

DRAFT Review of New Information Pertinent To
Domestic Sheep Allotment Management Plans
In the Gravelly Mountains
On the Beaverhead-Deerlodge National Forest

January, 2017



Domestic Sheep grazing on a permitted allotment in the Gravelly Mountains



Bighorn rams in the Greenhorn Mountains near the Ruby River Reservoir

Table of Contents

Table of Contents i

Background 1

Purpose 1

Allotment Management Plans 2

 Regulatory 2

 AMP/Grazing Permit Requirements for Sheep Allotments in the Gravelly Mountains..... 3

 2009 Forest Plan Direction Specific to Domestic Sheep Allotments in the Gravelly Mountains..... 5

Allotment Specific Information..... 5

 Barnett S&G 5

 Black Butte S&G 6

 Coal Creek S&G 6

 Cottonwood S&G 6

 Fossil-Hellroaring S&G 6

 Lyon-Wolverine S&G 6

 Poison Basin S&G 6

Rescission Act Schedule 6

Review of New Information 7

 Reintroduction of Bighorn Sheep 7

 2011 Listing of Bighorn Sheep as a Sensitive Species 11

 Existence of MOUs 12

 Updated Information Regarding Disease Transmission Between Domestic Sheep and Bighorn Sheep 14

 Consideration by MFWP that Bighorn Sheep Could Be Reintroduced to Closed Allotments 17

 Other Pertinent Information..... 22

 Vegetation/Soil/Water..... 22

 Availability of Bighorn Sheep Habitat 23

Background

Rocky Mountain bighorn sheep were once plentiful in Montana. By the 1930's, hunting, disease, and range competition from domestic livestock reduced the bighorn to remnant bands. The State of Montana began reintroduction programs in the 1940's. In 2001, the State decided to reintroduce bighorn sheep in the Greenhorn Mountains south of Alder, Montana, to help restore the area's biodiversity and provide potential hunting and wildlife-viewing opportunities. In 2003 and 2004, Montana Fish, Wildlife and Parks (MFWP) transplanted 69 bighorn sheep to the Greenhorn Mountains.

Domestic livestock, including domestic sheep, were introduced in the Gravelly Landscape¹ (including the Greenhorn Mountains) shortly after discovery of gold in Alder Gulch in 1863, more than 150 years ago. In 1920, an estimated 104,700 ewe/lamb pairs were permitted on the Madison National Forest² in the Gravelly, Greenhorn and Snowcrest Mountains. Currently, 7,800 ewe/lamb pairs are permitted to graze seven domestic sheep allotments (Barnett, Black Butte, Coal Creek, Cottonwood, Fossil-Hellroaring, Lyon-Wolverine and Poison Basin) on the Beaverhead-Deerlodge National Forest (BDNF) in the Gravelly Mountains³ near Black Butte. Permitted domestic sheep annually trail to and from these allotments through The Notch (located in the Snowcrest Mountains) from/to State, BLM and private lands located to the west. Grazing use of these allotments follows prescribed grazing practices detailed in term grazing permits and Allotment Management Plans (AMPs) described later in this document (beginning at page 3).

In 2015, Gallatin Wildlife Association filed a complaint (case 2:15-cv-00027-BMM) in US District Court for the District of Montana. One of Gallatin's⁴ claims alleged the USFS failed to supplement the domestic sheep grazing AMPs in the Gravelly Mountains (Court Order⁵, pg. 9). Briefly, Gallatin claimed five new pieces of information about bighorn sheep warrant a supplemental analysis of the AMPs including reintroduction of bighorn sheep, listing of bighorn sheep as a sensitive species, Memorandums of Understanding (MOUs) and updated information about disease transmission.

Purpose

The purpose of this document, as the Court ordered, is to “conduct a review of the five issues raised by Gallatin, and any other pertinent new information, to determine whether any, or all, of

¹ The Gravelly Landscape is a nearly 2 million-acre (~3,000 square miles) area located in Southwest Montana comprised of private property and lands managed by the Beaverhead-Deerlodge National Forest, Bureau of Land Management, U.S. Fish and Wildlife Service, USDA/Agriculture Research Station, Montana Fish, Wildlife and Parks and the Montana Department of Natural Resources. The Landscape is bounded by the Idaho/Montana border to the south, Highways 87 and 287 to the east and north and Highway 41 and Interstate 15 to the west.

² This portion of the 1920-era Madison National Forest is currently part of the Beaverhead-Deerlodge National Forest.

³ The Gravelly Mountains are 1 of 6 mountain ranges (Greenhorn, Gravelly, Snowcrest, Ruby, Centennial and Blacktail) in the Gravelly Landscape.

⁴ Because the June 14, 2016 Court Order collectively refers to plaintiffs Gallatin Wildlife Association, WildEarth Guardians, Western Watershed Project and Yellowstone Buffalo Foundation as “Gallatin”, this document adopts the same term when referring to plaintiffs.

⁵ For the reader's convenience, The U.S. District Court Order is electronically available on the BDNF webpage at: <http://www.fs.usda.gov/project/?project=50067>

this new information warrants supplementation of the original EIS prepared for the AMPs at issue here” (Court Order, pg. 37). The five issues raised by Gallatin are (Court Order, pg. 33):

1. The 2003/2004 reintroduction of bighorn sheep in the Greenhorn Mountains,
2. The 2011 listing of bighorn sheep as a sensitive species by the Regional Forester,
3. The existence of the 2002 and 2008 MOUs between the BDNF, BLM, MFWP and domestic sheep grazing operators facilitating implementation of a bighorn sheep transplant in the Greenhorn Mountains,
4. Updated information regarding disease transmission between domestic sheep and bighorn sheep, and
5. The consideration by MFWP that bighorn sheep could be reintroduced to closed allotments.

In this review, the Forest Service will analyze the effects of domestic sheep grazing in the Gravelly Mountains on the BDNF in terms of whether there may be significant effects to bighorn sheep due to the five issues described above.

The AMPs at issue prescribe livestock management practices for the Barnett, Black Butte, Coal Creek, Cottonwood, Fossil-Hellroaring, Lyon-Wolverine and Poison Basin sheep allotments located on the BDNF in the Gravelly Mountains near Black Butte. With the exception of the Black Butte AMP, these AMPs have been approved, over time, following environmental analysis in an Environmental Analysis Report (EAR), Environmental Assessment (EA), Decision Memo (DM) or Categorical Exclusion (CE). These environmental analyses did not include an EIS.

40 CFR 1502.9(c)(1)(ii) states “Agencies...shall prepare supplements to draft or final environmental impact statements if...there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts”. The Forest Service, in this review, is evaluating the environmental analyses previously prepared for the AMPs to determine if updated or supplemental NEPA analysis is required in accordance with 40 CFR 1502.9(c)(1)(ii). After evaluating the new information and considering public comment, the responsible official, Madison District Ranger Dale Olson, will determine if the new information is significant, relevant to environmental concerns and suggests a potential for significant environmental impacts that were not previously disclosed.

The District Court provided that “The USFS will need to consider the appropriateness and scope of future domestic grazing based upon a full and open environmental review process...This full and open environmental review process also must consider whether sufficient new information has emerged that requires the environmental review for the AMPs to be updated” (Order, pg. 36-37). To ensure full compliance with the Court’s Order, the BDNF is providing a 30-day public comment period on a draft review of new information.

Allotment Management Plans

Regulatory

An AMP is a document that applies to the management of rangeland ecosystems and livestock operations on public lands by prescribing: (1) the manner in and extent to which livestock operations will be conducted in order to meet ecosystem health, multiple use, economic and other objectives; (2) describes range improvements to be installed and maintained; and (3) contains such other provisions relating to livestock grazing and other objectives found by the Secretary of Agriculture to be consistent with the provisions of the Federal Land Policy and

Management Act. An AMP integrates resource objectives, standards, guidelines and management requirements for soil and water for watershed protection, wildlife and fisheries, recreation, timber and other resources on lands within a range allotment.

The specific authorization to graze livestock on National Forest System lands is the Term Grazing Permit (grazing permit). The grazing permit specifies who is allowed to graze, where grazing will occur, the number and type of livestock and the time frame when grazing is allowed. In addition, the grazing permit requires payment of grazing fees, maintenance of structures and may include additional allotment specific requirements deemed necessary to graze livestock while protecting resources within the area. Grazing permits are subject to direction contained in the Forest Plan and any revision thereto. This is specifically stated in the terms and conditions of the grazing permit. The AMP is also specifically listed as a term and condition of the grazing permit. Allotment grazing requirements as mentioned in the above paragraph must be followed to meet the conditions of the grazing permit. If changes to the AMP occur these changes automatically change the conditions of the grazing permit.

AMP/Grazing Permit Requirements for Sheep Allotments in the Gravelly Mountains

There are seven active sheep allotments in the Gravelly Mountains located along the mountain crest in the south central portion of the range. These allotments have been grazed by sheep since prior to the establishment of the National Forest. Current allotment boundary configurations are a result of various allotment combinations. As allotments were combined, the total number of permitted sheep were reduced.

All the sheep allotments are divided into camp units to facilitate a deferred rotation grazing system where each camp unit is grazed by domestic sheep at different times from year to year, allowing plant recovery and mostly uninterrupted plant development and reproduction. Each band is accompanied by a herder who manages the sheep throughout the grazing season. Specific grazing practices are followed when grazing and moving bands across an allotment. Primary grazing practices followed on all seven domestic sheep allotments in the Gravelly Mountains include:

- A. “Once over lightly” grazing will be practiced. Maximum forage utilization for “once over lightly” grazing is considered 35%.
- B. Sheep will be open herded and dogs will be used to a minimum to prevent heavy trampling and over grazing.
- C. Sheep will not be bedded within 300 yards of any stream or spring. There may be some exceptions due to topography. Sheep will not be shaded near water.
- D. Salting of livestock will be at least 100 yards away from roads and trails and at least ¼ mile from water unless authorized by the Forest Officer in charge.
- E. Sheep will be trailed to water using different routes. Trailing will be kept to a minimum.
- F. Bed grounds will not be used more than one night.

Six permitted bands of sheep are annually trailed to and from their respective allotments along a designated route. This trailing route begins on the west side of the Snowcrest Mountains (beginning on private property) enters the BDNF near The Notch, a relatively low pass located in the middle of the mountain range. From The Notch, the bands trail southward on BDNF lands along ridges and then drop down into the Beaver Bench area, cross the Ruby River and move

up to the assigned BDNF allotment. At the end of the grazing season the trailing route is reversed. This trailing route has been used since sheep grazing was initiated in the area. All trailing on the BDNF to and from the grazing allotments is controlled by terms specified in the grazing permits.

In addition to the grazing practices listed above, the following requirements found in the grazing permits and AMPs must also be followed:

1. The number, kind and class of livestock, period of use, and grazing allotment specified in the permit may be modified when determined by the Forest Officer in charge to be needed for resource protection. Except in extreme emergencies where resource conditions are being seriously affected by livestock use or other factors, such as fire, drought or insect damage, notice of scheduled reduction of numbers of livestock or period of use under a term permit will be given one full year before a modification in permitted numbers or period of use becomes effective.
2. When, in the judgment of the Forest Officer in charge, the forage is not ready to be grazed at the beginning of the designated grazing season, the permittee, upon request of the Forest Officer, will defer placing livestock on the grazing allotment to avoid damage to the resources. The permittee will remove livestock from Forest Service-administered lands before the expiration of the designated grazing season upon request of the Forest Officer when it is apparent that further grazing will damage the resources.
3. Dead sheep will be removed from the allotment immediately when found within ¼ mile of a road. If an animal dies or is killed in the vicinity of headquarters camps, streams, lakes, roads, trails, or recreational areas, its carcass must be moved to a point at least 100 yards from live water, or as far away as practical when terrain makes that distance impossible.
4. The permittee shall repair any damage, other than ordinary wear and tear, to roads and trails in the National Forest caused by the permittee where off road or on closed roads and areas.
5. Each camp will be equipped with a shovel and axe for use in extinguishing camp and forest fires. The camp will be kept and left in a sanitary condition. Refuse must be removed from the Forest and disposed of in a sanitary landfill. Holding pens, corrals and mangers will be removed or cleaned up when a camp is relocated.
6. All predator control will be in accordance with federal and state law.
7. The permittee and his employees shall not use or place poison, including cyanide guns, for predator control on the area under this permit.
8. No waste or by-products shall be discharged if it contains any substances in concentrations which will result in substantial harm to fish and wildlife or to human water supplies.
9. Vehicle access to install and service camps is shown on the attached map. Travel is restricted to dry ground conditions.
10. The permittee is responsible for clearing trees blocking the authorized travel routes. Driving around trees blocking access on authorized routes is prohibited.
11. Any hay, straw or processed feed used in association with this permit will be certified and tagged as noxious weed seed free as directed by Regional order signed October 9, 1997 by Kathleen A. McAllister for Hal Salwasser, Regional Forester.
12. Compliance with the Special Order No. 2014-BD/BITT-009, Safe Storage, Possession and Handling of Food and Attractants, signed June 1, 2014 by Melany Glossa, Forest Supervisor.

13. The permittee shall maintain the present improvements as well as any future improvements, appurtenances and furnishings constructed or installed by the Forest Service, in as good condition as received for use, ordinary wear and tear excepted, and shall supply and replace any articles that may be destroyed, broken, or lost, with articles of a like kind and of equal value according to a list of property supplied by the Forest Service. Such improvements, appurtenances, and furnishings shall at all times be maintained and operated by the permittee in a safe condition and manner; and upon termination of this permit, the permittee shall deliver to the Forest Service the premises, improvements, appurtenances and furnishings.
14. The permittee agrees to permit the free and unrestricted access to and upon the premises at all times for all lawful and proper purposes not inconsistent with the intent of the permit or with the reasonable exercise and enjoyment by the permittee of the privileges thereof.
15. Disorderly or otherwise objectionable conduct by the permittee or those occupying the premises with his permission shall upon proof thereof, be cause for termination of this permit.
16. The permittee shall protect the scenic aesthetic values of the area under this permit, and the adjacent FS land, as far as possible with the authorized use, during construction, operation and maintenance of the improvements.

2009 Forest Plan Direction Specific to Domestic Sheep Allotments in the Gravelly Mountains

The required grazing practice of “once over lightly grazing” resulting in a maximum forage use level of 35% is substantially less than the maximum utilization level ($\leq 55\%$) that could be allowed by interim standards in the Forest Plan (pg. 26). As a result, Annual Operating Instructions for domestic sheep grazing in the Gravelly Mountains specify “once over lightly grazing” instead of the less restrictive forage use prescribed by the 2009 Forest Plan.

Due to the location of the sheep allotments there is no big game winter range within the allotments. The 35% forage use level for winter range is not applicable to these sheep allotments.

The primary grazing practices listed above address Forest Plan Aquatics Resources Standard 17: Limit livestock trailing, bedding, watering, salting, loading and other handling efforts to those areas and times that would not retard or prevent attainment of desired stream function or adversely affect native fish and sensitive aquatic species. The overall unique nature of how sheep graze along with the grazing practices greatly reduce livestock impacts in riparian areas.

Allotment administration field reviews over many years have shown improved vegetation and soils conditions on all sheep allotments. Annual Grazing Allotment Compliance Reports for the last 17 years have shown all sheep allotments meeting standards. No sheep allotment has been called out of compliance with the terms and conditions of the grazing permits or AMPs.

Allotment Specific Information

Barnett S&G

Analysis for the Barnett S&G AMP is disclosed in an Environmental Analysis Report dated November 13, 1979. The AMP for the allotment was approved November 13, 1979. The allotment is grazed following a three camp unit deferred rotation system. 1350 ewe/lambs are permitted to graze the allotment from July 11 to September 21. There are no structures currently on the allotment and none are planned.

