrazed areas now, with little room for improvement. Rotational and deferred grazing with light stocking rates would continue to maintain fair range conditions with a static trend. Humphrey soils would continue to be very stable, and there would be an appropriate diversity of forbs, shrubs, and grasses. Light stocking with less than 400 rams and 200 ewes would continue. Only small (less than 10 acres) areas representing less than three percent of Humphrey property (trailing, watering, bedding) would continue to show heavy use.

Continued associated activities, seeding, noxious weed control, fence maintenance, cattle and horse grazing, would contribute to good range condition. Weeds are not a problem and weed control with sheep grazing and spot herbicide application would continue to keep weeds in check. Cattle and horse grazing during the non-growing season would continue to contribute by removing last-season grass growth. Removal by infrequent light stocking of cattle and horse grazing would continue to enhance forage production. Fence maintenance would continue to control sheep grazing within units and prevent livestock trespass use from surrounding private lands.

Henninger

Soils are stable and diversity of forbs, shrubs, and grasses is appropriate although there is a concern. Range condition is Fair and appears in Static trend. Utilization is light on forbs/grasses (Table 3).. Field survey 2009 (visual) found Modate to Heavy use on browse. .This may be from early and late deer and elk grazing. Historically, the ranch primarily grazed cattle up until purchased by the U.S. Sheep Experiment Station in the early 1940s. The presence of smooth brome (Bromus inermis) in pastures indicates that it was planted to purpose cattle feed. Smooth brome is not preferred by sheep and is spreading into native vegetation areas and increasing in density.

Only small (less than 10 acres) areas representing less than two percent of the area grazed (trailing/watering/bedding) showed heavy use. Season of use is June 25 - July 9 and August 31 - September 15.

Associated activities (noxious weed control, fence maintenance, predator mitigation measures) would continue. Effects would be the same as for Humphrey Ranch noted above.

East Summer Range (Tom's Creek)

Continuation of current grazing would have little effect on this range. Based on available data, there is little or no difference between the 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. Soils would continue to be stable with an appropriate diversity of forbs, shrubs, and grasses. Rotation and rest one year in three with light stocking have developed good range conditions with a continued stable or upward trend. A comparison of exclosures that have not been grazed in 30 years to areas outside

exclosures, showed no differences in 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 driveways, trailing, watering, bedding), representing less than two percent of East Summer Range, showed heavy use and this would be expected to continue.

Driveway maintenance would continue to facilitate moving sheep to graze underutilized areas.

West Summer Range (Odell/Big Mountain)

Continuation of current grazing would have little effect on this range. Based on available data, there is little or no difference between the 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. Soils would continue to be stable with an appropriate diversity of forbs, shrubs, and grasses. Rotational and rest one year in three with light stocking have developed good range conditions with a stable or upward trend and would continue. Only small (less than 50 acres) areas (sheep driveways, trailing, watering, bedding), representing less than two percent of West Summer, showed heavy use, and this would be expected to continue.

Alternative 1 - Summary Range Direct/Indirect Effects

Table 18 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.

Table 18. 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	1598	5.6	April 23 – June 25	86
				Sept 1 – Nov 1	61
Humphrey	4,476	603	13.5	June 1 – Oct 20	142
Henninger	1,914	455	23.8	June 25 – July 9	15
				Aug 31 – Sept 15	16
East Summer [d]	4,043	155	3.8	July 3 – Aug 31	60
West Summer [d]	9,881	500	5.1	July 9 – Aug 31	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) sheep3 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.

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 U.S. Sheep Experiment Station Properties and Bureau of Land Management/ Forest Service Allotments)

Headquarters/Humphrey East Summer /West Summer

Cessation of grazing would have little effect on these range properties. Based on available data, there is little or no difference between the grazed and ungrazed area now and little room for improvement.

Alternative 2 would likely lead to the maintenance of satisfactory range. The small disturbed areas of past grazing effects would recover at natural rates. This would include those areas of heavy use identified under alternative 1. Progress toward range vegetation condition of “fair up” or static would be met. Existing infrastructure (troughs, fences, springs, etc.) would not be maintained. Efforts to reintroduce fire to the landscape (Headquarters) and addressing invasive plants on these lands would not continue.

Favorable vegetation condition and utilization would be met on all lands eliminated from grazing. Absence of sheep grazing across all Agricultural Research Service lands would eliminate localized and short-term grazing effects on sheep driveways, watering sites, and bedding grounds. Absence of grazing is likely to allow late-seral species to increase and maintain dominance in herbaceous vegetation types, because preferred forage species would not be harvested by sheep.

Noxious weeds in small patches do exist on these lands. With current sheep grazing, invasive weeds are not a problem. Neighboring rangelands have more extensive weed infestations. Weed control (grazing and spot herbicide application) would not continue, and this could result in increasing weed populations. Fence maintenance on Headquarters and Humphrey properties would not continue which could result in cattle trespass use.

Henninger

Residual effects from sheep grazing would recover at natural rates. This would include those areas of heavy use identified under alternative 1. Range vegetation condition would probably move to “Fair trend Upward. . Invasive weed control on these lands would not continue. Fence maintenance would not continue which could result in cattle trespass grazing. Smooth brome (non-native grass) would continue spreading and increasing in density.

Alternative 2 - Summary Range Direct/Indirect Effects

Table 19 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.

Table 19. Alternative 2 – percent of forage used, grazing period and grazing days by property

Property	Available Forage AUMs	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing Days
Headquarters	28,353	0	0.0	NA	NA
Humphrey	4,476	0	0.0	NA	NA
Henninger	1,914	0	0.0	NA	NA
East Summer	4,043	0	0.0	NA	NA
West Summer	9,881	0	0.0	NA	NA

While cessation of grazing and associated activities the Agricultural Research properties would have some changes to the various properties, the overall unavailability of Headquarters, Henninger and Humphrey Ranches, and the East and West Summer Ranges for grazing would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.

Alternative 3 (No grazing U.S. Sheep Experiment Station Humphrey Ranch, East and West Summer Ranges)

Headquarters

Light stocking increases to moderate with an estimated utilization almost doubling Alternative 1. Utilization would remain light. Growing season deferment provided under Alternative 1 (June 25 – September 1) would be lost. Grazing would affectively move from before and after the growing season to during the growing season. Continued growing season use could affect plant composition and vigor, less desirable plants may increase. Use of sheep-preferred browse species and forbs would increase from 6.8 percent to 9.1 percent. Light stocking and predicted 9.1 percent utilization would not compensate for continued growing season use.

Associated activities (prescribed burning, seeding, noxious weed control, fence maintenance, cattle and horse grazing, predator avoidance and abatement) would continue but may be less effective than in 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. Noxious weeds in small patches do exist on these lands. Removal of additional vegetation by sheep would occur and plant and litter production would decrease. Cattle and horse grazing during the non-growing season could be done for a shorter period with less available forage. Fence maintenance would continue to facilitate sheep grazing within units.

Henninger

Forage utilization would be reduced from 23.8 percent in Alternative 1 to 15.5 in Alternative 3. Deferred grazing during the growing season provided under Alternative 1 (July 9 – August 31) would be lost. Range condition is currently Fair and trend Static. Smooth brome would probably continue spreading and increasing in density. Noxious weeds in small patches and at sheep handling facilities do exist. Noxious weed control measures and fence maintenance would continue.

Humphrey /East Summer/West Summer

Same as Alternative 2.

Alternative 3 - Summary Range Direct/Indirect Effects

Table 20 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.

Cessation of grazing and associated activities on Humphrey Ranch and the East and West Summer Ranges would have some changes to range conditions on the Agricultural Research properties. However, the overall unavailability of Humphrey Ranch and the East and West Summer Ranges for grazing would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.

Table 20. Alternative 3 – percent of forage used, grazing period and grazing days by property[c]

Property	Available forage AUMs[a]	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing Days[b]
Headquarters	28,353	2577	9.1	April 23 – Nov 1	193
Humphrey	4,476	0	0.0	NA	NA
Henninger	1,914	296	15.5	June 1 – Oct 20	142
East Summer	4,043	0	0.0	NA	NA
West Summer	9,881	0	0.0	NA	NA

[a] - Animal Unit Month. By definition, one (1) AUM represents 790 lbs of dry forage consumed over 30.44 days by a 1,000-lb cow that is nursing a calf. For the purposes of this table, five (5) sheep3 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).

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

Headquarters/Humphrey/Henninger

Same as Alternative 1.

East Summer Range

Same as Alternative 2.

West Summer Range (Odell/Big Mountain)

Forage utilization on West Summer Range would increase from 5.1 percent in alternative 1 to 7.2 percent in alternative 4. With increased forage use, stocking and utilization would remain light. Cessation of grazing on East Summer would result in grazing West Summer (Odell/Big Mountain) each year. Although rest rotation could be done on some grazing units, good range conditions with a static or slight upward trend would continue. Small (less than 50 acres) areas of heavy use on sheep driveways, watering sites, bedding and herder camps would increase with higher use.

Alternative 4 - Summary Range Direct/Indirect Effects

Table 21 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.

Cessation of grazing and associated activities on the East Summer Range would have some changes to range conditions on the Agricultural Research properties. However, the overall unavailability of the East Summer Range 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. Alternative 4 – percent of forage used, grazing period and grazing days by property[c]

Property	Available Forage AUMs[a]	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days[b]
Headquarters	28,353	1598	5.6	April 23 – June 25	86
				Sept 1 – Nov 1	61
Humphrey	4,476	603	13.5	June 1 – Oct 20	142
Henninger	1,914	470	24.6	June 25 – July 9	15
				Aug 31 – Sept 15	16
East Summer	4,043	0	NA	July 3 – Aug 31	60
West Summer	9,881	711	7.2	July 9 – Aug 31	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) sheep3 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).

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

Headquarters/Humphrey/Henninger/East Summer/West Summer

There would be no change from Alternative 1.

Alternative 5 - Summary Range Direct/Indirect Effects

Table 22 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.

Table 22. Alternative 5 – percent of forage used, grazing period and grazing days by property[c]

Property	Available Forage AUMs[a]	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days[b]
Headquarters	28,353	1119	3.9	April 23 – June 25	86
				Sept 1 – Nov 1	61
Humphrey	4,476	422	9.4	June 1 – Oct 20	142
Henninger	1,914	318	16.6	June 25 – July 9	15
				Aug 31 – Sept 15	16
East Summer [c]	4,043	108	2.7	July 3 – Aug 31	60
West Summer [d]	9,881	350	3.5	July 9 – Aug 31	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) sheep3 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.

Range Cumulative Effects

The spatial boundary for range cumulative effects for this analysis includes the U.S. Sheep Experiment Station properties (Headquarters, Humphrey, Henninger, East and West Summer Ranges) and the leased lands (Mud lake Feedlot, Snakey, Kelly, East Beaver, Meyers, Bernice), use of these lands is part of the overall grazing strategy for the U.S. Sheep Experiment Station. The temporal boundary represents

resource impacts that occur across timeframes of five years. The five-year timeframe allows for yearly fluctuations while being an appropriate timeframe to identify range condition and trend.

Within the cumulative effects area, none of the properties is adjacent to another. Sheep are trucked or trailed between properties and allotments. Therefore, effects to range are not interdependent. An increase or decrease in range condition on one property or allotment does not affect range condition on any other property.

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. A small number of sheep are grazed on lands surrounding the feedlot with 560 useable AUMs. Stocking is light and utilization is also light at 160 AUMs used. The use period (April 1-June 1) on feedlot grazing lands provides ample opportunity for regrowth during the area's prime growing season (June – August). No change is expected from the continuation of current management.

Snakey, Kelly and Bernice

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 unit 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 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 impacts. A satisfactory range vegetation condition of "fair up" or static would continue to be met. Existing infrastructure would be maintained. Snakey and Kelly are operated under permits with the Caribou-Targhee National Forest; grazing standards would continue. Bernice operates under a Bureau of Land Management permit, Upper Snake Field Office, grazing standards (permitted AUMs used and grazing period) would continue to be met.

Meyers Creek Allotment

Currently this allotment is lightly stocked with an estimated 2.3 percent utilization. This is a transition unit between low- and high-elevation grazing/growing seasons. The grazing period is during two weeks in July. This removes grazing pressure from Henninger and allows East Summer vegetation to achieve range readiness. The flexibility provided by Meyers Creek addresses condition and utilization on Henninger and East Summer. Plants are annually deferred, allowing for recovery and regrowth after grazing. Meyers Creek is rested when East Summer is rested (1 in 3 years).

Short duration grazing with light stocking and utilization would help maintain the range condition. Only small (less than 50 acres) areas (sheep trailing/watering/bedding) would continue to display grazing use impacts. A satisfactory range vegetation condition of "fair up" or static would continue. Meyers Creek operates under a permit with the Caribou-Targhee National Forest; grazing standards would continue to be met.

East Beaver Allotment

Currently this allotment is lightly stocked with an estimated 1.2 percent utilization. Rotational grazing is practiced within the unit to provide plant deferment. Only small (less than 50 acres) areas (sheep watering/bedding) would display sheep impacts. Satisfactory range vegetation condition of "fair up" or static would continue. East Beaver operates under a permit with the Caribou-Targhee National Forest; grazing standards would continue to be met.

Alternative 1 – Summary 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 current range resource.

Table 23 displays available forage in AUMs, AUMs used, percent of available forage used, grazing period used during the year and number of days available for grazing by allotment.

Table 23. Alternative 1 – percent of forage used, grazing period and grazing days by allotment

Allotment [a]	Available Forage AUMs[g]	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Mud Lake [e]	560	160	28.6	April 1 – June 1	62
Snakey-Kelly [b, c]	1756	421	24.0	Nov 1 – Dec 15	45
East Beaver	17887	213	1.2	July 3 – Sept 1	61
Meyers Creek	3076	71	2.3	July 5 – July 25	20
Bernice [d, f]	2808	650	23.2	Dec 15 – Feb 5	53

[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 - Bernice has 1050 sheep permitted for the allotment, Nov 23 to Feb 1, and 1050 sheep permitted for the allotment, Dec 06 to Feb 5,
e – 400 Rams and 700 ewe lambs are retained at Mud Lake when 2230 sheep are moved in mid November to graze at FS and BLM allotments
f- Grazing dates at Bernice depends on snow conditions, early snow requires moving earlier than early February 5 with less days grazed.
[g] - 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) sheep3 are equivalent to one (1) AUM.

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 U.S. Sheep Experiment Station Properties and Bureau of Land Management/ Forest Service Allotments)

Mud Lake Feedlot

Grazing of 158 AUM during the growing season (April thru September) on lands surrounding Mud Lake Feedlot would affect range condition and utilization. Progress toward range vegetation condition of "fair up" or static would not be met. Continued growing season use would affect composition resulting in less

desirable plants and an increase of existing noxious weeds. The light stocking and predicted 28.2 percent utilization would not compensate for continued growing season use.

Snakey, Kelly, and Bernice

Cessation of 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 litter would be available for soil protection.

The residual effects from past disturbances would recover at natural rates. This would include those areas of heavy use under alternative 1. Progress toward range vegetation condition of “fair up” or static would be met. Efforts to address invasive plants on these lands would stop.

Meyers Creek Allotment

Cessation of grazing would have little effect on this range. Currently this allotment is lightly stocked with an estimated 2.3 percent utilization. The grazing period is during two weeks in July. This is a transition unit between low- and high-elevation grazing. Flexibility to graze Meyers Creek addresses condition and utilization on Henninger and East Summer. Meyers Creek is now rested when East Summer is rested (1 in 3 years) under alternative 1.

The residual effects from past disturbances would recover at natural rates. This would include those areas of heavy use under alternative 1. Range vegetation condition of “fair up” or static would be met. Weeds could be expected to increase on these lands without control efforts implemented by U.S. Sheep Experiment Station.

East Beaver Allotment

Sheep grazing cessation would have little effect on this range. Currently (alternative 1) this allotment is lightly stocked with an estimated 1.2 percent utilization. Rotational grazing is practiced to provide plant deferment. No sheep grazing could result in slightly more forage additional 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. Range vegetation condition of “fair up” or static 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 this may cause forbs to increase.

Alternative 2 – Summary Cumulative Effects

All properties are eliminated from grazing. Mud Lake would be unsatisfactory based on effect on range condition trend and heavy utilization. All leased properties would be unsatisfactory based on loss of flexibility.

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

Table 24 displays available forage in AUMs, AUMs used, percent of available forage used, grazing period used during the year and number of days available for grazing by allotment.

Table 24. Alternative 2 – percent of forage used, grazing period and grazing days by allotment

Allotment [a]	Available Forage AUMs	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Mud Lake	560	158	NA	April 1 – Sept 20	173
Snakey-Kelly	1756	0	NA	NA	NA
East Beaver	17887	0	NA	NA	NA
Meyers Creek	3076	0	NA	NA	NA
Bernice	2808	0	NA	NA	NA

Elimination of grazing on Agricultural Research properties as well as Bureau of Land Management/ Forest Service allotments would not provide range conditions necessary for the U. S. Sheep Experiment Station to continue its current and ongoing research mission.

Alternative 3 (No grazing U.S. Sheep Experiment Station Humphrey Ranch, East and West Summer Ranges)

East Beaver and Meyers Creek Allotments

Same as Alternative 2.

Mud Lake/Snakey Kelly/Bernice

Same as Alternative 1.

Alternative 3 – Summary of Cumulative Effects

East Beaver and Meyers Creek would be unsatisfactory based on units that are eliminated from grazing/flexibility.

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

Table 25 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.

Cessation of grazing and associated activities on Humphrey Ranch and the East and West Summer Ranges and East Beaver and Meyers Creek allotments would have some changes to range conditions. However, the overall unavailability of Humphrey Ranch and the East and West Summer Ranges and 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 25. Alternative 3 – percent of forage used, grazing period and grazing days by allotment

Allotment [a]	Available Forage AUMs[g]	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Mud Lake [e]	560	158	28.2	April 1 – June 15	76
Snakey-Kelly [b], [c]	1756	337	19.2	Nov 8 – Dec 15	38
East Beaver	17887	0	NA	NA	NA
Meyers Creek	3076	0	NA	NA	NA
Bernice [d, f]	2808	520	18.5	Dec 15 – Feb 5	53

[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 - Bernice has 1050 sheep permitted for the allotment, Nov 23 to Feb 1, and 1050 sheep permitted for the allotment, Dec 06 to Feb 5,
e – 400 Rams and 700 ewe lambs are retained at Mud Lake when 2230 sheep are moved in mid November to graze at FS and BLM allotments
f- Grazing dates at Bernice depends on snow conditions, early snow would require moving earlier than early February 5, with less days grazed.
[g] - 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) sheep3 are equivalent to one (1) AUM.

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

Mud Lake Feedlot, Snakey, Kelly, Bernice, and East Beaver Allotments

Same as Alternative 1.

Meyers Creek Allotment

No grazing on Meyers Creek allotment eliminates grazing of the transition unit between low- and high-elevation grazing. Loss of this unit affects flexibility and increases utilization on Henninger. All other affects are the same as alternative 2.

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

Alternative 4 – 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 current range resource.

Table 26 displays available forage in AUMs, AUMs used, percent of available forage used, grazing period used during the year and number of days available for grazing by allotment.

Cessation of grazing and associated activities on the East Summer Ranges and Meyers Creek allotment would have some changes to range conditions. However, the overall unavailability of the East Summer Range and Meyers Creek allotment for grazing would not provide range conditions necessary for the U.S. Sheep Experiment Station to continue its current and ongoing research mission.

Table 26. Alternative 4 – percent of forage used, grazing period and grazing days by allotment

Allotment [a]	Available Forage AUMs[g]	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Mud Lake [e]	560	160	28.6	April 1 – June 1	62
Snakey-Kelly [b, c]	1756	421	24.0	Nov 1 – Dec 15	45
East Beaver	17887	213	1.2	July 3 – Sept 1	61
Meyers Creek	3076	0	NA	NA	NA
Bernice [d, f]	2808	650	23.2	Dec 15 – Feb 5	53

[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 - Bernice has 1050 sheep permitted for the allotment, Nov 23 to Feb 1, and 1050 sheep permitted for the allotment, Dec 06 to Feb 5,
e - 400 Rams and 700 ewe lambs are retained at Mud Lake when 2230 sheep are moved in mid November to graze at FS and BLM allotments.
f- Grazing dates at Bernice depends on snow conditions, early snow requires moving earlier than early February 5 with less days grazed.
[g] -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) sheep3 are equivalent to one (1) AUM.

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

Meyers Creek/Snakey/Kelly

Same as Alternative 1

East Beaver/Bernice/Mud Lake Feedlot

Same as Alternative 2

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 current range resource.

Table 27 displays available forage in AUMs, AUMs used, percent of available forage used, grazing period used during the year and number of days available for grazing by allotment.

Cessation of grazing and associated activities on the Snakey-Kelly and Bernice allotments would have some changes to range conditions. However, the overall unavailability of Snakey-Kelly and Bernice 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 27. Alternative 5 – percent of forage used, grazing period and grazing days by allotment

Allotment [a]	Available Forage AUMs [c]	AUMs Used	Percent of Available Forage Used	Inclusive Grazing Period	Approximate Grazing days Available
Mud Lake [b]	560	166	29.6	April 1 – June 15	76
Snakey-Kelly	1756	0	0	NA	NA
East Beaver	17887	149	0.8	July 3 – Sept 1	61
Meyers Creek	3076	50	1.6	July 5 – July 24	19
Bernice	2808	0	0	NA	NA

[a] - Grazing units within allotments are rest rotation grazed.
[b] - 400 Rams and 700 ewe lambs are retained at Mud Lake when 2230 sheep are moved in mid November to graze at FS and BLM allotments.
[c] - 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) sheep3 are equivalent to one (1) AUM.

Federally Threatened, Endangered, and Proposed Species

Activities on the U.S. Sheep Experiment Station are subject to the Endangered Species Act.

Canada Lynx (Lynx canadensis)

Canada Lynx Affected Environment

A comprehensive review of Canada lynx life history can be found in the Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al., 2000). A condensed version of life history from the Lynx Recovery Outline (USDI FWS, 2005(a)) is summarized below.

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

Canada lynx is a federally-listed threatened species and historically resided within the Centennial Mountain Range portions of the U.S. Sheep Experiment Station, which includes the West Summer Range (Odell Creek and Big Mountain) and the East Summer Range (Tom's Creek). These areas are outside of,

but adjacent to Lynx Analysis Units established on the Targhee National Forest in 2005. There is no Canada lynx critical habitat in the project vicinity. The Idaho statewide wildlife observation database indicates that historically, a number of Canada lynx have been observed in the Centennial Mountain Range. The TEAMS wildlife biologist has discussed occurrences of Canada lynx with US Fish and Wildlife Service in Chubbuck, ID (Arena, 2008, 2009), Idaho Department of Fish and Game Biologists (Schmidt, personal communications), and U.S. Forest Service Biologists on the Caribou-Targhee National Forest (Aber, Keetch, Orme, personal communications). Biologists with these agencies indicated that Canada lynx are unlikely to be currently residing year-round in the Centennial Range based on:

- A limited number of observations since 1984,
- Negative findings during hair snare surveys in 1999 – 2001, and
- Limited observations from winter track surveys conducted from 1996 – 2004.

A summary of lynx habitat and observation data compiled for the Caribou-Targhee National Forest (adjacent to Agricultural Research Service lands) is presented in a Forest report prepared by Orme, 2005. In a biological assessment (Aber, 2007) completed for sheep grazing on the USFS Meyers Creek Allotment, which is adjacent to Tom's Creek on Agricultural Research Service lands, the biologist determined that grazing activities would have "No Effect" on Canada lynx and are consistent with the Lynx Conservation Assessment and Strategy. According to maps prepared for the Lynx Conservation Agreement between the U.S. Forest Service and the US Fish and Wildlife Service (USDA Forest Service, 2006), areas in the Centennial Range are Secondary Habitat, which the Lynx Recovery Outline defines as "those with historical records of lynx presence with no record of reproduction; or areas with historical records and no recent surveys to document the presence of lynx and/or reproduction." A majority of habitat on Agricultural Research Service lands is unsuitable for lynx, because it is in lower elevation shrublands (Headquarters, Henninger Ranch). Higher elevation lands (West Summer Range, East Summer Range, and Humphrey Ranch) are potential lynx habitat but are of lower quality, because the lands do not contain large, connected expanses of boreal forest. Agricultural Research Service lands are outside of established Lynx Analysis Units.

Based on a review of the above information, there is potential for an occasional lynx to use the area traveling through high-elevation Agricultural Research Service lands in the Centennial Mountain Range, while temporarily foraging or moving between larger expanses of quality habitat in northwest Wyoming and Central Idaho. However, the area is unlikely to be currently occupied by a resident lynx population considering the lack recent observations in the Centennial Range and the status of adjacent habitat on USFS lands as unoccupied according to the Lynx Conservation Agreement (USDA Forest Service, 2006).

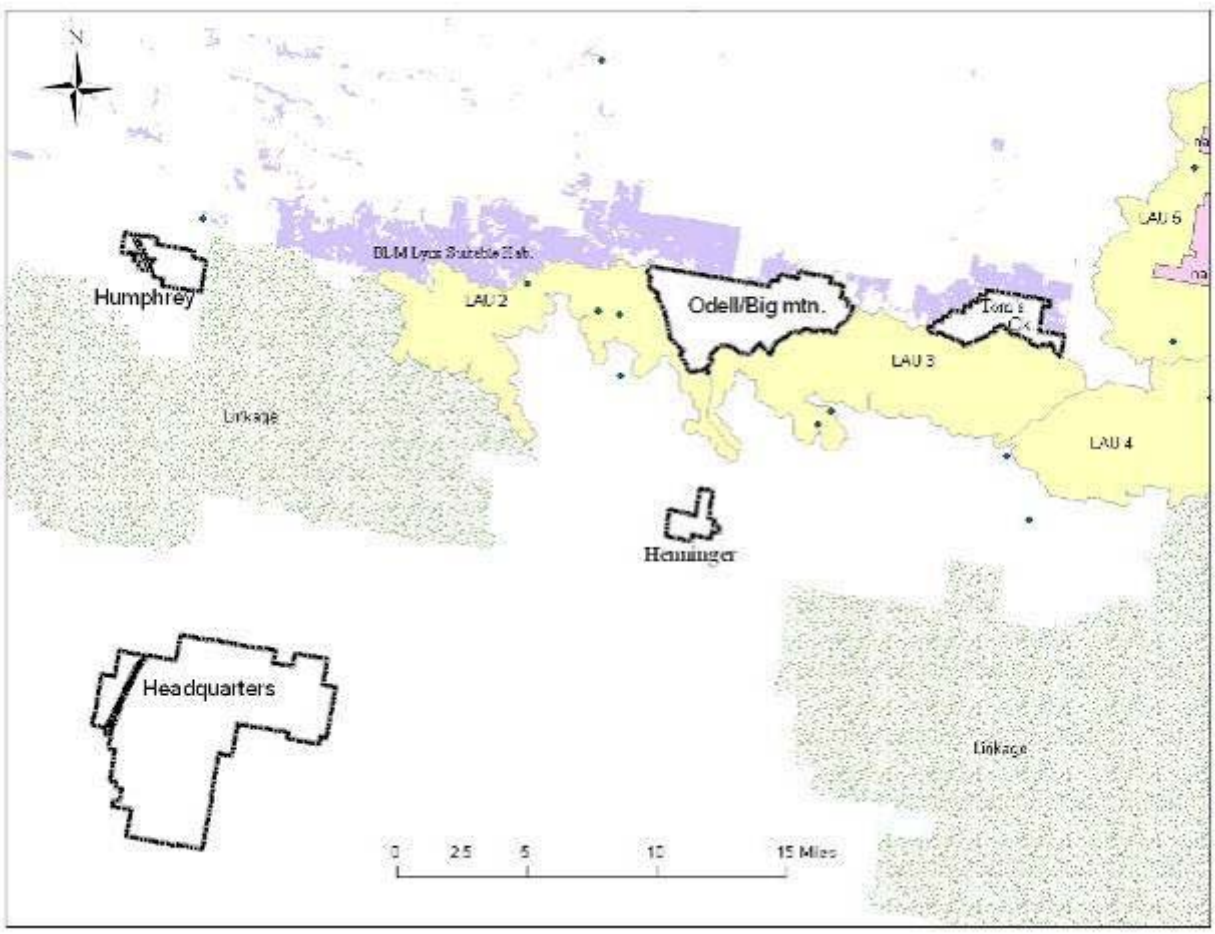


Figure 28. Sheep Station Lands adjacent to LAUs established in 2005 on the Caribou-Targhee National Forest.

Canada Lynx Direct/Indirect Effects

Alternatives 1 (Proposed Action), 4, and 5.

Effects from activities in these three alternatives are the same as each proposes similar livestock grazing and associated activities in suitable lynx habitat in the summer range (Centennial Mountains). Alternative 1 proposes grazing in both the East and West Summer Ranges; Alternative 4 does not propose grazing in the East summer range or U.S. Forest Service Meyers allotment but continues grazing in the West Summer Range; Alternative 5 removes grazing from Snakey/Kelly and Bernice allotments, but continues grazing in both the East and West summer ranges. As such, potential effects to Canada lynx remain the same throughout each alternative as described below.

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

Most of the activities would have no effect on Canada lynx or their habitat. Those activities that occur in sagebrush shrublands at lower elevation are outside of Lynx Analysis Units, occur in areas that do not

have continuous forested cover, and do not provide adequate habitat features for denning or routine lynx foraging activities. The activities that are outside of suitable habitat and thus would have no effect include:

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

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

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

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

Another possible indirect effect to lynx is that associated with competition for browse between livestock and snowshoe hare (Ruediger and others, 2000). On-the-ground conditions quantified in the Range Report(2009) indicate that sheep grazing in the Centennial properties is of low intensity with a high amount of available forage. Light stocking and a rotation schedule that rests areas one year in three have allowed for highly productive range conditions with a stable or upward trend. Appropriate diversity of forbs, shrubs, and grasses is present, and in 2009, forb production was double or triple that expected. Utilization was light. Visual comparison of plants inside enclosures that have not been grazed in over 30 years to those outside the enclosures showed no difference in vegetative composition. Forested understory

that provides winter cover and browse for snowshoe hares is present, and remains unaltered by the sheep grazing activities except where down logs are occasionally bucked into pieces to allow sheep passage along established trails. Near pristine on-the-ground conditions in the Summer Range are a result of many previous years in which the proposed activities have been occurring, and indicate that long-term habitat changes that might be of concern (described in the Lynx Conservation Assessment and Strategy (Ruediger and others, 2000) would not occur from the proposed activities.

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

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

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

Alternatives 2 and 3

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

Canada Lynx Summary of Direct/Indirect Effects

Disturbances to Canada lynx are unlikely in the proposed action as well as alternatives 4 and 5, based on low potential for year-round occupancy, lack of control measures directed at felines, and the presence of full time sheep herders and guard dogs that limit depredation. However, the potential exists for lynx to move through the area foraging and in search of larger expanses of high quality habitat. In such cases, disturbances would be limited to an occasional lynx avoiding the immediate area coincident with a band of domestic sheep, guard dogs, and herd dogs. Where suitable foraging and denning habitat is present in sufficient quantities, Canada lynx would temporarily adjust their location to avoid encounters, but continue to forage in nearby forested stands.

Alternatives 2 and 3 would have no effect on Canada lynx, since grazing and associated activities would not occur in the Centennial Range. The small potential for lynx to encounter herders or guard dogs would not occur, and there would be no competition for browse between domestic livestock and snowshoe hare.

Canada Lynx Cumulative Effects

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

As stated in the affected environment section of the report, the official status of adjacent habitat on U.S. Forest Service lands is unoccupied according to the Canada Lynx Conservation Agreement (USDA Forest Service, 2006). There is potential for occasional lynx to use the Centennial Mountains while temporarily foraging or moving between larger expanses of quality habitat in northwest Wyoming and Central Idaho. The proposed project and alternatives do not reduce available habitat, would not add additional effects which would render potentially occupiable habitat as unsuitable, nor would it deter from the Centennial mountains ability to provide temporary Canada lynx travel and foraging between higher quality habitat in Yellowstone or Central Idaho. As such, the project and alternatives do not contribute to additional cumulative effects.

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

Canada Lynx Biological Determination

The project biologist has determined that U. S. Sheep Experiment Station Grazing and Associated Activities Project 2009, may affect, but is not likely to adversely affect Canada lynx." This determination is supported by rationale presented in the Biological Assessment and summarized below.

- Suitable lynx habitat is present, however that habitat has been identified as having a low potential for year-round occupancy, and recent observations of Canada lynx in the area are rare.

- Canada lynx have not been targeted for abatement on Agricultural Research Service lands, nor are there records of personal accounts indicating that abatement actions have been taken to control Canada lynx on Agricultural Research Service lands. No take would occur from predator control activities.

- Grazing practices and associated activities implemented by U.S. Sheep Experiment Station do not affect denning habitat, do not remove cover important to lynx travel, and retain adequate cover and forage available to snowshoe hares, lynx primary prey. Activities are consistent with standards in the Lynx Conservation Assessment and Strategy.

- Cumulative effects of the project are negligible.

- Negative effects are unlikely. If they occur at all, they would be limited to small temporary changes in daily movements. In the Centennial Mountains, individual lynx moving through the area may make small temporary adjustments in habitat use/travel routes to avoid conflicts with guard dogs and/or humans associated with grazing a band of sheep.

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

Grizzly Bear (Ursus arctos horribilis)

Grizzly Bear - Affected Environment

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

- The court found that the Conservation Strategy, Forest Plan Amendment, and State Plans are not adequate regulatory mechanisms because they are minimally enforceable, particularly outside of the PCA, and rely on good faith and future promises of action. In addition, the final rule to delist didn't adequately analyze how various laws would protect the species.

- The court found that the FWS did not articulate a good rationale regarding expected declines in whitebark pine, and that the decline won't threaten grizzlies.

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

- The court found that the U.S. Fish and Wildlife Service analysis adequately demonstrated that maintaining a population size of 500 animals is sufficient for genetic diversity. Similarly, that translocation from other populations is an adequate method to address genetic diversity shortfalls over the long term, and that there is not a short-term issue with genetics. The population does not need to be "self-sustaining" to be delisted.

- The court found that the U.S. Fish and Wildlife Service analysis and the final rule to delist provided good rationale that the Distinct Population Segment /Primary Conservation Area (PCA)constitutes a significant portion of the Yellowstone grizzly bears' range. The U.S. Fish and Wildlife Service did not

need to identify migration corridors, because grizzlies, outside of the Distinct Population Segment boundary, are still protected under Endangered Species Act.

The Yellowstone Distinct Population Segment of grizzly bear was de-listed in 2007 because of an increasing population in and around Yellowstone National Park in the bear's Primary Conservation Area, and because grizzly bears are expanding their range to inhabit suitable habitat throughout the boundaries of the Distinct Population Segment (which includes Sheep Experiment Station lands). Though the species has since been relisted, both of these factors are still applicable in evaluating the context of potential effects of the project. The US Fish and Wildlife Service (FWS) Grizzly Bear Recovery website (http://www.fws.gov/mountain-prairie/species/mammals/grizzly/yellowstone.htm) summarizes information from the Final Rule to Delist (USDI FWS, 2007) stating that,

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

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

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

The U.S. Sheep Experiment Station has an Interagency Agreement (USDA Forest Service, 2007) with the Caribou-Targhee National Forest for grazing on the Meyers Creek allotment, which is inside the Primary Conservation Area. This grazing has been analyzed previously in a biological evaluation (Aber, 2007) prepared by the Forest Service Wildlife Biologist which found that ,"Continuing grazing on the allotment may impact individual grizzly bears or their habitat, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species." This finding was based on:

- The U.S. Sheep Experiment Station sheep grazing in the Meyers Creek allotment for decades with minimal conflicts,
- Standards and guidelines from the Grizzly Bear Forest Plan Amendment are being met, and
- "The permittees (U.S. Sheep Experiment Station) have had an excellent record of avoiding conflicts with bears for many years."

Based on a 2007 radio-telemetry data of grizzly bear activity and habitat types on the Agricultural Research Service lands (seen in the figures below), the following can be inferred about grizzly bear habitat and occupancy on Agricultural Research Service lands.

- Two U.S. Sheep Experiment Station parcels of land exist in Montana in high-elevation portions of the Centennial Range. These parcels contain suitable habitat that is occupied by grizzly bear. They include the East Summer Range (Tom's Creek) and West Summer Range (Odell Creek and Big Mountain). All are outside of the grizzly bear Primary Conservation Area.

- The Henninger Ranch is a small U.S. Sheep Experiment Station parcel of land in Idaho, at the base of the Centennial Range. Telemetry data indicates that, on occasion, grizzly bear have been in the vicinity of this parcel. However, the presence of county roads, open sagebrush habitat, and lack of white bark pine limit its value to grizzly bears. On rare occasion, this parcel could be temporarily occupied by a traveling grizzly bear.

- All other parcels of Agricultural Research Service lands are in Idaho and are unlikely to be occupied by grizzly bear. These parcels are dominated by sagebrush with frequent motorized activity on county roads. 2007 telemetry data indicated no grizzly bear observations on or adjacent to these lands. They include Humphrey Ranch and the Sheep Experiment Station Headquarters.

- The U.S. Sheep Experiment Station grazes sheep on additional federal agency lands. Similar to the above, these areas do not support grizzly bear activity, are dominated by sagebrush, and recent telemetry data showed no observations on or adjacent to these areas. They include the Snakey/Kelly allotment (U.S. Forest Service), East Beaver allotment (U.S. Forest Service), Bernice allotment (Bureau of Land Management), and the Mud Lake Feedlot (Department of Energy).

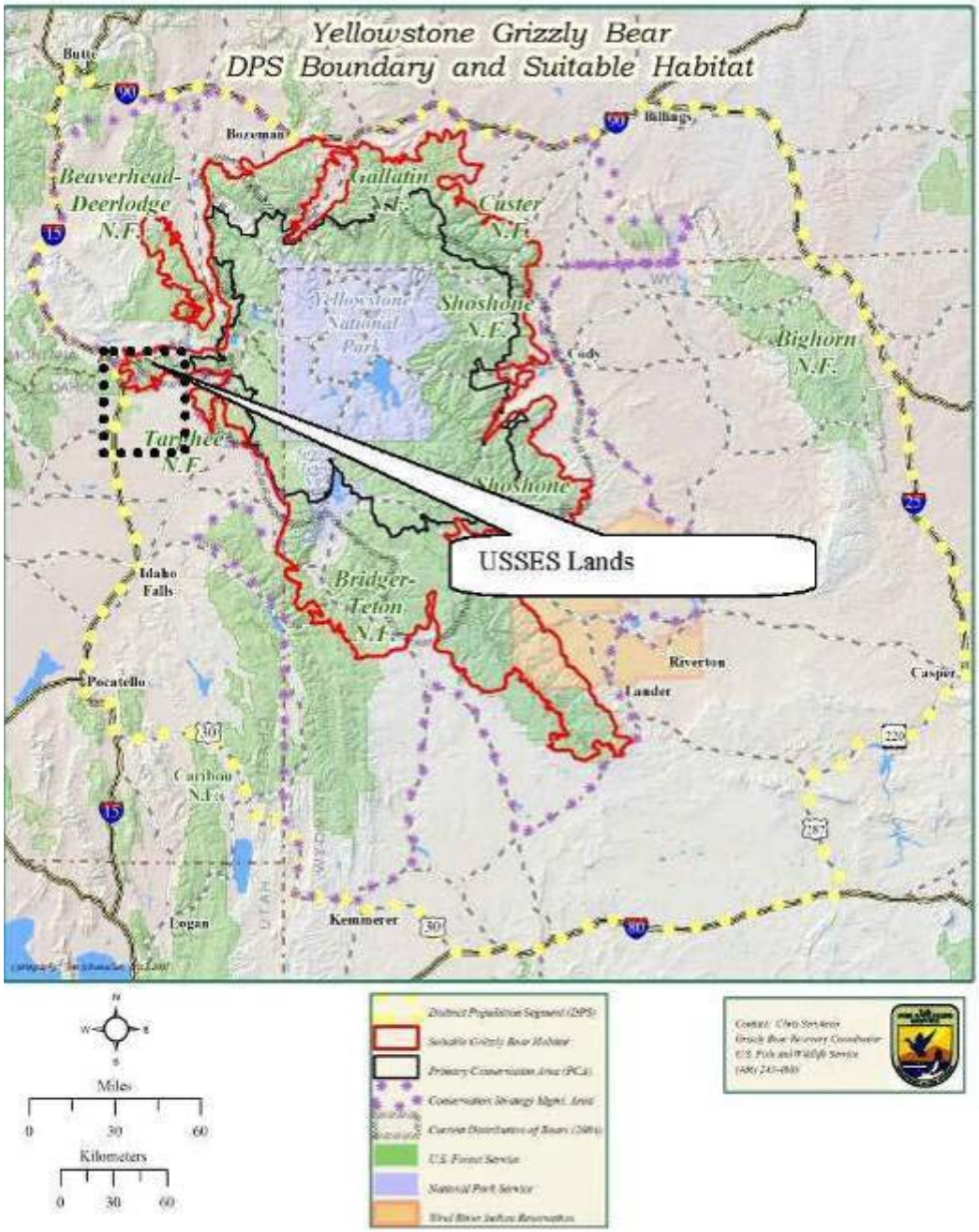


Figure 29. Vicinity, Yellowstone Grizzly DPS

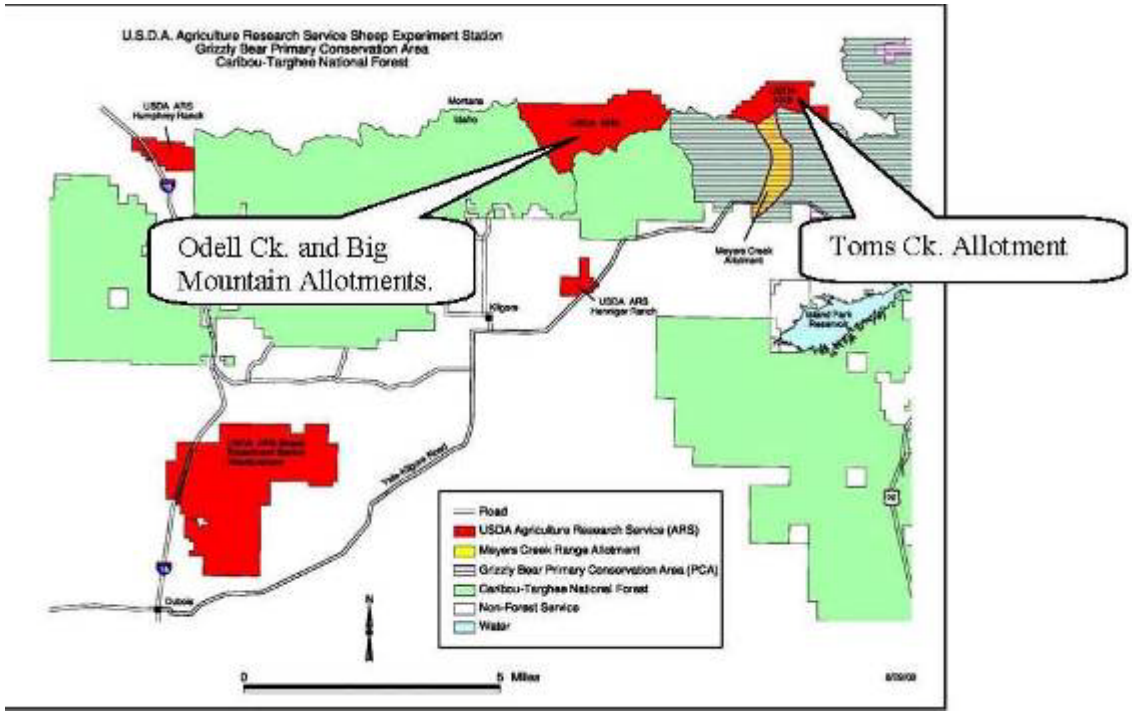


Figure 30. Agricultural Research Service lands, Odell, Big Mountain, and Tom's Ck, Outside of the Primary Conservation Area

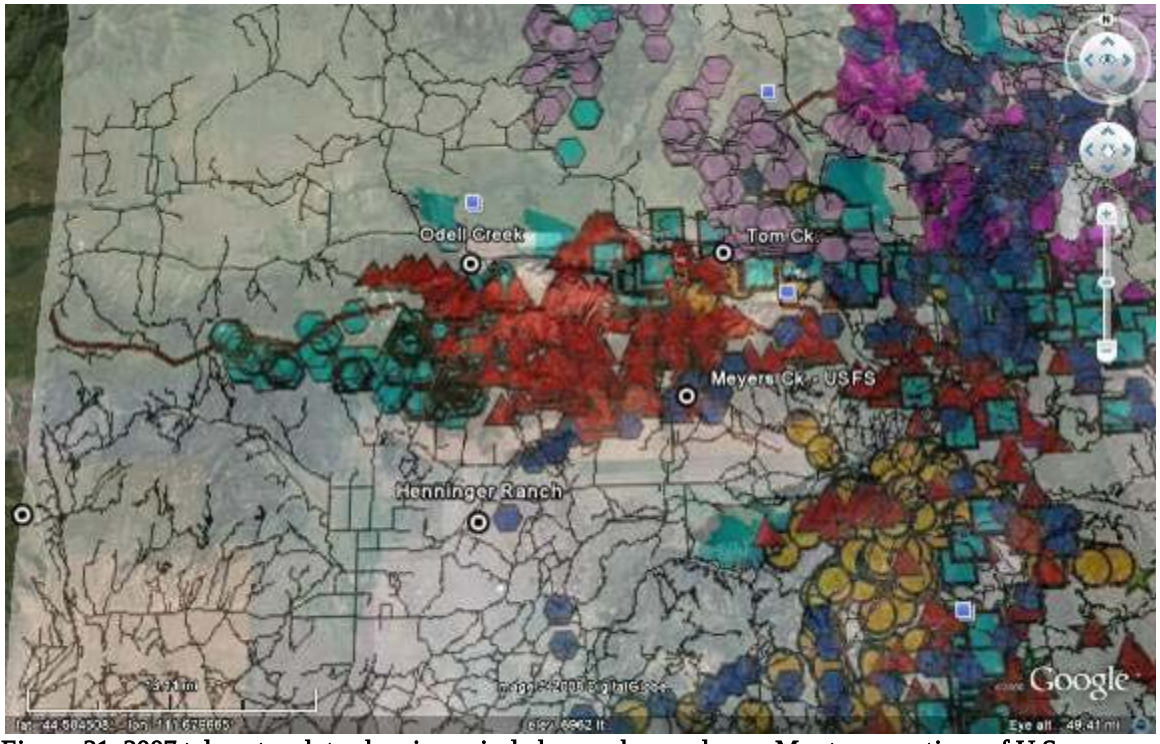


Figure 31. 2007 telemetry data showing grizzly bears observed near Montana portions of U.S. Sheep Experiment Station

A summary of key information from the Annual Report of the Interagency Grizzly Bear Study Team (Schwartz et al., 2008) includes the following information pertinent to the U.S. Sheep Experiment Station:

- There have been no grizzly bear conflicts on the Meyers Creek Sheep allotment of the Caribou-Targhee National Forest in the last five years. The Icehouse sheep allotment was permanently closed in 2008.

- Small reductions in grizzly bear secure habitat in the Centennial Bear Analysis Unit, which includes the Agricultural Research Service lands, are related to updated mapping efforts on the Caribou-Targhee National Forest, and no actual decrease in security occurred. (Schwartz et al.).

- The Grizzly Bear Habitat Conservation Guideline for Livestock Grazing states - Outside the Primary Conservation Area in areas identified in State (Idaho and Montana) Management plans as biologically suitable and socially acceptable for grizzly bear occupancy, livestock allotments or portions with recurring conflicts that cannot be resolved through modification of grazing practices may be retired as opportunities arise with willing permittees.

- There were 48 known and probable grizzly bear mortalities in 2008. In 2009, there have been 22 known and probable grizzly bear mortalities as of October 10 (IGBST Website, 2009)

- Haroldson and Frey (included in the Annual Report) indicated that mortality thresholds were exceeded for the first time in 2008 for independent female and independent male grizzly bears in the Greater Yellowstone Ecosystem. Exceeding the mortality threshold for two consecutive years (females) or three consecutive years (males) triggers a biology and management review under the Final Rule to delist the Yellowstone Grizzly Bear DPS (USDI FWS 2007(a)).

- Thirty-seven (37) of the 2008 mortalities were human caused (77percent). Of the 37 human caused mortalities, 20 were related to black bear and other hunting incidents, 10 were management removals, two were malicious killings, two were in defense of residences, two were related to handling of animals, and one was a road kill.

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

- Current levels of genetic diversity are consistent with known historic levels and do not threaten the long-term viability of the species.

- The Final Conservation Strategy (2007) includes the transplant of one to two effective migrants per generation if no movement or genetic exchange is documented by 2020.

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

- Indicators of fitness in the Yellowstone population demonstrate that the current levels of genetic heterozygosity[10] are adequate, as evidenced by measures such as litter size, little evidence of disease, high survivorship, an equal sex ratio, normal body size and physical characteristics, and an increasing population.

- Yellowstone grizzly bear populations are not as low as previously feared, and the need for novel genetic material is not urgent.

- In addition to monitoring for gene flow and movements, interagency efforts would continue toward completing the linkage zone task in the Recovery Plan (U.S. Fish and Wildlife Service 1993, pp. 24–26) to provide and maintain movement opportunities for grizzly bears, and reestablish natural connectivity and gene flow between the Yellowstone grizzly bear Distinct Population Segment and other grizzly bear populations.

- Linkage work not directly associated with the Yellowstone grizzly population is being completed in the northern Rockies, to address ways to improve cooperation and affect management on public lands, private lands, and highways in linkage areas across the northern Rockies.

The recent court challenges to relist the grizzly bear included genetic diversity concerns, and their merit was reviewed by the court (U.S. District Court, 2009(b)). The court found that in the Final Rule to delist the grizzly bear, the U.S. Fish and Wildlife Service provided adequate evidence to support that maintaining a population size of 500 animals is sufficient for genetic diversity, there is not a short term issue with genetics, and that translocation from other populations is an adequate method to address genetic diversity shortfalls over the long term.

U.S. Sheep Experiment Station activities to reduce grizzly bear conflicts

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

1. When creating research plans that include a sheep grazing component, they consider potential livestock-bear conflicts and avoid areas where problems can be anticipated.
2. Use good husbandry practices so that sheep are as healthy as possible, are suitable for research, and the number of sick/stray animals is kept to a minimum. An Institutional Animal Care and Use Committee evaluates research protocols and livestock management practices to ensure they are consistent with good animal husbandry, and comply with Federal laws that govern the use of agricultural animals in research. Protocols and practices that do not comply are not approved.
3. Sheep herders, working dogs, and guard dogs are kept with the sheep full-time when on rangelands to reduce the likelihood of encounters, and to assist in efficient and prompt movement of animals when necessary.
4. All unnatural attractants to bears are minimized. This includes treatment or removal of livestock carcasses, and proper storage of human foods, garbage, and dog food. Approved "bear-proof" containers are used and damaged containers are repaired or replaced so that they work as designed. Camp tenders and managers make periodic visits to remove trash and/or dead animal carcasses in order to eliminate potential bear attractants.

[10] Heterozygosity : having dissimilar pairs of genes for any hereditary characteristic.

5. At least two formal training-orientation meetings are conducted annually with U.S. Sheep Experiment Station employees and herders to make sure they can identify grizzly bear, black bear, bighorn sheep, Canada lynx, mountain lions, sage-grouse, and other species they might encounter. In addition, they discuss U.S. Sheep Experiment Station sanitation and garbage removal practices, nonlethal procedures to address livestock-wildlife encounters, and who to contact should encounters occur. Training and education are ongoing and not limited to formal meetings.
6. Regarding grizzly bears, herders are instructed to do everything possible to avoid an encounter. Moving the sheep to other areas of the pasture may occur, and moving sheep to other pastures/locations is an option if problems persist. They are to report the sighting to their supervisor as soon as possible. Sheep herders carry guns for safety and to scare off inquisitive animals. If a grizzly bear is threatening sheep, herders may discharge their rifle into the air if they think it would help frighten the bear (hazing). A herder may shoot directly at a grizzly bear only if his personal safety is threatened, however this situation has not occurred with U.S. Sheep Experiment Station grazing, and is not expected to occur.
7. When on Agricultural Research Service land, all existing and suspected bear activity and/or conflicts are reported directly to APHIS Wildlife Services. APHIS Wildlife Services then contacts state and federal agencies as necessary.
8. When grazing on lands owned by USDA Forest Service or USDI Bureau of Land Management, all existing and suspected bear activity and/or conflicts are reported directly to the Forest Service or Bureau of Land Management, respectively, as well as APHIS Wildlife Services.
9. In an interagency agreement with the U.S. Forest Service (USDA Forest Service, 2007), the U.S. Sheep Experiment Station agrees they would comply with meeting grizzly bear management goals on the Myers Creek and East Beaver Allotments including notifying appropriate personnel of encounters, and temporarily stopping or modifying grazing as necessary, should bear conflicts arise with humans or livestock. Refer to the specific interagency agreement for details.
10. Grizzly bear trapping, transportation, or lethal removal is outside the scope of this project and thus, if needed, would require the U.S. Sheep Experiment Station to re-initiate consultation or conduct an emergency consultation, in order to consider the probability of incidental take.

Known accounts of past interactions between domestic sheep and grizzly bears

In the past five years, there have been no grizzly bear conflicts on the Meyers Creek Sheep allotment of the Caribou-Targhee National Forest (Schwartz et al., 2008 in habitat monitoring report section). There have been three confirmed grizzly bear accounts on Agricultural Research Service lands, 1985, 1999, and 2008, all which ended without grizzly bear mortality or attempting lethal control actions. In 2008, an encounter on Odell creek was investigated by APHIS Wildlife Services, who determined probable cause of damage was grizzly bear (Farr, personal communications). No control actions were taken and sheep were moved without further incident. Similarly, in the two additional previous cases, the sheep were moved without further incidents (1999), or the grizzly bear left the U.S. Sheep Experiment Station band of sheep without killing any of them (1985), and no additional problems occurred. No grizzly bears have been killed, captured, or relocated on Agricultural Research Service lands or on Forest Service/Bureau of Land Management allotments in response to U.S. Sheep Experiment Station activities.