Black Butte S&G

The Black Butte S&G Management Plan was approved June 17, 1968. The allotment is grazed following a four camp unit deferred rotation system. 1400 ewe/lambs are permitted to graze the allotment from July 12 to September 16. There is a cabin, corral and horse pasture located on the allotment. No other structures are planned.

Coal Creek S&G

Analysis for the Coal Creek S&G AMP is disclosed in a Documentation of Notice and Finding of No Significant Impact for the Evaluation narrative, Environmental Assessment (EA) signed May 21, 1980. The AMP for the allotment was approved on the same date. The allotment is grazed following a three camp unit deferred rotation system. 1350 ewe/lambs are permitted to graze the allotment from July 1 to July 17 and September 21 to October 6. There are no structures currently on the allotment and none are planned.

Cottonwood S&G

Analysis for the Cottonwood S&G AMP is disclosed in the Decision Notice and Finding of No Significant Impact and Environmental Assessment (EA) for the North Gravelly/Snowcrest AMP Updates signed February 1, 2000. The AMP for the allotment was approved April 2, 2001. The allotment is grazed following a six camp unit deferred rotation system. 1000 ewe/lambs are permitted to graze the allotment from July 12 to September 16. One trough is currently located on the allotment. No other structures are planned.

Fossil-Hellroaring S&G

Analysis for the Fossil-Hellroaring S&G AMP is disclosed in the Decision Memo (DM) Fossil/Hellroaring S&G Revised Allotment Management Plan signed April 11, 1991. The AMP for the allotment was approved April 8, 1991. The allotment is grazed following a four camp unit deferred rotation system. 1350 ewe/lambs are permitted to graze the allotment from July 19 to September 20. There are no structures currently on the allotment and none are planned.

Lyon-Wolverine S&G

Analysis for the Lyon-Wolverine S&G AMP is disclosed under Categorical Exclusion for the Lyon Mountain/Wolverine Allotment Management Plan signed March 7, 1988. The AMP for the allotment was approved May 31, 1988. The allotment is grazed following a five camp unit deferred rotation system. 1350 ewe/lambs are permitted to graze the allotment from July 11 to September 21. There are no structures currently on the allotment and none are planned.

Poison Basin S&G

Analysis for the Poison Basin S&G AMP is covered under an Environmental Analysis Report approved June 27, 1979. The AMP for the allotment was approved June 27, 1979. The allotment is grazed following a three camp unit deferred rotation system. 1350 ewe/lambs are permitted to graze the allotment from July 17 to October 6. There is a cabin, shed, toilet, corral and horse pasture located on the allotment. The permittee is also responsible for maintenance of the Upper Ruby C&H boundary fence located on the west side of the allotment. No other structures are planned.

Rescission Act Schedule

The Rescissions Act of 1995 requires the Secretary of Agriculture to schedule when Forests will complete environmental analysis and documentation required under the National Environmental Policy Act for all grazing allotments. This schedule is set by the Secretary and periodically

reviewed and updated to account for completed environmental analysis and adjust timeframes due to agency workload management and priorities. Currently six of the seven sheep AMPs are scheduled for revision by 2019. The Cottonwood S&G allotment currently does not have a date for analysis listed in the schedule due to an updated analysis and decision completed in 2000. Through various riders, Congress requires reissuance of expired, transferred or waived grazing permits prior to completion of NEPA analysis for AMP revisions. Existing term grazing permits authorizing domestic sheep on the seven allotments were issued following this Congressional direction.

Review of New Information

Reintroduction of Bighorn Sheep

Bighorn sheep historically occupied the Gravelly Landscape. They were likely extirpated from the Gravelly Landscape in the early 1900s, probably due to excessive hunting by miners/settlers and disease. Bighorn sheep were reintroduced into the Greenhorn Mountains in 2003 and 2004 by MFWP, under their legislated authority, following approval of the transplant by the MFWP Commission in May, 2002. The BDNF's November, 2016 Forest Plan DSEIS (pg. 6-8) describes the environmental analysis process completed by MFWP for the proposed transplant and adoption by the MFWP Commission of recommended management practices intended to successfully establish the transplanted individuals as a new herd in the Greenhorn Mountains.

The primary purpose and reasoning behind the MFWP proposal of re-establishing bighorn sheep in native habitat, in addition to the biodiversity of the area and providing benefit to the public through both huntable and watchable wildlife opportunities (MFWP 2001) has been partially met in the Greenhorn Mountains. The Greenhorn herd has been established and provides watchable wildlife opportunities, especially from the Upper Ruby Road near the Ruby Reservoir and Upper Canyon Ranch during the winter. MFWP continues monitoring this herd to determine if hunting will be recommended. The 2010 Montana Bighorn Sheep Conservation Strategy (pg. 222) recommends hunting when the following four criteria are met for a minimum of three successive years:

1. The population is at least 75 observable sheep.
2. There are at least 30 rams:100 ewes
3. More than 30% of the rams are at least $\frac{3}{4}$ -curl
4. There are at least 30 lambs:100 ewes.

While these criterion have not all yet been met for the Greenhorn herd, the overall population is reproducing and moving towards providing hunting opportunities. Documented in Appendix B is the MFWP Wildlife Biologist Dean Waltee's email message of April 11, 2016 which provided a summary of Greenhorn herd survey information. This email provided as attachments two spreadsheets and two distribution maps. One of the spreadsheets show total bighorn counts from June 2003 through March 2016 and the other spreadsheet identifies each observation from 2013 to 2016. The two distribution maps show Greenhorn herd distribution for the periods May 2015 to April 2016 and October 2013 to April 2016. In terms of the population of the total herd, the data show a population increase from 17 bighorn counted in 2009 to a minimum of 59 bighorn in 2015 and a minimum of 48 bighorn in the spring of 2016. The difference in population numbers from 2015 to 2016 does not indicate a population decline as Mr. Waltee states [b]ecause of the potential detection error, I hesitate to say that the population has declined from last year." In terms of the distribution maps, they show no observations on the BDNF

allotments. In summary, in his email Mr. Waltee discusses the 2010 Montana Bighorn Sheep Conservation Strategy criteria stating:

“Based on monitoring efforts, the Greenhorn herd has met criteria 2, 3, and 4 during each of the last two years. I will monitor this herd again throughout the next year. If at least three of the four criteria are met for a third consecutive year, I will initiate discussion on proposing a limited legal ram harvest opportunity during the biennial season setting process, following the 2017 hunting seasons. If proposed and adopted by the Commission, this would mean a harvest opportunity during the fall of 2018.”

At the time of the 2003 and 2004 transplants, domestic sheep were permitted to graze seven allotments in the Gravelly Mountains in the same manner described above in the AMP section. In addition, domestic sheep and goats were known to graze private property north and west of the Greenhorn Mountains. Domestic sheep grazing practices (area grazed, number of animals, season of use, forage utilization, etc.) have remained constant on the permitted BDNF allotments. However, domestic sheep grazing practices may vary on private property, at the discretion of the landowner. As of January 2016, 19,300 sheep and goats were inventoried in Beaverhead and Madison Counties⁶ (USDA 2016, pg. 63). Based on this inventory, 11,500⁷ more sheep and goats graze the general area than what is permitted for the roughly 3-month summer grazing season on BDNF sheep allotments.

Domestic sheep and goats grazing on private property in Beaverhead and Madison Counties contrasts with domestic sheep grazing on the BDNF in terms of ability to manage grazing to avoid potential impacts to the Greenhorn bighorn sheep herd. MFWP biologists annually observe individual members of the Greenhorn herd and in terms of domestic sheep grazing on the BDNF they have consistent, predictable knowledge of where and when domestic sheep are present on the BDNF or trail across MFWP or BLM managed lands. If the species risk comingling, MFWP knows who owns the livestock and who manages the land and can promptly implement measures to decrease the risk of co-mingling and potential pathogen exposure by bighorn sheep. The inverse situation also applies. If land managers or permitted livestock operators observe a risk of species comingling, they are well informed of the potential for pathogen exposure and can initiate coordination and preventive measures to reduce risks to the Greenhorn herd.

For example, several bighorn sheep have been observed in the Snowcrest Mountains north of the trailing route (separated by Hogback Mountain). The local MFWP biologist, knowing when domestic sheep will be present along the trailing route, checks the location of these individuals prior to domestic sheep trailing. To date there has been no known comingling because bighorn sheep and trailing domestic sheep have not been present at the same time and location. Because individual bighorn sheep have been present in the Snowcrest Mountains for several years but have not moved south of Ledford Creek/Hogback Mountain, potential future comingling during trailing is speculative. However, if the species risk comingling at some point in the future, coordination measures such as altering the trailing route or hazing bighorn sheep away from the route while in short term use by domestic sheep can be initiated. While the same

⁶ Agriculture statistics for both Madison and Beaverhead Counties are used because the Greenhorn Mountains and BDNF sheep allotments are located in Madison County and the livestock operators holding domestic sheep grazing permits on the BDNF have ranch headquarters in Beaverhead County.

⁷ 19,300 sheep/goats – 7,800 ewe/lamb pairs permitted on the BDNF = 11,500 sheep/goats grazing in Beaverhead and Madison Counties somewhere other than the BDNF.

management options exist on private property, less predictable variables including location, season of use, livestock/property ownership and operator knowledge reduces the timeliness and effectiveness of management options.

The 2001 MFWP EA assumed transplanted sheep would establish a new herd in the Greenhorn Mountains in the absence of domestic sheep but, as a precaution, included provisions for managing individual bighorns that did not remain in the general transplant location and risked exposure to pathogens by comingling with domestic sheep permitted on the BDNF in the Gravelly Mountains or grazing private property elsewhere in Beaverhead and Madison Counties. During a species transplant, it is common for some individuals to leave the transplant area as the transplanted animals adjust to an abrupt change in location – in the case of the Greenhorn herd, animals were trapped in the Missouri Breaks and Rocky Mountain Front and moved to a new and unfamiliar (to them) mountain range. Provisions included in the MFWP Commission decision approving the transplant protected bighorn and domestic sheep in the event bighorn sheep moved out of the transplant area and the species risked comingling.

Some individuals and organizations continue to raise concerns based on analysis assumptions in the 2001 MFWP EA and public comment on the EA. Specifically, Gallatin recently identified a comment from a sheep producer in March, 2001 that interaction between bighorn and domestic sheep would be inevitable. To address that landowner concern in 2001, MFWP included preventive measures reducing the risk of disease transmission to the entire bighorn sheep herd should individual bighorns risk pathogen exposure by comingling with domestic sheep. The MFWP Commission approved the transplant following adoption of additional measures formalized in an MOU (described below). An indication of the effectiveness of these preventive measures, including separation of occupied bighorn habitat in the Greenhorn Mountains from domestic sheep herds in Beaverhead and Madison Counties is the lack of pneumonia outbreaks in the Greenhorn herd compared to other bighorn sheep herds. In 2010, pneumonia outbreaks and subsequent population declines occurred in several bighorn herds in western Montana. However, the Greenhorn herd remains disease free.

The 2003/2004 transplants followed MFWP general guidelines approved in 1995. Since that time, MFWP transplant guidelines were revised in the 2010 Montana Bighorn Sheep Conservation Strategy (pg. 59) to reflect changes in laws and policies. Preventive measures (spatial separation, lethal removals etc.) and habitat evaluations utilizing GIS mapping and modeling efforts, viewed as relatively “new” in the 2001 EA were incorporated into the 2010 Conservation Strategy and recommended by the Western Association of Fish and Wildlife Agencies in 2012. Objectives for the Greenhorn bighorn population identified in the 2010 Conservation Strategy (pg. 84 and 220-223) direct, future management of the species in the Greenhorn Mountains - not the 1995 transplant guidelines.

While it remains possible the species could potentially comeingle on BDNF sheep allotments in the Gravelly Mountains or along the trailing route sometime in the future, information gained since the 2003/2004 transplants show that comingling on BDNF lands has not occurred and is unlikely. Assumptions in the 2001 MFWP EA were made prior to the reintroduction of bighorn sheep in the Greenhorn Mountains and Gravelly Landscape. Those assumptions, after the reintroduction of bighorn sheep and over 13 years of bighorn sheep inhabiting the Greenhorn Mountains are now informed by site-specific information. In 2001, MFWP made assumptions concerning what habitat bighorn sheep would likely occupy in the Greenhorn Mountains to help determine if successful establishment of a herd was likely and if the agency wanted to commit

resources to a transplant. In 2016, MFWP doesn't have to assume, they know, what habitat bighorns have occupied for 13 years and are likely to continue occupying in the Greenhorn Mountains and surrounding areas.

Typical of species transplants, some individuals left the transplant site and, when they risked comingling with domestic sheep off BDNF land, were lethally removed by MFWP to protect the Greenhorn herd from possible pathogen exposure and domestic ewes from interbreeding as proposed in the EA and approved by the MFWP Commission. Bighorn sheep leaving the Greenhorn transplant area generally traveled west and north away from the BDNF – not south into the Gravelly Mountains and towards the permitted allotments. The 2001 EA considered a potential for comingling of the species on BDNF sheep allotments or along the trailing route, however that has not materialized in the 13 years since the transplant and establishment of the Greenhorn bighorn sheep herd.

The 2001 EA estimated the Greenhorn Mountains could support 150-200 bighorn sheep. In 2001, MFWP proposed reintroducing a population of bighorn sheep in the Greenhorn Mountains that did not exceed 200 animals. If vegetation monitoring indicated a higher carrying capacity, MFWP would initiate an amendment to the 2001 EA to determine if the population should be allowed to expand (2001 MFWP EA, pg. 5). The 2010 Conservation Strategy identifies a population objective of 125 bighorn sheep for the Greenhorn herd. Habitat that is currently available (and being used) in the Greenhorn Mountains is sufficient to meet this population objective. MFWP encourages maintenance and improvement of the existing habitat on public lands in the Greenhorn Mountains so bighorn sheep continue utilizing public lands rather than moving onto private lands (MFWP, 2010, pg. 221-222).

Based on estimated carrying capacity and known movements/distribution since 2003 it is not reasonable to expect herd distribution to expand in a southerly direction into the Gravelly Mountains. There is a lack of escape habitat and preferred foraging habitat to the south. Specifically, the terrain between the current south distribution of the Greenhorn herd (near Upper Canyon Ranch) and the permitted domestic sheep allotments in the Gravelly Mountains lacks escape habitat (cliffs) desired by bighorn sheep and lodgepole pine forests dominating north facing slopes (beginning at Warm Springs Creek) deter southerly movement of individual bighorn sheep. These lodgepole pine forests do not provide desirable bighorn sheep foraging habitat (grass and shrubs) and are so dense, visibility for detection and avoidance of predators by bighorn sheep is limited. In the unlikely occurrence of herd expansion outside of the Greenhorn Mountains as the population grows, it is likely that expansion of the herd would geographically move west and north where there is escape habitat (away from the BDNF) following a similar travel path used by bighorn sheep leaving the transplant area in the early to mid-2000's.

The September, 2001 MFWP Decision Notice (pg. 9) identified a “relatively low likelihood of contact” between domestic and wild sheep in the transplant area after considering potential effects from the presence of domestic sheep on the BDNF and other lands. Grazing practices on the domestic sheep allotments have not substantially changed (presence, location and season of use have remained constant) since MFWP proposed transplanting bighorn sheep into the Greenhorn Mountains. While we cannot state that no wandering ram may ever come in contact with permitted domestic sheep grazing in the Gravelly Mountains, comingling of species on the permitted allotments or along the trailing route is lower than the “relatively low likelihood of contact” disclosed in 2001. Further, the reintroduction of bighorn sheep by MFWP was

purposely constrained to the Greenhorn Mountains. MFWP's 2001 environmental assessment states that "[i]f bighorns expand beyond the Greenhorn Mountains, an amendment [] will be initiated to determine if populations should be allowed to expand."