Grizzly Bear Direct/Indirect Effects

Alternative 1 – Proposed Action and 5

Effects from activities in these two alternatives are essentially the same as each proposes similar livestock grazing and associated activities in grizzly bear habitat in the summer range (Centennial Mountains). Alternatives 1 and 5 propose grazing in both the East and West Summer Ranges; including the Meyers Creek Allotment on U.S. Forest Service which is inside the grizzly bear Primary Conservation Area. Alternative 5 removes grazing in Snakey/Kelly (U.S. Forest Service) and Bernice (Bureau of Land Management) allotments, which does not affect suitable grizzly bear habitat. As such, potential effects to grizzly bear remain the same throughout the two alternatives as described below. Grizzly bear trapping, transportation, or lethal removal is outside the scope of this project and thus, if needed, would require the U.S. Sheep Experiment Station to re-initiate consultation or conduct an emergency consultation with the U.S. Fish and Wildlife Service, in order to consider the probability of incidental take.

A review of the activities described in the proposed action indicates that most of the activities would have no effect on grizzly bears or their habitat. Activities that may have minimal effects to grizzly bears can be categorized as follows:

- Trailing, grazing, and camp tending activities in the Centennial Range could be an attractant to grizzly bears. Sheep grazing within high-elevation forests surrounding the grizzly bear Primary Conservation Area could be likely to attract occasional bears opportunistically searching for food. However, conservation measures including the presence of full-time sheep herders, guard dogs, and herd dogs provide consistent and effective methods of non-lethal control that, in-turn, discourages bears from habituating to sheep as a food source. Regular camp-tending would be used to remove trash and remove or treat sheep carcasses that would otherwise attract bears if left untreated on site. As a result, the potential effect of attracting grizzly bears to domestic sheep as a food source would be substantially reduced :

  1. First: by minimizing additional attractants through food storage, trash removal, and sheep carcass disposal,
  2. Second: by using non-lethal methods of control that discourage bears to habituate to sheep, and
  3. Third: by moving bands of sheep to other areas of a grazing location in order to avoid problem grizzly bears before a persistent conflict develops.

  The number of previous encounters has been minimal, and the direct and indirect effect to grizzly bears was inconsequential as incidents ended promptly without lethal removal or disruption of the bears activities or habitat. This trend would be expected to continue. As discussed under affected environment, there have been no grizzly bear/livestock conflicts on the Meyers Creek allotment in the last five years, the only three confirmed grizzly bear encounters on Agricultural Research Service lands are separated by numerous years, and ended when sheep were moved to a new location. Based on this history, it would be expected that grizzly bear and domestic sheep encounters could occasionally occur on Agricultural Research Service lands as well as the Meyers Creek Allotment. However, the proactive nature of the conservation measures described above would prevent the habituation of grizzly bears to domestic sheep, trash, and food associated with camp tending activities.

- Effects to grizzly bears from predator control activities are non-lethal and limited to occasional harassment of bears before they habituate to domestic sheep. As mentioned previously, herders are instructed to avoid all encounters if possible, move sheep within the pasture, and move sheep to other

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

- Effects to grizzly bear genetic diversity would not occur as demonstrated by several key points.

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

- Second, The Final Conservation Strategy (USDI FWS, 2007(b)) includes the transplant of one to two effective migrants per generation if no movement or genetic exchange is documented by 2020.

- Third, grizzly bear mortality or change in habitat use would not occur from U.S. Sheep Experiment Station activities based on the history of only a few encounters that ended without incident, and conservation measures in place to reduce the potential of conflicts.

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

Grizzly Bear Alternatives 2, 3, and 4

Alternative 4 was developed specifically to address public scoping comments related to sheep grazing within and adjacent to the grizzly bear Primary Conservation Area. In this alternative, U.S. Sheep Experiment Station grazing and associated activities would not occur on the East Summer Range (Tom's Creek) or on the Meyers Creek allotment of the U.S. Forest Service. The intent of habitat standards in the Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area Forests (USDA Forest Service, 2006) would be fully implemented by eliminating sheep grazing on the last occupied sheep allotment (Meyers Creek) within the Primary Conservation Area. Presumably, the Meyers Creek allotment would become vacant and permanently close. Similarly, sheep grazing would be eliminated on the East Summer Range (Tom's Creek), which is immediately adjacent to the Primary Conservation Area. The area is likely biologically suitable and socially acceptable to grizzly bear occupancy according to the Grizzly Bear Management Plan for Southwestern Montana (Montana Fish Wildlife and Parks, 2002), though boundaries for such designation have not been formally identified in Montana. The potential for livestock/grizzly bear conflicts would be nearly eliminated, since the predominant grizzly bear population is located within the Primary Conservation Area, and U.S. Sheep Experiment Station grazing would not occur within five miles of the Primary Conservation Area. Grizzly bear mortality from U.S. Sheep Experiment Station activities would not occur.

Alternatives 2 and 3 affect grizzly bears in a manner similar to Alternative 4 except that the potential for U.S. Sheep Experiment Station livestock/grizzly bear conflicts would be completely eliminated. In Alternative 2, no U.S. Sheep Experiment Station grazing would occur, and in Alternative 3, no U.S. Sheep Experiment Station grazing would occur in the Centennial Mountains, which is identified as biologically

suitable and socially acceptable to grizzly bear occupancy (Schwartz et al., 2009 in the Habitat Monitoring Report section).

Grizzly Bear Cumulative Effects

The spatial boundary for the discussion of cumulative effects for grizzly bears is the Greater Yellowstone Ecosystem, because it is the boundary for the Yellowstone Distinct Population Segment of grizzly bears, and, therefore, puts the potential effects in the context of grizzly bear recovery for the designated population. The temporal boundary is 10 years because projections beyond this time period are less likely to be accurate. The expected level of the effects for the project would not contribute to overall cumulative effects in a way which is detrimental to grizzly bear recovery considering the following points:

- The Yellowstone Distinct Population Segment of grizzly bears continues to expand in both population size and distribution.
- No grizzly bear mortality is expected from U.S. Sheep Experiment Station activities, nor is there an expected loss of habitat or loss of use in existing suitable habitat. Effects would be limited to rare occasions when a lone bear or sow with cubs is temporarily harassed to stop an immediate threat to sheep or human safety.
- Occasional harassment of a bear and implementation of other conservation measures described previously would not increase annual mortality or cause exceedence of mortality threshold described in the Final Conservation Strategy. Although mortality thresholds were exceeded in 2008 for the Distinct Population Segment, none of these mortalities were attributed to U.S. Sheep Experiment Station activities, and most were attributed to hunting related incidents (many related to black bear hunting). It is reasonable to conclude that management actions that reduce mortalities related to hunting incidents are a likely tool to minimize grizzly bear mortality and keep it below established thresholds.

U.S. Sheep Experiment Station activities are not expected to limit grizzly bear movement or occupancy in the Centennial Mountains, and similarly would not limit genetic exchange with other grizzly bear populations. This finding is based on a limited number of documented encounters, no previous control actions on Agricultural Research Service lands or Meyers Creek, no projected mortality as a result of U.S. Sheep Experiment Station activities, and large expanses of suitable habitat in the Centennial Mountains.

“Interrelated actions” are those that are part of a larger action and depend on the larger action for their justification. The removal and closure of sheep grazing permits on Forest Lands inside the PCA, is an interrelated action, part of the Forest Plan Amendment for grizzly bear. Under this interrelated action, all domestic sheep grazing on National Forests inside the PCA has been subsequently vacated and/or closed except for that occurring on the Meyers Creek allotment by the USSES. Under the proposed action, this allotment would continue to be grazed in its current fashion. It remains consistent with the Forest Plan Amendment because the standard applies to permittees voluntarily withdrawing their grazing. Since grazing on Meyers Creek allotment is instrumental to the grazing rotation schedule and movement of sheep, the US Sheep Experiment Station would not currently be considered a “willing” permittee.

Grizzly Bear Biological Determination

The biological determination described below is preliminary. Based on the relatively recent court order vacating the decision to delist the Yellowstone Distinct Population Segment of grizzly bear, there is a considerable probability that appeals, information gathering, and U.S. Fish and Wildlife Service processes

are underway that may influence or change the project biologist's determination and/or supporting analysis prior to a final decision on the project.

The project biologist has determined that U. S. Sheep Experiment Station Grazing and Associated Activities Project - 2009, may affect, but is not likely to adversely affect the Yellowstone Distinct Population of grizzly bear. This determination is applicable to the proposed action (Alternative 1) as well as alternatives 4, and 5. Effects are similar in these alternatives; however the potential encounters are further reduced in alternatives 2 and 3. This determination is supported by rationale presented in the Biological Assessment and summarized below.

- No grizzly bear mortality would be expected. Neither lethal control nor trap and transport would be implemented or requested under this proposal. Should the need arise for these abatement techniques related to grizzly bear, consultation would be reinitiated.

- Effects are limited to rare occasions when a lone bear or sow with cubs is temporarily harassed to stop an immediate threat to sheep or human safety.

- The project would not limit grizzly bear occupancy or movement through the Centennial Mountains, because grizzly bear habitat would not be reduced, and the U. S. Sheep Experiment Station grazing practices include light utilization, for short durations, over a large landscape, with Summer Ranges rested one out of every three years. This grazing method would prevent frequent and recurring encounters with grizzly bears that might otherwise alter bear behavior or necessitate the need for lethal control.

- Potential opportunities for genetic exchange with other grizzly bear populations would not be affected as occupancy or movement through the Centennial range would not be limited. In addition, recent evidence demonstrates that genetic diversity is not limiting Yellowstone Distinct Population Segment grizzly bear populations in the short term, and that translocation from other populations is an adequate method to address genetic diversity shortfalls over the long term.

- Ten (10) conservation measures (described previously) would be in place to ensure that the U. S. Sheep Experiment Station activities continue to operate in a manner that minimizes the potential for encounters and effects to grizzly bears. These conservation measures include proactive measures to avoid conflicts (research design criteria, guard dogs, sheep herders, and storage/removal of attractants), annual training, policy to address encounters non-lethally (move sheep, haze only if necessary), and established communication processes with other agencies.

- There have been only a few encounters with grizzly bears in the past decade relative to the U. S. Sheep Experiment Station activities. No grizzly bears have been killed, captured, or relocated from Agricultural Research Service lands or on U.S. Forest Service/Bureau of Land Management allotments in response to U. S. Sheep Experiment Station activities. It is expected this trend would continue.

- U. S. Sheep Experiment Station sheep grazing in the Meyers Creek allotment was analyzed previously by the U.S. Forest Service who found that the grazing has occurred there for decades with minimal conflicts, meets the standards and guidelines from the Grizzly Bear Forest Plan Amendment, and noted that "The permittees [U. S. Sheep Experiment Station] have had an excellent record of avoiding conflicts with bears for many years."

- The potential for livestock/grizzly bear encounters would be further reduced in Alternative 4, since the predominant grizzly bear population is located within the Primary Conservation Area, and U. S.

Sheep Experiment Station grazing would not occur within five miles of the Primary Conservation Area.

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

The project biologist has determinate that alternatives 2 and 3 would have "No Effect" on the Yellowstone Distinct Population Segment of grizzly bears since U. S. Sheep Experiment Station sheep grazing activities would not occur in occupied grizzly bear habitat or alter habitat conditions.

Other Wildlife Species

There are no federal laws applicable to 'Other Wildlife Species.' These species are discussed here, because of the potential status change for the gray wolf, and because an alternative addresses public concern for the Rocky Mountain bighorn sheep.

Gray Wolf (Canis lupus)

Gray Wolf - Affected Environment

The delisting of the northern Rocky Mountain Gray Wolf Distinct Population Segment took effect on May 4, 2009. On June 2nd, a coalition of 13 groups challenged the U.S. Fish and Wildlife Service delisting decision in Federal District Court in Missoula (9th Circuit). On September 8th, 2009, the Court ordered that a motion for preliminary injunction be denied, indicating that the species will currently remain delisted but that a separate order will follow to establish a dispositive briefing schedule and set a hearing on the merits of the complaint. The order to deny preliminary injunction is based largely on supporting evidence that the Distinct Population Segment will not suffer irreparable harm from the 2009 wolf hunting seasons in Idaho and Montana, and that hunting will not impact genetic connectivity of the Distinct Population Segment, assuming hunters manage to kill up to 330 wolves allowed in the quotas.

Because renewed legal challenges to gray wolf status are expected and may be lengthy, it should be noted that this project analysis is applicable to wolves as de-listed, or if returned to previous status of a nonessential experimental population. Nonessential experimental population status (as previously designated) would apply to all wolves in the southern half of Montana, all of Idaho south of Interstate 90, and all of Wyoming. The 2005 and 2008 Endangered Species Act nonessential experimental population regulations allow people to take wolves under certain circumstances, such as when wolves are in the physical act of killing, wounding, chasing, or molesting legally present livestock and dogs.

As summarized in the Montana Fish, Wildlife, and Parks Fact Sheet on Wolves (2009), "The northern Rocky Mountain gray wolf population first met biological recovery goals in 2002. The Northern Rockies "metapopulation" is comprised of wolf populations in Montana, Idaho, and Wyoming. About 1,600 wolves live in the region, where wolves can travel about freely to join existing packs or form new packs. This, combined with wolf populations in Canada and Alaska, assures genetic diversity. The decision to remove the wolf from the Federal Endangered Species List took effect May 4, 2009." Federal rules require Montana and Idaho to maintain at least 100 wolves and 10 breeding pairs in each state (as well as Wyoming). About 497 wolves inhabited Montana in 2008 in about 84 packs, 34 of which were breeding pairs." Similarly, about 846 wolves inhabited Idaho in 2008 in about 88 packs, 39 of which were documented breeding pairs (Nadeau et.al, 2008).

The wolf is reclassified under Montana law as a "species in need of management" statewide.

Montana laws and administrative rules protect wolves. Wolves can only be legally killed: during an official hunting season authorized by the FWP Commission, if the wolf is seen attacking or killing or threatening to kill dogs or livestock, to protect human life, or as authorized by FWP to resolve wolf-livestock conflicts.

In Idaho wolves are being managed as a big game animal. They are protected by state laws already approved by the U.S. Fish and Wildlife Service, the Idaho legislature, and Idaho Fish and Game Commission. The Fish and Game Commission approved 2009 wolf hunting season dates in March and on August 17, 2009 set a statewide harvest limit of 220 wolves. The Nez Perce Tribe may take up to 35 additional wolves within the Tribal Treaty Area.

Wolf Pack Locations near the U.S. Sheep Experiment Station, Dubois, Idaho

Three gray wolf pack's territories are in the vicinity of, but not centered on, U.S. Sheep Experiment Station properties including the West Summer Range (Odell/Big Mountain), East Summer Range (Tom's Creek), Henninger Ranch property, and Humphrey Ranch property, which are all part of the U.S. Sheep Experiment Station ownership in the Centennial Range. These three wolf packs may occasionally occupy Agricultural Research Service lands in search of food, but denning or rendezvous areas are not known to occur there. In 2009, two of the wolf packs denned in southwestern Montana near the Interstate 15 corridor in the vicinity of Humphrey Ranch property. They included the two border packs called the Sage Creek pack, and wolf group B394 (shown in Idaho, 2008). The Bishop Mountain Pack resides in Idaho nearest to the Henninger Ranch property and East Summer Range. In addition to the three packs discussed above, the Horn Mountain pack, Centennial, pack, and Henry's Lake suspected pack use areas in the Centennial Mountains, though they are substantially further removed from U.S. Sheep Experiment Station properties.

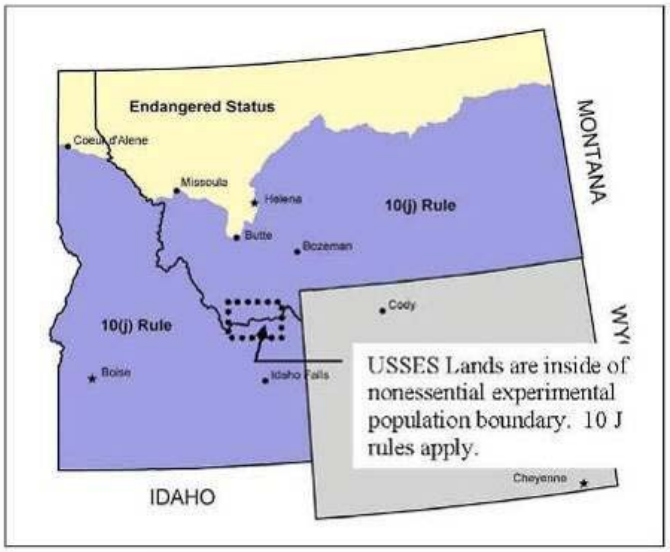


Figure 2. Management areas established by the U.S. Fish and Wildlife Service under the 10(j) Rule to restore gray wolf populations in the northern Rocky Mountains of Idaho, Montana, and Wyoming.

Figure 32. U.S. Sheep Experiment Station within Area Previously Designated as Nonessential Experimental Population.

Figure 33 - Wolf Pack Locations Near Agricultural Research Service lands, based on 2008 Annual Wolf Reports for Montana and Idaho.

The following summary of activity was synthesized from several sources including the 2007 and 2008 gray wolf conservation and management annual reports (Sime et. al 2009, Nadeau et. al, 2009, USDI Fish and Wildlife Service, 2008), Idaho Wolf Management Progress Report (2009), Montana Wolf Weekly Reports (2009), and personal communications with Idaho Fish and Game staff (Meintz, 2009).

Sage Creek Pack and B394 Group

Until 2009, lethal control actions in response to wolf depredation on Agricultural Research Service lands has been uncommon, since most encounters are avoided through regular movement of sheep, and the full-time presence of guard dogs and sheep herders. On U.S. Sheep Experiment Station, no trapping for wolves had occurred for several years preceding 2008 other than an incident three years prior. In that incident, encounters discontinued before any wolves were trapped.

In 2008 two wolf packs denned in Montana, but occurred on the border of Idaho/Montana near the Humphrey Ranch property, Interstate 15 corridor. They included the Sage Creek Pack (East of Interstate 15) and B394 group (west of Interstate 15). The Sage Creek Pack is a border pack between Montana and Idaho that formed in 2007. In 2008, based on livestock depredations on cattle from private landowners, three wolves were lethally removed from the area. In 2008, wolf B394 (Idaho) was trapped and radio collared in response to depredations incidents at the U.S. Sheep Experiment Station that resulted in 16 confirmed dead sheep. In January 2009, the B394 wolf was affiliated with an adult black wolf. In June/July/and August of 2009, numerous depredations occurred along the Interstate 15 corridor on livestock belonging to private producers as well as the U.S. Sheep Experiment Station. After investigation by APHIS Wildlife Services, the Idaho and Montana wildlife agencies incrementally authorized removal of depredating wolves from the Sage Creek pack and wolves associated with the B394 group. Eventually, to address numerous and continuing depredations on private livestock as well U.S. Sheep Experiment Station livestock, all known members of the packs were removed. Control efforts were completed with the lethal removal of approximately ten adult wolves from the Sage Creek pack as well as wolf B394 and six pups. At the time of this report, it is probable that both the Sage Creek pack and the group associated with B394 have been entirely removed.

Bishop Mountain Pack

The Bishop Mountain pack was an uncollared, suspected pack in 2007. Pack status was verified in February of 2008, when two wolves were darted from a helicopter and radio collared.

Three lethal control actions occurred in 2008, none were associated with U.S. Sheep Experiment Station activities. The Bishop Mountain pack was counted as breeding pair in 2008 after four pups were verified in this pack, and aerial flights determined that the pack was comprised of at least five wolves. In 2009, the wolves with radio-collars could not be located, so the status of this pack is unclear.

Other Packs in Surrounding Areas

Three additional wolf packs are known to occur in the vicinity of the Centennial Mountains but are typically found well outside of the U.S. Sheep Experiment Station properties. Since wolves are known to have wide ranging habits, the status of these packs was briefly reviewed. Control actions have been implemented on these packs, to a varying extent, but none involved U.S. Sheep Experiment Station activities.

- The Centennial Pack (Montana) was a new pack in 2008 with six wolves including a breeding pair, and occupied a portion of the 2007 Freezeout pack's old territory. The pack consists of two collared adults and a litter of pups of the year.
- The Horn Mountain pack, also in Montana, was a new pack identified in 2007. Five wolves remained in the pack after 2008.
- The Henrys Lake suspected pack (Idaho) was identified during the 2008 season, which indicated the likely presence of a new pack of 7 wolves. While tracks of these wolves have been verified by agency personnel, reproductive status has not.

Wolf Control Procedure

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

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

Gray Wolf Direct/Indirect Effects

Alternative 1, 4, 5

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

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

1. Trailing, grazing, and camp tending activities in the Centennial Mountains have previously, and would continue to result in occasional encounters with wolves. The habitat is occupied by deer and elk (a natural food source for wolves), and the addition of sheep bands would, on occasion, attract wolves opportunistically searching for food, or wolves habituated to sheep as an easy food source. Mitigations including the presence of full time sheep herders, guard dogs, and herd dogs provide consistent and effective methods of non-lethal control, which in-turn discourages most individual wolves and wolf packs from habituating to U.S. Sheep Experiment Station sheep herds as a food source. In addition, on a daily basis, herders keep a daily count on sheep, and ride trails to gather strays. Dead or injured sheep are removed from the field when possible, or treated with lime and/or buried to render the carcass unavailable as a food source. As a result, the effect of attracting wolves to domestic sheep as a potential food source is substantially reduced because of continual human presence, guard dog presence, and by reducing the number of stray sheep, or dead sheep available as a food source. The overall direct and indirect effect to wolves from these activities is minimal. Effects of harassment and predator control activities (such as firing gun shots in the air and other abatement tools) are discussed separately in number 3 below.
2. Activities that could affect daily or annual movements of wolf prey (deer, elk, and moose) also have the potential to indirectly effect gray wolf movements. Prescribed fire may improve range conditions such as increased vigor on the annual growth of shrubs and grasses, which correspondingly attracts more ungulates. Thus, wolves could be indirectly attracted to areas with prescribed fire, in search of big game food sources concentrated near productive foraging habitats. Prescribed fire is occurring on the headquarters property, which is big game transitional range. Since this area is covered in snow much of the winter season, its capacity to support deer and elk in large concentrations is minimal, and its corresponding potential to affect gray wolf is even smaller and limited to a short duration as ungulates migrate through the area to different elevations. Maintenance of fire breaks and roads on the Agricultural Research Service lands could temporarily have small effects on deer and elk herd movements, where the ungulates avoid mechanized operating equipment. However, these effects are limited to times when heavy equipment is operating in the area. With a lack of public motorized access to roads on the U.S. Sheep Experiment Station, big game persists with minimal disruption across the landscape, which translates to few or no corresponding impacts to wolves. Water developments that occur in the Big Mountain allotment may occasionally attract deer, elk or moose, but these occasions are rare since ungulates more likely use natural water sources. Fencing on Agricultural Research Service lands at lower elevations is constructed to specifications that do not limit travel for ungulates, and upper elevation fencing (horse corral) is temporary, small in size, and is

not big enough to substantially affect big game movements. The one large fence present on Agricultural Research Service lands near the headquarters (coyote fence) does eliminate big game access to forage on approximately 640 acres. Since the fence is within low elevation sagebrush that does not include any mapped wetlands or unique wildlife habitat features, and is surrounded by thousands of acres of similar habitat, the fence does not limit ungulate use across the landscape or their access to limited habitats. As a result, effects would be limited to the loss of a small amount of available forage for deer and elk, a local change in daily movements of deer and elk around the one square mile exclosure, and ultimately, little or no corresponding effect to wolves.

3. Effects to wolves are expected from predator control activities on Agricultural Research Service lands including non-lethal measures such as hazing, lethal removal of individual animals, and in some cases, particularly when depredation to private livestock is also occurring, removal of entire packs and/or breeding pairs. The history of minimal conflicts with wolves on U.S. Sheep Experiment Station before 2008, and the incremental control measures that resulted in the removal of two packs in 2009 near Humphrey Ranch, indicate that control measures are likely to vary from year to year. In most years, such as occurred in 2005 through 2008, non-lethal activities including having sheep herders and guard dogs with sheep, hazing individual wolves during encounters, and trapping/radio collaring individual wolves would be adequate to address depredation on U.S. Sheep Experiment Station. Despite proactive conservation measures to reduce conflicts, in some years packs would establish and/or expand in or near the Centennial Mountains, and depredate more heavily on livestock from U.S. Sheep Experiment Station as well as adjacent private producers. In these cases, lethal control measures would be necessary to curtail depredation on U.S. Sheep Experiment Station sheep and/or prevent a pack from habituating to domestic sheep. Lethal removal would be implemented on one to three wolves. In uncommon circumstances such as occurred in 2009, when numerous depredations continue on private and U.S. Sheep Experiment Station livestock, control actions could continue in an incremental fashion until an entire offending pack is removed, varying between three and ten animals. At the legal discretion of U.S. Fish and Wildlife Service, Idaho/Montana Wildlife Agencies, and APHIS Wildlife Services (depending on current listing status), incremental control measures would continue to be authorized, to a varying degree, resulting in the removal of individual wolves, breeding pairs, and on occasion, established packs.

Alternatives 2, 3

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

Gray Wolf Cumulative Effects

The spatial boundary for the discussion of cumulative effects for wolves is the Centennial Mountain Range because this area is:

- Large enough to sustain one or more wolf packs,

- Is influenced by (or influences) wolf management on adjacent lands under other ownership, and
- Is an important piece of undeveloped habitat between the GYE and Central Idaho.

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

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

- Hunt season quotas for 2009 in identified hunt units that contain Agricultural Research Service lands are five wolves in the Upper Snake Wolf Hunt Zone of Idaho and 12 wolves in the Wolf Management Unit 3 of Montana. Hunting seasons are managed on an annual quota basis by state wildlife agencies, who point to evidence that such management will not detract from sustaining the current population, and that genetic connectivity will not be impacted, even if the maximum quota of 330 animals is reached. On September 8, 2009, Judge Molloy (Missoula) denied a request for a preliminary injunction based on a lack of evidence of irreparable harm to the wolf from the 2009 wolf hunting season in Idaho and Montana.
- The Northern Rocky Mountain Wolf population is expanding in both size and distribution, and a limited number of wolves or packs have been or would be impacted by continued operations on the U.S. Sheep Experiment Station.
    - State wildlife agencies have the authority to authorize or deny lethal control actions on private or agency lands, thus procedures are in place to balance lethal control actions with larger population/pack management goals in the Centennial Mountain Range.

Gray Wolf Biological Determination

The project biologist has determined that the proposed project is “Not likely to jeopardize the continued existence of the gray wolf or adversely modify proposed critical habitat”

This determination is supported by rationale presented in the Biological Assessment including:

- There are no known wolf packs residing on Agricultural Research Service lands.
- Gray wolves in the project area are within the Northern Rocky Mountain Distinct Population Segment designated by the U.S. Fish and Wildlife Service and are managed as a non-essential experimental population.
- The effect of attracting wolves to domestic sheep as a potential food source is mitigated by non-lethal measures including full time herd dogs, guard dogs, and sheep herders.
- Proposed activities would have minimal effects to ungulate movements and thus, few, if any effects to wolves that depend on them as a food source.
- Control measures would be used as a last resort, would be implemented through APHIS Wildlife Services, would target only offending animals, and would be conducted under authority granted by state wildlife agencies and the US Fish and Wildlife Service consistent with the 10j. rule.
- There is a low incidence of past conflicts between domestic sheep and wolves on Agricultural Research Service lands.

- The Northern Rocky Mountain Gray Wolf Population continues to expand in size and distribution, and exceeds original recovery goals.

Rocky Mountain Bighorn Sheep Ovis canadensis canadensis

Rocky Mountain bighorn sheep are not a federally listed species and as such are not subject the Endangered Species Act. However an alternative was developed for this project in response to comments received during scoping that expressed concern for this species.

Rocky Mountain bighorn sheep are not known or expected to be present on Agricultural Research Service lands. Bighorn sheep in Idaho and Montana portions of the project area have no federal listing status, and are managed as game species with controlled hunting allowed in certain areas. Bighorn sheep herds nearest to Agricultural Research Service lands are in Montana, considerably far removed from all U.S. Sheep Experiment Station activities such that interactions are not a concern with these herds. Two small herds from prior bighorn sheep reintroductions are present in the Upper Snake region of Idaho near the Snakey/Kelly allotment (USFS) and the Bernice allotment (Bureau of Land Management). Specified actions (detailed in the Bighorn Sheep Action Plan portion of the memorandum of understanding with the BLM) are in place to minimize the potential for interactions between domestic sheep and bighorn sheep in these areas.

Bighorn Sheep Affected Environment

In the Rocky Mountain west, a primary issue regarding bighorn sheep and domestic sheep interaction revolves around die-offs within native or transplant bighorn sheep herds, after coming in contact with domestic sheep. The issue has been largely polarized by evidence that domestic sheep diseases threaten the persistence of bighorn sheep populations, economic and social consequences of restricting domestic sheep grazing are substantial, and the effectiveness of maintaining separation between domestic sheep and bighorn sheep is debated. In examples such as occurred near Hell's canyon in Western Idaho, one or more bighorn sheep become infected with pneumonia (*Pasteurella* or *Manhiemmia*), the pneumonia spreads to other members within a bighorn sheep herd, and a portion of the bighorn sheep herd may die. The majority of documented bighorn sheep die-offs follow contact with domestic sheep (Clifford et al., 2009). In contrast, it isn't known if sufficient contact for a transmission event occurs under existing grazing conditions, and pneumonic disease in bighorn sheep has also been reported in the absence of detectable contact with small ruminants (Knowles, personal communication). Knowles describes the following events that must come together to infect bighorn sheep:

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

Each of these steps has a probability associated with them, and it is in question whether these events would occur in a quantity high enough to lead to disease and/or a further transmission event.

Agricultural Research Service lands in Idaho are within Idaho Game Management Unit 61 of the Upper Snake Region. A small population of bighorn sheep occurs on the Idaho-Montana border in the Lionhead area of Idaho Game Management Unit 61. In Montana, this bighorn herd is known as The Hilgard herd, Montana Hunting District 302, with an estimated population of 105 animals, and a population goal of

100. The herd has limited available winter range, thus the Montana Fish, Wildlife and Parks' goal is to manage the herd at current levels. The herd is separated from U.S. Sheep Experiment Station East/West Summer Ranges which include Odell Creek, Big Mountain, and Tom's Creek lands by a distance of approximately 20 miles, Henry's Lake basin, and substantial geographic topography along the continental divide. There is no indication that the herd uses Agricultural Research Service lands. Neither the Idaho Fish and Game Bighorn Sheep Progress Report (2008) nor the Montana Draft Bighorn Sheep Strategy (2009) suggests any known interaction or concerns between this herd and U.S. Sheep Experiment Station grazing activities. According to the Idaho Fish and Game Bighorn Sheep Progress Report, 12-15 sheep are seen in Idaho during the summer months.

Bighorn sheep populations in other adjacent areas of Montana, which are also outside of U.S. Sheep Experiment Station properties, include the Tendoy Mountain herd, over 20 miles to the northwest of the Humphrey property. The herd is in Montana Hunting District 315, with an estimated population of 59, and a population goal of 200. It is currently closed to hunting until objectives are achieved.

U.S. Sheep Experiment Station also grazes sheep on U.S. Forest Service and Bureau of Land Management allotments (Snakey/Kelly and Bernice respectively). A review of the 2008 Idaho Progress Report indicates that:

- In the Lemhi Range, the Bernice Bureau of Land Management domestic sheep allotment on the Little Lost River side of the range overlaps with bighorn sheep range within Idaho Game Management Unit 51.
- In the Beaverhead Range, the Snakey Canyon domestic sheep allotment (USFS) overlaps with bighorn sheep range in Idaho Game Management Unit 59a.
- Observations of 30 bighorn sheep in the Lemhi range and nine bighorn sheep in the Beaverhead range occurred in 2007.
- There is no documented interaction/contact between domestic sheep and bighorn sheep on these allotments. However, there was one incident where a stray domestic sheep was observed three linear miles from bighorn sheep and a U.S. Sheep Experiment Station employee subsequently removed the domestic sheep.

According to the bighorn sheep progress report (2007(a)), Idaho Fish and Game will continue to work with the Bureau of Land Management and the U.S. Forest Service to identify areas of range overlap between bighorn sheep and domestic sheep use on the Lemhi and Beaverhead ranges, and develop contingency action plans with the respective agencies and domestic sheep permittees to minimize the potential of bighorn-domestic sheep interaction. Action plans would be designed to quickly remove bighorn sheep that have come into contact with domestic sheep in order to prevent the potential spread of diseases discussed earlier. In the MOU prepared between the Bureau of Land Management and the U.S. Sheep Experiment Station for grazing on the Bernice allotment (USDI, Bureau of Land Management, 2007), a "Bighorn Sheep Action Plan" is included. The action plan describes five action items that will be taken in order to minimize potential contact between bighorn and domestic sheep. They include:

- On-site supervision of the domestic sheep bands as well as accompaniment by guard dogs to prevent interaction.
- Keeping domestic sheep below the 5,600 foot contour and off of mountain foothills and canyons.
- If funding is available, cooperation regarding data collection for bighorn sheep surveys.

- Maintaining a three-mile buffer of separation between domestic sheep and bighorn sheep.
- Notifying a list of individuals if contact occurs or becomes imminent.

These action items are consistent with Idaho's Interim Strategy for Managing Separation Between Bighorn Sheep and Domestic Sheep in Idaho (IDFG, 2007(b)).

Additional discussions have occurred between U.S. Sheep Experiment Station and Idaho Fish and Game regarding the commitment to a number of Best Management Practices (Draft BMPs) for Separation between Domestic Sheep and Bighorn Sheep, which was presented to the U.S. Sheep Experiment Station in July, 2009 by the Idaho Fish and Game. The first five Draft BMPs are already included in the MOU between U.S. Sheep Experiment Station and Bureau of Land Management for the Bernice Grazing allotment. The remaining Draft BMPs (not described here since only in draft form) are typically implemented within current operating procedures. Some of the individual details are implemented on the ground less precisely than is worded in the Draft BMPs to account for variability in weather, sheep herder duties, and remote access. A formal agreement has not been reached regarding the Draft BMPs, because questions have surfaced regarding the authority by which the agreement is made, and how to rectify complexities such as that Bureau of Land Management and USFS are the landowners, U.S. Sheep Experiment Station has agreements with those agencies, and Idaho Fish and Game seeks the agreement being discussed. Overall, U.S. Sheep Experiment Station grazing activities are consistent with the 20 BMPs that were presented.

Bighorn Sheep Direct/Indirect Effects

Alternatives 1 (Proposed Action), 3, and 4

Effects from activities in these three alternatives are the same since each proposes similar livestock grazing and associated activities in occupied bighorn sheep habitat. Bighorn sheep are not directly affected by grazing on any of the U.S. Sheep Experiment Station properties, because bighorn sheep do not occur there. The Hilgard bighorn herd in Montana is over 17 miles away from the nearest U.S. Sheep Experiment Station property (Summer East pasture), and the Tendoy bighorn herd also in Montana is over 23 miles away from the Humphrey property. Interaction between domestic sheep on U.S. Sheep Experiment Station properties and existing bighorn sheep herds is not known or expected to occur.

U.S. Sheep Experiment Station sheep grazing on Bureau of Land Management (Bernice allotment) and USFS (Snakey/Kelly allotments) has the potential to negatively affect the Idaho bighorn herds reintroduced into the Lemhi range and the Beaverhead range, however the measures in place are appropriate methods to minimize potential contacts, and consistent with Idaho direction. The Idaho Progress Report (2008) indicates that bighorn sheep range does overlap with these allotments, therefore the potential for interaction, and resulting mortality in the bighorn herds is plausible. Based on a review of parameters modeled in Clifford et al., 2009, bighorn sheep herds that occupy the southern portion of the Lemhi range and to a lesser extent the Beaverhead range have a moderate probability of coming into contact with domestic sheep, over a period of several decades, and potentially leading to a respiratory outbreak and subsequent bighorn mortality. This contact could occur from U.S. Sheep Experiment Station grazing on these Bureau of Land Management/USFS allotments or from contact with domestic sheep grazing in other nearby areas. Precise research on the movements of this bighorn sheep herd (such as radio-telemetry data collected over a period of years) is expensive and has not yet been established. Idaho progress reports, the Bureau of Land Management MOU and communications between various agency personnel express a desire and willingness to collect additional site specific data if funds become available.

Several factors are in place to minimize potential of direct contact and subsequent bighorn herd mortality. Bighorn sheep are thought to be geographically and temporally separated from areas grazed by U.S. Sheep Experiment Station domestic sheep on the Snakey/Kelly allotments, by an approximate distance of three miles or more of rough terrain and heavy snow loads during winter months (Personal communication, Keetch, 2008). Bighorn sheep typically occupy the west side of the Beaverhead Mountains in the winter months, while the U.S. Sheep Experiment Station grazes domestic sheep on the east side of Beaverheads (Snakey/Kelly allotments) November 6 – January 3rd. Similarly, on the Lemhi range, bighorn sheep typically occupy higher elevations in the foothills and mountains while domestic sheep remain in the lower elevations. Although it is unknown how far south individual sheep may wander in high snow years, bighorn sheep typically stay north of North creek, (Personal communication, Lowe, 2009). The Bernice allotment (which is grazed by U.S. Sheep Experiment Station between November 23 – February 5) is south of the North Creek geographic boundary. In addition to the relative geographic and temporal separation described above, implementation of the "Specified Actions" included in Bighorn Sheep Action Plan portion of the Bureau of Land Management/U.S. Sheep Experiment Station MOU further reduces the possibility of potential contact in the following ways:

- On site supervision of the domestic sheep bands as well accompaniment by guard dogs would assist in preventing direct contact and interaction between domestic sheep and bighorn.
- Active herding to keep domestic sheep below the 5,600 foot contour and off of mountain foothills and canyons would assist in maintaining geographic separation between bighorns and domestics.
- Scouting for bighorns and maintaining a 3-mile or larger buffer of separation between known bighorn sheep herds and domestic sheep bands would minimize the probability of direct contact.
- Promptly notifying designated Idaho Fish and Game personnel if contact is suspected or becomes imminent would allow for the option of management removal of individual bighorn sheep to prevent infection spreading to the remainder of the bighorn herd.

Conclusion: There is a possibility that contact could occur between bighorn sheep herds and domestic sheep herds using southern portions of the Lemhi and Beaverhead mountain ranges. This contact could occur from U.S. Sheep Experiment Station winter grazing on Bureau of Land Management /U.S. Forest Service allotments, or from contact with other domestic sheep grazing activities in this portion of the range (such as private lands or other permitted grazing on federal lands) during any season of the year. Bighorn sheep mortality and overall suppressed health of a bighorn herd may or may not occur as result of contact with domestic sheep, but the degree of negative effects to the herd, and the primary source of infection are speculative. Grazing practices that are already in place by the U.S. Sheep Experiment Station, implementation of the specified actions of the Bighorn Sheep Action Plan, and geographic factors that naturally separate U.S. Sheep Experiment Station grazing and bighorn sheep winter ranges appear to adequately minimize the potential of interaction between U.S. Sheep Experiment Station domestic sheep and bighorn sheep, and allow for appropriate control/removal of sheep should contact occur or become imminent.

Alternatives 2 and 5

Effects from activities in these two alternatives are nearly the same as each proposes that the U.S. Sheep Experiment Station would not graze livestock in occupied bighorn sheep habitat.

Alternative 2 eliminates all domestic sheep grazing by the U.S. Sheep Experiment Station. Grazing activities on U.S. Sheep Experiment Station properties are not known or expected to affect the existing Tendoy and Hilgard bighorn sheep herds in Montana, so the portion of the alternative that eliminates

grazing on Agricultural Research Service lands would not change the condition of these bighorn sheep herds.

Removal of U.S. Sheep Experiment Station sheep grazing on Bernice and Snakey/Kelly allotment would occur in both alternatives 2 and 5.

Removal of U.S. Sheep Experiment Station sheep grazing on Bernice and Snakey/Kelly allotments would eliminate one potential source of infection to bighorn sheep in the Southern Lemhi and Beaverhead mountains. However, removal of this potential vector for disease spread is unlikely to eliminate or even largely reduce respiratory disease in the existing bighorn herds for the following reasons.

- There is no evidence, documentation, or anecdotal report among local biologists that domestic sheep grazing on Bernice and Snakey/Kelly allotments is the primary source of contact, respiratory infection, or decline of these bighorn sheep populations. Grazing on these allotments occurs outside of the suspected core winter range areas for these bighorn, and the bighorn summer ranges include a much larger landscape.

- The small size and condition of the reintroduced bighorn sheep herds in this portion of Idaho may have many plausible explanations and is as likely to be a result of factors not associated U.S. Sheep Experiment Station activities. They include respiratory diseases naturally circulating within the bighorn sheep population, limiting habitat conditions such as nutritional value of forage, fragmented seasonal migration routes, limited winter range capability, and other livestock operations.

Conclusion: Removal of U.S. Sheep Experiment Station grazing on the Bernice and Snakey/Kelly allotments would reduce one potential vector of respiratory disease transmission. It is speculative that these alternatives would result in an observable change in the existing bighorn sheep herds' condition, health, or population. More likely, bighorn sheep herds would remain unaffected by these alternatives, and continue in their current condition.

Bighorn Sheep Cumulative Effects

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

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

- Grazing of U.S. Sheep Experiment Station sheep on Forest Service and Bureau of Land Management federal lands has only a minimal risk of contact between bighorn sheep and domestic sheep because of geographic and temporal separation.

- Grazing of U.S. Sheep Experiment Station sheep near occupied bighorn sheep habitat includes the presence of guard dogs and full-time sheep herders, which affords additional protection measures to reduce the possibility of actual contact between bighorn and domestic sheep.

- U.S. Sheep Experiment Station follows the specified actions listed in the Bighorn Sheep Action Plan which includes procedures to manage separation between bighorn sheep and domestic sheep, and

initiate a communication plan to allowing prompt removal of infected bighorn or domestic sheep should contact be suspected.

- Although the risk of contact from U.S. Sheep Experiment Station activities can only be completely eliminated in alternative two, additional sources for spread of respiratory disease occur throughout known or suspected bighorn sheep range. Thus, bighorn populations are expected to continue in their current condition and trend, regardless of which alternative is selected.

There are no known or foreseeable planned bighorn sheep reintroductions in areas grazed by U.S. Sheep Experiment Station.

Additional Wildlife Species

Based on comments received during scoping and additional review of pertinent information, effects analysis occurred for the following wildlife resources: greater sage-grouse, pygmy rabbit, wolverine, black bear, habitat connectivity for wide-ranging carnivores, fisheries and amphibians. This additional review is included in the Wildlife Specialist Report.

Other Resource Considerations

Infrastructure

There are no federal laws and regulations applicable to infrastructure. The existing condition is considered the baseline for comparison of alternatives.

Infrastructure Affected Environment

Roads

Road locations are shown on each U.S. Sheep Experiment Station properties area map in the Maps section. There are 25 miles of existing system roads on the Headquarters Range (Figure 7, Map 5). No new roads have been developed in at least 15 years. Annual road maintenance is done on main roads as needed. Road segments with ruts or other maintenance needs are bladed or improved for efficient motorized travel. Each year approximately 20 miles of road need maintenance improvements. Road maintenance is contained within the road right-of-way.

An existing road through section 18 that ends at the horse corrals near the southwest corner of section 7, T15S, R1W in the West Summer Range provides motorized access. Motorized travel is limited to the existing road for camp tending and other management activities with some off road travel exceptions for maintenance operations that require supplies that are too heavy for pack-horse safety and welfare.

Recent off-road motorized use on the West Summer Range include pickup travel in 2006 and 2007 for research at bed grounds in section 13, T15S, R2W and in section 8, T15S, R1W; four wheel drive tractor use for bridge reconstruction on Odell Creek crossing near the north line section 23, T15S, R2W in 2007; and a pickup and trailer were used to haul supplies to rebuild the Location 23 exclosure in 2008, one trip to haul supplies in and haul old materials out. All terrain Vehicles (ATVs) were used in 2007 to haul supplies for mine reclamation work on Big Mountain pasture. Camp tending and other management activities are done with horses. Occasional off road pickups, ATVs, or tractors are used for maintenance or research on off road sites.

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 Range, and to Forest Service and Bureau of Land Management allotments (Table 28).

Table 28. 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 & BLM Allotments)	2,100 ewes (± 100 depending on year)
	200 rams
Mud Lake (DOE)	3,300 animals (± at shearing and breeding time)

There are permanent corrals and loading chutes at Headquarters, Mud Lake, Humphrey, and Henninger. At the Snakey-Kelly Forest Service allotment, sheep are unloaded on Forest Service Road 202. On the Bernice Bureau of Land Management Allotment, sheep are unloaded on the allotment road at the grazing site. 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 loading sites are similar in size and ground cover condition. Headquarters and Mud Lake truck loading sites have permanent corrals with bare soil similar to sheep pens. The Headquarters loading pen is 0.6 acre. The Mud Lake loading pen is 0.4 acre. Humphrey and Henninger 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.

Trails

Sheep are trailed along existing roads to move sheep from Headquarters and Henninger ranges to other grazing areas. Sheep are trucked to an unloading site on National Forest Road 202 and trailed along the roads to Snakey-Kelly Allotment (see list of trails on page 2, Map 3).

Driveways[11]

See Table 3, page 4 for the sheep numbers trailed on pastures as an average of last five years.

Sheep are moved along driveways through timbered areas on East and West Summer ranges. Herders on horseback use working dogs to herd sheep from one grazing location to another. There are about four miles of maintained sheep driveways through timbered areas on the West and East Summer Ranges. Sheep driveway locations are shown on Maps 14 and 16.

There are no sheep driveways on Headquarters, Humphrey and Henninger, the only maintained driveways are through timbered areas in West Summer Range (Odell/Big Mountain) and East Summer Range (Tom's Creek). Annual driveway maintenance is done through the timbered areas. Small diameter down wood across driveways is retained on site; some limbing may be done on retained down trees. Any new or recently fallen trees (greater than 10 or 12 inches in diameter) are cut out and removed (pulled back into adjacent timber stands) from the driveways each year. Occasionally sheep driveway trails are rerouted, closed, and rehabilitated. Driveways may be rerouted when a better route is located or an alternate route is

[11] Driveway: Travel route used to herd sheep from one grazing location to another; sheep spread out over larger areas in open terrain, move slowly while grazing

needed for research. Only one reroute has been done in the past few years. Driveways through timber patches and across meadows are short, generally less than one half mile long. If adverse effects to soil or water occur, mitigation measures (cross drains with woody debris to divert over land flow) are implemented or a driveway segment maybe rerouted to avoid sensitive areas. Old driveways, no longer needed or used, and corral sites not needed are closed and rehabilitated; seeded with native species, brush or woody debris if available returned to the site, and animals are kept off to restore the area.

At three to four week intervals, sheep are moved from grazing areas to staging areas for data collection. On these drives, sheep are spread out over larger areas in open terrain and moved slowly while grazing to reduce adverse effects on the travel routes.

The sheep driveway crossing on Odell Creek in section 11, T15S, R2W has bare soil, 10 feet wide for about 150 feet, on the south side of the crossing on 15 to 20 percent slope. The narrow trail to the west of the crossing is developing into a trench from overland water runoff. Suggested mitigation to this crossing site is described in the effects section. The sheep driveway crossing on the south fork of Odell Creek near the south line, section 14, T15S, R2W, is low impact, with grass and forb cover.

Fences

There are about 180 miles of permanent sheep fence on Headquarters, Humphrey, and Henninger ranches. All fences are inspected and repaired annually. Fence locations, including exclosures, are shown on various maps. Fence types (exclosures - Figure 11, three-wire - Figure 19) are shown and described in the map legends.

Pasture Fences

Sheep proof fences at Headquarters, Humphrey, and Henninger are maintained to confine sheep. An eight foot high coyote proof fence is maintained at Headquarters around, and subdividing, section 2, T10N, R36E, for coyote-sheep interaction research.

Horse Corral

The horse corral fence on 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 (See Map 15). The north and west part of the horse corral is sheep proof net-wire with two strands of barb wire above the net-wire. The south and east portion of the corral is two strand barb wire. All of the corral fencing on Odell pasture is let-down type. The drop fence is let down each year after grazing operations are complete.

Exclosures

Exclosures at Headquarters are sheep proof, maintained to exclude sheep from grazing excluded areas. The West Summer Range exclosures are drop fences, put up to exclude sheep when pastures in the exclosure areas are grazed. These drop fences are let down after sheep are removed from the pasture.

An eight feet high wildlife exclosure fence in section 7, T15N, R15S, Odell pasture, is maintained to exclude wild ungulates and sheep. An adjacent four foot-high sheep proof exclosure is maintained to compare grazing effects. This wildlife and sheep exclosure includes a riparian area. These exclosures are located and designed to compare and evaluate domestic and wild ungulate grazing effects on willow and other riparian vegetation. The entire fenced area is less than 1/2 acre.

Firebreaks

After a 2000 wildfire, a two mile long firebreak was reestablished to protect U.S. Sheep Experiment Station headquarters buildings and research plots on the Headquarters Range (Map 5). The firebreak around the headquarters area is maintained annually with a motor grader to provide a mineral soil break about 20 feet wide. Chemicals may be used to control noxious weeds on the Headquarters firebreak. Weed management is described in the pest control section below. Firebreaks 15 to 20 feet wide down to mineral soil are constructed around prescribed burn areas including blackline burn areas.

Prescribed burn firebreaks are constructed with a dozer and motor grader. Unit firebreak lines and blackline firebreaks are generally within 50 to 200 feet of each other. Cleared firebreaks around burn units are also used for vehicle and equipment access during burn operations and for research during and after the areas are burned. Shrub and grass debris removed from fuelbreaks is pulled back and spread over the cleared area on firebreaks not needed for research access after the burn, generally within the same season.

Fire breaks around prescribed burn areas are not maintained. They are not seeded and are left to revegetate with native species. Fire breaks not needed for motorized access for research are rehabilitated. Windrowed shrubs, grass, litter, and top soil are pulled back and spread over the firebreak with a motor grader. Invasive, noxious weeds have not been a problem on the cleared firebreaks. *Bromus tectorum L.* (cheatgrass), present since 1930s, shows up on some cleared areas but is not persistent at this elevation or environment.

Infrastructure Direct/Indirect and Cumulative Effects

The direct/indirect and cumulative effects area includes the U.S. Sheep Experiment Station properties, the Department of Energy, Mud Lake Feedlot, and the Forest Service, Bureau of Land Management allotments, because these areas include the infrastructure used by the U.S. Sheep Experiment Station to manage sheep grazing. The timeframe includes the next five years, because that is the timeframe within which management activities can be reasonably predicted.

The changes in infrastructure use for alternatives 1-5 are displayed in Table 29.

Table 29. Infrastructure changes from the proposed action by alternative

Component	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Roads	Roads would continue to be maintained as needed. No road construction is expected.	Only roads connected to the Headquarters facility would be maintained	Roads would continue to be maintained as needed. No road construction is expected	No change from existing	
Sheep Transportation by Truck	There would be no change to sheep transportation by truck.	The only transportation of sheep by truck would be between Headquarters sheep pens and Mud Lake	Sheep would continue to be transported to the winter range and Mud Lake by truck		

Component	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Trails	There would be no change in the use of sheep trails.	The sheep trails and driveways would not be used	Sheep would continue to be trailed to Henninger and to Snakey-Kelly	Sheep would continue to be trailed to Henninger, Snakey-Kelly, and West Summer	Sheep would continue to be trailed to Henninger and East and West Summer
Driveways	There would be no change in the use of sheep driveways.		No driveways would be used	Driveways in West Summer would continue to be used	No change from existing
Fences	Fences would continue to be maintained as necessary.	No fences would be maintained	Fences would continue to be maintained as necessary	No change from existing	
Firebreaks	Firebreaks would continue to be maintained and constructed as necessary.	Only the firebreak around the headquarters area would be maintained	Firebreaks would continue to be maintained and constructed as necessary		

Sheep

U.S. Sheep Experiment Station currently has approximately 3,300 mature sheep, plus attendant young sheep for research purposes. Including mature ewes and lambs, lambing rates are approximately 170 percent, and weaning rates are approximately 145 percent. The total number of sheep soon after the end of the lambing period is approximately 6,500. The numbers of mature and young sheep retained vary according to research needs. Sheep in excess of those needed for hypothesis-driven research are not retained. U.S. Sheep Experiment Station sheep harvest most of their feed through grazing. Sheep numbers are kept below range carrying capacity to maintain favorable range conditions. In the fall, excess sheep are sold.

There would be no change in existing sheep numbers from the existing condition under Alternative s 1 (proposed action) and 4. Alternatives 2, 3, and 5 would each require a reduction in the numbers of sheep that could be retained at the U.S. Sheep Experiment Station for research purposes. Excess sheep would be either sold or destroyed. For a number of reasons, some research animals cannot be sold for breeding stock or go into the food chain. In those cases, the animals must be retained until they die of natural causes or are euthanized (i.e., destroyed), and their carcasses are rendered inedible and disposed of properly (carcasses can be disposed of in a legal landfill). Listed below are some of the types of sheep that U.S. Sheep Experiment Station now euthanizes, instead of sell, when they are no longer part of a research project. If the U.S. Sheep Experiment Station were forced to terminate research projects, all of the sheep (approximately 200) of the following types would be euthanized instead of sold.

- Sheep with genotypes that make them susceptible to certain diseases: These genotypes occur naturally. Some of the sheep with these genotypes are used for research to gain an understanding of the relationship between genotype and onset of disease (i.e., mechanism of action); study the onset and natural progression of certain diseases; develop genetic tests that can be used to reduce the frequency of sheep with genotypes that make them susceptible to certain diseases; develop genetic tests that can be used to produce sheep that are resistant to certain diseases; produce effective vaccines; and improve the care of sheep that develop certain diseases.

- Sheep that have been treated with experimental pharmaceutical compounds.
- Sheep that are part of research to quantify the effects of certain naturally occurring diseases on lifetime productivity.
- Sheep that have been ovariectomized and used for various research projects.

Table 30 displays the adjustment in sheep numbers from the proposed action that would need to be made for alternatives 2-5 based on the reduction of grazing areas.

Table 30.Sheep number adjustments by alternatives 2-5

Sheep	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Number of sheep to be retained	1,155	2,640	No Change from existing	2,310
Percent of Existing herd retained	35%	80%		70%
Numbers of sheep to be disposed of	2,145	660		990
Percent of Existing herd disposed of	65%	20%		30%

Soils

There are no federal laws and regulations applicable to soils. The existing condition is considered the baseline for comparison of alternatives.