In short, a review of new information indicates comingling on the BDNF is unlikely because:

- Comingling has not occurred on the BDNF in the 13 years since bighorn sheep were reintroduced to the Greenhorn Mountains. No bighorn sheep have been removed from the Greenhorn herd due to the presence of domestic sheep on the BDNF.
- Existing habitat in the Greenhorn Mountains appears capable of sustaining a herd above MFWP's population objective.
- Any expansion of herd distribution beyond the Greenhorn Mountains would likely be west and north, away from BDNF lands and domestic sheep allotments due to the lack of escape habitat and preferred foraging on BDNF lands to the south in the Gravelly Mountains.
- In 13 years, bighorn sheep have not wandered into the Gravelly Mountains and risked comingling with domestic sheep permitted on the BDNF. Natural terrain and vegetation appear to effectively deter such movement.

2011 Listing of Bighorn Sheep as a Sensitive Species

In 2011, bighorn sheep were officially listed as a sensitive species for Forest Service Region 1 (Weldon, 2011); covering northern Idaho, North Dakota, Montana and part of South Dakota. Listing of bighorns as sensitive in Region 1 was preceded in neighboring Regions 2, 3, and 4, all of which supported more bighorn sheep than Region 1 (Tomasik, 2011). The impetus for listing primarily centered around the 2009-2010 die-offs in bighorn sheep believed to have resulted from epizootic (pneumonia) events, having lingering effects on lamb survival and recruitment (Stelfox 1976, Ouderlea and Wishart 1982, Spaker and Hibler 1982, and Jessup 1985 all appearing in Gross et al. 2000; Desert Bighorn Council 1990, Foreyt 1990, Coggins and Matthews 1992, Ward et al. 1992, Foreyt 1989, and Hunter 1995 all as appearing in Schommer and Woolever 2001).

However, the listing by Region 1 of the bighorn as a sensitive species did not mean that management on the National Forests or the BDNF were adversely impacting bighorn populations. This change in status, identifying the bighorn as a sensitive species, did not represent specific concerns on National Forest System lands or the BDNF. First, none of the local die-offs could be linked to grazing of domestic sheep on public lands and a 2010 Western Association of Fish and Wildlife Agencies (WAFWA 2010) summary of the die-offs indicates the likely disease transmission occurred from non-Forest Service lands. Second, the listing evaluation contained no discussion with MFWP nor the Montana Natural Heritage Program (MNHP) for any need to change the current State heritage ranking of S4 (apparently secure) for bighorn sheep to a more vulnerable classification. In fact, the population of bighorn sheep in Montana has steadily grown from 1970 to 2010 with a total population in 2010 of 5,694 bighorns in 45 herds. (2010 Conservation Strategy). Third, there was no discussion of spatial separation between bighorn herds and active Forest Service sheep grazing allotments in the listing evaluation, which could address one element of the issue based on a plethora of literature addressing disease transmission between domestic and wild sheep. Actively and cooperatively maintaining spatial separation adjacent to Forest Service sheep grazing allotments, sheep production ranches, and hobby herds may have helped prevent any effects on bighorn sheep from domestic grazing on national forest lands (Rohrbacher 2010).

Presently, bighorn sheep remain on the Region 1 Sensitive Species List but this status is not significant new information related to management of bighorn sheep on the BDNF. The review of BDNF management direction in the report *Potential Bighorn Sheep Interactions with Domestic Sheep on the Beaverhead-Deerlodge NF – Report to the Chief* (USDA 2011) found that the BDNF Forest Plan and specific AMP strategies provided sufficient direction for the overall management of bighorn sheep on the Forest. This coupled with the lack of management removals of any bighorns related to the management of BDNF domestic sheep grazing allotments demonstrates that a change in bighorn sheep management is not warranted.

Further, there is no indication that the 2011 change in status of the bighorn means that each population or herd has increased in importance to the species as a whole. For example, in their 2015 EA for the depopulation of the Tendoy bighorn herd, MFWP states that if the Tendoy bighorn sheep herd had not already existed, re-establishment of a healthy herd would likely not be considered because of the proximity to domestic sheep on private lands in Montana and grazing allotments in Idaho (2015 MFWP EA pg. 12). However, MFWP also gives merit to the strategy of managing smaller herds for the benefit of the species because population density is known to be a risk contributing to pneumonia outbreaks (2015 MFWP EA, pg. 7). MFWP manages the bighorn populations across the state of Montana including transplanting sheep, establishing new populations, and when necessary, as with the Tendoy herd, depopulating the herd to have a long-term positive impacts to bighorn sheep. (2015 MFWP EA, pg. 19).

Consideration of the Region 1 sensitive species listing of bighorn sheep does not lead to a conclusion that potential significant environmental impacts to the Greenhorn herd exist from the continued presence of permitted domestic sheep on seven allotments on the BDNF in the Gravelly Mountains.

Existence of MOUs

The MFWP Commission approved the transplant of bighorn sheep into the Greenhorn Mountains in May, 2002 following review of a proposed MOU allowing continued domestic sheep grazing on public land allotments (consistent with the 1995 transplant guidelines in place at the time), commitment by MFWP to issue annual kill permits for bighorn sheep to domestic sheep producers in the event of incidental contact and providing a satellite phone for sheep operators to contact MFWP wardens or biologists if wild sheep are in close proximity to domestic sheep. The MOU was signed in May, 2002 by the BDNF, BLM, MFWP and sheep producers permitted to graze BDNF sheep allotments in the Gravelly Mountains. Bighorn sheep were transplanted to the Greenhorn Mountains in February 2003 and 2004. In 2008, the 2002 MOU was replaced with a new MOU that expires January 31, 2018. The MOUs are included with the BDNF's November 2016 Forest Plan DSEIS as Appendices A and B. Both MOUs contain provisions to protect the Greenhorn bighorn sheep herd from disease outbreaks by managing individual bighorn sheep when they risk comingling with domestic sheep by coming into close proximity.

For a few years following the transplant, some individuals risked comingling with domestic sheep (but not on the BDNF) and some individuals were removed by MFWP (under their normal legislative authority, not agreements in the MOU) preventing potential pathogen exposure of the larger bighorn sheep herd. However, there have been no such removals since 2008. Further, there have been no removals on BDNF lands and no use of the "kill permit" in the MOUs by BDNF domestic sheep permittees at any time. In short, the kill permit provision in the 2002 and 2008 MOUs is a preventative measure designed to protect the Greenhorn bighorn sheep herd

from disease when bighorn sheep risked pathogen exposure by comingling with domestic sheep, but, it has never been needed.

Forest Service permit administration and on-the-ground grazing administration were not affected by the MOUs. If management of the domestic sheep did not meet Forest Plan standards, AMP and AOI requirements, permit action would have been initiated to correct the deficiencies. However, permit administration and on-the-ground management of domestic sheep have not changed since 2002 because (1) annual grazing use complied with terms and conditions in the permits and (2) a need to alter grazing practices to avoid comingling of bighorn sheep and domestic sheep in close proximity to the permitted allotments never occurred. This lack of a need to alter grazing practices to avoid comingling also applies to the trailing route.

The BDNF considered terminating the 2008 MOU because the transplant has occurred and adequate separation of wild and domestic sheep has been maintained thereby protecting the Greenhorn bighorn sheep herd from possible disease transmission without a need to implement any of the land management provisions of the MOU. However, MFWP desired to continue cooperative efforts through a MOU and identified concerns that cancellation of the MOU may hinder proposed transplants or recovery of bighorn sheep and other species in Montana. In addition, the BDNF Forest Plan provides as a forest-wide desired condition (pg. 11) that “[i]ssues involving species with needs that go beyond Forest boundaries and authority are identified and resolved in conjunction with other federal agencies, state, county, tribal, and city governments”.

In support of obtaining this desired condition and cooperatively managing the Greenhorn bighorn sheep, the BDNF met in 2016 with MFWP, BLM and domestic sheep producers holding grazing permits on the BDNF, and modified the 2008 MOU to clarify legal authorities that may not have previously been clear to general members of the public not party to the MOU and to recognize that the Greenhorn bighorn sheep herd has now been established. The modified MOU is included as Appendix C to the BDNF Forest Plan. A summary of primary changes made in the MOU are described in the BDNF Forest Plan DSEIS (pg. 26).

The 2002 and 2008 MOUs provided a system of notification and tracking to safeguard the Greenhorn bighorn sheep herd. The 2016 Modification continues these protections. In the unlikely event the species risk comingling and exposing bighorn sheep to disease pathogens, a kill permit issued to the sheep producers, if MFWP wardens or biologists are unavailable, would prevent an exposed bighorn from returning to the Greenhorn herd and possibly risk exposing the entire herd to pathogens and a potential pneumonia outbreak.

Between 2003 and 2008, 16 of the transplanted bighorn sheep were lethally dispatched by MFWP personnel for venturing away from the Greenhorns onto adjacent private lands and an additional 18 bighorns were trapped and moved to supplement the Highland bighorn herd⁸. Even with removal of 34 bighorn sheep and additional natural mortality, the Greenhorn herd has become established. During the springs of 2015 and 2016, MFWP tallied at least 59 and 48 sheep, respectively. (As discussed above, this reduction should not be viewed as a drop in population but is due to variations in survey conditions and animal locations on the dates of the aerial flights.) The overall population is reproducing and moving towards providing hunting opportunities. No bighorn sheep have been removed through management practices, including

⁸ The Highland bighorn sheep herd occupy habitat in the Highland and East Pioneer Mountains north and west of the Greenhorn Mountains.

those agreed upon in the MOUs, since 2008. Speculating that occasional removals might become necessary at some point in time in the future to protect overall herd health and individual bighorns are lethally removed under provisions in the 2016 MOU modification, such removals would not prevent continued population growth of the overall bighorn herd.

Because the MOUs provided, and continue to provide, protective measures that reduce the risk of pathogen exposure and subsequent potential pneumonia outbreaks in the bighorn herd, the MOUs improve the likelihood of continued occupancy of the Greenhorn Mountains by bighorn sheep and potential for future hunting opportunities, meeting the intent of the transplant proposal without a need to revise management practices described in the domestic sheep AMPs. Preventative measures in the MOUs enhance the “relatively low likelihood of contact” disclosed in the 2001 MFWP EA.

Updated Information Regarding Disease Transmission Between Domestic Sheep and Bighorn Sheep

Transmission of disease between domestic and wild sheep has been suspected for over a hundred years or the mid-19th century (Wehausen et al. 2011, Schommer and Woolever 2001). While the exact role of domestic sheep in the disease process (e.g. pathogens carried and involved) is still being studied, there is little debate they serve as a vector (Dassanayake et al. 2009 in Krehbiel 2016; O’Brien et al. 2014) for transmission. McQuivey (1978), Goodsen (1982), Martin et al. (1996), Singer et al. (2001), Coggins (2002), and George et al. (2008) as appearing in Wehausen et al. (2011) as well as Grinnell (1928), Marsh (1938) and Schillenger (1937) appearing in Krehbiel (2016), all support the hypothesis that bighorn sheep die-offs are often subsequent to contact between domestic sheep and bighorn sheep. Where scientist have been able to collect clinical evidence, pneumonia, from a possible mixture of pathogens, has been cited as the cause of death (Wehausen et al. 2011; Foreyt 1993 and Jaworski et al. 1998 as appearing in Schommer and Woolever 2001; Brewer et al. 2014; Carde et al. 2005 and Besser et al. 2012 both in Carpenter et al. 2014).

The management response to bighorn sheep die-offs essentially falls under two categories: translocation (re-introduction; relocation; or augmentation) of bighorn sheep herds and separation between domestic and wild sheep either temporally, or spatially (Krehbiel 2016; WAFWA 2012; Brewer et al. 2014; O’Brien et al. 2014). However, even with successes in translocation, a literature review by Brewer et al. 2014 indicated varied results with the effectiveness of establishing viable bighorn sheep populations, especially those with numbers less than 50 individuals, partially because other potential factors (e.g. predation, habitat, inclement weather, genetics etc.) affect the success of small bighorn sheep populations (viability). Regardless of herd size, maintaining spatial or temporal separation between domestic and wild sheep appears to be the most effective way to hinder the transmission of disease (Brewer et al. 2014; Krehbiel 2016; WAFWA 2012; O’Brien et al 2014; Schommer and Woolever 2001).

Without de-valuing the role and contribution of translocating wild sheep to either re-establish herds or to augment existing herds, the physical separation of domestic and wild sheep appears to be most critical to managing bighorn sheep populations due to the exponential impact of disease. Maintaining spatial separation is imperative for long-term management because of the known distance of bighorn ram forays (Carpenter et al. 2014; DeCesare and Pletscher 2006; Bleich et al. 1996 as in DeCesare and Pletscher 2006) as well as a natural attraction between

domestic and wild sheep (Young and Manville 1960, Martin et al. 1996, and George et al. 2008 all appearing in O'Brien et al. 2014). Bighorn rams have been documented to travel 5km (3 miles) to 50 km (31 miles) depending on the season (O'Brein et al. 2014; DeCesare and Pletscher 2006; Festa-Bianchet 1986 as in O'Brein et al. 2014; Carpenter et al. 2014; FWP 2010; WSWG 2012 and Cassirer and Sinclair 2007 in Krehbiel 2016) during their forays.

For bighorn sheep herds on the BDNF, this documented foray distance equates to the possibility that any resident bighorn herd could come into contact with domestic sheep on private ranches (i.e. sheep producers), hobby herds, or Forest Service domestic sheep grazing allotments (Brock et al. 2006) depending on terrain and vegetation separating the species. Because the risk of contact between the species extends beyond Forest lands, associated issues involving bighorn sheep exceed the authority of the BDNF (USDA 2011) and any habitat available on the BDNF. DeCesare and Pletscher (2006) suggest that more open areas which allow for high-visibility, such as grasslands and recently burned forests, were generally preferred by bighorn sheep over more densely vegetated forests. The preference for high-visibility areas by bighorn sheep is also supported by Valdez and Krausman (1999) (as appearing in O'Brein et al. 2014) as well as Brewer et al. (2014). Sparsely vegetated areas are more likely to provide forage in quantity and quality, facilitate travel and forays and provide greater visual site-distance to detect predators. Both slope and distance to escape terrain appear to be important to seasonal bighorn sheep movements (DeCesare and Pletscher 2006).

Based on the information above as well as noted field observations by area MFWP biologist (D. Waltee per. Comm. with Jan Bowey of BDNF) concerning risk of contact between the BDNF Greenhorn bighorn sheep herd (north-west Gravelly Landscape) and the closest domestic sheep grazing allotments on the BDNF, the likelihood for contact between the species as related to permitted sheep allotments is considered low. Between the Greenhorn bighorn sheep herd and the closest permitted sheep grazing allotment lies approximately seven miles of terrain containing several swaths of dense forests. These areas of dense forests coupled with previously known forays (all documented forays have been to the north and west of translocation site) of individuals from the Greenhorn bighorn sheep herd and lack of escape habitat (cliffs) support the low probability that the comingling of domestic and wild sheep will occur as a result of continued sheep grazing on the BDNF.

Comingling and risk of contact resulting in pathogen exposure and possible disease transmission is much more likely to result for Greenhorn bighorn sheep venturing onto adjacent private lands west and north of their current home range. The BDNF lands in the Gravelly Mountains are surrounded by adjacent mixed land ownerships (USDA 2011) where a collage of domestic sheep presence exists (private sheep producers, hobby herds; weed control; USDA Sheep Experiment Station). For example, MFWP (2010) noted that sheep producers on private lands are in close proximity to 15 bighorn sheep herds (Krehbiel 2016). Adding to the difficulty of managing risk of contact between the species' is that currently there is no database identifying all domestic sheep grazing on private lands (Krehbiel 2016) including those utilized for weed control, sheep producers, and hobby herds (4-H projects) and private owners often lack a full understanding of the risk of disease transmission.