Soils Summary

Current soil conditions at all U.S. Sheep Experiment Station properties under current management are stable and are not trending towards chronic soil erosion problems. Since soils and vegetation processes are linked, vegetation composition was used as a surrogate for soil function. Current vegetation composition fits within expected ranges for Headquarters, Humphrey, and Summer Ranges. Sparse uplands have higher proportion of native species, while fertile bottomlands have high abundance of pasture grasses. Henninger dry meadows have altered potential from irrigation and Dry Creek incision. Henninger uplands are stable and within expected vegetation range. Prescribed fire at Headquarters has positive effects with enhanced nutrient availability, though some risk for expansion of crested wheatgrass changing native soil and vegetation composition. Control of invasives has no long-term adverse effects on soils, although there's uncertain risk for offsite leaching of Krovar at the Headquarters feedlots. To date, well monitoring has not detected herbicide leachant.

The no grazing alternatives would increase litter for soil production. Positive effects from not grazing would not be realized in the short term due to the low utilization at less than 10 percent for most properties and from the arid context. The cold and dry conditions lead to limited plant vigor response. For Alternative 2, Henninger has the highest potential for response from no grazing given the combination of high utilization (24 percent) and favorable climate. For Alternative 2 and Alternative 3 at Humphrey, the willow riparian area along the Beaver Creek tributary floodplain would improve with no sheep or cattle watering. For Alternative 4, the elimination of rest rotation could lead to less vegetation recovery on the West Summer range.

Soils Affected Environment

For a detailed discussion of soils, see Soils Report, 2009 found in the project file.

As detailed in the Range Report (2009, project file), the current soil conditions appear functional on all U.S. Sheep Experiment Station ownerships. Bare soils are in the expected range for all areas sampled, and soil erosion sign is rare. From a soil physical standpoint, all areas are functional and do not show overt signs of degradation.

Headquarters

Soil physical function would continue at Headquarters with vegetation composition aligning with expected diversity and species representation (NRCS 1991, (In Review)) on the shallow and moderately deep soils. Bottomlands have more divergent species mixes with higher abundance of pasture grasses in addition to 10-15 percent of the property planted with crested wheatgrass (*Agropyron cristaetum*) to improve forage. The productive swales have an influx of exotic pasture grasses due to the richer soil fertility here. In arid environments, higher productive sites have a propensity for supporting exotic species (Lejuene and Seastedt 2001, Bashkin et al 2003).

The presence of exotic grasses such as the planted paddocks of crested wheatgrass and pasture grasses impacts the soil biotic community (Wardle et al 2004, Wolfe and Klironomos 2005) but does not lower productivity per se. Expansion of the perennial grasses would have less impact than expansion of cheatgrass (*Bromus tectorum*) (Norton et al 2007). Predominance of cheatgrass changes the moisture regime in soil with different root structure and litter quality than native grasses, ultimately shifting the fertility regime to favor itself and out of line with competing native species adaptations (Belnap and Phillips 2001, Thorpe and Callaway 2005, Norton et al 2007). Currently, cheatgrass is relatively sparse across the range. The presence of the exotic perennial grasses would most likely show changes in arbuscular[12] mycorrhizal assemblages (Wardle et al 2004) but not impact resources such as nutrients and water (Norton et al 2007).

Prescribed burning on the U.S. Sheep Experiment Station has occurred on Headquarters since 1936, with a purpose toward restoration and range improvement. During the past 30 years, roughly 5,400 acres were burned under prescription along with 13,867 acres from wildfire (see Range Report). Prescribed burning occurs on approximately 200-acre units and averages 670 acres per year. Since 1990, prescribed burning efforts use experimental design to discern impacts from fall versus spring burning. The U.S. Sheep Experiment Station is planning for a 30-year fire-return interval, within the 25-40 year natural interval based on the ecological site references for historic range condition (NRCS In review).

Henninger

Henninger shows degraded states on the sage flats with a departed condition from the expected community (Range Report 2009; NRCS In review). Species composition is stable with pasture grasses and grazing increaser forb species, but lacks native grass species. The current condition shows a downward trend, although no overt erosion sign was observed. Historical grazing at the site along with evidence of dewatering from entrenched drainages suggests a shift in the water table. This site also has irrigation, both at the site and from adjacent land users. The upland sage community has likely expanded into bottomland areas though the extent is uncertain.

Henninger uplands show fair conditions with plant species diverging from the historic community. The exotic perennial grass smooth brome (*Bromus inermus*) is common indicating past range planting and, thus, may interfere with recolonization of native grass species. Observations found that upland rocky areas where conifers and aspen predominate are closer to expected plant species for this area. That said,

[12] Arbuscular : Of or pertaining to a dwarf tree; shrublike.

this area gets higher sheep use, percent utilization, than all other ownerships of U.S. Sheep Experiment Station (see Table 1).

Humphrey

The vegetation is close to the expected range for this area. Overall, vegetation is robust, diverse and soil erosion not evident outside the bare slope zones from small landslips. These bare slope areas are considered a natural feature and concentrates water in deep mineral soils in adjacent swales below. Soil development is a century to millennium process. The very dark accumulated organics in these swales when compared to much shallower adjacent hillslope soils suggest that these slips are a natural ongoing process.

The Beaver Creek floodplain/valley bottom has lush grass cover, as do all the smaller tributary valleys that support only ephemeral or disconnected flow in small incised, and loamy bank channels. The ephemeral drainage that connects with Beaver Creek ,which has abundant willow growth, showed bank trampling from sheep watering along a quarter mile of the stream. The sedge meadow drainages had no observed bank disturbance.

Summer Ranges

The Summer Ranges show abundant, productive capacity given the higher precipitation regime and vegetation state. Current vegetative assemblages suggest a stable vegetation community. Keith Klement found no outstanding differences for vegetation inside and outside exclosures during his 1990s sampling (1997). Sampling during summer 2009 showed vegetation within expected ranges for the sites compared to the soil surveys in the 1990s (Range Report. 2009; NRCS 1991). Overall the Summer Ranges have likely improved from the 1980s with rest rotation instituted, elimination of one band of sheep (1,000 animals), and continued emphasis on herding for light, even use by sheep.

The vegetation and soil associations of the summer range are unique given the persistent tall forb communities and a high proportion of forbs within grasslands (Agricultural Research Service 2008). Ongoing studies on the U.S. Sheep Experiment Station suggest that the high presence of forbs here may be unique to these highlands. Past evaluations vary on the interpretation of conditions with initial estimates showing degraded conditions in the 1950s till the late 1970s, despite a steady amount of grazing pressure of 1,000 to 3,000 sheep (Agricultural Research Service 2008). More recently, interpretations shifted to good to excellent ratings and research focused on the prevalence and persistence of these vegetative conditions even within grazing exclosures (2008). The persistence of the tall forb communities and high expression of forbs may also be an artifact of prehistoric grazing disturbance from the late 1800s and early 1900s, and/or from turn of the century wildfire.

Current assessments found bare soil predominant along steep ridges and thin soils, particularly in protected concavities. Bare soils are isolated and related to sheep bedding on ridges, past impacts from combination of old wildfire and/or historic grazing practices (see Range report, Klement 1997), and natural bare slopes related to snow patches on protected aspects. Sheep bedding areas are typically scattered and less than one quarter acre each. A chronic erosion patch observed on the Tom’s Creek divide is one quarter acre and continues to sheet wash. This area is not grazed. The snow slopes are steep un-vegetated slopes and therefore experience only transient use by sheep.

Past evidence of bare soils and degraded conditions is referenced (Klement 1997) and reported for Tom’s Creek in the middle 1980s (Montagne 1988). The barren conditions cited by Montagne (1988) are partly due to shallow soil on unstable shale. The extensive faulting and bedrock orientation have created unstable conditions that inhibit deep soil development.

Sheep impacts on the nutrient regime are most prevalent at bedding sites. A recent study by Leytem and Seefedt (2008) for sites on the U.S. Sheep Experiment Station summer range highlights the changes. The bedding sites have reduced vegetation and this translates to lower organic carbon and long term nitrogen (total N). The input of sheep feces offsets the lack of vegetation somewhat with spikes of ammonium (NH_4-N) and soluble phosphorus (P), although overall the bedding areas experience a net loss of nutrient potential (Leytem and Seefedt 2008). The impact of these conditions can influence the vegetation at these bedding areas although specifics were not given in the study. More opportunistic vegetation is associated with these spikes (Vinton and Burke 1994) with exact characterizations depend on grazing history and ecological context (Milchunas and Laurenroth 1993, Biondini et al 1998).

Invasive Plants

Select sheep grazing and herbicide spraying are used to contain the spread of invasive plants. The main species targeted are leafy spurge (*Euphorbia esula*), spotted knapweed (*Centaurea stroebe*), and cheatgrass (*Bromus tectorum*). Minor infestations are noted for hoary cress (*Cardaria draba*), lambsquarters (*Chenopodium album*), kochia (*Bassia scoparia*) and thistle (*Cirsium spp.*) Hand spraying targets roadsides, feedlots and corrals, and near building structures using hand spraying. Broadcast spraying is done with a four-wheeler or tractor- in small pastures and large feedlots. Roughly, 50 acres are sprayed annually (Table 31).

The ecological and thus soil related implication is notable for leafy spurge, spotted knapweed, and cheatgrass. These plants are pervasive in arid rangelands. The success of these species may be due in part to positive feedbacks they create in the soils as self sustenance in addition to lack of predators such as soil pathogens (Thorpe and Callaway 2005, Wolf and Klironomos 2005). Cheatgrass changes soil structure and can influence nutrient content and timing (Hawkes et al 2006, Norton et al 2007). Spotted knapweed may “mine” phosphorus unavailable to other species (Thorpe et al 2006) in addition to altering nutrient cycles with its root exudates (Thorpe and Callaway 2005).

Table 31. Percent utilization with the existing proposed action (Alternative 1) versus the no grazing alternatives

Percent utilization	AUM	Existing	Alternatives with varying degrees of no grazing			
Properties	**Available**	**Alt1**	**Alt2**	**Alt3**	**Alt4**	**Alt5**
Agricultural Research Service	48,667	6.8	-	5.9	7	4
Headquarters	28,353	5.6	-	9.1	5.6	3.9
Humphrey	4,476	13.5	-	-	13.5	9.4
Henninger	1,914	23.8	-	15.5	24.6	16.6
Summer East (Toms Cr.)	4,043	3.8	-	-	-	2.7
Summer West (Odell Cr./Big Mt.)	9,881	5.1	-	-	7.2	3.5
Leased (DOE, USDA-FS, DOI-BLM)	26,087	5.8	0.6	3.9	5.5	1.4
Mud Lake	560	28.6	28.2	28.2	28.6	29.6
Snakey-Kelly	1,756	24	-	19.2	24	-
East Beaver	17,887	1.2	-	-	1.2	0.8
Meyers Creek	3,076	2.3	-	-	-	1.6
Bernice	2,808	23.2	-	18.5	23.2	-

Select grazing by sheep is documented as effective control and eradication for leafy spurge and spotted knapweed (Olson and Lacey 1994, Tu et al 2003). Select grazing for leafy spurge has reported strong success with up to 90 percent eradication (Olson and Lacey 1994), while spotted knapweed control is mixed, probably due to the bittering agent in leaves cnicin (Whitney and Olson 2006). It would make sense that select grazing would benefit soils by moving plant community structure further toward native composition.

Herbicide treatment on the Agricultural Research Service lands is outlined below (Table 32). The main herbicide used is Curtail which is dominantly 2,4 D. Roadsides and fence lines at Headquarters are the main targets for control of weed infestations with an average annual treatment of 45 acres. Secondarily, Krovar – a composition of Bromacil and Diuron – is applied to headquarters feedlots comprising averaging two acres. A recent pasture reseeding at Humphrey used Roundup (Glyphosate) for 12 acres. Other herbicides with some prior use at the U.S. Sheep Experiment Station, though not used regularly, include Arsenal (impazapyr), Tordon (pycloram) and Garlon (triclopyr).

Herbicide application indirectly benefits soil function by containing the spread of noxious weeds, particularly those that alter soil nutrient regimes. Most of the spraying focuses on weed containment eradication along travelways and high disturbance areas such as the feedlots.

However, certain suites of microbes are sensitive to Tordon (picloram), Arsenal (imazapyr) and Garlon (tryclopyr). Tordon has some toxicity to certain fungi at high application rates and is known to affect nitrification portion of the N mineralization cycle (SERA 2003a). Garlon is toxic to some soil bacteria at low and high doses (2004). Arsenal has slight effect on soil microbes at high doses (SERA 2004).

Table 32. Herbicide general use, types and location.

Herbicide	Active ingredients	Area	Frequency	Acres	Notes
Curtail	2,4 D (39%) and Clorpyralid (5%)	Headquarters roadsides +/- 5 m	Annual	35	Leaches, esp sandy soils and shallow water tables
Curtail	2,4 D (39%) and Clorpyralid (5%)	Humphrey roadsides (+/- 5 m) and fencelines (+/- 2 m)	Annual	10	Leaches, esp sandy soils and shallow water tables
Krovar	40% Bromacil (40%) and Diuron (40%)	Headquarters feedlots	Annual	2	leaches readily, long half life in soil
Roundup	Glyphosate (48%)	Humphrey pasture reseeding	One time	12	Strong sorption to soil

Herbicides are typically used on disturbed areas such as roads and feedlots. These areas are characteristically compact and barren and thus herbicides may reside longer. Soil processes are key to the breakdown of herbicides, and, thus, these impaired conditions lead to longer herbicide residency. Krovar and Tordon have relatively long residency times in soils with soil half lives in the order of a year or more (Extronet 1993, SERA 2003a), while Roundup and Garlon have short residency times in soil, at 47 days (SERA 2003b) and 30 days (SERA 2004) respectively. It should be noted that these half lives are averages and vary depending on the amount of moisture available, organic matter and warmth for soil processing (Bollag and Liu 1990).

Krovar, Tordon, and Curtail have moderate to high leaching potential and can contaminate groundwater if used near shallow aquifers (Extronet 1993, Dow 2008, Dupont 2008). Herbicide buffers are recommended to assure adequate protection (see Protocols, Appendix A: Integrated Pest Management).

Roundup has a very strong affinity to soils and thus has the least potential for affecting groundwater. Once absorbed by soils the herbicide is degraded by soil microbes and is unavailable to plants.

Prescribed Burning

The U.S. Sheep Experiment Station has an ongoing prescribed burning on Headquarters since 1936, with a purpose toward restoration and range improvement. During the past 30 years, roughly 5,400 acres were burned under prescription along with 13,867 acres from wildfire (see Range report). Prescribed burn occurs on approximately 200-acre units and averages 670 acres per year. Since 1990, prescribed burning efforts use experimental design to discern impacts from fall versus spring burning. The U.S. Sheep Experiment Station is planning for a 30-year fire-return interval, within the 25-40 year natural interval based on the ecological site references for historic range condition (NRCS In review).

Prescribed burning generally increases mineralization cycles in the short-term (Fisher and Binkley 2000, Erickson and White 2008) with long-term consequences depending on the vegetation and soil biotic conditions (Hart et al 2005). Plant available nitrogen and phosphorus increases for the first (one) year, while longer time increases in sagebrush systems of up to four years for nitrate is reported (Rau et al 2007); Mackenzie et al (2006) have found elevated nitrate in nearby forested systems up to 60 years. The effects depend highly on biological substrate and precipitation since mineralization is a soil biotic process (Hart et al 2005, Rau 2007).

The primary risk for these sage systems is expansion of crested wheatgrass, a planted range grass alternative, and cheatgrass, an exotic annual grass (Zouhar et al 2008). Cheatgrass is of particular concern with the changes to soil nutrient regime and risk for more frequent flashy fires (D'Antonio and Vitousek 1992, Norton et al 2007). Invasion is high risk from too frequent fire (NRCS In review; Zouhar et al 2008).

Soils Direct/Indirect Effects

The spatial boundaries for soils direct, indirect and cumulative effects are the U.S. Sheep Experiment Station properties since soil processes are largely in-place. The spatial boundary is the Agricultural Research Service lands Headquarters, Henninger, Humphrey and the Summer Ranges. The BL M and Forest Service allotments are not considered since these are not under U.S. Sheep Experiment Station ownership.

Short term impacts are within 10 years, while long term impacts are typically greater than 30 years. Short term is considered recoverable such as with regrowth re-established and no excavation of topsoil. Long term effects occur where topsoil is removed to the extent that vegetation cover slowly re-establishes.

Alternative 1 Direct/Indirect Effects

Using vegetation as an indicator of soil health, the current vegetation composition for Humphrey and the Summer Ranges appears stable and not showing signs of degrading range condition. Reports on trend for the Summer Ranges by Klement (1997) and VanHorn-Ecret (1986) show the vegetation composition within exclosures that were installed in the 1960s does not differ substantially from vegetation composition outside exclosures. Humphrey has strong presence of desirable native range species and approaches the expected sagebrush community using the NRCS range sites (SCS 1981). These conditions would persist given the long history of the U.S. Sheep Experiment Station and consistent grazing numbers. The low utilization of 6 percent at Headquarters, 14 percent at Humphrey along with the varied staging of the animals throughout the year leads to maintenance of the good conditions observed. At

Henninger grazing use observations and higher utilization (24 percent) compared to the other properties indicate a downward trend (see Range Report, 2009), possibly related to the altered hydrology regime from historic downcutting of Dry Creek and irrigation diversion.

Localized areas of soil disturbance associated with sheep driveways and bedding would continue to occur, though the vegetation appears robust enough to recover seasonally with no chronic erosion.

Headquarters

Vegetation composition would persist in the Headquarters areas, although crested wheatgrass could expand. Soil physical function would continue at Headquarters with vegetation composition aligning with expected diversity and species representation (NRCS In review) on the shallow and moderately deep soils. Bottomland soils would continue to support mix of pasture grasses and native species.

Henninger

The site appears stable and shows no erosion sign and therefore should continue to support the existing range condition with functional soils. The alluvial flats and footslopes may show continued degradation of vegetation with the higher utilization. The rocky hillslopes would stay the same.

Humphrey

Given the long history and steady grazing numbers, the conditions would likely stay the same with continued livestock grazing.

Summer Range

Given the long history and steady grazing numbers, the conditions would stay the same with continued livestock grazing. Soil disturbance from sheep drives is temporary and groundcover restored with regrowth. Nutrient impacts from sheep grazing outside of the main congregation areas such as bedding areas are not expected. Areas outside of the bedding areas have strong vegetation production, and thus, shifts in nutrients from urine and manure input would not occur. The dispersal of sheep and low grazing capacity diminishes the impacts. Bedding areas would continue to have altered nutrient regimes.

Invasive Plants

Adverse impacts on soil organisms overall is not expected given the low toxicity listed by Tu et al (2003) and using application rates within label restrictions. Decomposition of all listed herbicides is primarily by soil microbe metabolism. Continued use of Krovar at the feedlots risks offsite leaching through runoff or to groundwater.

Prescribed Burning

Short-term adverse impacts to soils from severe burning are not expected from either fall or spring burning, nor are offsite erosion given the low seasonal rainfall. Continued burning creates short term nutrient flux for vegetative vigor. However, continued burning poses risk for cheatgrass and crested wheatgrass expansion. Agricultural Research Service staff indicate there is low risk for cheatgrass expansion in the Mountain big sage communities where they are burning.

Alternatives 2-5

Conditions would stay the same for lowland Headquarters, Henninger, Humphrey ownerships and the highland summer ranges in the Centennials where grazing is continued at current levels.. Discontinuation of grazing would allow for more leaf litter available for organic accumulation into soils. The alternatives with limited grazing would not result in detectable changes on the soil resource for Headquarters, Humphrey, and East Summer Ranges as the projected use is near or less than the current ten percent (see Table 9 in EA). Soil conditions may improve at Henninger for Alternative 2 since use would be discontinued compared to the current 24 percent. Alternative 3 would extend grazing through summer months on Headquarters, but the effect is uncertain since utilization continues at less than ten percent. Alternative 4 could have some lower vegetation recovery potential at west summer range with no rest rotation system here. Recovery infers to vegetation regrowth after grazing.

Conceptually, where grazing is discontinued on lowlands, plant and soil associations would persist since the arid conditions lend to slow recovery potential. Long-term studies on sheep grazing during the mid 20th century show varied potential for recovery based on current soil potential and vegetation composition (Michunas and Laurenroth 1993, Johnson 2003). State and transition models developed for rangeland integrate these ideas and use indicator species and surface soil conditions to judge current condition, but also recovery trajectory of the plant community (NRCS *In review*). Staging areas for animals would remain compacted for the long term given arid conditions and the relatively infertile environment. In contrast, uplands with species compositions closer to the historical climax communities and with hydrologic regimes intact would have greater potential. For the U.S. Sheep Experiment Station properties on the lava plains, Henninger has the highest potential for regrowth with no grazing given the favorable climatic conditions.

The absence of sheep grazing would improve litter accumulation and retention of biomass. This cover would add mulch and further protection to soils. Plant composition changes would be difficult to detect after resting given the resilience of the current communities and the closeness to the expected natural habitat for the northern reaches of Headquarters and especially Humphrey, using the NRCS ecological site logic. Again, the differences may be subtle given the current low uses on these lands.

No grazing would improve footslope and dry meadow sites at Henninger for Alternative 2. Henninger serves as a staging area and has utilization of 24 percent (see Table 9). Henninger has higher moisture, deep soils, and lacks the calcareous upper soil layer that can limit plant production. Improvement would be most notable on the footslope sage sites. The predominant species mix of pasture grasses in the lowlands would persist and therefore a higher-level plant community state is not expected, though production could improve. not expected. The altered hydrology from irrigation and deeper entrenchment of Dry Creek has less potential to support historic dry meadow plant species.

Humphrey pasture has strong semblance to the expected native vegetative community, and, therefore, may show minute improvements except in the willow riparian area. Floodplain soils along this tributary of Beaver Creek would show improvement over the current condition if grazing was terminated since no overt signs of compaction were observed and soil through-flow in the riparian corridor was evident.

Alternative 4 would condense grazing to the west Summer Range only for the summer and likely not instill the rest rotation system, and alternatives 2 and 3 eliminate grazing for both alternatives. Alternative 5 decreases grazing proportionally about 2/3 of current levels. No differences would be detected in the short term for alternatives 2-5. Alternative 4 could have potentially seasonally worse range conditions with concentrated use in the west range with more incidental soil damage from trampling and bedding.

Invasive Plants

Eliminating grazing and active management in alternatives 2-5 has uncertain impacts for invasive weeds and thus soils productivity. Eliminating selective sheep grazing and loss of active management could further expand existing invasives. On the other hand, reduced sheep numbers and associated inputs of fecal matter and disturbance along with less travel use of road ways decreases the chance for invasive plant invasion and, thus, impacts to soil productivity.

Herbicide use would decline by 10 acres annually with elimination of the Humphrey range in alternatives 2 and 3 and cease altogether except for the two acres at the U.S. Sheep Experiment Station main facility (Table 31). No changes in soil productivity are anticipated with this loss since the sprayed areas are primarily disturbed sites. Similar tradeoffs exist as with the elimination of selective grazing.

Prescribed Burning

Alternative 3-5 would have similar impacts from prescribed burning to Alternative 1, since these alternatives retain Headquarters as primary range. The assumption is the elimination of sheep grazing at Headquarters would forego a burning program. For alternative2, the absence of burning lessens the chance of maintaining the natural 25-40 year fire cycle.

Summary of Soil Direct Indirect Effects

Table 33 displays a comparison of direct/indirect soils effects by alternative.

Table 33. Summary of soil effects

Soil Effects	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 4
Grazing - Headquarters	Soils stable and productive	Slight improvement with added leaf litter	Soils stable and productive	Soils stable and productive	Soils stable and productive
Grazing – Henninger	Continued low veg/soil production	Possible improvement on lowland and footslopes with higher litter accumulation, less disturbance	Continued low veg/soil production	Continued low veg/soil production	Slight improvement with less grazing use
Grazing – Humphrey	Soils stable and productive	Improvement in Beaver Creek riparian soils	Improvement in Beaver Creek riparian soils	Soils stable and productive	Soils stable and productive
Grazing-Summer Range	Soils stable and productive	Slight improvement with added leaf litter	Slight improvement with added leaf litter	Risk for downward trend in summer west from no rest-rotation	Slight improvement with added leaf litter
Invasive Plants	Decreases risk of invasion, possible offsite leaching of krovar	Uncertain: eliminates grazing weed dispersal, decreases active control	Decreases risk of invasion, possible offsite leaching of krovar	Decreases risk of invasion, possible offsite leaching of krovar	Decreases risk of invasion, possible offsite leaching of krovar
Prescribed burning	Maintains natural fire cycle at Headquarters.		Maintains natural fire cycle at Headquarters.		

Soils Cumulative Effects

The cumulative effects to soils are considered similar for all action alternatives. Over the last 86 years, grazing management appears relatively consistent with possibly upward trends in the last twenty years from reduced grazing and rest rotation in the uplands along with evolving grazing practices. The additive effects are considered more in detail within the context of the current plant community and soil condition (see Affected Environment and Direct Effects sections).

The additive effects of past grazing are considered more in detail within the context of the current plant community and soil condition (see Affected Environment and Direct Effects sections). Over the last 86 years, grazing management appears relatively consistent with possibly upward trends in the last twenty years from reduced grazing and rest rotation in the uplands along with evolving grazing practices.

Rehabilitation has occurred on the road to Blair Lake and on the Odell mine, returning hydrologic function; soil impairments from soil removal would continue at the mine site (see U.S. Sheep Experiment Station Hydrology Report, 2009) while the road to Blair lake has mixed revegetation success. Observations in summer 2009 found some sign of continued off-road vehicle use. The forb-dominated vegetation had vigorous regrowth due to the productive mollic soils. Ruts were still visible in some areas with continued erosion between water bars. Reclamation at this area would depend on halting travel. Adverse effects are limited to the road area and thus isolated.

Wildfire has past imprints that affect the ongoing soil productivity on Agricultural Research Service lands for the summer range. Wildfire sign from the early 1900s is visible still in the east Summer Range with old erosion gullies still visible at the north side of Tom’s Creek divide. This is indicative of the low production for the limestone and shale geology on steep slopes. Elsewhere, old wildfire sign is not visible and soil/vegetation is robust. Recent fire on the Meyers Creek allotment shows quick recovery.

Prescribed fire is limited to the Headquarters range where ongoing efforts continue. Roughly 19,000 have burned since 1936. About 70percent of this is from wildfire, though a more active burning program is in place over the past 10 years; prescribed burning averages 600 acres per year. The U.S. Sheep Experiment Station would like to increase to 900 acres per year to approximate a natural 30 year fire-return interval (NRCS In Review). Positive effects occur where fire is returned in the system with nutrient influx.

Hydrology

Activities on the U.S. Sheep Experiment Station are governed by the Clean Water Act, Executive Order 11990, 1977, Wetlands Management, and Executive Order 11998, 1977, Floodplain Management..

Hydrology Summary

Compliance with Relevant laws, Regulations, Policies and Plans

All proposed alternative would meet the intent of the Clean Water Act and the Executive Orders for wetlands and floodplains (see Hydrology Report, Desired Condition).

Affected Environment

Watershed Characteristics and Conditions

In general, alluvial flats found on lower basin floors are dominated by sagebrush and underlying basalt flows. Areas underlain by basalt flows lack defined drainages due to the high permeability and porosity of

basalt. Adjacent lower elevation flatlands are very well drained and have moderate grassland productivity. The summer ranges have complex stream networks that dissect the rolling ridges of the Centennial Mountains and are characterized by relatively high productivity with intermixed grass-forb lands, sagebrush, and conifers (Figure 34).

Sixth (6^{th}) level watersheds, and associated grazing properties are summarized in Figure 35. Table 34 summarizes surface conditions observed on U.S. Sheep Experiment Station grazing areas.

Figure 34. Typical view of upland conditions, Tom Creek headwater areas –em 7/11/09

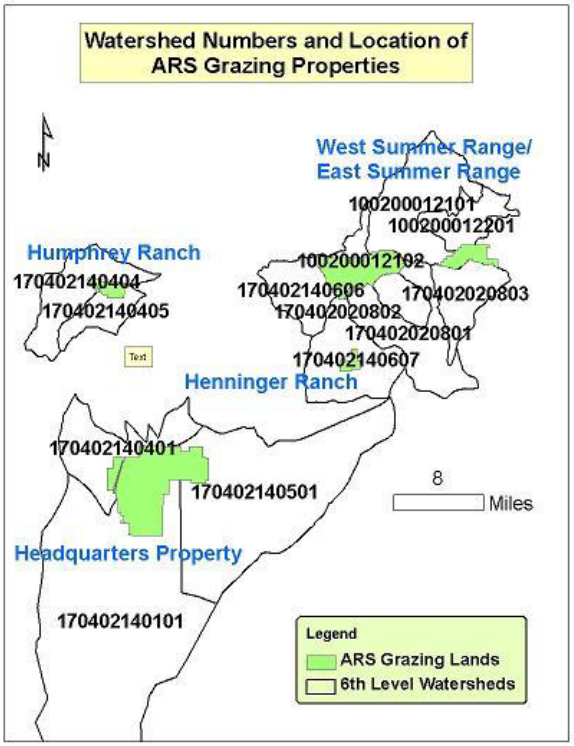


Figure 35. 6^{th} level watersheds involved with the Agricultural Research Service lands

Sheep beds occur in all of the U.S. Sheep Experiment Station grazing areas. Bedding areas have only been mapped in the Odell and Big Mountain grazing areas and comprise less than one percent of the area. Moffet (2009) determined that runoff and erosion are more likely on bed grounds after use, but only under extreme rainfall conditions. Field observations from 2008 and 2009, at various bedding areas, did not note rilling, gully development, or upland sediment transport associated with these areas. Bedding areas were determined not be impacting watershed condition nor are they functioning as chronic sources of erosion and sediment transport (Moser and Fryxell, 2008, Fryxell, 2009).

Initial field visits to the project area, to collect data and observations, were conducted on July 8 through July 12, and August 28 through September 2 of 2008. Field work was also conducted in August of 2009. A rating classification of soil condition and cover, with ratings 1 through 4, was devised to catalogue observations. These classifications were quantified to portray general conditions and spatial trends (USDA 2003, USDA Forest Service 2008).

- Condition class 1 indicated ground that has severe soil disturbance and in a hydrologically impaired state. Soil conditions follow Forest Service (2003) indications for long term impairments to soil

productivity with sparse ground cover, evidence of severe compaction (surface ponding), displacement, or erosion (rills, soil pedestals).

- Condition class 2 would be ground that also had evidence of soil disturbance with marginal hydrologic functionality, and little or no sign of recent sheet wash, surface erosion. Soil ground cover and understory vegetation are adequate to resist erosion.
- Condition class 3 indicates conditions with one-time impairment, but recovery to full hydrologic function.
- Condition Class 4 has minimal sign of impairment with complete soil and hydrologic function.

Table 34 displays a summary of existing conditions.

Table 34. Summary of existing conditions

Area	General condition	Surface Condition Class	Erosion	Proper Functioning Condition Surveys	Water Developments	Channel, Riparian, and Floodplain
Headquarters	Sage brush steppe	2-4	Localized compaction and ponding of surface water, and trampling	None surveyed-no surface drainage	Troughs; Up to 20 acres disturbance	No floodplain or riparian due to lack of surface water expression
Humphrey	Sage brush steppe	2-4	Restricted to localized areas of active slumping controlled by underlying geology	Six streams surveyed, five rated as PFC and one as FAR[a]	Irrigation and ditches	Only on Beaver Creek; PFC
Henninger	Sage brush steppe	1-4	Flat areas showing evidence of possible wind erosion	Two streams surveyed; Two streams rated as FAR[a]	Irrigation and ditches	Functioning impaired due to alteration of flow, rip-rapping and possible road influences; Riparian not present
Tom's Creek	Consistent, well-vegetated	1-4	No areas of rilling and gullying noted	3 streams surveyed; 3 rated as in PFC	None	When present riparian is functioning; channel condition functioning where surveyed, floodplains not present due to channel type
Big Mountain	Consistent, well-vegetated	2-3	Only near mine – minor channeling	3 streams surveyed; 3 rated as in PFC	5, 1.3 acres disturbance	One site surveyed with floodplain; restriction due to old road bed; riparian functioning
Odell	Good, consistent	1.4	No surface rilling and gully, except at Pts OD 4 and 5	6 stream reaches	None	No floodplains present; riparian healthy were present; channel function pfc where surveyed

Hydrology

Stream gage stations for the project area are located in Montana on Beaver Creek, Odell Creek, and Tom Creek. These gauges are operated by the U.S. Geological Survey (USGS, 2008). Beaver Creek runs through the western portion of the Humphrey Ranch. The gauges on Odell and Tom Creek are located near Lakeview, Montana.

Table 35 provides summary information for the three gauges.

Table 35 Hydrologic description for streams with U.S. Geological Survey stream gauges, Montana

Station	Period of Record	Watershed Area (mi²)	Gauge Elevation	Flow Regime	Average Flow (cfs)[a]	Peak Flow of Record (cfs)
Beaver	1921-1987	220.0	5, 150	Intermittent	25.6	858
Odell	1994-1998	17.7	6, 750	Perennial	46.5	506
Tom Creek[b]	1989	6.4	6, 740	Intermittent	2.8	12

a - Includes dates during which there was no flow
b - Partial year, May through September

Peak flows in watersheds influenced by the Centennial Mountains are during late spring snowmelt, usually during May and June for all three gauges. In summer range areas underlain by igneous rocks precipitation water does not percolate deep in to the relatively un-weathered rock and travels down slope as shallow subsurface interflow in soil. At major slope breaks or at major geologic features, water daylights as springs or boggy seeps.

Springs and Wetlands

Fieldwork was conducted in 2008 and 2009. No springs were observed. No wetlands were present, but water-influenced soils were only found associated with flowing streams or on the margin at Blair Lake. The width of water-influence appeared to be limited and often reflected by the presence of *Salix* spp. and *Equisetum fluviatile*. Wet meadow conditions were noted in low-lying areas at Humphrey Ranch with limited trampling and trailing in these areas.

Water-influenced soils around Blair Lake were observed to have limited trampling and compaction. These areas were limited to driveway crossings and areas around Blair Lake where sheep access the water for drinking. At driveway crossings and around Blair Lake adjacent vegetation and water-influenced soils did not appear to be disturbed or otherwise compromised.

No bedding areas were observed in areas of water-influenced soils.

Water Quality

303(d)/305(b) Report

Integrated 303(d)/305(b) reports for Idaho and Montana were reviewed to evaluate existing water quality conditions within the project area. These reports are required by the Clean Water Act (CWA), of 1972, and subsequent amendments of 1977 and 1987, is the primary federal law that governs water pollution in the United States. Water quality criteria and standards for both states are tiered to designated beneficial uses. For the State of Idaho, these are aquatic life, recreation, domestic water supply, wildlife habitat, and aesthetics (State of Idaho, 2009). The State of Montana's designated beneficial uses are: public water

supplies, wildlife, fish and aquatic life, agriculture, industry, recreation, and other beneficial uses (State of Montana, 2006a). The State of Montana defines impaired as "a water body or stream segment for which sufficient credible data shows that the water body or stream segment is failing to achieve compliance with applicable water quality standards" (http://data.opi.mt.gov/bills/mca/75/5/75-5-103.htm).

Waters in the integrated 303(d)/305(b) reports are classified by category, denoting their compliance with applicable water quality standards. Table 36 and Table 37 refer to category 4a, 4c and 5. Category 4a waters do not support a standard for one or more designate uses, but a Total Maximum Daily Load (TMDL) is not needed. Category 4a waters mean that the Total Maximum Daily Load has been done and approved by EPA. Category 4c indicates that that non-support of water quality standard(s) is not due to a pollutant. Category 5 streams are defined as "waters where one or more applicable beneficial uses are impaired or threatened, and a Total Maximum Daily Load is required to address the factors causing the impairment or threat." These waters make up the 303(d) list for a state (State of Montana, 2009). Each state proposes which reaches would have Total Maximum Daily Loads developed and the year to be completed.

The 2008 State of Idaho Integrated 303(d)/305(b) report, and accompanying GIS data, document that 10.4 miles of stream flowing through U.S. Sheep Experiment Station-administered lands are categorized as 4a. Total Maximum Daily Loads have been approved by the Environmental Protection Agency for these reaches but are still considered as impaired. See Hydrology Report in the project file for details.

Alteration of flow was observed on Modoc Creek where water is diverted to provide irrigation in the western portion of Humphrey Ranch and to guide the stream under the Interstate. However, evidence of flow, physical substrate, and habitat alterations were not observed during the 2008 and 2009 field seasons on the Ranch. Fieldwork along Beaver and Long Creeks did not provide indications of past riparian harvest or removal. As a result, non-support of water temperature is most likely due to flow alterations. The Idaho 2008 Integrated 303(d)/305(b) report indicates fecal coliform issues are the presumed sources of contamination (State of Idaho, 2009). The western-most stream is by used by the U.S. Sheep Experiment Station to water and bed sheep. Some evidence of bank trampling was noted but riparian vegetation appeared healthy.

It should be noted that Beaver Creek is listed as impaired although present function condition surveys on the Ranch rated the stream as in proper functioning condition, where surveys were conducted.

The 2008 Montana draft Integrated 303(d)/305(b) Report listed 25.4 miles of Corral Creek, O'Dell Creek, and Tom Creek as Category 5 streams flowing through U.S. Sheep Experiment Station-administered lands. Probable causes and sources of impairment are detailed in the Hydrology Report (2009).

Table 36 Hydrologic descriptions for Creeks Located in Montana Creeks within Agricultural Research Service summer range.

Station	Period of Record	Watershed Area (mi.2)	Gauge Elevation	Flow Regime	Average Daily Flow (cfs)[a]	Peak Flow of Record (cfs)
Beaver	1921--1987	220.0	5150	Intermittent	25.6	858
Odell	1994--1998	17.7	6750	Perennial	46.5	506
Tom*	1989 [b]	6.43	6740	Intermittent	2.8	12

[a] --Includes dates during which there was no flow.
[b] --Partial year, May through September.

Table 37 Summary of Proper Functioning Condition Surveys Conducted on Agricultural Research Service Grazing Areas

Property/Grazing Area	Point ID	Rating	Comments
Big Mountain	BM1	FAR	Stream eroding into road prism at Spring Creek
	BM3	PFC	A3 channel type
	BM4	PFC	A2 channel type
Odell	OD2	PFC	B3 channel type
	OD4	PFC	B3 channel type; North Fork Toms Creek
	OD5	PFC	A/B4 channel type
	OD7	PFC	B3 channel type
	OD8	PFC	C3 channel type
	OD15	PFC	E4 channel type
Tom's Creek	Pt M	PFC	Corral Ck; A3/A4
	Pt G	PFC	Stream near Blair Lake (below stream crossing)
	Pt J	PFC	A4
Humphrey	H15	FAR	Ditch
	H14	PFC	E3 channel type
	H2	PFC	E3/34 channel type
	JF2	PFC	E3/34 channel type
	H1	PFC	E3/34 channel type
	JFPT 3	PFC	G4/5 channel type-middle portion of stream at lower end of PFC
Henninger	HEN8	PFC	F4 channel type; Alteration of flow, rip-rapping, irrigation; Dry Creek
	Hen1	Far	C4 channel type; Alteration of flow; rip-rapping; Moose Creek
Headquarters	No Surface Flowing Drainages		
DOE Feedlot	No Data Taken-Industrial Area		

Although these streams are listed from headwaters to stream mouths, the listings appear to be based on problems specific to certain reaches lower within the Red Rock Lakes basin that are not on Agricultural Research Station lands. Causes of impairment appear to be related to human activities, flow alterations, agriculture, grazing and irrigation (Montana 2006b, 2006c, 2006e; See Hydrology Report in the project file for details). During the field seasons of 2008 and 2009, on Agricultural Research Station lands, no substantial and chronic sources of sediment and siltation, alterations to flow or to stream side vegetation were observed on these three creeks (Moser and Fryxell, 2008 and Fryxell, 2009). It should be noted that though these drainages are listed as requiring Total Maximum Daily Loads and dates have been listed for their completion, these goals have not yet been accomplished by the State of Montana (State of Montana, 2009, Appendices B and F).

Water Quality and Sheep Crossings

A study was done by Agricultural Research Service researchers to determine the effects on Total Suspended Sediment (TSS) and generic *Escherichia coli* (*E. coli*) when sheep cross O'Dell Creek. The study was conducted over two years and each year 2,000 to 2,500 sheep crossed the stream (Lewis et al, 2009). Water samples were collected every two minutes at a point 25 meters above the crossing and at 25, 100, 500, and 1,500 meters below of the crossing. Samples collected above the 25-meter upstream collection point represent background concentrations for both sediment and *E. coli* in Odell Creek. See Hydrology Report for data results.

The State of Montana water quality standard for Total Suspended Sediment is narrative. It states that no increases are allowed above natural concentrations, which would or would be likely to create a nuisance, or render waters harmful or detrimental to public health or other beneficial uses, expect as permitted in 75-5-318, MCA ((http://www.deq.state.mt.us/dir/Legal/Chapters/Ch30-10.pdf).

Although Total Suspended Sediment values are obviously greater than those collected at the -25 meter site, these values would not be considered as exceedances as the elevated levels do not create a nuisance or render the water detrimental to its beneficial uses at the 26-minute collection time.

O'Dell Creek is classified as B-1 drainage. The State of Montana water quality for these streams states: "from April 1 through October 31, the geometric mean number of *E-coli* may not exceed 126 colony forming units per 100 milliliters and 10 percent of the total samples may not exceed 252 colony forming units per 100 milliliters during any 30-day period; and from November 1 through March 31, the geometric mean number of E-coli may not exceed 630 colony forming units per 100 milliliters and 10 percent of the samples may not exceed 1,260 colony forming units per 100 milliliters during any 30-day period" (http://www.deq.state.mt.us/dir/Legal/Chapters/Ch30-10.pdf). *E. coli* measurement results displayed in Table 38 do not reflect geometric means.

Table 38. Summary of Total Suspended Solids (TSS) Water Quality Data Collected 2005-2006, O'Dell Creek

Reach	Distance downstream (meters)	Peak Maximum Concentration (MPN/100 mL)	Post-peak Minimum Concentration (MPN/100 mL)	Peak Duration (minutes)
Upper	-25	14[a]	n/a	n/a
	25	2, 808	119	7
	100	768	87	8
	500	484	16	15
	1,500	39	41	13
Lower	-25	24[b]	n/a	n/a
	25	1, 667	42	9
	100	1, 744	68	11
	500	1, 471	252	14
	1,500	795	101	14

[a] Mean concentrations for comparisons: No peaks were detected at 25 meters upstream
[b] Mean concentrations for comparisons: No peaks were detected at 25 meters upstream

As a result, direct comparisons to water quality criteria for the State of Montana cannot be made. Data indicates that for both Total Suspended Sediment and *E. coli* concentrations, effects diminish rapidly with distance downstream and duration of elevated water quality analytes[13] is short-lived.

Herbicide Applications

Invasive weeds are present and have been addressed through targeted select grazing and localized herbicide use. Herbicides are used to kill or inhibit the growth of invasive undesirable or exotic broadleaf weeds and/or woody plants.

[13] Analyte: The sample being analyzed. The science of chemical characterization and measurement; qualitative analysis is concerned with the description of chemical composition in terms of elements, compounds, or structural units, whereas quantitative analysis is concerned with the measurement of amount.

Herbicides have been used along roads, buildings, feedlots, and corrals for the past thirty years following manufacturer's directions. No herbicides are applied on rangelands. Herbicides that are used include: clopyralid, triclopyr amine, Imazapyr, Diuron, Picloram, Bromacil, non-aquatic Glyphosate, 2, 4-D amine. Application methods are spot application, hand wand application to control weeds along roadsides, in dry-lots and corrals and near building structures. Four-wheeler-mounted and tractor-mounted boom-sprayer applications are done in small pastures and large dry lots (USDA Agricultural Research Service, Appendix C, 2008).

In 2009 a total of 59 acres were treated. Thirty-five (35) acres on the Headquarters property were treated with Curtail which is a combination of Clopyralid and 2, 4 D and another 10 acres were treated on Humphrey Ranch. Two acres associated with feedlots were treated with Krovar, which is a combination of Bromacil and Diuron. Targeted weed species include spotted knapweed (*Centaurea stoebe)*, and leafy spurge (*Euphorbia esula)*. These herbicides and their relationships to soil and water are summarized in Table 39.

Table 39. Summary of herbicides applied on Agricultural Research Service lands

Herbicide	Comments
2, 4 D amine	Used for both aquatic and terrestrial vegetation control; Binds slightly to soil; Water soluble, Ester forms toxic to fish
Imazapyr	Used for both aquatic and terrestrial vegetation control; Binding to soils is pH dependent; Water soluble and degrades rapidly in sunlight; Low toxicity to fish and algae
Picloram	Used for terrestrial vegetation control; *Known surface and groundwater contaminant*; Does not bind tightly with soils
Bromacil	Used for terrestrial vegetation control; Mobile in soil; *Known groundwater contaminant.*
Clopyralid	Weakly adsorbed with moderate leaching potential in soils; Not known to be a common groundwater contaminant and is considered moderately toxic to fish
Triclopyr amine	Weakly adsorbed to soil; Practically non-toxic to fish
Diuron	Used for terrestrial vegetation control; *Known groundwater contaminant*; Moderately toxic to fish and highly toxic to aquatic plants
Non-aquatic Glyphosate	Used for control of annual and perennial weeds; In water glyphosate is rapidly dissipated through adsorption to suspended and bottom sediments. Half life of 12 days to 10 weeks. Relatively low toxicity to birds, mammals and fish.

Review of available GIS layers, obtained from U.S. Sheep Experiment Station, documenting weed locations, show that herbicides have been applied adjacent to Beaver Creek on the west side of the Headquarters Property and along several intermittent tributaries. Applications are according to product directions and adhere to directions in the MSDS sheets.

Municipal Watersheds

There are two wells located on the Headquarters property. One well, developed in 1918, is estimated to be at least 350 feet deep. The other well, developed in 1937, is 856 feet deep with the water level at 731 feet.

These wells are used for drinking water. Table 40 summarizes the monitoring schedule and the analytes for which the U.S. Sheep Experiment Station samples. Out of the three compounds known for groundwater contamination, only Picloram is monitored (Feisthamel, 2009). Feisthamel was not aware of (or unsure of whether there are) any regulations that require monitoring for Bromacil and Diuron in Idaho groundwater. Exceedances above maximum contaminant levels are rare, with only one exceedance of MCLs in 2005 for coliform. There have been no detections of Picloram (Feisthamel, 2009).

Table 40. Summary of monitored water quality analytes and frequency of monitoring

Water Quality Analyte	Frequency of Required Monitoring
Coliform P/A	Quarterly
Lead and Copper	Annually
Volatile Organic Compounds	Every three years
Arsenic	Every three years
Inorganic Compounds	Every nine years
Nitrites	Every nine years
Nitrates	Annually
Synthetic Organic Compounds (Herbicides)	Every six years

There is also a domestic well on the Henninger Ranch, but that well is not used and is not monitored (Jacobson, 2009b, Yurczyk, 2009b).

Desired Condition

Research activities must adhere to federal laws and regulations such as Executive Orders and Acts. Applicable federal laws and regulations related to hydrology and water quality are the Clean Water Act of 1977, Executive Order 11990 of 1977 - Wetlands Management and Executive Order 11998 of 1977 - Floodplain Management.

Hydrology Direct/Indirect Effects

See proposed action for applicable design features, best management practices, mitigation measures, and monitoring. For additional details of this analysis, see the Hydrology Report (2009) in the project file.

Geographical Information System (GIS) data was used to help determine values for Issue Indicators used to compare alternatives. Literature reviews, discussions with local experts, and professional experience and judgment were also used in analyzing data and developing interpretations. Field notes and photographs are in the planning file.

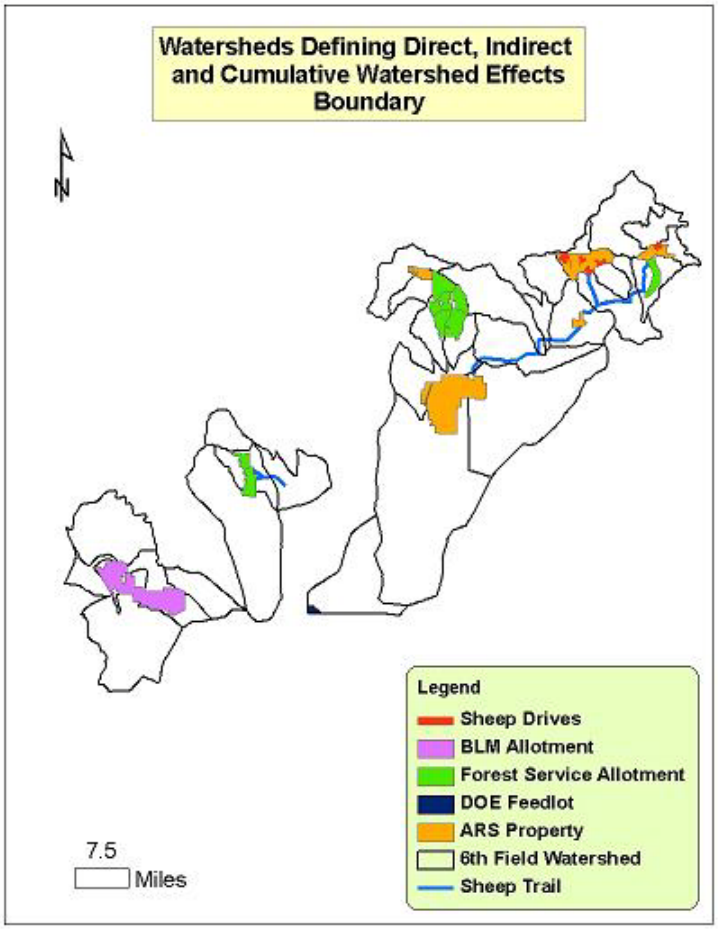


Figure 36. Watersheds Defining the Area of Analysis for Direct, Indirect and Cumulative Effects

Two levels of spatial context have been defined for this project. The area of analysis for potential direct and indirect effects and the area of analysis for cumulative effects are displayed in Figure 36. The boundary is defined by those 6th level watersheds involved with any U.S.

Sheep Experiment Station properties, grazing allotments, trails, and driveways used in U.S. Sheep Experiment Station activities. This level of analysis was selected as it provides a good scale for determining potential effects. Watersheds' containing only roads used for trucking sheep to various grazing areas where not included in the cumulative effects area, as there are only twelve trips a year, which is the maximum under the proposed action. Maintaining or reducing this number would be inconsequential when comparing to traffic levels on State Highways, County, and Forest Service Roads, which are used for trucking sheep.

Two levels of temporal context will be discussed in the effects analysis. The time frame for short-term effects is defined as less than 10 years and long-term is defined as greater than 30 years. These time frames are based on best professional judgment and discussions with other TEAMS hydrologists. These timeframes apply to direct, indirect and cumulative effects.

Hydrologic indicators, used for analyzing the potential effects of alternatives, are summarized in Table 41.

The types of direct and indirect effects are the same for all alternatives.

Table 41. Summary of hydrologic indicators by alternative

Unit of Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Total Miles of Driveway	3.1 miles	0.0 miles	0.0 miles	2.3 miles	3.1 miles
Total Miles of Driveway within 300 ft of Streams	1.4 miles	0.0 miles	0.0 miles	1.2 miles	1.4 miles
Percent Change in Number of Acres Grazed Compared to Alternative 1 [a]	0 acres (47, 606 acres total)	*-99* %	*-39* %	*-8* %	*-30* %
Total Number of Sheep Grazed [b]	3, 330	2165 (65% reduction)	2660 (20% reduction)	3,330 (0 % reduction)	2330 (30 % reduction)
Additional Issue Indicators for Cumulative Effects					
Total Miles of Trail	59.5 miles	0.0 miles	26.3 miles	49.7 miles	52.9 miles
Total Miles of Trail within 300 ft of Streams	19.8 miles	0.0 miles	2.71 miles	14.7 miles	17.0 miles

[a] A negative number means reduction in acres grazed on Agricultural Research Service lands

[b] This number represents the maximum number of sheep grazed, which would be from late April/early May through early November. This includes ewes with lambs (See Appendix B, page 25)

Alternative 1 – Proposed Action

Alternative 1 represents current operations at the U.S. Sheep Experiment Station.

Alternative 1 Direct Effects

Alternative 1 proposes the largest number of acres for grazing, total miles of driveway, and total miles of driveway within 300 feet of streams. Alternative 1 propose grazing a maximum of 3, 330 sheep. A sheep is defined as a weaned lamb, a yearling ram or ewe, a mature ram or ewe, pregnant ewe or a lactating ewe with a lamb(s) (Yurczyk, 2009b).

There would be no change in the type and magnitude of direct effects between existing grazing operations and the proposed action, as Alternative 1 is the same as current management. Direct effects would include

alteration of soil hydrology due to ground disturbance, compaction, loss of vegetative ground cover, and in-stream disturbance during sheep crossings.

With the exception of reducing localized sources of sediment, the type and magnitude of direct effects are generally not expected to change with the implementation of the proposed action, as Alternative 1 is the same as current management. Sediment reduction would occur at points OD 4 and OD 5 and on the road to Blair Lake. Sheep grazing in the North Fork Tom Creek would continue to be incidental and the amount of ground disturbance is expected to remain the same.

Current levels of ground disturbance, compaction, loss of vegetative cover, and in-stream use, including bank trampling, would be expected to continue on the east /west trending stream, in the eastern portion of Humphrey Ranch, as watering sheep would continue. The potential for localized increases in E. coli is not expected to increase as the number of sheep involved would not change. The expected increases would be of short duration as shown in Table 1. No other alterations to existing water quality conditions would be expected. No wetlands exist. There would be no change in direct effects to water-influenced soils and riparian areas as the number of sheep and grazing locations would not change.

Levels of ground disturbance associated with maintenance activities would continue and not change from current management levels.

Alternative 1 Indirect Effects

Resting of the North Fork Tom Creek from consistent grazing, but allowing grazing for incidental use would continue. Incidental use would allow sheep to be moved up and out of this drainage to the rest of the Big Mountain grazing area.

Best Management Practices for herbicide use would be implemented. These measures have been proven effective across the country in managing non-point sources of pollution, and their implementation is required in both Idaho and Montana as part of the Clean Water Act (State of Montana, 2007, State of Idaho, 1999, Seyedbagheri, 1996, Schuler and Briggs, USDA Forest Service, 2002).

Recommended buffer widths would be implemented during herbicide application, and well water monitoring for herbicide contamination would continue.