In summary, from a review of most recent literature, it is clear scientists, veterinarians, researchers, wildlife management agencies, land management agencies, as well as many wildlife organizations agree that currently, maintaining spatial separation between domestic and wild sheep, is foremost the best approach to limiting disease transmission between the two

species (Schommer and Woolever 2001). Brewer et al. (2014) notes there is currently no effective treatment once clinical signs of pneumonia are documented. As late as 2001, no vaccines or antibiotic treatment was available that would protect bighorn sheep from pneumonia (Ward et al. 1999 and Cassirer et al. 2001 as in O'Brien et al. 2014; Schommer and Woolever 2001; MFWP 2015) and O'Brien et al. (2014) suggests that even if a treatment was available the logistics of delivery would be extremely difficult and near impossible. Unfortunately, once a herd has been exposed to pneumonia, it may experience continued effects (e.g. generational carriers) making population recovery difficult even when habitat is apparently abundant (Krehbiel 2016; Enk et al. 2001; Toweill and Geist 1999; Stelfox 1976, Ouderlea and Wishart 1982, Spaker and Hibler 1982, and Jessup 1985 all appearing in Gross et al. 2000).

In terms of management of the BDNF domestic sheep allotments in relation to the Greenhorn herd, spatial separation has been maintained between the BDNF domestic sheep allotments and the Greenhorn herd since 2003. Further, the 2002 and 2008 MOUs and the modified 2016 MOU between the BDNF, MFWP, BLM, and domestic sheep producers contain preventative measures to manage risk of contact between domestic and wild sheep reducing the risk of an infected bighorn sheep returning to the Greenhorn herd and affecting the population. No comingling between domestic and bighorn sheep has occurred on the BDNF since the bighorn sheep were transplanted.

For this analysis, the following science and supporting documentation was reviewed and the appearance of contributing science in the literature reviewed was acknowledged:

Wehausen et al. 2011. *Domestic sheep, bighorn sheep, and respiratory disease: a review of the experimental evidence.* Other literature acknowledged within and pertinent to this analysis includes: McQuivey 1978; Goodsen 1982; Martin et al. 1996; Singer et al. 2001; Coggins 2002; George et al. 2008; and Deszak et al. 2000.

Schommer and Woolever. 2001. *A Process for Finding Management Solutions to the Incompatibility Between Domestic and Bighorn Sheep.* Other literature acknowledged within and pertinent to this analysis includes: Ashmankas 1995; Onderka and Wishart 1988; Goodsen 1982; Martin et al. 1996; Buechner 1960; Foreyt 1989, 1990, 1992, 1993, 1994, 1995; Foreyt et al. 1994; Honess and Frost 1942; Jaworski et al. 1998; Ryder et al. 1994; Hunter 1995; Coggins and Matthews 1992; Coggins 1988; and Onderka 1986; Hunt 1980; Desert Bighorn Council 1990; Jessup 1980; Foreyt and Jessup 1982; Pybus et al. 1994 and Kistner 1982.

Gross et al. 2000. *Effects of Disease, Dispersal, and Area on Bighorn Sheep Restoration.* Other literature acknowledged within and pertinent to this analysis includes: Wishart 1978; Thorne et al. 1985; Krausman 1997; Valdez and Krausman 1999; Stelfox 1976; Ouderlea and Wishart 1982; Spaker and Hibler 1982; Jessup 1985; Goodson 1982; Foreyt 1989; and Foreyt et al. 1994.

Enk et al. 2001. *Factors Limiting a Bighorn Sheep Population in Montana Following a Dieoff.*

Brewer et al. 2014. (Wild Sheep Working Group – WAFWA). *Bighorn Sheep: Conservation Challenges and Management Strategies for the 21st Century.* Other literature acknowledged within and pertinent to this analysis includes: WAFWA 2012.

Krehbiel, R. 2016. *Bighorns at Risk: Identifying Risks Posed by Domestic Sheep.* Other literature acknowledged within and pertinent to this analysis includes: Besser et al. 2012; Carpenter et al. 2014; Grinnell 1928; Marsh 1938; Schillenger 1937; Dassanayake et al. 2009;

WSWG-WAFWA 2012; MFWP 2010; Cassirer and Sinclair 2007; DeCesare and Pletscher 2006; and Backus 2005.

Brock et al. 2006. *A Wildlife Conservation Assessment of the Madison Valley, Montana.* Wildlife Conservation Society, Greater Yellowstone Program, Bozeman, MT.

DeCesare and Pletscher 2006. *Movements, Connectivity, and Resource Selection of Rocky Mountain Bighorn Sheep.* Other literature acknowledged within and pertinent to this analysis includes: Bleich et al. 1990; DeForge et al. 1979; MacArthur and Wilson 1967; Geist 1970 and 1971; Shackleton et al. 1999; and Bleich et al. 1996.

O'Brien et al. 2014. *Incorporating Foray Behavior Into Models Estimating Contact Risk Between Bighorn Sheep and Areas Occupied by Domestic Sheep.* Other literature acknowledged within and pertinent to this analysis includes: Singer et al. 2001; George et al. 2008; Ward et al. 1999; Cassirer et al. 2001; WAFWA 2012; Young and Manville 1960; Martin et al. 1996; Smith 1954; Valdez and Krausman 1999; DeCesare and Pletscher 2006; Copeland et al. 2010; and Festa-Bianchet 1986.

Carpenter et al. 2014. *A spatial risk assessment of bighorn sheep extirpation by grazing domestic sheep on public lands.* Other literature acknowledged within and pertinent to this analysis includes: Garde et al. 2005 and Besser et al. 2012.

Garrott et al. 2015 (on-going). *The role of disease, habitat, individual condition, and herd attributes on bighorn sheep recruitment and population dynamics in Montana.* Other literature acknowledged within and pertinent to this analysis includes: MFWP 2010; Toweill and Geist 1999; Butler, Garrott and Rotella 2013; Gaillard et al. 2000; Saether 1997; and Cook et al. 2013.

USDA FS. 2011. BDNF. *Potential Bighorn Sheep Interactions with Domestic Sheep on the Beaverhead-Deerlodge National Forest – Report to the Chief.*

MFWP 2015. *The Proposed Depopulation and Restocking of the Tendoy Mountains Bighorn Sheep Herd; Draft Environmental Assessment.*

Consideration by MFWP that Bighorn Sheep Could Be Reintroduced to Closed Allotments

In the event BDNF domestic sheep grazing allotments in the Gravelly Mountains were vacated due to future AMP re-analysis decisions or due to lack of interest (vacated voluntarily) from permittees, the newly available habitat could be evaluated by MFWP as to its capability to support a viable bighorn sheep herd in the absence of domestic sheep. It should be noted that all existing domestic sheep grazing allotments would have to become vacant in order for any potential use of the area by bighorn sheep to become feasible. Otherwise, maintaining sufficient spatial separation between domestic and wild sheep would not be possible.

Current MFWP guidance for species translocation is described here to provide readers information about the process that would likely be followed in order for a bighorn sheep transplant to be proposed by MFWP in the Gravelly Mountains sometime in the future, in the absence of domestic sheep. Management of bighorn sheep, including decisions to establish new herds in historic habitat, are within the legislated authority of MFWP, not the BDNF. The following information is provided only to address Gallatin's assertion that if the BDNF cancelled permitted domestic sheep grazing on allotments near Black Butte, MFWP would establish a bighorn sheep herd in the Gravelly Mountains. The MFWP process to reach such a decision would require an in-depth habitat analysis, public involvement, and consideration of a

commitment of resources for bighorn sheep management across the entire state of Montana (not limited to only BDNF lands).

Since the issuance of earlier versions of their transplant guidelines (1986) and policy (1995), new laws and regulations affecting these earlier MFWP directions leading to the development of additional elements for translocating wild sheep were developed. The updated process for wild sheep translocation has three major elements which are described at length beginning on page 60 of the strategy (MFWP 2010). The three elements include: 1) criteria for identifying potential new transplant sites; 2) process for recommending and implementing new transplants; and 3) process for augmenting existing bighorn populations.

Briefly, the process for new site evaluation (element 1) involves assessing the site utilizing a 10 point filter which assists managers in quantifying the habitat. These 10 quantifiers look at, for example, historical bighorn sheep use, movement barriers, escape terrain, existence of suitable winter and summer range, lambing habitat, and proximity to domestic sheep and goats.

The process for recommending and implementing translocations of bighorn sheep to new sites (element 2) involves an 11 step strategy, again assessing the available habitat, connectivity to other wild sheep populations, amount of public land, potential conflict with domestic livestock and agricultural lands, as well as benefits to the public. The third element involves augmenting an existing bighorn sheep herd and while it lists fewer criteria, they are equally important and examine existing factors affecting the herd such as amount of available habitat, predator types and numbers, herd health (e.g. lungworm presence), herd genetics, and public benefit.

Qualities of bighorn sheep habitat, which would contribute to the MFWP evaluation, consist of three essential elements; (1) escape terrain (slopes greater than 60% with occasional rock outcroppings) with abundant, adjacent open foraging areas, (2) high visibility to detect and avoid predators and access forage efficiently and (3) winter range areas which tend to be low-elevation, south-facing slopes with escape cover in proximity to foraging areas. Winter range is defined as all escape terrain, which receives less than 25 cm (10 inches) of snowpack. In the Southern Mountains ecological region (east of the Gravelly Mountains), some bighorn sheep winter on high elevation windswept slopes and migrate to lower elevations prior to lambing (MFWP 2010, pg. 71).

The top of the Gravelly Mountains, while frequently meeting the 60%+ slope habitat characteristic, generally lacks occasional rock outcroppings, especially between the Ruby River and the top of the mountain range. Additionally, based on annual measurements since 2000, the maximum average annual snow depth at the Clover Meadows snow survey site (located at 8,600 feet elevation on top of the Gravelly Mountain Range) is 63 inches (NRCS, 2016). Even on windswept slopes at this elevation, it is likely snow depth often exceeds the preferred 10 inch or less. Snow is slow to melt at this elevation. Even assuming bighorn sheep could successfully winter on windswept slopes in the vicinity of the domestic sheep allotments and migrate to lower elevation escape habitat (as occurs for some herds in the Southern Mountains ecological region located east of the Gravelly Mountains), maximum snow depth in May averaged 52 inches (as measured annually since 2000 on May 1) when ewes would attempt to migrate to lower elevation escape habitat for lambing.

In summary, the habitat conditions in the Gravelly Mountains, especially at high elevations where domestic sheep allotments are located, do not appear to provide sufficient year-round habitat needed for a bighorn sheep herd of 125 individuals or larger based on the information

above. Due to the lack of quality winter-range, if bighorn sheep were translocated by MFWP to the Gravelly Mountains where domestic sheep grazing allotments currently exist, then bighorn sheep would likely have to seasonally migrate to BLM and private lands for the winter where risk of contact with domestic sheep will be high. Any evaluation by MFWP on the potential for the current domestic sheep grazing lands in the Gravelly Mountains to serve as wild sheep habitat would also consider this risk of contact and potential disease transmission. Overall, based on the habitat conditions discussed above and the remnant (risk of contact remaining in absence of Forest permitted domestic sheep grazing allotments) high level for risk of contact with domestic sheep on nearby private lands, it is unlikely MFWP would consider translocating bighorn sheep into the Gravelly Mountain area as a viable opportunity. According to Tomasik (2011 pers comm. with Tom Carlsen of MFWP; Feb. 4, 2011) MFWP has indicated that pursuing additional transplants in the Gravelly Landscape is unlikely even in the absence of domestic sheep because of risk of contact on nearby private lands. Regardless of the possibilities, if MFWP were to decide to consider transplanting sheep to the Gravelly Mountains, MFWP would follow their internal evaluations described above prior to any translocation. Further, as MFWP previously stated it will undertake an environmental assessment and solicit public participation.

Gallatin asserted that MFWP seeks to reintroduce bighorn sheep into the Gravelly Mountains if the existing domestic sheep allotments are closed. Gallatin also claims, citing Brock et al. (2006), that bighorn sheep habitat in the Gravelly Range is degraded due to the presence and use by domestic sheep and that in order to evaluate the potential for the Gravelly Mountains to serve as bighorn sheep habitat, domestic sheep must first be removed. Our review of information does not show this to be the case. First, as discussed below, current MFWP guidance on translocation and habitat conditions in the Gravelly Mountains does not readily support translocation of bighorn sheep into the Gravelly Mountains. Second, the documents cited by Gallatin do not reflect any decision by MFWP and do not reflect any recent evaluation by MFWP (since the 1995 transplant guidelines were revised in 2010) as to the capability to support a viable bighorn sheep population.

Gallatin has cited to a number of documents asserting that MFWP seeks to reintroduce bighorn sheep into closed allotments in the Gravelly Mountains. The documents and our review follows:

- 2010 Montana Bighorn Sheep Conservation Strategy, pg. 3 and 7.

Pages 3 and 7 discuss, in general terms, MFWP's bighorn sheep strategy in terms of maintaining separation of bighorn and domestic sheep, including buy-outs of domestic sheep and goat leases. However, no mention is made of the Gravelly Mountains and, on page 6, the Gravelly Mountains are not suggested as a transplant site.

- 2001 Draft Environmental Assessment of the Reintroduction of Bighorn Sheep Into the Greenhorn Mountains, Montana, pg. 28

Page 28 of the 2001 MFWP EA is MFWP Commission's 1995 Bighorn Sheep Transplant Guidelines. There is no discussion on page 28 of the Gravelly Mountains. Rather, this page describes MFWP Commission policy to reduce the possibility of disease outbreaks in newly established transplanted bighorn sheep herds and provide assurance to landowners that the presence of newly established bighorn sheep will not be used by MFWP to restrict existing land management pursuant to Montana statute through 11 actions/considerations. There is no statement in the 1995 Transplant Guidelines supporting an assertion that MFWP would reintroduce bighorn sheep on vacated sheep allotments located on public lands.

The 2001 MFWP EA (pg. 13) discloses consideration of an alternative to release bighorn sheep into the Gravelly or Snowcrest Mountain Ranges but MFWP did not proceed with detailed analysis because “...there are domestic sheep that graze in the Gravelly Mountains so that the potential for disease transmission from domestic sheep to bighorn sheep is too great. Also, all the domestic sheep that graze in the Gravelly Mountains trail through the middle of the Snowcrest Mountains so that the potential for disease transmission to bighorns exists here also”. This statement does not support an assertion that MFWP seeks to reintroduce bighorn sheep into the Gravelly Mountains. The first policy action identified in the 1995 Transplant Guidelines is “...give preference to those sites, which are not in close proximity to domestic sheep or are separated by physical barriers to reduce potential of interaction”. Following the 1995 Transplant Guidelines, MFWP did not “give preference” to a 2001 alternative to transplant bighorn sheep in the Gravelly and Snowcrest Mountains due to proximity of domestic sheep. To our knowledge, MFWP did not proceed with further consideration of the remaining eight actions/considerations in the policy. Regardless, the 1995 Guidelines have been replaced by the 2010 Conservation Strategy.

- September 26, 2001 MFWP Decision Notice – Reintroduction of bighorn sheep into the Greenhorn Mountains, Montana (pg. 3)

In response to comment, MFWP states, “Finally, FWP is aware that the Gravelly Range has been domestic sheep range since before the Forest Service was established. We are also aware that the Gravelly Range was historic bighorn sheep range before domestic sheep were introduced. It is precisely because domestic sheep use that range now that we are not proposing to reintroduce bighorns to the Gravelly Range.” This statement does not reflect a determination by MFWP or a site evaluation considering quality winter range to support bighorn sheep in the Gravelly Mountains or domestic sheep on private lands. Please refer to information concerning similar statements in the 2001 MFWP EA.

- Email communications between Plaintiffs and MFWP.

This document was filed in court by Gallatin as Proposed Supplement 2. It is an email exchange in June 2015 between Mr. John Meyer, an attorney representing Gallatin and Howard Burt MFWP Region 3 Wildlife Manager. Mr. Meyer asked the MFWP biologist whether there was a policy in place for evaluating potential reintroduction onto public lands. The response from Mr. Burt was that to his knowledge there was not an official policy but that the MFWP evaluated both public and private lands for potential transplant areas including evaluating habitat available and proximity of domestic sheep. This email exchange does not discuss the Gravelly Mountains and further, it expresses the number of factors that go into evaluation of choosing a transplant location.

- June 2009 Draft EA Reintroduction of Bighorn Sheep into the Greenhorn Mountains and Decision Notice for 2009 EA.

These documents were electronically submitted to the Forest Service by Mr. Meyer, Cottonwood Environmental Law Center, in October, 2016. They show a date of 2009. However, the Draft EA and Decision Notice for the reintroduction occurred in 2001 and MFWP has informed us there is no Draft EA and Decision Notice dated 2009 for the reintroduction of the bighorn sheep into the Greenhorn Mountains. The MFWP Draft EA and Decision Notice are dated 2001 and are discussed above.

- A Wildlife Conservation Assessment of the Madison Valley (pg. 32)

This 2006 document, compiled by The Wildlife Conservation Society, Greater Yellowstone Program, covers the Madison River drainage encompassing the Madison Valley itself as well as the east portions of the Gravelly and Tobacco Root Mountains and west portion of the Madison Mountains (pg. 2). It does not encompass the west portions of the Gravelly or Greenhorn Mountains draining into the Ruby Valley. This document was not prepared by the MFWP.

Included in the report are several maps depicting species habitat modeling intended to “map *potential* habitat because they do not include human activities or land uses as parameters. Therefore, the models are not intended to predict species occurrence or abundance but rather, serve to indicate where a species might find suitable habitat in the absence of human influences” (pg. 27). For bighorn sheep, the report includes Bighorn Sheep Potential Habitat (Figure 12, pg. 34), Bighorn Sheep Habitat Effectiveness (Figure 13, pg. 35), and Bighorn Sheep Habitat Degradation (Figure 14, pg. 36). Citing Figure 14, the report identifies “significant habitat degradation” in the Gravelly Mountains from domestic sheep grazing on public lands (pg. 32) and states “A long-term priority should be to restore bighorn sheep to the Gravelly and Centennial Mountains, which could provide complete meta-population connectivity among all bighorn herds with the Madison assessment areas” (pg. 33). However, there is no indication this is a strategy proposed or supported by MFWP. In the recent 2015 Tendoy EA, MFWP questions high population objectives and the concept of metapopulations connecting bighorns and all available habitats. MFWP is now experimenting with limiting connectivity due to disease potential to spread among connected populations (2015 Tendoy EA pgs. 7, 12 and 19).

After reviewing the maps, it is clear that the report shows potential bighorn habitat exists in the Gravelly Mountains. However, the report makes no attempt to determine if all seasonal habitat components to sustain a desired bighorn sheep population exist. In addition, the habitat is more isolated (distant from potential and occupied habitat with limited patches of habitat connected to other mountain ranges).

In terms of priority areas for bighorn sheep reintroduction the Gravelly Mountains is not identified as a priority area, rather the report recognizes that “The Tobacco Roots appear to offer extensive areas of high quality habitat and do not contain sheep allotments” and “A priority of immediate concern should be to maintain connectivity across Jack Creek [private property in the Madison Mountains] to allow expansion of the Spanish Peaks herd into the Fan Mountain area” (pg. 33). The MFWP wildlife biologist tasked with managing wildlife for most of Madison County identifies priorities for bighorn sheep management in the area as: (1) monitoring and continued management of the established Greenhorn herd to determine if/when hunting opportunities may become available, and (2) potential relocation opportunities in the Tobacco Root Mountains where cursory analysis indicates all habitat components exist to support a desired herd size but coordination and management of private domestic sheep and goat herds in the Ruby, Jefferson and Madison Valleys needs to be explored. In the Madison Mountains, MFWP translocated bighorn sheep associated with the Hilgard herd (described as the Taylor Mts in this report) further north in the Madison Range (Wolf Creek area) late winter/early spring, 2016.

Considering the presence of existing populations and larger expanses of more contiguous habitat in mountains ranges east and north of the Gravelly Mountains, it appears prudent to place a higher priority on connecting/establishing herds north and east of the Madison Mountains than on attempting to establish a herd in the more isolated habitat in the Gravelly Mountains. MFWP has not indicated a preference to place their limited resources on

consideration of herd establishment in the Gravelly Mountains. Rather, they are prioritizing management of established herds and consideration of relocations or augmentations in areas of more extensive, connected bighorn sheep habitat.

In summary, the habitat on the BDNF in the Gravelly Mountains where domestic sheep are permitted is not key habitat for bighorn sheep and **MFWP has made no determination that it is where they would reintroduce bighorn sheep.** Nor, is it habitat that the bighorn sheep seek to use based on 13 years of bighorn sheep occupancy of the Greenhorn Mountains. Further, the habitat on the BDNF in the Gravelly Mountains where domestic sheep are permitted is not important from the standpoint of MFWP in expanding the Greenhorn population as sufficient existing habitat in the Greenhorn Mountains exists for expansion. Use by domestic sheep of habitat in the Gravelly Mountains is not restricting use of important habitat by bighorn sheep.

Other Pertinent Information

Vegetation/Soil/Water

The seven sheep allotments within the Gravelly Mountains are located along the central crest of the Gravelly Mountains. The overall appearance of the allotments is open grasslands and sagebrush/grass communities with areas of dense forest. Gentle slopes dominate the crest of the range with steep slopes and cliffs associated with the drainage valleys. Elevations run from 10,500 feet at the top of Black Butte to 7,200 feet at the point Elk River leaves the Lyon-Wolverine allotment.

Area geology is dominated by soft shales and sandstones. The basalt of the old volcanic plug that is Black Butte is the exception. Landforms across the area are a mix of subdued glacial cirque basins dissected by water erosion and mass wasting. Soils that develop from this geology tend to be shallow, stony loams on the ridges and deep silt, sandy and clay loams in swales and basins.

Annual precipitation averages about 30 inches per year on the allotments. The majority of this precipitation is in the form of snow. Snowbanks may persist throughout the summer on lee side of ridges and gully heads at higher elevations. High intensity thunderstorms in summer months are also a major contributor of moisture.

A little less than half of the area within the sheep allotments are open grasslands and sagebrush/grass plant communities. The dominant grassland plant communities classify as Idaho fescue (*Festuca idahoensis*)/ bearded wheatgrass (*Agropyron caninum*) or Idaho fescue/ tufted hairgrass (*Deschampsia cespitosa*) habitat types (Mueggler and Stewart, 1980). Wet meadows found in the allotments generally fit the tufted hairgrass/ Sedge (*Carex spp.*) habitat type. Shrub dominated communities are generally found toward the lower elevations of the allotments. The dominant habitat type here is mountain big sagebrush (*Artemisia tridentate*)/Idaho fescue with a sticky geranium (*Geranium viscosissimum*) phase. The bulk of permitted domestic sheep grazing occurs within these plant communities.

The remainder of the allotments are dominated by forests with small, scattered rock cliff and scree slopes. The dominant tree species found in the area are lodgepole pine (*Pinus contorta*), subalpine fir (*Abies lasiocarpa*) and whitebark pine (*Pinus albicaulis*). In the less dense more open forest communities ground vegetation can be well established. This low vegetation is comprised of various grasses and forb. These areas can be grazed by permitted sheep.

The “once over lightly grazing” that results in a maximum forage use level of 35% is substantially below the generally accepted 50-55% forage use needed to maintain healthy, high vigor plants in a livestock grazing situation. Field reviews over the last few decades have detected no indicators of over use of the vegetation or detrimental soil impacts within the sheep allotments. (Suzuki, personal communication). Species diversity and abundance is as expected for these plant communities – well within the expected potential and natural range of variability of the sites. The most recent reading of long term monitoring plots show high ground cover of litter, good native species coverage and lack of noxious weeds.

Riparian areas found within the allotments are a mix of willow (*Salix spp.*) dominated wet shrub plant communities, wet meadows and forest dominated streams. Due to the nature of domestic sheep they greatly limit grazing within thicker forested areas. Impacts to forested riparian areas has not been observed in the allotments. Within the shrub dominated riparian areas the major habitat types include Geyer willow (*Salix geyeriana*)/beaked sedge (*Carex utriculata*) and wolf's willow (*S. wolfii*)/water sedge (*Carex aquatilis*) (Hanson et al, 1995). Scattered through the allotments are small riparian areas with no shrub or tree overstory and dominated by graminoids. The major plant communities found in these situations include beaked sedge and water sedge habitat types and the Nebraska sedge (*Carex nebrascensis*) community type (Hanson et al, 1995).

Grazing practices required under the grazing permits, AMPs and Annual Operating Instructions greatly limit impacts sheep grazing has within riparian areas. The “once over lightly grazing”, open herding, bedding and salting of sheep away from streams and use of different trailing routes down to water have been effective in reducing impacts in and along streams and wet meadows within the allotments. As noted above, field reviews over the last few decades have found no indicators of over use of the vegetation or detrimental soil or streambank impacts within the sheep allotments. (Suzuki, personal communication). Within riparian areas the species diversity and abundance is as expected for these plant communities – well within the expected potential and natural range of variability for the sites. Plant cover is high and shrub cover continues to increase. The overall unique nature of how sheep graze, along with required grazing practices, greatly reduce livestock impacts in riparian areas.

The following documents were referenced in this section:

Hansen, P.L., R.D. Pfister, K. Boggs, B.J. Cook, J. Joy, and D.K. Hinckley. 1995.

Classification and management of Montana's riparian and wetland sites. Misc. Pub. No. 54, Missoula, MT: The University of Montana, School of Forestry, Montana Forest and Conservation Experiment Station. 646 p.

Muegglar, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. Gen. Tech. Rep. INT-66, Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 154 p.

Current vegetative, soil and riparian conditions on the allotments do not indicate significant environmental impacts from domestic sheep grazing practices as currently permitted through grazing permits, AMPs and Annual Operating Instructions.

Bighorn Sheep Habitat Assessment GIS Analysis

The MFWP has recently begun using, as part of its consideration for any new bighorn sheep reintroductions, a GIS-based landscape analysis to produce a bighorn sheep habitat assessment. The MFWP provided its GIS data files, as updated, to the BDNF along with

MFWP's description of the GIS data files in a document titled "Bighorn Sheep Habitat Assessment GIS Analysis." The MFWP describes its bighorn sheep habitat assessment GIS analysis as follows:

"As part of the bighorn sheep translocation program outlined in the Montana Bighorn Sheep Conservation Strategy (MFWP 2010 pp 59-67), Montana Fish, Wildlife and Parks uses GIS-based landscape analyses for an initial rough characterization of potential habitat available to Bighorn Sheep and an initial estimate, again very rough and preliminary, of how many sheep that habitat could support without considering any other factors.

For Montana FWP programmatic approaches to Bighorn Sheep management please refer to the Conservation Strategy (<http://fwp.mt.gov/fishAndWildlife/management/bighorn/>). Landscape analysis to produce a habitat assessment is an initial coarse-scale evaluation of habitat potential to be considered for any new bighorn sheep reintroductions. It is one of many steps that occur before any reintroduction is considered further. Evaluation of an area does not mean it will proceed through the rest of the required steps, and in no way means that an area is automatically considered for reintroduction. There are 11 criteria that must be met for any proposed site" (MFWP 2010 pp 64-65).

(Bighorn Sheep Habitat Assessment GIS Analysis, Jan. 11, 2017). The MFWP also states that "[t]he GIS products are intended to be information that biologists consider along with their on-the-ground understanding of the area, the 11 criteria in the plan and other considerations, all of which are evaluated following Montana Environmental Policy Act (MEPA) guidelines."

Utilizing the GIS data files provided by the MFWP, the BDNF has overlaid the data on the allotment boundaries producing the map shown as Appendix A.

In reviewing the MFWP modeled bighorn sheep habitat assessment GIS analysis in relation to the BDNF's seven domestic sheep allotments, it can be seen that potential habitat is lacking with poor juxtaposition within the BDNF domestic sheep allotments, with the exception of the Lyon-Wolverine allotment. For the other six allotments, only scattered, small areas of modeled habitat occur within the allotment boundaries. Bighorn sheep, by nature, are relatively social animals that congregate in small herds. As a result, small-sized, scattered habitat does not provide desired, quality habitat for bighorn sheep. For the Lyon-Wolverine allotment, modeled summer habitat (areas within 300 meters of escape cover), modeled escape cover (areas of 60% slope), and modeled lambing winter habitat (escape cover with summer exposure between 90 and 270 degrees aspect) occur within the allotment boundary. This habitat is contiguous with additional modeled habitat occurring east and north of the allotment. However, the modeled lambing winter habitat gives no consideration to documented average snow depths for the Gravelly Mountains as previously described, so seasonal availability (winter to early spring) of this habitat to bighorn sheep is questionable. The modeled habitat also does not consider dense lodgepole pine forests interspersed within the modeled habitat or within close proximity that would limit bighorn sheep movements. The amount of modeled habitat does not appear to be adequate as seasonal habitat components are lacking for sufficient year-around habitat and the modeled habitat is of limited size to support a bighorn sheep herd of 125 individuals.

Other site-specific information must be considered along with the modeled habitat including recent observations by the MFWP area biologist concerning the Greenhorn bighorn sheep herd

and potential for individuals to foray in proximity to BDNF domestic sheep allotments. As previously described, past forays (where management action was taken) from individuals of the Greenhorn bighorn sheep herd extended to the north and west of the translocation site onto both BLM and private lands. Conversations with local MFWP area biologist (Per Comm. D. Waltee of MFWP with J. Bowey, BDNF) have indicated no attempts of individuals of this herd to venture south toward the domestic sheep grazing allotments in the Gravelly Mountains.

In the 13 years since the initial transplant, bighorn sheep have not moved south out of the Greenhorn Mountains and into high elevation areas in the Gravelly Mountains where the domestic sheep allotments are located. Based on conversations with the local MFWP biologist, this has likely not occurred for several reasons. First, sufficient habitat exists in the Greenhorn Mountains to support the population objective of 125 individuals. The 2001 EA estimated sufficient habitat in the Greenhorn Mountains for 150-200 bighorn sheep. While the population is gradually expanding, it remains well below the carrying capacity of available habitat so individuals have not left the area in search of additional habitat.

Second, if individuals were to leave the existing occupied habitat sometime in the future, they would likely move the same direction as the individuals initially leaving the area following the transplants – indicating a preference for travel corridors and habitat to the west and north of the Greenhorn Mountains within high-visibility habitat, and away from BDNF lands and domestic sheep allotments in the Gravelly Mountains. The terrain between the Greenhorn Mountains and the top of the Gravelly Mountains, while frequently meeting the 60%+ slope habitat characteristic, generally lacks occasional rock outcroppings, especially between the Ruby River and the top of the mountain range. In addition, lodgepole pine forests dominate the north facing slopes beginning at Warm Springs Creek and subsequent drainages to the south. These forests do not provide desirable bighorn sheep foraging habitat (grass and shrubs) in the understory and are so dense that visibility for detection and avoidance of predators is limited. The presence of these bands of dense, forested vegetation likely deter southerly movement of individual bighorn sheep.

Other recent observations by the MFWP area biologist concerns the juxtaposition and capacity of ungulate winter range surrounding the Gravelly Mountains. Winter range located east of potential modeled bighorn sheep habitat (MFWP modeled habitat 2012) within and north of the Lyon-Wolverine grazing allotment is largely located in the general vicinity of the Wall Creek State Wildlife Management Area (WMA) and private property in the Madison Valley. While the WMA and private property contains winter range potentially suitable for bighorn sheep, it receives abundant use by wintering elk and deer, approaching the range's carrying capacity for wintering ungulates. In addition, bands of relatively dense lodgepole pine forests occur mid-slope (between the modeled habitat near the grazing allotments and the lower elevation winter range) that would likely deter bighorn sheep movement.