The type and magnitude of indirect effects is expected to remain essentially the same between existing operations, and the proposed action, as current operations and the proposed action are the same. Indirect effects would primarily be the incorporation of sediment by overland surface runoff or stream flow.

The potential for ground disturbance under Alternative 1, loss of vegetative cover, and compaction, would remain the same as under current operations. Localized sediment sources associated with sheep driveways at points OD 4 and OD 5, drainage from the waste water pond at the old phosphate mine, and with the road to Blair Lake would be reduced or eliminated through the implementation of mitigation measures. Current levels of erosion and sediment contribution to the east/west trending stream (eastern-most Humphrey Ranch) would not be expected to change. No changes to upland watershed conditions would be expected as the numbers of sheep and duration of grazing would not change. This would also be the case in the North Fork of Tom Creek.

Recovery from current and past prescribed burns would continue and, as these areas recover their potential for transport by surface runoff, would decline. No changes in existing indirect effects, related to sediment transport, is predicted, as this number does not change from past yearly burn acreages Field work in 2008 did not find any areas of surface-water related erosion in these recovering burn areas.

Short-term indirect effects would be associated with maintenance activities due to their ground disturbing nature and would be associated with initial disturbances. Long-term effects associated with roads would be expected to remain the same as no road construction was proposed.

Indirect effect levels related to *E. coli* and Total Suspended sediment would not be altered. There would be no changes to channel function, morphology, floodplain function, or riparian condition as the number of sheep and duration of grazing would remain the same as current conditions Table 41.

There would be no change to existing levels of indirect effects for water influenced soils, as the number of sheep would be the same as current management.

Herbicides listed in Table 32 would be applied. Picloram, Diuron and Bromacil are all proven ground water contaminants (Gilliom, 2007 SERA, 2003). Alternative 1 would implement herbicide Best Management Practices and recommended buffer widths, shown in Table 5, which would reduce the potential for any future opportunities for ground water contamination. For a discussion of BMP effectiveness the reader is referred to page 16. Additional direction regarding herbicide applications at the U.S. Sheep Experiment Station is found in Appendix C of this environmental assessment.

Alternative 2

Under Alternative 2, no grazing would occur on the Headquarters property, East and West Summer grazing areas or Henninger and Humphrey Ranches. No trailing would occur and no driveways would be used. No mitigation measures and design features, as described under Alternative 1, would be implemented, as none of the Agricultural Research Service lands would be grazed. No herbicides would be applied.

Alternative 2 Direct Effects

No direct effects would occur as grazing would not occur on U.S. Sheep Experiment Station administered lands.

Alternative 2 Indirect Effects

No indirect effects would occur as grazing would not occur on U.S. Sheep Experiment Station administered lands, except for localized sediment contributions. Sediment would continue to be generated from sheep driveways at points OD 4 and OD 5 and along the road to Blair Lake as mitigation and maintenance measures would not be implemented.

Alternative 3

The only U.S. Sheep Experiment Station grazing areas incorporated into Alternative 3 are the Headquarters and Humphrey areas. The design feature for rest and incidental use of the North Fork Tom Creek would not be implemented as this area would not be grazed. Mitigation measures for sheep driveways at points OD 4 and OD 5, the road to Blair Lake, and at the exit of the mine drainage pond would not be implemented, as the West and East Summer grazing areas are not included in Alternative 3. Well monitoring and recommended buffers would be implemented. Best Management Practices for herbicide application would be implemented on the U.S. Sheep Experiment Station grazing areas proposed for use. See Alternative 1, for a discussion of Best Management Practices effectiveness.

Alternative 3 Direct Effects

The Headquarters and Henninger Ranch grazing areas are the only Agricultural Research Service lands that would be grazed under Alternative 3. There would be a 20 percent reduction in total sheep numbers and 42 percent reduction in the number of acres available for grazing. There would be zero miles of driveways and zero miles of driveway within 300 ft of streams (Table 10). Grazing would be pushed to the carrying capacity of the Headquarters area, and the season of use would be significantly increased (Yurczyk, 2009g). Utilization at Henninger would decrease as the number of Animal Unit Months is decreased (Yurczyk, 2009c).

Alternative 3 has an increased potential for ground disturbance, compaction, and loss of vegetative ground cover as the season of use at Headquarters would be increased significantly compared to Alternative 1. At Henninger the potential for increased ground disturbance would be expected to be somewhat less than under Alternative 1. Fewer sheep would be grazed on the Ranch and there is a 35 percent decrease in the predicted number of Animal Unit Months that would be utilized.

Ground disturbance, compaction, and loss of vegetative cover near the east/west trending stream, used for watering on the Humphrey Ranch, would be expected to quickly recover as existing conditions would not be extensively modified (Fryxell, 2009). *E. coli* contributions from sheep to would be eliminated on those properties not included under Alternative 3. Direct effects should be essentially the same as under Alternative 1 as the number of sheep grazed is not substantially different.

Under Alternative 3, Humphrey Ranch and the East and West summer ranges would not be grazed. These grazing areas contain the riparian and water-influenced soil areas on Agricultural Research Service administered lands. With no grazing existing levels of direct impacts on water influenced soils would gradually recover over time. However, improvements would not be expected to be substantial as watershed conditions are generally good to excellent. Riparian areas, where present, are presently in good condition. As a result, no discernible difference to riparian conditions would be expected under this alternative.

Prescribed burning could continue and would result in short-term loss of vegetative cover. There would be no difference in level of disturbance associated with maintenance activities as described in Alternative 1.

Alternative 3 Indirect Effects

Summer ranges would not be grazed and stream crossings would not be used. However, mitigation measures for stream crossings would not be implemented as described under Alternative 1 for the stream crossing exits or for the road to Blair Lake. These areas would continue to function as localized sediment sources.

Alternative 3 has an increased potential for ground disturbance, compaction, and loss of vegetative ground cover as the season of use at Headquarters would be increased significantly compared to Alternative 1. However, the use of adaptive management would be implemented as well as supplemental feeding, to mitigate this potential.

The stream at Humphrey Ranch would not be used for watering, allowing for recovery from bank trampling. No measurable change to existing levels of indirect effects would occur as compared with Alternative 1 or for the North Fork of Tom Creek as the area receives only incidental use. Areas compacted due to grazing in the Humphrey, East and West Summer ranges would re-vegetate and decompact over time, but improvements would likely be minimal as watershed conditions are presently good to excellent.

Short-term indirect effects to water quality in the summer ranges would not occur as the summer ranges would not be grazed. Floodplain function in the summer ranges and Humphrey Ranch would not be altered as no proposed changes would involve these areas. As existing levels of direct effects on water influenced soils would be expected to decline, indirect effects would also be expected to decline. Riparian areas, where present, are presently in good condition. As a result, no discernible difference to riparian conditions would be expected under this alternative with the cessation of grazing in the Humphrey Ranch, East and West Summer Ranges.

Existing levels of prescribed burning may continue. Please refer to Alternative 1 for a discussion of associated effects. Effects would be slightly less than Alternative 1. Alternative 3 proposes 13 percent fewer acres for seeding. No measurable differences in indirect effects would be expected due to the small difference in acreage and the present lack of noted burn-associated erosion at the Headquarters property.

Indirect effects related to herbicide application would be the same as Alternative 1. Please refer to that section for discussion of this topic. Use of wells for domestic use would continue.

Alternative 4

Grazing would occur on Headquarters Property, Henninger Ranch, Humphrey Ranch, and the West Summer Range. The East Summer Range would not be grazed. A total of 2.3 miles of driveway would be used and 1.2 miles of the driveways would be within 300 ft of water. There would be an eight percent decrease in the total number of acres to be grazed compared to Alternative 1 and existing management (Table 11).

The design feature for rest and incidental use of the North Fork Tom Creek and for the road to Blair Lake would not be implemented as the East Summer Range would not be grazed. Best Management Practices for herbicide application and recommended buffers would be implemented on U.S. Sheep Experiment Station properties proposed for use. See Alternative 1 for a discussion of Best Management Practices effectiveness. Mitigation measures for sheep driveways at points OD 4 and OD 5, and at the exit of the mine drainage pond would be implemented.

Alternative 4 Direct Effects

Alternative 4 and Alternative 1 propose to conduct grazing on the same areas with one exception. Under Alternative 4 the East Summer Range would not be grazed. As a result, please refer to the discussion under Alternative 1 for direct effects for all areas except for the East Summer Range.

Alternative 4 would implement consecutive year grazing, of 3, 300 sheep, on the West Summer Range as the result of the East Summer Range being closed to grazing. Currently this pasture is rested every third year. Consequently, grazing pressure would potentially increase in the West Summer Range with a concomitant increased potential for ground disturbance, compaction, loss of vegetation and in-stream disturbance as sheep cross streams; with increased grazing pressure there is the potential for a decline in range due to concentrated use in bedding areas, development of trailing, soil trampling and loss of vegetative cover (Grooms et al 2009). However, adaptive management would be used to mitigate the increased potential for ground disturbance, compaction and loss of vegetative cover (Yurczyk, 2009g).

Although grazing pressure would increase in the West Summer Range this would not be expected to result in measurable degradation of riparian vegetation, as sheep prefer high exposed ridge tops. Loss of riparian vegetation adjacent to stream crossings would not be expected to be measurable as sheep would not browse on riparian vegetation. The increased potential for compaction and trampling includes water loving soils immediately adjacent to streams at stream crossings, due to potential increases in the number

of times sheep are moved across creeks. However, the use of adaptive management and the implementation of mitigation measures would be expected to mitigate increased effects.

Alternative 4 Indirect Effects

Indirect effects would be the same for Alternative 4 as Alternative 1 except for those potential indirect effects that would occur in the East Summer Range. Please refer to Alternative 1, Indirect Effects for that discussion. These discussions include implementation of mitigation measures, which would reduce localized sources of erosion and sediment generation at the Odell sheep crossings and at the drainage flowing from the waste water pound at the old phosphate mine.

With the elimination of the East Summer Range incidental sheep grazing would not occur. Elimination of incidental grazing use in the North Fork of Tom Creek would not result in observable improvement to this drainage.

Alternative 5

Grazing would occur on Headquarters Property, Henninger Ranch, Humphrey Ranch, and both the East and West Summer Range. There would be a total of 3.1 miles of driveway with 1.4 of the miles within 300 ft of streams. 2, 331 sheep would be used for grazing compared to 3,300 under Alternative 1.

Design features and BMPs would be implemented for Alternative 5. Best Management Practices, design feature for grazing limitations in the North Fork of Tom Creek, well monitoring, and recommended buffers for herbicide applications would all be implemented. Refer to Alternative 1 for additional detail.

Alternative 5 Direct/Indirect Effects

Alternative 5 would have the same potential direct/indirect effects as Alternative 1 as the same U.S. Sheep Experiment Station properties are proposed for grazing. In addition, the same mitigation measures would be applied. However, Alternative 5 proposes to graze an estimated 969 fewer sheep so Alternative 5 has a lower potential for ground disturbance, compaction, loss of vegetative cover, and in-stream disturbance during stream crossings. The difference though would not be expected to be measurable as overall watershed condition health on these properties is good to excellent.

Refer to Alternative 1, direct and indirect effects for a detailed discussion.

Hydrology Cumulative Effects

Alternative 1 – Proposed Action

Alternative 1 is the same as what is currently being implemented. There would be no change in existing levels of cumulative effects on Agricultural Research Service lands as there are no changes to grazing schedule or number of sheep used for grazing. However, there would be increased ground disturbance in watershed 170402140401 associated with the proposed route for NorthWestern Energy's proposed power line. There would be no changes to existing cumulative effect levels for Snakey-Kelly, Bernice, Mud Lake Feedlot, Meyers Creek and Bernice grazing allotments as the number of sheep and grazing durations would not change.

Alternative 2

There would be no increase in adverse cumulative effects with the implementation of this alternative. Grazing would continue at the Mud Lake with potential increases in direct and indirect effects as sheep are grazed the longest at Mud Lake under this alternative. However, cumulative effects would not increase because there are no other U.S. Sheep Experiment Station grazing property or Bureau of Land Management or Forest Service allotments within the same watershed as the Mud Lake feedlot, and grazing would not occur on these allotments.

Localized effects related to unauthorized use of the road to Blair Lake would continue, as would present levels of erosion associated with this road as would surface runoff and erosion presently associated with points OD 4 and 5 and the channel draining the waste water pond at the old phosphate mine.

Grazing would no longer occur on Snakey-Kelly, East Beaver, Meyers Creek, and Bernice allotments, which are located on lands administered by the Caribou-Targhee National Forest and Bureau of Land Management. Recovery from existing effects would occur over time.

Alternative 3

There is the potential for an increase in adverse cumulative effects in 6th level watershed 1700402140401 due to the potential for increased direct and indirect effects related to substantial increases in the season of use and maximizing carrying capacity on the Headquarters property and potential ground disturbance associated with Northwestern Energy's proposed Mountain States transmission intertie (http://www.msti500kv.com/about/projectoverview/intro.html). Short-term cumulative effects would be associated with power line construction. Long-term cumulative effects would be associated with power line maintenance and increased grazing pressure. The magnitude of potential increases would be mitigated by the use of adaptive management, supplemental feeding, and movement of water troughs. In addition, there is an absence of surface water on the Headquarters property, topography is subdued, and the area is underlain by permeable basalt flows. These factors also would minimize any change for increased surface disturbance and erosion.

Cumulative watershed effects would be expected to decrease in watersheds involved with the Humphrey, West and East Summer Ranges, and the East Beaver Creek and Meyers Creek allotments, as these allotments would not be grazed. This conclusion incorporates the direct and indirect effects discussed above.

In-stream disturbance would be eliminated. Localized sources of sediment generation, such as Blair Lake and stream crossings at points OD4 and OD5 would continue to function. The amount of road used for trailing and amount within 300 feet of streams would decrease (Table 10). However, this would not result in any measurable change due to current activity levels on these roads.

Alternative 4

Cumulative effects would be the same for all watersheds involved with U.S. Sheep Experiment Station grazing areas as described under Alternative 1.This conclusion incorporates the direct and indirect effects discussed above.

Cumulative effects would remain the same for the Mud Lake Feedlot, Snakey-Kelly-Bernice and East Beaver allotments as they were described under Alternative 1. Grazing would not be conducted on the Meyers Creek allotment. With this loss there is a loss of flexibility in adaptive management and increase utilization at Henninger (Grooms et al, 2009). However, utilization under Alternative 4 increases only by

0.8 percent when compared to Alternative 1. Alternatives 3 and 5 propose less utilization at Henninger than Alternative 4. With such a small increase in utilization it, is unlikely any increase in direct and indirect effects would be detectable. As a result, no measureable increases in cumulative watershed effects would be expected.

Alternative 5

Cumulative effects would be the same for all watersheds involved with U.S. Sheep Experiment Station grazing properties as described under Alternative 1.This conclusion incorporates the direct and indirect effects discussed above.

Snakey-Kelly and Bernice allotments would not be grazed. Cumulative effects would be the same as under Alternative 2.

The Mud Lake Feedlot, East Beaver and Meyers Creek allotments would be grazed. Cumulative effects would be the same as discussed under Alternative 1.

Botany

Effects to the botany resource are subject to the Endangered Species Act.

Botany Summary

There would be no impacts to federally listed plant species from any alternatives proposed ,because no species occur and no habitat is present within Agricultural Research Service lands.

Compliance with Relevant Laws, Regulations, Policies and Plans

All alternatives proposed within this environmental assessment would be in compliance with threatened and endangered plants according to the Endangered Species Act.

Heritage Resources

Activities on the U.S. Sheep Experiment Station are governed by the National Historic Preservation Act (NHPA) of 1966 as amended, the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, and the Archaeological Resources Protection Act.

Desired Condition

Lands under the purview of the USSES, and the activities associated with the stated Mission objectives, will be reviewed for compliance with the National Environmental Protection Act (NEPA) and the National Historic Preservation Act (NHPA) of 1966 as amended.

Under the NHPA and its attendant regulations found at 36 CFR Part 800, an inventory strategy and management plan for the USSES would be developed in consultation with the Idaho and Montana State Historic Preservation Offices (SHPOs).

Heritage Summary

Grazing and associated activities at the U.S. Sheep Experiment Station have occurred for approximately 86 years. Knowledge of prehistoric archaeological data is limited within the Agricultural Research

Service lands, but such sites and resources are known to exist. Ranching, mining, and U.S. Sheep Experiment Station activity and development make up the historic component for the area.

The U.S. Sheep Experiment Station has proposed several activities over the course of the next five years. To comply with Section 106, a Heritage Management Plan has been outlined. This plan establishes a baseline from which to begin heritage work. Both Montana and Idaho State Historic Preservation Offices have yet to comment on the Heritage Management Plan outline. The Section 106 process will begin in the Spring of 2010, after high priority undertakings with the potential to effect cultural resources are identified and ground visibility improves.

Selection of any alternative will require Heritage review and compliance.

Compliance with Relevant Laws, Regulations, Policies, and Plans

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects that their federally funded activities and programs have on significant historic properties. "Significant historic properties" are those properties (historic and prehistoric) that are included in, or eligible for, the National Register of Historic Places. Properties that have not been evaluated for significance are considered eligible until such evaluation occurs. The National Register is a list of districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, and culture. The National Register is administered by the National Park Service in conjunction with the State Historic Preservation Offices (SHPOs).

As defined in 36 CFR Part 800 (Protection of Historic Properties as amended in August 2004), the Section 106 process and compliance with such also includes the coordination with other reviews, including NEPA, the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, the Archaeological Resources Protection Act and any agency specific legislation (36 CFR Part § 800.3). Coordination and consultation with Idaho and Montana State Historic Preservation Offices would fulfill compliance with Section 106 of the National Historic Preservation Act.

As proposed, the Heritage Management Plan (Plan) would consider all activities in the Agricultural Research Service, U.S. Sheep Experiment station five-year action plan for Section 106 compliance procedures. The Plan would also include survey, recording and evaluation of Agricultural Research Service historic facilities, and provide a guidance plan for general maintenance and facility use of the historic resources.

The Plan would provide for a phased compliance survey procedure. According to 36 CFR Part 800, a phased identification and evaluation is possible when:

> …alternatives under consideration consist of corridors or large land areas, or where access to properties is restricted, the agency official may use a phased process to conduct identification and evaluation efforts. The agency official may also defer final identification and evaluation of historic properties if it s specifically provided for in a memorandum of agreement executed pursuant to § 800.6, a programmatic agreement executed pursuant to §800.14 (b), or the documents used by an agency official to comply with the National Environmental Policy Act pursuant to §800.8 (36 CFR Part 800.4).

The phased-in compliance procedure would be conducted in consultation with the Idaho State Historic Preservation Office and would provide direction for surveying areas of high probability regarding the

potential occurrence of historic properties. This would include a sampling procedure of the high probability areas, phased in over a three- to five-year period, depending on the occurrence of historic properties.

Socio-Economic

There are no federal laws and regulations applicable to socioeconomics. The existing condition is considered the baseline for comparison of alternatives.

Socio-Economic Summary

The U.S. Sheep Experiment Station is the largest employer in Clark County. Consequently it provides important economic stimulus to local businesses and public services. Under the proposed action alternative there would be no change in social or economic conditions. In the case of action alternatives, only 2 and 3 would result in any reduction in employment and there would be no change to total salaries paid. Alternatives 4 and 5 would yield no change to employment and income conditions, and consequently have no effect on household migration patterns and public services. The remaining effects would occur as a result of changes in information generated from research programs, and substitute uses of public lands no longer being grazed. Effects to the sheep industry are unquantifiable given the lack of data, but it is reasonable to assume that adverse effects increase as grazing decreases. Under each scenario, it is assumed that changes in use patterns would not substantially alter the social and economic environments.

Socio-Economic Affected Environment

The U.S. Sheep Experiment Station employs 23 people and pays a total of $1,166,065 in annual salaries. Of the total salary paid, $842,227 is earned by residents of Clark County. Thus, the direct contribution to employment and income is 23 jobs and $842,227 in household income. A portion of household income is then spent locally which increases the total economic contribution. There is no precise measure of the purchasing habits of local households available. However, given the relatively thin economic base in Clark County, it is likely that a large proportion of purchases of household goods and services are made outside of the study area. The total economic contribution was estimated assuming a variety of local household expenditure patterns. Table 42 reports the total jobs and income supported by U.S. Sheep Experiment Station activities. Depending on the proportion of income spent locally, the total contribution could range from 23.13 jobs and $843,735 in income, to 25.02 jobs and $864,852 income. This accounts for 2.47 percent to 2.67 percent of total employment, and 3.00 percent to 3.07 percent of total income.

The recent closure of an Idahoan Foods plant in Dubois substantially increased the proportion of total jobs and income supported by the U.S. Sheep Experiment Station, and made it the largest employer in the County. 2006 IMPLAN data does not reflect that closure and is therefore not reflected in the contribution analysis. However, it is worth mentioning because it increases the importance of U.S. Sheep Experiment Station activities as an economic driver. Overall, about 140 employees at the Dubois plant were transferred to a plant in Idaho Falls (http://www.localnews8.com/Global/story.asp?S=10499649).

Table 42. Total contribution by local expenditure levels

	Jobs	Percent of Total County Employment	Income	% [a] of Total County Income
5 percent	23.13	2.47%	$843,735	3.00%
10 Percent	23.27	2.49%	$845,244	3.00%
25 Percent	23.67	2.53%	$849,769	3.01%
50 Percent	24.35	2.60%	$857,310	3.04%
75 Percent	25.02	2.67%	$864,852	3.07%

Source: IMPLAN 2008

a - IMPLAN – IMPLAN® is an input-output model describing commodity flows from producers to intermediate and final consumers. The total industry purchases are equal to the value of the commodities produced. Industries producing goods and services for final demand purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services continues until leakages from the region stop the cycle. The resulting sets of multipliers describe the change of output for regional industries caused by a change in final demand in an industry. The IMPLAN database describes the economy in 509 sectors. IMPLAN® is used to create complete, extremely detailed Social Accounting Matrices and Multiplier Models of local economies. MIG, Inc. provides software tools, region-specific data (see Products), and outstanding technical support to enable users to make in-depth examinations of state, multi-county, county or sub-county, and metropolitan regional economies. http://www.implan.com/

In addition to contributing to employment and income, activities at the U.S. Sheep Experiment Station also affect total tax base. Table 43 displays the total tax contribution under current operating levels. The largest contribution falls within the federal social security and income taxes. These taxes should have no direct bearing on the current state of Clark County's economy as such funds are allocated to the federal government and are not immediately spent on local services. However, other tax categories such as property tax, motor vehicle licensing and sales tax may affect to the total funding available for operating services such as law enforcement, roads, and schools. Thus, the tax base supported by U.S. Sheep Experiment Station activities provides for improved social and economic conditions.

In addition to economic stimulus in the form of employment and monetary flows, there is also the knowledge gained with the research conducted at the U.S. Sheep Experiment Station. It is the sole sheep research facility specializing in range sheep in the United States west of the 100th meridian. Seventy percent of all sheep and lamb products produced in the Country come from the western states, the vast majority of which are range fed. Thus, the research conducted at the U.S. Sheep Experiment Station in Dubois is carried out in conditions very similar to those under which a large proportion of sheep producers operate (Orwick, 2008). Research valuable to the production of sheep and lamb products includes the mapping of specific genetic traits resistant to certain types of disease allowing for better health management, as well as the identification of traits important to both the maternal and paternal side of reproduction. Such information aids in the production efficiency of operations as the more healthy lambs born, the more competitive farmers and ranchers may be in today's dynamic agricultural markets. Furthermore, research regarding how sheep respond to drought cycles and the associated change in the nutritional value of plant species is valuable when dealing with issues of climatic change in rangelands. Thus, the activities associated with U.S. Sheep Experiment Station management have implications for agricultural productions across the Country, and have proven valuable to farmers and ranchers involved in the sheep industry.

Table 43. Implications for local taxes

Tax		Total Contribution
Enterprises (Corporations)	Transfers	$2,666
	Total	**$2,666**
Federal Government Non-Defense	Corporate Profits Tax	$37,879
	Indirect Bus Tax: Custom Duty	$1,145
	Indirect Bus Tax: Excise Taxes	$3,087
	Indirect Bus Tax: Fed Non-Taxes	$1,399
	Personal Tax: Estate and Gift Tax	$0
	Personal Tax: Income Tax	$135,166
	Personal Tax: Non-Taxes (Fines- Fees	$0
	Social Ins Tax- Employee Contribution	$141,007
	Social Ins Tax- Employer Contribution	$144,286
	Total	**$463,971**
State/Local Government Non-Education	Corporate Profits Tax	$5,910
	Dividends	$10,117
	Indirect Bus Tax: Motor Vehicle License	$508
	Indirect Bus Tax: Other Taxes	$1,925
	Indirect Bus Tax: Property Tax	$13,055
	Indirect Bus Tax: S/L Non-Taxes	$1,845
	Indirect Bus Tax: Sales Tax	$19,432
	Indirect Bus Tax: Severance Tax	$34
	Personal Tax: Estate and Gift Tax	$0
	Personal Tax: Income Tax	$45,555
	Personal Tax: Motor Vehicle License	$4,082
	Personal Tax: Non-Taxes (Fines- Fees	$7,234
	Personal Tax: Other Tax (Fish/Hunt)	$4,279
	Personal Tax: Property Taxes	$1,345
	Social Ins Tax- Employee Contribution	$2,174
	Social Ins Tax- Employer Contribution	$8,698
	Total	**$126,193**
	Total	**$592,829**

Source: IMPLAN 2008

Socio-Economic Direct/Indirect Effects

It is assumed that under all alternatives U.S. Sheep Experiment Station property in Clark County would remain under U.S. Sheep Experiment Station ownership, and there would be no additional permitted uses of the land. There remains no definitive means of estimating the actual effects to the economy from changes in future land use because affirmative data on this issue does not exist.

Alternative 1 – Proposed Action

Under Alternative 1, there would be no change from the current socioeconomic conditions.

Alternatives 2 and 3

Direct and indirect effects would vary by alternative. Under Alternative 2 it is estimated that seven jobs would be lost due to a reduction in grazing. That represents a 30 percent decrease in employment.

However, due to changes in staffing, there would be no decrease in total salaries paid. Research scientists would replace technicians and no herders would be required. Therefore, no change to local income is anticipated. Similarly, under Alternative 3 it is estimated that a total of four jobs would be lost and there would be no decrease in total salaries paid. The total direct effect of alternatives 2 and 3 would be the loss of seven and four jobs respectively. Because there would be fewer employees at the station, total labor supply would increase. Due to the limited economic activity in Clark County, other sectors of the economy would probably not be able to absorb the increase in supply, resulting in a rise in the unemployment rate. Consequently, the newly unemployed may migrate out of the study area in search of new job opportunities. This decrease in population could indirectly impact the socioeconomic environment. Since total salary would remain unchanged, there should be no impact to local tax revenue. However, services receiving funding based on population, such as public education, could be adversely impacted if any of the former U.S. Sheep Experiment Station employees and their families were to move outside of Clark County.

Alternatives 4 and 5

There would be a net decrease in grazing under alternatives 4 and 5. There would be no decrease in sheep inventory under Alternative 4, and a 30 percent reduction under Alternative 5. In both cases there would be no resulting change in employment and income. Therefore economic contributions reported under the affected environment would remain in effect. There would also be no out-migration of local households and no effect on public services and tax revenue.