West of the modeled bighorn sheep within the BDNF domestic sheep grazing allotments lies approximately six miles of high elevation open grasslands with virtually no escape terrain for venturing bighorn sheep until reaching the Snowcrest Mountains. However, once reaching the Snowcrest Mountains, suitable winter range is further to the east and once again located on private, BLM, and State lands (Blacktail State WMA and Robb Ledford State WMA) where wintering ungulate presence is again, likely approaching capacity.

Similarly, to the south of BDNF domestic sheep allotments in the Gravelly Landscape, little escape terrain for bighorn sheep exists leaving them vulnerable during travel and wintering.

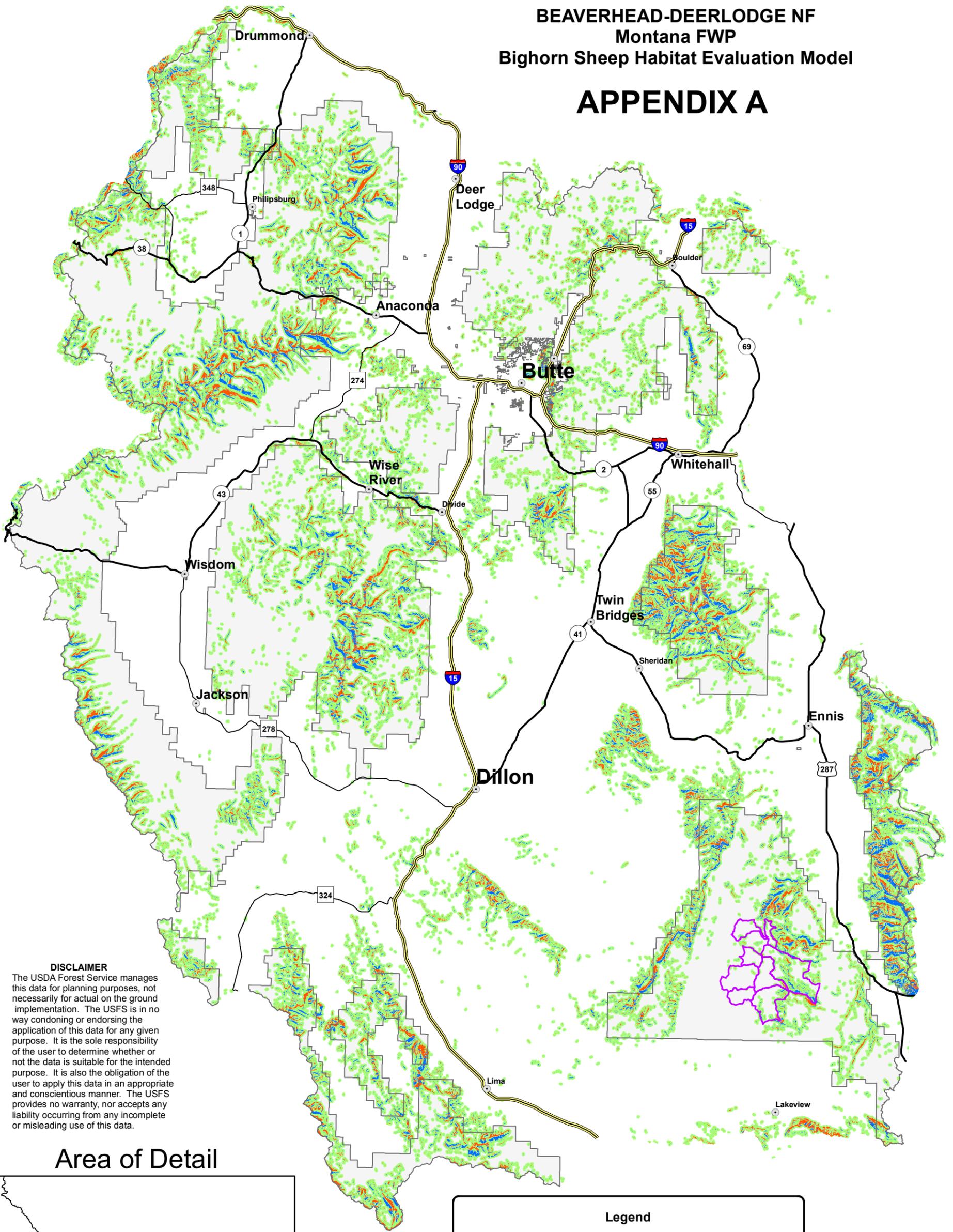
Also, the presence of the U.S. Sheep Experiment Station on the south end of the Centennial Valley serves as an additional vulnerability for bighorn sheep due to comingling and therefore risk of disease. Private lands are also in the Centennial Valley where other venues of domestic sheep may exist in domestic herds provides additional opportunities for risk of contact between the species and limited connected bighorn sheep habitat to serve as travel corridors.

In summary, agency managers would be required to take an extensive look before relocating bighorn sheep into the Gravelly Mountains if the BDNF domestic sheep allotments were vacated. Proximity to domestic sheep is only one factor in establishing a new bighorn sheep herd. The MFWP modeled habitat shows that there is limited bighorn sheep habitat on the BDNF domestic sheep allotments and on-the-ground understanding of the area puts in question the connectivity and availability of seasonal habitat due to snow depth and vegetative communities. Further in expanding upon additional considerations that are part of any MFWP reintroduction of bighorn sheep, MFWP cautioned that just because an area was historic habitat does not mean it is suitable bighorn sheep habitat now. A lot has changed on the landscape in the past 100 plus years. For example, much of what had been suitable winter range is no longer bighorn sheep winter range due to conifer encroachment on open hillsides. MFWP biologists consider a variety of factors beyond just the presence of historic habitat when determining if an area is truly suitable to provide year-round habitat for a viable herd (MFWP, J.Vore email, January 2017). There is no indication MFWP would prioritize a commitment of their resources to establish a new bighorn sheep herd in the Gravelly Mountains given the juxtaposition, quantity, quality and availability of seasonal habitat and use of wintering habitat by other wild ungulate herds. Rather, it is far more likely MFWP will continue prioritizing the management and possible expansion of existing herds and consideration of translocations elsewhere in Montana where seasonal habitats are more extensive.

Appendix A

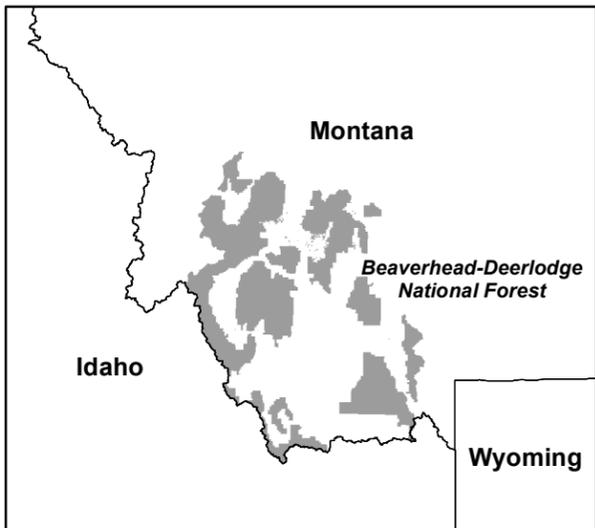
**BEAVERHEAD-DEERLODGE NF
Montana FWP
Bighorn Sheep Habitat Evaluation Model**

APPENDIX A



DISCLAIMER
The USDA Forest Service manages this data for planning purposes, not necessarily for actual on the ground implementation. The USFS is in no way condoning or endorsing the application of this data for any given purpose. It is the sole responsibility of the user to determine whether or not the data is suitable for the intended purpose. It is also the obligation of the user to apply this data in an appropriate and conscientious manner. The USFS provides no warranty, nor accepts any liability occurring from any incomplete or misleading use of this data.

Area of Detail



Legend

- Beaverhead-Deerlodge NF Boundary
- Permitted Sheep Allotments

Modeled Bighorn Sheep Habitat Class

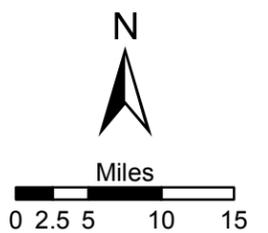
- Summer
- Escape_LambingWinter
- Escape_Other

Data Source:
Montana Fish, Wildlife & Parks
2010 Bighorn Sheep Conservation Strategy

This layer is for use in the determination of habitat characteristics for assessment of potential translocation sites.

Note: These data primarily represent escape cover and do not include landcover characteristics, including forest cover.

Additional characteristics, beyond those included in this model, should be evaluated by site specific assessments by trained biologists to determine the validity of this model.



MT FWP Bighorn Sheep Habitat Evaluation Model - Use limitations

INTERNAL USE ONLY: Data is considered draft until evaluated for site specific application by a MFWP area biologist.

Completed mediated data request form is needed to release data for use outside of FWP. Contact FWP's Data Services at FWPMediatedDataRequest@mt.gov for a mediated request form. These data are subject to change without notice. Do not distribute data to second parties. Users must assume responsibility to determine the usability of this data for their purposes. This data set is provided "as is" without warranty of any kind. Montana Fish, Wildlife and Parks (FWP) makes no representations or warranties whatsoever with respect to the accuracy or completeness of this data set and assumes no responsibility for the suitability of this data set for a particular purpose. FWP will not be liable for any damages incurred as a result of errors in this data set.

Beaverhead-Deerlodge NF
1/13/2017

Map Requested By: J. Bowey
Map Created By: S. Kujala

This map replaces all versions of same title printed with prior dates.

Map PDF Location:
T:\FS\FWS\BeaverheadDeerlodge\Program\1900Planning\GIS\SEIS_BighornSheep\Product\Maps\11x17_MFWP_BH_HabitatAnalysis_011317

Map MXD Location:
T:\FS\FWS\BeaverheadDeerlodge\Program\1900Planning\GIS\SEIS_BighornSheep\MXD\MFWP_BighornSheepHabModel_011317.mxd

Bighorn Sheep Habitat Assessment GIS Analysis

Adam Messer and John Vore, MFWP, January 11, 2017

As part of the bighorn sheep translocation program outlined in the Montana Bighorn Sheep Conservation Strategy (MFWP 2010 pp 59-67), Montana Fish, Wildlife and Parks uses GIS-based landscape analyses for an initial rough characterization of potential habitat available to Bighorn Sheep and an initial estimate, again very rough and preliminary, of how many sheep that habitat could support without considering any other factors.

For Montana FWP programmatic approaches to Bighorn Sheep management please refer to the Conservation Strategy (<http://fwp.mt.gov/fishAndWildlife/management/bighorn/>). Landscape analysis to produce a habitat assessment is an initial coarse-scale evaluation of habitat potential to be considered for any new bighorn sheep reintroductions. It is one of many steps that occur before any reintroduction is considered further. Evaluation of an area does not mean it will proceed through the rest of the required steps, and in no way means that an area is automatically considered for reintroduction. There are 11 criteria that must be met for any proposed site (MFWP 2010 pp 64-65). For example, the considerations for keeping wild populations separated from domestic sheep, and the considering the locations of existing wild sheep herds when planning a reintroduction are not part of the preliminary habitat assessment products. In addition to the 11 criteria mentioned above there are other fundamental considerations. Among others, the Strategy says (p 42), “While connecting existing populations with new populations ... is desirable to improve genetic flow, this should not occur if the potential for disease transmission exists ...**the protection of the integrity and health of existing populations and metapopulations has to be the first priority** ... as opposed to creating new metapopulations.”

This current document is meant to outline, and assist in the interpretation of, the products of the preliminary habitat analyses. The GIS products are intended to be information that biologists consider along with their on-the-ground understanding of the area, the 11 criteria in the plan and other considerations, all of which are evaluated following Montana Environmental Policy Act (MEPA) guidelines. The GIS analyses depend upon current available knowledge and data to represent habitat relationships and corresponding population characteristics of Bighorn Sheep. Both existing knowledge and data available to apply that knowledge are imperfect and subject to refinement and improvement. As such, these products should not be interpreted without an understanding of the limitations of the data, and assumptions made in applying current knowledge, both of which require consultation with a biologist familiar with these analyses. See data considerations notes below.

The following components are typically part of a suite of data provided to the biologists for consideration. Not all components are produced for every evaluation.

Images:

- Habitat Analysis – Defined on page 62 of conservation strategy
 - Escape Cover – Area of 60% (27 degrees) slope (GIS Code 2)
 - Lambing Winter Habitat – Escape cover with Southern exposure (90-270 degrees) (GIS Code 3)

- Summer Habitat – Areas within 300 meters of all Escape cover (GIS Code 1)
- Analysis Area (not in other habitats) – All other areas in the analysis area not contained within one of the above 3 habitat types. (GIS Code 0)
- Habitat Suitability Model – Model analysis output showing relative habitat suitability of area.
 - This analysis uses Maxent to compare Bighorn Sheep observed locations to available habitat characteristics to determine the relative suitability of the habitat. Separate models generated for East and West MT. Analysis is questionable due to biases inherent in the positive locations used to generate maxent models, view with caution.
- Reference Map – Background reference map of analysis area.
- Land cover – Montana land cover classifications of analysis area from the Montana Spatial Data Infrastructure landcover layer.

Habitat Calculations Spreadsheet:

- See descriptions of Habitat types above.
- Land Cover Class Table
 - Breakdown in Square Kilometers of each land cover class within each habitat class
- Population Supported
 - ALL Landcover
 - List Sq. Km of Habitat on first line
 - Remaining lines list populations supported within each habitat type at two published densities reflecting potential Montana habitats
 - Lambing and Winter habitat population estimates are based upon the densities listed for supporting a Minimum Viable Population
 - NON-FORESTED Landcover
 - Same as ALL Landcover – without the Forest and Woodland land cover class
 - Assumption is that the majority of Bighorn Sheep habitat use occurs outside of forested habitat. Thus the potential population estimates are more likely reflected in this table

Specifications from Conservation Strategy:

- This lists the area required to support Sheep during summer, winter and lambing seasons at a Minimum Viable Population (MVP) size of 125 animals.

Data Layer Considerations:

- Montana Landcover
- All Landcover calculations are made using REGAP ecological systems. from the Montana Spatial Data Infrastructure landcover layer.
 - 90 Meter Resolution
 - Mapping accuracy of each ecological system are not currently reported
 - Forest / Non-forest calculations may not be accurate – compare with existing knowledge of the area
 - These data reflect landcover at time imagery was acquired, data may change over time due to landscape changes such as fire.
- Habitat Area Calculations (Escape, Winter & Lambing, Summer)
 - A minimum size of 2 hectares was required for inclusion in analysis
 - Winter Habitat is not distinguished separately from Lambing Habitat, due to inability to effectively estimate current spatial snowpack characteristics

- Note several references indicate areas should be within 1000m of water. Water is assumed to not be limiting in this analysis, as most areas meet this characteristic. Be cautious if your area has water limitations.
- Population Estimates
 - Keep in mind that if your area assessed is very broad, such as an entire mountain range the population estimates will likely be very large as it assumes saturation of ALL habitats at the given density. More often than not the area will include many separate areas not all of which will be used by the population at a given time. Refer to the density publications to assist in correct interpretation and application of the density estimates.
 - Analyses can easily be rerun for a smaller likely area within a broader area after the initial assessment.

Literature Cited

Montana Fish, Wildlife and Parks (MFWP). 2010. Montana Bighorn Sheep Conservation Strategy. Montana Fish, Wildlife and Parks, Helena, Montana.

Appendix B

From: Waltee, Dean [mailto:DWaltee@mt.gov]

Sent: Monday, April 11, 2016 4:18 PM

To: Aaron Paulson <[redacted]>; Abby Dennis <editor@madisoniannews.com>; Allen Schallenger <[redacted]>; Bart Story <[redacted]>; Bill Allen <[redacted]>; bill_west@fws.gov; Bob Neary <[redacted]>; Bobby Sutton <[redacted]>; Charlie McCarthy <[redacted]>; Chuck Bowey <[redacted]>; Colton Barnosky <[redacted]>; Dan Crismore <[redacted]>; Durham, Daniel - NRCS, Sheridan, MT <Daniel.Durham@mt.usda.gov>; Dan Kenworthy <[redacted]>; Dan Vermillion <[redacted]>; Dave Delisi <[redacted]>; Dave Dixon <[redacted]>; David Farmer <david_m_farmer@fws.gov>; Dennis Smith <[redacted]>; DNRC Ruby Valley CD <rvcd@3rivers.net>; Doc Buehler <[redacted]>; Don Drake <[redacted]>; Donna McDonald <[redacted]>; Doug Reedy <[redacted]>; Ed Duda <[redacted]>; Ed Malesich <[redacted]>; Erwin Clark <[redacted]>; Fred King <[redacted]>; Glenn Hockett <[redacted]>; Ash, Gordon -FS <gash@fs.fed.us>; Grant Godbolt <[redacted]>; Harold Johns <[redacted]>; Hilary Anderson <[redacted]>; Jack Atcheson <[redacted]>; Jackie Vann <jackie_vann@fws.gov>; Jake Barnosky <[redacted]>; Jared Brown <[redacted]>; Jeff Welborn <[redacted]>; Roose, Jenna M -FS <jmroose@fs.fed.us>; Jim Ludwick <[redacted]>; Joe Perry <[redacted]>; John Anderson <[redacted]>; John Cargill <[redacted]>; John Detton <[redacted]>; John Helle <[redacted]>; Kara Maplethorpe <communityorg@centennialvalleyassociation.org>; Katie Benzel <kbenzel@blm.gov>; Kelly Bockting <kbocktin@blm.gov>; Kirt Mayson <[redacted]>; Kurt Alt <[redacted]>; Kyle Hardin <[redacted]>; Lauren Bleck <[redacted]>; Leonard Costa <[redacted]>; Les Castren <[redacted]>; Les Gilman <[redacted]>; Linda Rebich <[redacted]>; Logan Miller <[redacted]>; Madison County Commissioners <madco@madison.mt.gov>; Mark Clark <[redacted]>; Mark Savinsky <[redacted]>; Marshall Johnson <marshall@muledeer.org>; Michael Kuiper <mkuiper@muledeer.org>; Mike Dvorak <[redacted]>; Mike Krzan <[redacted]>; Nathan Korb <nkorb@TNC.ORG>; Neil Barnosky <[redacted]>; Nick Gevock <ngevock@mtwf.org>; Pat Lewis <[redacted]>; Pat Mckenna <[redacted]>; Paul Olsen <[redacted]>; Race King <[redacted]>; Rauscher, Ryan <[redacted]>; Ray Gross <[redacted]>; Ray King <[redacted]>; Ray Marxer <[redacted]>; Ray Shaw <[redacted]>; Rebecca Ramsey <rubywatershed@gmail.com>; Reed Rowberry <[redacted]>; Rick Douglass <RDouglass@mtech.edu>; Rick Sandru <[redacted]>; Robert Simpson <[redacted]>; Sam Milodragovich <[redacted]>; Scott Huntsman <[redacted]>; Steve Jennings <[redacted]>; Steve Sherman <[redacted]>; Throop, Trevor <TThroop@mt.gov>; Tim Mulligan <[redacted]>; Todd Nelson <[redacted]>; Todd Throop <throop@bresnan.net>; Tom Grimes <[redacted]>; Vito Quatraro <[redacted]>; Windy Davis <windy.davis@idfg.idaho.gov>; Yvonne Martinell <mattie@3rivers.net>; FWP *Wildlife R3 <FWPR3Wild@mt.gov>; Brozovich, Shane <sbrozovich@mt.gov>; Dawson, Bill <BDawson@mt.gov>; Picken, Ryan <RPicken@mt.gov>; Schmauch, Rick <RSchmauch@mt.gov>; Smolczynski, Jim <JSmolczynski@mt.gov>; Wahl, Kerry <Kewahl@mt.gov>

Cc: Vore, John <jvore@mt.gov>; qkujala@mt.gov

Subject: Greenhorn Bighorn Sheep Survey Summary

Folks,

Over the past year, I kept track of all Greenhorn bighorn sheep observations I made or others reported to me. I ask every hunter that passes through my check-station in Alder (annual mean = 902) about big horn sheep observations. Hunters coming through this check-station provide information from a large percentage of the Ruby River Watershed annually – especially the public land portions. I also spent several days in February and March searching for and classifying big horn sheep. This information allows me to track minimum known distribution, minimum known population, and population vital rates.

Since May 2015, I documented 51 bighorn observations. The attached map titled May2015-April 2016 shows the distribution of those observations. The map titled October2013-April2016 shows the distribution of all bighorn observations I have documented since taking over as the area biologist. With the exception of no observations in Sweetwater Creek to date, this distribution is very similar to the distribution documented from radio collared sheep from 2003 through 2009.

From these observations, I come up with a minimum of 48 bighorn sheep present during this past fall and winter. This compares to a minimum of 59 documented last year, and an annual average of 36. Because of the difficult detectability of bighorn sheep across much of this area, I hesitate to say that the population has declined from last year. We could have easily missed a group of sheep that we observed last year. Because of the potential detection error from year to year, I believe the best way to track this population trend will be through a 3-year running average. Without data from 2010 through 2014, it is difficult to use this method to make any inferences for another couple of years. Relative to the end of the 2003 through 2009 survey effort, the minimum population has increased.

During February and March, I classified 39 bighorn sheep, including 20 ewes, 6 lambs, 3 yearling rams, and 10 adult rams. The observed lamb: ewe ratio was 30: 100 – 32% lower than last year (44: 100) and 33% below the annual average (45: 100). The observed ram: ewe ratio was 65:100 – 16% higher than last year (56: 100) and 8% above the annual average (60: 100). The observed yearling ram: ewe ratio was 15: 100 – 150% higher than last year (6:100) and 33% higher than the two-year average (10: 100). The adult ram: ewe ratio was 50: 100 = equal to last year and the two-year average. Of the adult rams observed, 69% met the classification as legal by harvest standards. The lower ewe: lamb ratio could be the product of a higher yearling ewe presence, as suggested by an increased yearling ram: ewe ratio. It could also be the product of harsh winter conditions, or increased predation, or a combination of all.

The criteria for establishment of a hunting season for this herd, as defined by the Montana Bighorn Sheep Conservation Strategy, is that at least three of the following four criteria be met for a minimum of three consecutive years:

- 1) The population is at least 75 observable sheep;
- 2) There are at least 30 rams: 100 ewes;
- 3) More than 30% of the rams are at least 3/4 –curl;
- 4) There are at least 30 lambs: 100 ewes;

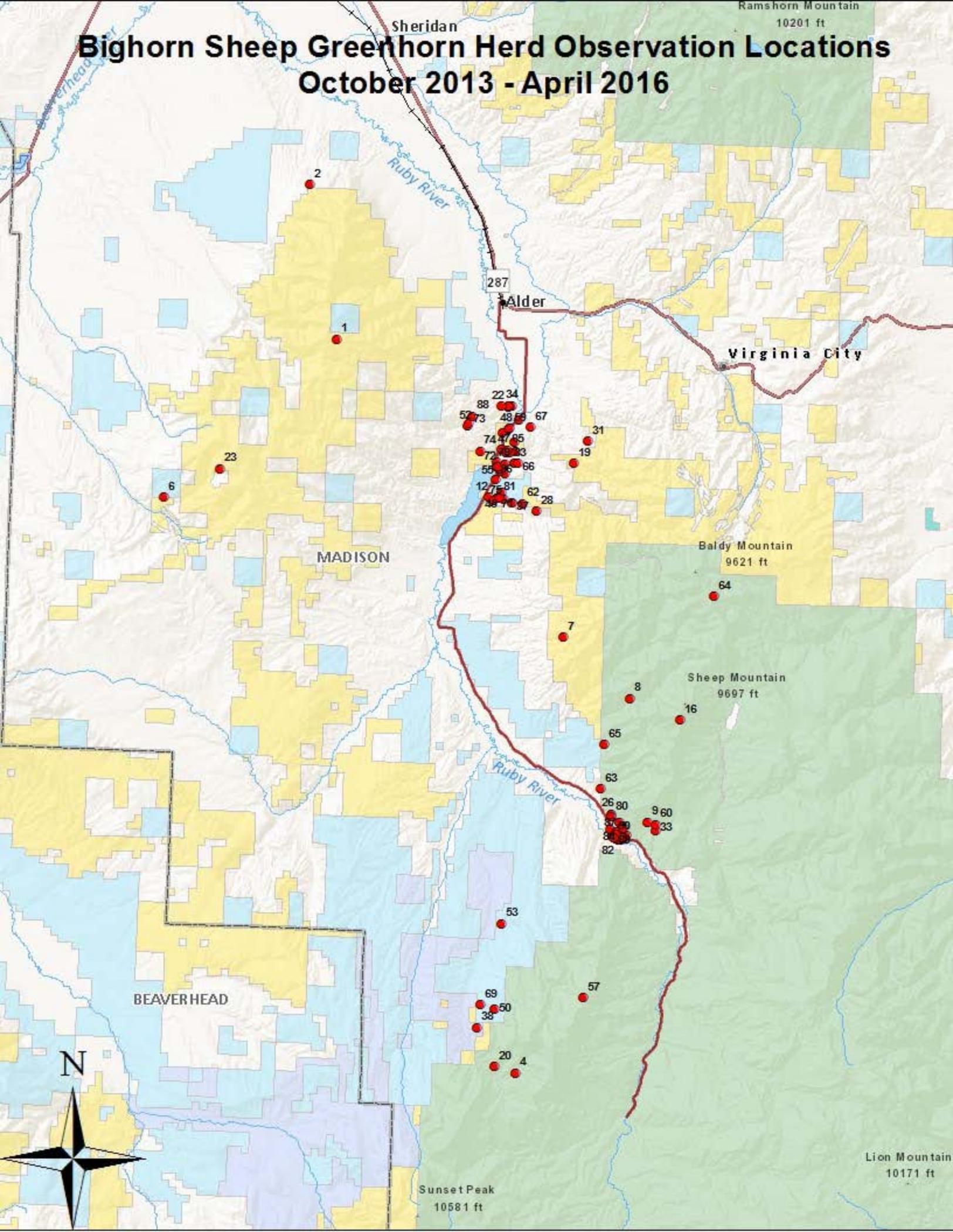
Based on monitoring efforts, the Greenhorn herd has met criteria 2, 3, and 4 during each of the last two years. I will monitor this herd again throughout the next year. If at least three of the four criteria are met for a third consecutive year, I will initiate discussion on proposing a limited legal ram harvest opportunity during the biennial season setting process, following the 2017 hunting seasons. If proposed and adopted by the Commission, this would mean a harvest opportunity during the fall of 2018. If you happen across any bighorn observations within the Ruby Watershed, I would greatly appreciate you documenting the date, location, and number/classification, and passing along to me. In addition to monitoring these bighorns, I will continue to coordinate with the USFS and the BLM on several ongoing habitat enhancement projects that would be beneficial to this bighorn herd.

As always, if you have any questions about these efforts or would like to discuss management of this bighorn herd, please feel free to contact me.

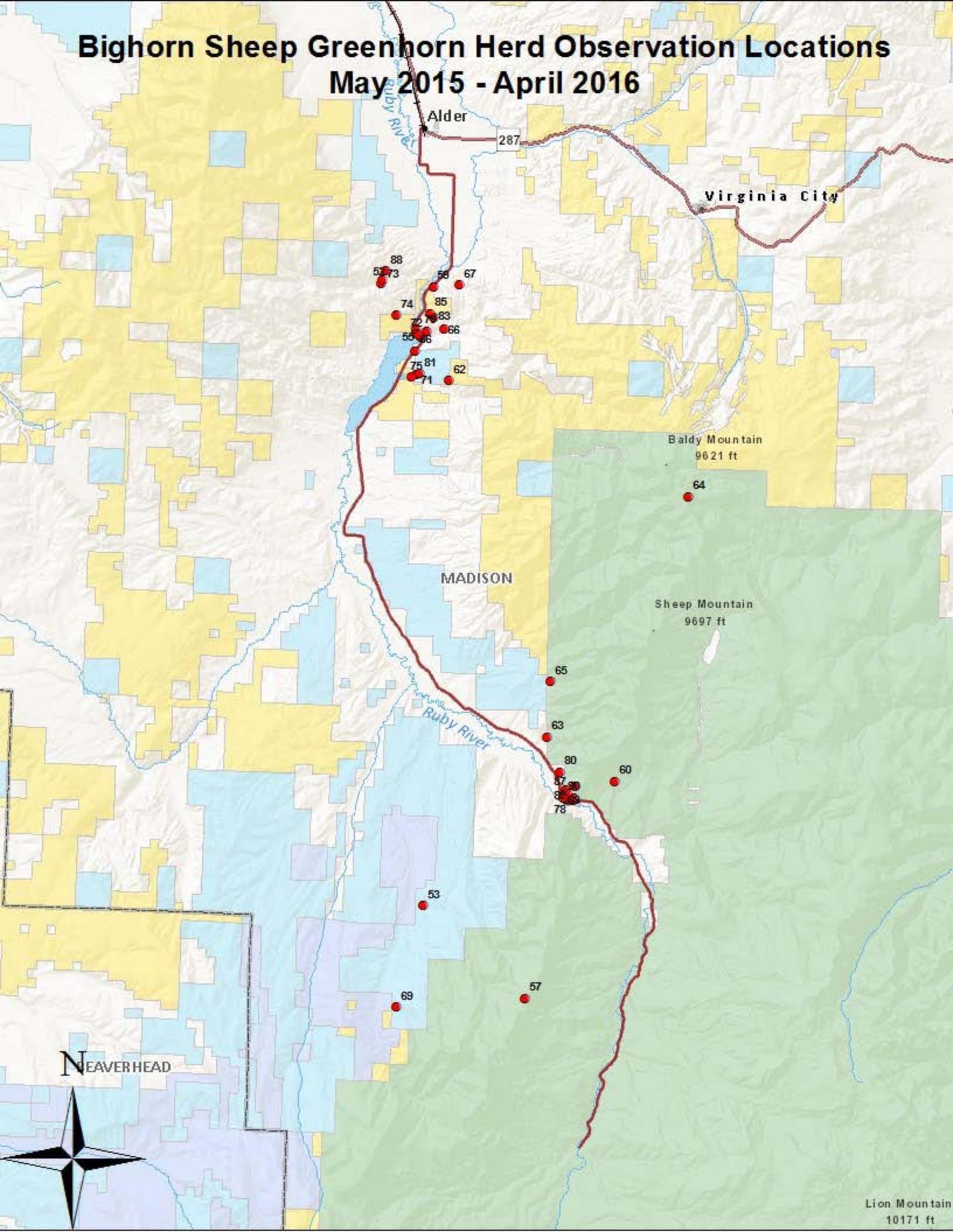
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Bighorn Sheep Greenhorn Herd Observation Locations October 2013 - April 2016