Under all action alternatives there would be effects on the sheep industry resulting from lost knowledge associated with reductions in research capabilities. Current contributions to the sheep industry are summarized in the affected environment. U.S. Sheep Experiment Station research is dynamic; and therefore impossible to predict the full extent of impacts to sheep producers. However, it is logical to assume that as reductions in grazing increase, the informational capacity of research would decrease, and thus increase adverse impacts to the sheep industry.

Additional consequences may stem from changes that could occur to the use of federal lands as a result of changes to the U.S. Sheep Experiment Station grazing regimen. Under all alternatives sheep grazing would be scaled back. This could allow for additional opportunities for recreation and environmental conservation. Some uses of the lands may have implications for the economic health of Clark County. For example, increases in recreational opportunities could increase visitation rates, and thus increase expenditures at local business and firms. However, given the volume of public lands in Idaho and Montana, it is unlikely that grazing by the U.S. Sheep Experiment Station would substantially affect recreational travel, thereby limiting the implications for local business.

Socio-Economic Cumulative Effects

Cumulative effects include the total change in social and economic conditions that would result from actions taken under the alternatives in conjunction with the direct and indirect effects of other present and reasonably foreseeable activities being conducted in the study area. The spatial and temporal boundary for the discussion of cumulative effects for economics is Clark County because expanding beyond this area could result in the dilution of impacts. Ground disturbing activities that could create additional effects are listed in Table 44. There is currently no estimate of economic effects for these activities. Therefore, it is not possible to quantitatively estimate cumulative effects. No activities are expected to have a measurable effect on Clark County’s economy. Additionally, the Mountain States Transmission Intertie (MSTI) 500kV would pass through portions of the study area. Economic effects of this transmission line include

increased jobs and income (MSTI, 2009). Those effects are not estimated specifically for Clark County, and therefore are not quantitatively valued for cumulative effects.

Table 44. U.S. Sheep Experiment Station present and reasonably foreseeable activities causing ground disturbance

Location	Activities
Summer Range	1: Replace 2 miles of old horse pasture fence with new fence, metal braces, etc. 2: remove old range enclosures 3: continue repairs on existing enclosures (new posts, wire) 4: replace 2 existing wooden water developments with metal developments. Continue annual spring (water) cleanings for water sources.
Henninger	1: Replace 2 miles of existing border fence with new fence, metal braces, etc. 2: Continue to lightly grade the existing roads (no new roads). 3: Continue cleaning the existing ditches with the ditching tool. 4: Install new concrete diversion head gate on the U.S. Forest Service ground (once approved by U.S. Forest Service).
Humphrey	1: Continue cleaning the existing ditches with the ditching tool. 2: Replace 3 miles of existing fence with new fence (same location) 3: Surplus the existing house and have it removed. Clean-up the cinder brick foundation, etc. 4: Install 2 new weir boxes into Modoc Creek (better measurement of water). 5: Continue clean-up of old nonfunctional fence lines, equipment.
Dubois (Headquarters)	1: Annual road maintenance (pulling up the shoulders and smoothing out pot holes). All replacement gravel is hauled in from the State of Idaho gravel pits. 2: Remove, clean, repair and reinstall 6 existing cattle guards. 3: Replace 4 miles of existing fence with new fence materials. 4: Clean-up nonfunctional research pens. 5: No remodels scheduled for either research buildings or the resident houses. However, there would be yearly maintenance to these structures (leaky waterlines, broken windows, annual chimney cleanings/inspections, etc. 6: Several different storage buildings that have been proposed for either paint or siding to be installed.

Cumulative effects would be similar under all alternatives. The only difference would be any changes in the levels and distribution of direct and indirect effects on the economic and social environments across alternatives.

Environmental Justice

The Environmental Justice principles set forth in Executive Order 12898 and CEQ (1997) were considered in regards to activities on the U.S. Sheep Experiment Station. Alternatives were reviewed to determine whether or not the proposed actions adversely impact minority and low-income populations. Alternative 1, the proposed action, would result in the continued operation of the U.S. Sheep Experiment Station. Under this alternative there would be no change in the current economic conditions, and would not have any impact on minority or low income populations.

Under action alternatives resulting in a reduction in labor force, there would be an important loss of jobs and income. Employment opportunities at the U.S. Sheep Experiment Station are generally higher paying than other jobs in Clark County, thus U.S. Sheep Experiment Station employees are likely not part of the population living below the poverty level. However, the loss of jobs at the U.S. Sheep Experiment Station not only affects the employees themselves, it also affects the conditions of local businesses due to

decreased household income. Lower total income leads to reduced demand for goods and services, which consequently may cause local firms to cut back their employment. Given that nearly one-fifth of Clark County's total population, and more than one-quarter of the population under the age of 18, is below the poverty level, low income populations may be adversely impacted by any loss in household income. The purchasing habits of local residents may affect the total impact to low income populations. The proportion of income spent outside of Clark County does not benefit local firms and business. Thus, the greater the proportion of lost income associated with a loss of employment at the U.S. Sheep Experiment Station spent outside of Clark County, the less the impact to local poverty groups. Given that Clark County does not have a major retail outlet for purchasing household goods and services, the majority of lost household expenditures would occur outside of Clark County. This would limit the impact to local populations living below the poverty level since the majority of that income would likely leave the study area regardless of employment conditions at the U.S. Sheep Experiment Station. Thus, the total impact to environmental justice populations would be limited by the structure of Clark County's economy, but any local spending lost may have some adverse affect on low income populations, and should therefore be considered in the decision making process regarding the alternatives assessed in this EA.

Additional Information

Preparers & Consultants

Preparers

Archer, Vince	Soils, U.S. Forest Service, TEAMS Enterprise
Campbell, Amanda	Heritage, U.S. Forest Service, TEAMS Enterprise
Fryxell, Jenny	Hydrology, U.S. Forest Service, TEAMS Enterprise
Grooms, Troy	Range, U.S. Forest Service, TEAMS Enterprise
Jankiewicz, Charlie	Range
Kozlowski, Steve	Wildlife, U.S. Forest Service, TEAMS Enterprise
Laufmann, Julie	Botanist, Ecologist, U.S. Forest Service, Enterprise Technical Services
Nykamp, Robert	Heritage, U.S. Forest Service, TEAMS Enterprise
Smith, Lucretia	Range, GIS, U.S. Forest Service, TEAMS Enterprise
Whisennand, Kristin	Editor, U.S. Forest Service, TEAMS Enterprise
Wilson, Josh	Economics, U.S. Forest Service, TEAMS Enterprise
Wingate, Sue	Environmental Coordinator, U.S. Forest Service, TEAMS Enterprise
Yurczyk, Frank	Forester, U.S. Forest Service, TEAMS Enterprise

Consultants

Aber, Bryan	Wildlife Biologist, Caribou-Targhee National Forest, Ashton/Island Park Ranger District
Baxter, Rick	Wildlife, U.S. Forest Service, TEAMS Enterprise
Colinge, Mark	State Director, APHIS Wildlife Services, Boise, ID
Arena, Sandi	Section 7 Consultation, US Fish and Wildlife Service, Southeast Idaho
Farr, Jonathan	APHIS, Wildlife Services, Southeast Idaho
Jacobson, Quinn	Herd Manager, University of Idaho, US Sheep Experiment Station
Keetch, Curtis	Wildlife Biologist, U.S. Forest Service, Dubois Ranger District
Knowles, Don	Research Leader Animal Disease Research Unit, Agricultural Research Service, Washington State University
Lewis, Gregory S.	Research Leader, Agricultural Research Service, U.S. Sheep Experiment Station
Lowe, Joe	Wildlife Biologist, USDI Bureau of Land Management, Upper Snake Field Office
Moffet, Corey	Rangeland Scientist, Agricultural Research Service, U.S. Sheep Experiment Station
Moser, Eric	Hydrology, U.S. Forest Service, TEAMS Enterprise
Orme, Mark	Forest Wildlife Biologist, U.S. Forest Service, Caribou-Targhee National Forest
Schmidt, Steve	Regional Supervisor, Idaho Department of Fish and Game, Upper Snake Region
Smith, Casey	Guide, Centennial Outfitters
Taylor, Bret	Rangeland Scientist, Agricultural Research Service, U.S. Sheep Experiment Station
Williams, Mark	Agricultural Research Service, U.S. Sheep Experiment Station

References

Aber, B. C. 2007. Biological Assessment for Meyers Creek and Icehouse/Willow Creek Range Allotment CE. US Forest Service, Caribou-Targhee National Forest, Ashton/Island Park Ranger District, Island Park, Idaho. 9pp.

Aber, B. C. 2008 [Personal Communication]. May 1, 2008. USDA Forest Service, Caribou-Targhee National Forest, Ashton/Island Park Ranger District. Island Park, ID. Notes on file in project record.

Aber, Bryan C. 2007. Biological Evaluation for Meyers Creek and Icehouse/Willow Creek Range Allotment CE. US Forest Service, Caribou-Targhee National Forest, Ashton/Island Park Ranger District, Island Park, Idaho. 15 pp.

Archer, V. 2009. U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009; Soils Report.

Arena, S. 2008, 2009. Meeting Notes, Emails, Log of Personal Communication. May 6, September 26, October 2, October 10, 2008, August 14, 2009, U.S. Department of Interior, Fish and Wildlife Service, Chubbuck, ID. Notes on file in project record.

Arena, S. Fish and Wildlife Biologist, USFWS Eastern Idaho Field Office Chubbuck Idaho. Meeting at FWS Field Office in May 2008.

Agricultural Research Service, USSES. 2008. Interim U.S. Sheep Experiment Station Grazing and Associated Activities Project Environmental Assessment.

Agricultural Research Service. 2008. Excerpt from History of Summer Range. Memo from Dubois Agricultural Research Service staff. August 19, 2008.

Belnap, J. and S.L. Phillips. 2001. Soil biota in an ungrazed grassland: response to annual grass (*Bromus tectorum*) invasion. Ecological Applications. 11(5): 1261-1275

Biondini, M.E., B.D. Patton, and P.E. Nyren. 1998. Grazing intensity and ecosystem processes in a northern mixed-grass prairie, USA. Ecological Applications. 8(2): 469-479

Bollag, J.M., S.Y. Liu. 1990. Biological Transformation processes of Pesticides. In Pesticides in the Soil Environment. H.H. Cheng. (ed.) Soil Science Society of America book series, no. 2. Madison, Wis., USA: Soil Science Society of America. p. 169-211

Bork, Edward W., West, Neil E., and Walker, John W. 1998, Cover Components on Long-term Seasonal Sheep Grazing Treatments in Three-tip Sagebrush Steppe, Journal of Range Management 51 (3), May 1998

Clifford, Deana L., B.A. Schumaker, T.R. Stephenson, V. C. Bleich, M.A. Cahn, B.J. Gonzales, W.M. Boyce, J.A.K. Mazet. 2009. Assessing disease risk at the wildlife-livestock interface: A study of Sierra Nevada bighorn sheep. Biological Conservation 142 (2009) 2559-2568.

D'Antonio, C.M. and P.M. Vitousek 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. Annu. Rev. Ecol. Syst. 23: 63-87

Dow AgroSciences. 2008. Specimen Label – Curtail Specialty Herbicide (2,4 dichlorophenoxyacetic acid, salt). Revised 09-24-08. Dow AgroSciences LLC, Indianapolis, IN. 9 p.

DuPont. 2008. DuPont Krovar I DF (bromacil and diuron). E.I. du Pont de Nemours and Company. Wilmington, Delaware. 9 p.

Erickson, H.E., and R. White. 2008. Soils under fire: soils research and the Joint Fire Science Program. General Technical Report PNW-GTR-759: USDA Forest Service, pacific Northwest Research Station, Portland, OR. 17p.

Extronet. 1993. Pesticide information profile for Bromacil. Extention Toxicology Network. Cornell University. Ithaca, NY. 8p.

Farr, J. 2008 [Personal Communication]. November 11, 2008. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Idaho Wildlife Services. Notes on file in project record.

Fisher, R.F. and D. Binkley. 2000. Ecology and Management of Forest Soils. 3rd Edition. John Wiley & Sons, New York

Fryxell, J. 2009. U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009; Hydrology Report.

Gibson, C. Ecologist, Beaverhead-Deerlodge NF, Dillon MT. Telephone conversation, April, 2008.

Grooms, T. 2009. U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009; Rangeland Assessment Report.

Hart, S.C., T.H. DeLuca, G.S. Newman, M.D. MacKenzie, and S.I. Boyle. 2005. Post-fire vegetative dynamics as drivers of microbial community structure and function in forest soils. Forest Ecology and Management. 220: 166-184

Hawkes, C.V., J. Belnap, C. D'Antonio, and M.K.Firestone. 2006. Arbuscular mycorrhizal assemblages in native plant roots change in the presence of invasive exotic grasses. Plant and Soil. 281: 369*-380

Holecheck, Jerry L., Pieper, Rex D., Herbel, Carlton H., Range Management Principles and Practices, Department of Animal and Range Sciences, New Mexico State University, Las Cruces, NM 88003, 1989, Regents/Prentice Hall, Englewood Cliffs, New Jersey 07632

Idaho Department of Fish and Game. 2007(a). Bighorn Sheep Progress Report. Project W-170-R-31. Headquarters Office, Boise, Idaho. 77pp.

Idaho Department of Fish and Game. 2007(b). Interim Strategy for Managing Separation Between Bighorn sheep and Domestic Sheep in Idaho. Available at http://fishandgame.idaho.gov/cms/wildlife/.

Idaho Department of Fish and Game. 2008. Bighorn Sheep Progress Report. Project W-170-R-32. Headquarters Office, Boise, Idaho. 78pp.

Idaho Department of Fish and Game. 2009. Idaho Wolf Management Progress Report. Available at http://fishandgame.idaho.gov/cms/wildlife/wolves/wklyReport/2009/sept.pdf

Interagency Grizzly Bear Study Team. 2009. Known and Probable Grizzly Bear Mortalities in the Greater Yellowstone Ecosystem, Preliminary Data. Available at http://nrmsc.usgs.gov/science/igbst/2009mort.

Jacobson,Q. 2009. [Personal communication]. Agriculture Research Station Range Conservationist. Discussion on ditch history and background management information for Agricultural Research Service lands. Duboise, ID. 6p.

Jankiewicz, C., Yurczyk, F., Smith, L. 2009. U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009; Range Report.

Johnson, C.G., Jr. 2003. Green fescue rangelands: changes over time in the Wallowa Mountains. General Technical Report PNW-GTR-569. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 41p.

Keetch, Curtis. 2008 [Personal Communication]. May 7, 2008. USDA Forest Service, Targhee National Forest. Dubois, Idaho. Notes on file in project record.

Klement, K. 1997. Condition and trend analysis on subalpine rangeland grazed by sheep in the Centennial Mountains, Montana. M.S. Dept. Rangeland Ecology and Watershed Management. University of Wyoming. Laramie, WY. 82p.

Knowles, Don. 2008. Personal communication regarding bighorn sheep - domestic sheep interactions. November 12, 2008. Research Leader, Animal Disease Research Unit, Agricultural Research Service, Washington State University. Notes on file in project record.

Kozlowski. 2009. U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009; Wildlife Report.

____. 2009. U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009; Biological Assessment.

Laufmann, Julie. 2009. U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009 Botany Report.

Lewis, Gregory S., Moffet, Corey A., Mousel, Michelle R., and Taylor, Bret J., 2007, Project Plan, NP 205, Rangeland, Pasture, and Forages, Panel Review, September – November 2007

Lewis, Gregory S. 2008. Personal Communications with Greg Lewis, Rangeland Scientist, ARS, USSES Dubois, Idaho, Personal Communication October - November 2008

Leytem ,A.B., and S.S. Seefedt. 2008. Impact of sheep bedding on soil nutrient dynamics in the Centennial Mountains of Montana and Idaho. Soil Science. 173(8): 503-510

Localnews8.com. <http://www.localnews8.com/Global/story.asp?S=10499649>. Accessed September 23, 2009.

Lowe, J. 2009. October. Personal communication regarding bighorn sheep locations near the Bernice allotment. October, 2009. USDI BLM Wildlife Biologist, Idaho Falls, Idaho.

MacKenzie, M.D., T.H. DeLuca, and A. Sala. 2006. Fire exclusion and nitrogen mineralization in low elevation forests of western Montana. Soil Biology & Biochemistry. 38: 952-961

Meintz, D. 2009 [Personal Communication]. October 15, 2009. Idaho Department of Fish and Game. Idaho Falls, Idaho. Notes on file in project record.

Milchunas, D.G. and W.K. Laurenroth. 1993. Quantitative effects of grazing on vegetation and soils over a global range of environments. Ecological Monographs. 63(4): 327-366

Minnesota IMPLAN Group. IMPLAN Version 2.0, 2006 Data. August 11, 2008.

Moffet, Corey (2008) Personal Communications with Corey Moffet, Rangeland Scientist, ARS, USSES Dubois, Idaho, Personal Communication October - November 2008

Montagne, C. 1988. Field Examination of Tom Creek Headwaters. Centennial Mountains, Southwest, MT. Unpublished Report to Red Rock Lakes National Wildlife Refuge. Lakeview, MT. 3p.

Montana Fish Wildlife and Parks. 2009. Montana Bighorn Sheep Draft Conservation Strategy. Wildlife Division, Helena, MT. 311 pp.

____.. 2002. Grizzly Bear Management Plan for Southwestern Montana, 2002-2012. Available at http://www.fws.gov/mountain%2Dprairie/species/mammals/grizzly/Appendix_K_Montana_grizzly_plan.pdf

____. 2009. Fact Sheet – Montana Wolf Delisted. Available at http://fwp.mt.gov/wildthings/wolf/default.html. Accessed 2009

____. 2009. Montana Wolf Weekly Reports. Available at http://fwp.mt.gov/wildthings/wolf/wolfWeekly2009.html. Accessed 2009.

Mountain States Transmission Intertie (MSTI). “Benefits to Montana’s Economy.” <www.northwesternenergy.com> July 2009.

Nadeau, M. S., C. Mack, J. Holyan, J. Husseman, M. Lucid, D. Spicer, B. Thomas. 2009. Wolf conservation and management in Idaho; progress report 2008. Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe, P.O. Box 365, Lapwai, Idaho. 106 pp.

Natural Resource Conservation Service. 1991. United States Sheep Experiment Station summer range soil survey, Beaverhead County, Mont.

Natural Resource Conservation Service. 1995. Agricultural Research Service, US Sheep Experiment Station, Station Headquarters, Soil/Vegetative Inventory.

Natural Resource Conservation Service. In review. Compilation of ecological site descriptions and range sites applicable to Agriculture Research Station ownerships. Includes Range sites: R011BY002ID, R011BY027ID, R013XY005ID, R013XY039ID. Contact Bill Hiett, Natural Resource Conservation Service, Idaho Falls, ID.

Nelson, Ruth Ashton, (revised by Williams, Roger L.), 1992. Handbook of Rocky Mountain Plants.

Norton, J., T.A. Monaco, and U. Norton. 2007. Mediterranean annual grasses in western North America: kids in a candy store. Plant Soil. 298: 1-5

Olson, B.E., and J.R. Lacey. 1994. Sheep: A method for controlling rangeland weeds. Sheep Research Journal. Special Issue: 105-112

Orme, M. 2005. Summary of Canada Lynx Occurrences, Snowshoe Hare Studies, and Subalpine Fir Habitat Information for the Caribou-Targhee National Forest and Adjacent Bureau of Land Management Lands. USDA Forest Service, Caribou-Targhee National Forest, Idaho Falls, Idaho. 22pp.

____. 2008 [Personal Communication]. April 15, May 7, 2008. Forest Wildlife Biologist. USDA Forest Service, Targhee National Forest. Twin Falls, Idaho. Notes on file in project record.

Orwick, Peter. Personal Interview. August 12, 2008.

Parker, Robert, Lee, Richard D., Nelson, Burrell E., Cudney, David W., Burrill, Larry C., Whitson, Tom D., Dewey, Steven A. 2006. Weeds of the West, 9th Edition

Quinn Jacobson (2008) Personal Communications with Quinn Jacobson, Rangeland Scientist, university of Idaho, Dubois, Idaho, Personal Communication October - November 2008

Rau, B.M., R.R. Blank, J.C. Chambers, and D.W. Johnson. 2007. Prescribed fire in a Great Basin sagebrush ecosystem: Dynamics of soil extractable nitrogen and phosphorus. Journal of Arid Environments. 71: 362-375

Ruediger, Bill, Jim Claar, Steve Gniadek, Bryon Holt, Lyle Lewis, Steve Mighton, Bob Naney, Gary Patton, Tony Rinaldi, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. Canada lynx conservation assessment and strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.

Schmidt, S. 2008. [Personal Communications]. Idaho Department of Fish and Game Regional Supervisor. Upper Snake Region. Notes on file in project record.

Schuler, Jamie L and Russell D. Briggs. 2000. Assessing Application and Effectiveness of Forestry Best Management Practices in New York, NJAF 17(4).

Schwartz, C.C., M.A. Haroldson, and K. West, editors. 2009. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2008. U.S. Geological Survey, Bozeman, Montana, USA.

Seefeldt, Steven S. and McCoy, Scott D. 2003, Measure Plant Diversity in the Tall Threetip Sagebrush Steppe: Influence of Previous Grazing Management Practices, Environmental Management Vol. 32, No. 2, pp. 234-2454

SERA (Syracuse Environmental Research Associates Inc.). 2003b. Glyphosate- Human Health and Ecological Risk Assessment Final Report. SERA TR 02-43-09-04a. March 1, 2003.

____. 2003a. Picloram - Revised Human Health and Ecological Risk Assessment Final Report. SERA TR 03-43-26-01b. June 30, 2003.

____. 2004. Imazapyr - Human Health and Ecological Risk Assessment - Final Report. SERA TR 04-43-17-05b. December 18, 2004.

Seyedbagheri, Kathleen. 1996. Idaho Forestry Best Management Practices: Compilation of Research on Their Effectiveness, United States Department of Agriculture, Forest Service, Intermountain Research Station, General Technical report INT-GTR-339, October 1996.

Sime, Carolyn A., V. Asher, L. Bradley, K. Laudon, N. Lance, and M. Ross, and J. Steuber. 2009. Montana gray wolf conservation and management 2008 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 154 pp

Smith, Casey (2008) Personal Communications with Casey Smith, Wrangler, Centennial Outfitters, Lakeview, Montana, Personal Communication September 2008

Soil Conservation Service. 1981. Range sites for Beaverhead County. Dillon, MT.

State of Idaho, 1999, Nonpoint Source Management Plan, http://www.deq.idaho.gov/water/data_reports/surface_water/nps/management_plan_entire.pdf

State of Montana, 2007, Montana Nonpoint Source Management Plan, Montana Department of Environmental Quality, wAter quality Planning Bureau, Watershed Protection Section, P.O. Box 200901, Helena MT 59620-0901, http://www.deq.state.mt.us/wqinfo/nonpoint/2007NONPOINTPLAN/Final/NPSPlan.pdf

Taylor, Bret. 2008. Personal Communications with Bret Taylor, Rangeland Scientist, Agricultural Research Service, USSES Dubois, Idaho, Personal Communication October 2008

____. 2009. Personal Communication. USSES. 8/29/09

Thorpe, A.S. and R.M. Callaway. 2005. Interactions between invasive plants and soil ecosystems: positive feedbacks and their potential to persist. *In* M.W. Cadotte, S.M. McMahon and T. Fukami (eds.) Conceptual ecology and invasions biology. Springer. Great Britain. 331-351pp.

Thorpe, A.S., V. Archer, and T.H. DeLuca. 2006. The invasive forb, Centaurea maculosa, increases phosphorus availability in Montana grasslands. Applied Soil Ecology. 32: 118-122

Tu, M., C. Hurd, and J. M. Randall. 2003. Weed Control Methods Handbook: Tools &Techniques for Natural Areas. The Nature Conservancy, version June 2003.

U.S. District Court (9th Circuit). 2009(b). Court order vacating and remanding the 2007 USFWS decision to delist Yellowstone DPS of Grizzly Bears. Missoula, Montana. 46 pp

____. 2009. Court order denying a motion for preliminary injunction to prevent scheduled wolf hunts in Idaho and Montana. Missoula, Montana. 14 pp

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Idaho Fish and Game, and USDA Wildlife Services. 2008. Rocky Mountain Wolf Recovery 2007 Interagency Annual Report. C.A. Sime and E. E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601. 275pp

USDA (U.S. Department of Agriculture). 1937. Range Plant Handbook, March 1937

USDA, Forest Service. 2006. Canada Lynx Conservation Agreement. Northern Region, Missoula, Montana. Also available at http://www.fs.fed.us/r1/planning/lynx.html

____. 2006. Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests, Record of Decision. USDA Forest Service, Shoshone National Forest, Cody, Wyoming. 69pp. Available at http://www.fs.fed.us/r1/wildlife/igbc/Subcommittee/yes/YEamend/gb_internet.htm

____. 2007. Interagency Agreement # 07-IA-11041561-025 between the Caribou-Targhee National Forest and US Sheep Experiment Station. Idaho Falls, ID. 6pp.

____. 2007. Northern Rockies Lynx Management Direction. Northern Region, Missoula, Montana. Also available at http://www.fs.fed.us/r1/planning/lynx.html

USDI, Bureau of Land Management. 2007. Memorandum of Understanding between BLM Upper Snake Field Office and U.S. Sheep Experiment Station. Idaho Falls, ID. 5pp.

USDI Fish and Wildlife Service. 2007(b). Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area. Prepared by the Interagency Conservation Strategy Team. Available at http://www.fws.gov/mountain%2Dprairie/species/mammals/grizzly/Final_Conservation_Strategy.pdf

____.2005(a). Recovery Outline, Contiguous United States Distinct Population Segment of the Canada Lynx. Montana Field Office. Helena, MT. 21pp.

____.2007(a). 50 CFR Part 17 – Final Rule Removing the Yellowstone DPS of Grizzly Bears from the Federal List of Threatened Species. Federal Register / Vol. 72, No. 60 / Thursday, March 29, 2007 / Rules and Regulations.

VanHorn-Ecret, R. L. 1986. An ecological analysis of the tall forb community of the Centennial Mountains, Montana. M.S. Thesis, Univ. of Idaho. Moscow, Ida.

Vinton, MA and IC Burke. 1995. Interactions between individual plant species and soil nutrient status in shortgrass steppe. Ecology 76(4): 1116-1133

Wardle, D.A., R.D. Bardgett, J.N. Klironomos, H. Setala, W.H. van der Putten, and D.H. Wall. 2004. Ecological linkages between aboveground and belowground biota. Science. 304: 1629-1633

Whitney,T.R. and B.E. Olson. 2006. Conditioning ewes and lambs to increase consumption of spotted knapweed. Applied Animal Behaviour Science. 100: 196-203

Williams, Mark (2008) Personal Communications with Mark Williams, Rangeland Scientist, ARS, USSES Dubois, Idaho, Personal Communication October 2008

Wilson, J. 2009. U.S. Sheep Experiment Station Grazing and Associated Activities Project 2009; Economics Report.

Wolfe, B.E., and J.N. Klironomos. 2005. Breaking new ground: Soil communities and exotic plant invasion. BioScience. 55(6): 477-487

Zouhar, K, J.K. Smith, S. Sutherland, and M.L. Brooks. 2008. Wildland fire in ecosystems: fire and nonnative invasive plants. Gen. Tech. Rep. RMRS-GTR-42. Vol. 6. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. pp.152-159