Bighorn Sheep Greenhorn Herd Observation Locations May 2015 - April 2016



ident	type	area	month	day	year	species	ewes	lambs	rams	adult rams	yearling Rams	unclass	total	observer	comments
1	waypoint	Head of Hinch Creek	November	na	2013	big horn sheep	3	1	0	0	0	0	4	BLM Fisheries Biologist	Reported by BLM Wildlife Biologist, Katie Benzel.
2	waypoint	Morse Land	November	19	2013	big horn sheep	0	0	1	1	0	0	1	Chuck Bowey	Photo captured by a trail camera.
3	waypoint	Snowcrest Mountains	October	27	2013	big horn sheep	1	0	0	0	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
4	waypoint	Devils Hole	October	27	2013	big horn sheep	na	na	na	na	0	3	3	hunter	Reported by a hunter at the Alder Check-Station.
5	waypoint	Green Horn Mountains	November	9	2013	big horn sheep	na	na	na	na	0	1	1	hunter	Reported by a hunter at the Alder Check-Station.
6	waypoint	Stone Creek	November	10	2013	big horn sheep	1	0	0	0	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
7	waypoint	Jasmine Creek	November	10	2013	big horn sheep	0	0	1	na	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
8	waypoint	South Fork of Green Horn Creek	November	10	2013	big horn sheep	0	0	1	na	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
9	waypoint	Timber Creek	November	5	2013	big horn sheep	na	na	na	na	0	3	3	Dean Waltee	Observed while hunting.
10	waypoint	Ruby Reservoir Dam	February	1	2014	big horn sheep	2	1	1	na	0	0	4	Marty Petritz	Observed while traveling home from fishing.
11	waypoint	Upper Canyon Ranch	February	20	2014	big horn sheep	2	1	6	6	0	0	9	Bobby Sutton	Observed while scouting the country.
12	waypoint	Barton/Ruby Rd Intersection	January	1	2014	big horn sheep	3	0	1	1	0	0	4	Bobby Sutton	Observed while scouting the country.
13	waypoint	Upper Canyon Ranch	February	26	2014	big horn sheep	1	0	1	0	0	0	2	Dean Waltee	Observed while scouting the country.
14	waypoint	Ruby Reservoir Dam	May	18	2014	big horn sheep	5	0	0	0	0	0	5	Dean Waltee	Observed from highway.
15	waypoint	Upper Canyon Ranch	June	3	2014	big horn sheep	1	0	1	1	0	0	2	Dean Waltee	Observed from Upper Canyon Ranch.
16	waypoint	Sheep Mountain	August	27	2014	big horn sheep	0	0	3	3	0	0	3	Dean Waltee	Observed while surveying for Mountain goats.
17	waypoint	Ruby Reservoir Dam	September	16	2014	big horn sheep	3	2	0	0	0	0	5	BLM Wildlife Biologist Kelly Bocking	Observed while driving along highway.
18	waypoint	Mouth of Hinch Creek	October	11	2014	big horn sheep	2	2	0	0	0	0	4	Tom Bowler	Observed while taking photos.
19	waypoint	Davey Creek	October	26	2014	big horn sheep	6	0	0	0	0	0	6	hunter	Reported by a hunter at the Alder Check-Station.
20	waypoint	Upper Ledford Creek	October	26	2014	big horn sheep	0	0	1	na	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
21	waypoint	Mouth of Hinch Creek	November	11	2014	big horn sheep	3	0	0	0	0	0	3	hunter	Reported by a hunter at the Alder Check-Station.
22	waypoint	Mouth of Hinch Creek	November	8	2014	big horn sheep	3	0	0	0	0	0	3	hunter	Reported by a hunter at the Alder Check-Station.
23	waypoint	Stone/Cottonwood Creek Divide	November	9	2014	big horn sheep	1	0	0	0	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
24	waypoint	Upper Canyon Ranch	November	9	2014	big horn sheep	0	0	1	na	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
25	waypoint	Vigilante FAS	November	9	2014	big horn sheep	na	na	1	na	0	7	8	hunter	Reported by a hunter at the Alder Check-Station.
26	waypoint	Tate's Upper Canyon	November	29	2014	big horn sheep	na	na	5	na	0	15	20	hunter	Reported by a hunter at the Alder Check-Station.
27	waypoint	Vigilante FAS	November	29	2014	big horn sheep	na	na	1	na	0	6	7	hunter	Reported by a hunter at the Alder Check-Station.
28	waypoint	Barton Gulch	November	29	2014	big horn sheep	na	na	na	na	0	3	3	hunter	Reported by a hunter at the Alder Check-Station.
29	waypoint	Davey Creek	November	29	2014	big horn sheep	0	0	1	na	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
30	waypoint	BLM Just north of Ruby Dam	November	30	2014	big horn sheep	6	0	1	na	0	0	7	hunter	Reported by a hunter at the Alder Check-Station.
31	waypoint	Vigilante FAS	November	30	2014	big horn sheep	na	na	na	na	0	4	4	hunter	Reported by a hunter at the Alder Check-Station.
32	waypoint	Tate's Upper Canyon	November	30	2014	big horn sheep	na	na	na	na	0	30	30	hunter	Reported by a hunter at the Alder Check-Station.
33	waypoint	Timber Creek	November	30	2014	big horn sheep	0	0	1	1	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
34	waypoint	Mouth of Hinch Creek	December	6	2014	big horn sheep	4	2	0	0	0	0	6	Tom Bowler	Observed while taking photos.
35	waypoint	Upper Canyon Ranch	December	19	2014	big horn sheep	2	2	5	4	0	0	9	Dean Waltee	Observed while traveling to the Upper Ruby.
36	waypoint	Lower Barton Gulch	December	20	2014	big horn sheep	na	na	1	1	0	15	16	Tim Rose	Unclassified were all ewes and lambs. Observed while checking trapps.
37	waypoint	Lower Barton Gulch	January	1	2015	big horn sheep	7	3	1	na	0	0	11	Tim Rose	Observed while checking trapps.
38	waypoint	Upper Ledford Creek	January	1	2015	big horn sheep	2	0	2	1	0	0	4	Dean Waltee	Observed while completing a winter mule deer survey.
39	waypoint	Ruby Reservoir Dam	January	18	2015	big horn sheep	3	3	1	1	0	0	7	Dan Durham	Observed while ice fishing.
40	waypoint	Between Davey and Barton Gulch	January	18	2015	big horn sheep	4	0	0	0	0	0	4	Dan Durham	Observed while hiking. All were adults.
41	waypoint	Just northeast of the Ruby Dam	February	13	2015	big horn sheep	0	0	1	1	0	0	1	Dean Waltee	Observed while completing a winter elk survey.
42	waypoint	Upper Canyon	February	13	2015	big horn sheep	3	1	0	0	0	0	4	Dean Waltee	Observed while completing a winter elk survey.
43	waypoint	Upper Canyon	February	14	2015	big horn sheep	0	0	4	4	0	0	4	Dean Waltee	Observed while looking for sheep.
44	waypoint	Upper Canyon	February	14	2015	big horn sheep	6	4	0	0	0	0	10	Dean Waltee	Observed while looking for sheep.
45	waypoint	Lower Barton Gulch	February	14	2015	big horn sheep	3	0	0	0	0	0	3	Dean Waltee	Observed while looking for sheep.
46	waypoint	Ruby Reservoir Dam	February	14	2015	big horn sheep	3	3	0	0	0	0	6	Dean Waltee	Observed while looking for sheep.
47	waypoint	Below Ruby Reservoir Dam	February	19	2015	big horn sheep	7	3	0	0	0	0	10	Dean Waltee	Observed while looking for sheep.
48	waypoint	Above Vigilant FAS	February	22	2015	big horn sheep	7	3	0	0	0	0	10	Erwin Clark	Observed while traveling the highway.
49	waypoint	Upper Canyon	March	27	2015	big horn sheep	0	0	4	4	0	0	4	Art Hall	Observed while traveling the county road.
50	waypoint	Snowslide Creek	March	27	2015	big horn sheep	1	1	4	3	0	0	6	Dean Waltee	Observed while completing a aerial mule deer survey.
51	waypoint	Ruby Reservoir Dam	May	15	2015	big horn sheep	5	1	0	na	0	0	6	Tom Bowler	Observed while taking photos.
52	waypoint	Hinch Creek	May	15	2015	big horn sheep	0	0	1	1	0	0	1	Tom Bowler	Observed while taking photos.
53	waypoint	Robb-Ledford Battle Pasture	May	30	2015	big horn sheep	0	0	1	1	0	0	1	Dean Waltee	
54	waypoint	Ruby Reservoir Dam	August	13	2015	big horn sheep	2	0	0	0	0	0	2	MFWP Game Warden Kerry Wahl	Observed while traveling out of the Ruby.
55	waypoint	Ruby Reservoir Dam	August	19	2015	big horn sheep	3	2	0	0	0	0	5	Glenn Hockett	One lamb had a noticable limp.
56	waypoint	Upper Canyon	October	9	2015	big horn sheep	0	0	3	2	0	0	3	Marty Petritz	Observed while traveling to the Upper Ruby.
57	waypoint	Sliderock Mountain	October	5	2015	big horn sheep	1	0	1	1	0	0	2	Dean Waltee	Observed while completing a mountain goat survey.
58	waypoint	Upper Canyon	November	7	2015	big horn sheep	8	4	2	2	0	0	14	hunter	Reported by a hunter at the Alder Check-Station.
59	waypoint	Vigilante FAS	November	7	2015	big horn sheep	4	0	0	0	0	0	4	hunter	Reported by a hunter at the Alder Check-Station.
60	waypoint	Timber Creek	October	25	2015	big horn sheep	1	0	2	na	0	0	3	hunter	Reported by a hunter at the Alder Check-Station.
61	waypoint	Cream Creek	October	25	2015	big horn sheep	0	0	1	na	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
62	waypoint	Barton Gulch	October	24	2015	big horn sheep	na	na	0	0	0	15	15	hunter	Reported by a hunter at the Alder Check-Station.
63	waypoint	Ice Creek	November	5	2015	big horn sheep	0	0	2	na	0	0	2	hunter	Reported by a hunter at the Alder Check-Station.
64	waypoint	Head of Wigwam Creek	October	24	2015	big horn sheep	0	0	2	na	0	0	2	hunter	Reported by a hunter at the Alder Check-Station.
65	waypoint	Willow Creek	November	7	2015	big horn sheep	0	0	1	na	0	0	1	hunter	Reported by a hunter at the Alder Check-Station.
66	waypoint	Davey Creek	November	8	2015	big horn sheep	2	0	0	0	0	0	2	hunter	Reported by a hunter at the Alder Check-Station.
67	waypoint	Dry Hallow	November	14	2015	big horn sheep	5	0	1	1	0	0	6	MFWP Fisheries Tech Lucas Bateman	Observed while hunting.
68	waypoint	Lone Rock Creek	November	29	2015	big horn sheep	0	4	4	na	0	0	4	Brad Sauer	observed while hunting.
69	waypoint	Snowslide Creek	November	26	2015	big horn sheep	2	0	5	na	0	0	7	Tom Hardesty	observed while hunting.
70	waypoint	Powder Gulch	November	28	2015	big horn sheep	8	1	3	na	0	0	12	hunter	Reported by a hunter at the Alder Check-Station.
71	waypoint	Barton Gulch	November	29	2015	big horn sheep	4	0	0	0	0	0	4	hunter	Reported by a hunter at the Alder Check-Station.
72	waypoint	Ruby Reservoir Dam	November	29	2015	big horn sheep	na	na	na	na	na	5	5	hunter	Reported by a hunter at the Alder Check-Station.
73	waypoint	Hinch Creek	December	11	2015	big horn sheep	3	0	1	0	1	0	4	Tom Bowler	the ram was a yearling.
74	waypoint	Ruby Reservoir Dam	November	19	2015	big horn sheep	0	0	1	1	0	0	1	BLM staff Joe Sampson	the ram was about 1/2 curl.
75	waypoint	Barton Gulch	December	29	2015	big horn sheep	0	0	1	1	0	0	1	Tim Rose	the ram was missing its left horn.
76	waypoint	Upper Canyon	February	1	2016	big horn sheep	0	0	4	4	0	0	4	Dean Waltee	Observed while searching for bighorns.
77	waypoint	Upper Canyon	February	1	2016	big horn sheep	4	3	1	0	1	0	8	Dean Waltee	Observed while searching for bighorns.
78	waypoint	Upper Canyon	February	1	2016	big horn sheep	5	0	0	0	0	0	5	Dean Waltee	Observed while searching for bighorns.
79	waypoint	Davey Creek	February	3	2016	big horn sheep	3	0	1	0	1	0	4	Dean Waltee	yearling ram: observed while completing an aerial elk survey.
80	waypoint	Upper Canyon	February	3	2016	big horn sheep	4	1	1	1	0	1	4	Dean Waltee	1 yearling ram; observed while completing an aerial elk survey.
81	waypoint	Barton Gulch	February	19	2016	big horn sheep	3	0	2	0	2	0	5	Dean Waltee	Observed while searching for bighorns.
82	waypoint	Upper Canyon	February	27	2016	big horn sheep	1	1	1	0	1	0	4	Dean Waltee	Observed while searching for bighorns.
83	waypoint	Below Ruby Reservoir Dam	February	27	2016	big horn sheep	0	0	2	2	0	0	2	Dean Waltee	Observed while searching for bighorns.
84	waypoint	Upper Canyon	February	27	2016	big horn sheep	0	0	1	1	0	0	1	Dean Waltee	Observed while searching for bighorns.
85	waypoint	Below Ruby Reservoir Dam	February	27	2016	big horn sheep	5	0	2	0	2	0	7	Dean Waltee	Observed while searching for bighorns.
86	waypoint	Between Dam and Barton on HW	March	4	2016	big horn sheep	5	0	0	0	0	0	5	Tom Bowler	Sheep were on the highway licking salt.
87	waypoint	Upper Canyon	March	5	2016	big horn sheep	5	1	7	6	1	0	13	Dean Waltee	Observed while searching for bighorns.
88	waypoint	Hinch Creek	March	9	2016	big horn sheep	2	0	0	0	0	0	2	Dean Waltee	Observed while searching for bighorns.
89															

Year	Date	**Ewes	**Lambs	**Total Rams	**Yearling Rams	**Adult Rams	**Legal Rams	Unclassified	*Total	3-year Running Avg	Lambs:100 Ewes	Rams:100 Ewes	Yrlg Rams:100 Ewes	Adlt Rams: 100 ewes	% Legal Rams	Notes	Total Includes
2003	June	22	14	na	na	na	na	0	36	na	64	na	na	na	na	Radio Collar Relocation Observations	
2004	June	35	24	na	na	na	na	0	59	na	69	na	na	na	na	Radio Collar Relocation Observations	
2005	June	23	12	na	na	na	na	0	35	43	52	na	na	na	na	Radio Collar Relocation Observations	
2006	June	20	17	na	na	na	na	0	37	44	85	na	na	na	na	Radio Collar Relocation Observations	
2007	June	12	5	na	na	na	na	0	17	30	42	na	na	na	na	Radio Collar Relocation Observations	
2008	June	17	3	na	na	na	na	0	20	25	18	na	na	na	na	Radio Collar Relocation Observations	
2009	June	17	0	na	na	na	na	0	17	18	0	na	na	na	na	Radio Collar Relocation Observations	
2010	June								No Data Available								
2011	June								No Data Available								
2012	June								No Data Available								
2013	June								No Data Available								
2014	June								No Data Available								
2015	February-March	18	8	10	1	9	7	6	59	na	44	56	6	50	70%	Ground Surveys.	≥30 at Upper Canyon on November 30; ≥16 at Williams to Barton on December 20; ≥6 in Hinch Creek on December 6; ≥6 Lone Rock to Ledford Pass on March 27; ≥1 in Stone Creek on November 15
2016	February-March	20	6	13	3	10	9	9	48	na	30	65	15	50	69%	Ground Surveys.	≥19 at Upper Canyon in February 2016; ≥ 15 between Williams and Barton Gulch in November of 2015; ≥ 7 in Hinch Creek in November 2015; and ≥ 7 in Snowside Creek in January 2016
Average									36		45	60	10	50	70%		

* Beginning in 2015, The total equals the minimum known alive, or the greatest number observed between early November and late March.
** Beginning in 2015, All classifications were completed during the late winter/early spring.