

**BIGHORN SHEEP UNIT MANAGEMENT PLAN**  
**MINERAL MOUNTAINS**  
**May 2018**

**BOUNDARY DESCRIPTION**

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Beaver and Millard counties: Boundary begins at Black Rock Road and I-15 near Cove Fort; west on Black Rock Road to SR-257; south on SR-257 to SR-21; south and east SR-21 to I-15; north on I-15 to Black Rock Road near Cove Fort.

**LAND OWNERSHIP**

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Table 1. Range area and approximate ownership of Mineral Mountains bighorn sheep management unit and modeled bighorn sheep habitat.

Ownership	MANAGEMENT UNIT		MODELED SHEEP HABITAT	
	Area (acres)	%	Area (acres)	%
Bureau of Land Management	233,656	68%	91,733	87%
Private	84,723	25%	4,653	4%
Utah State Institutional Trust Lands	23,885	7%	9,880	9%
Tribal	262	<1%	0	0%
Utah State Parks	208	<1%	1	<1%
Utah Division of Wildlife Resources	40	<1%	40	<1%
Utah Department of Transportation	1	<1%	0	0%
<b>Totals</b>	<b>342,774</b>	<b>100%</b>	<b>106,307</b>	<b>100%</b>

**UNIT MANAGEMENT GOALS**

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The Mineral Mountains unit is located west of Beaver and east of Milford (Figure 1). It is proposed to transplant desert bighorn sheep into the unit in an effort to reestablish bighorns to their native ranges (Buechner 1960, Dalton and Spillet 1971) and to promote wildlife diversity in the area for hunting and viewing, in accordance with Utah Code 23-14-21. This plan will then guide future management decisions consistent with the Utah Statewide Bighorn Sheep Management Plan. Specific goals are to:

- 1) Manage for a healthy population of desert bighorn sheep capable of providing a broad range of recreational opportunities, including hunting and viewing.
- 2) Balance bighorn sheep impacts with other uses such as authorized cattle grazing and local economies.

- 3) Maintain a population that is sustainable within the available habitat in the unit boundary.

## **CURRENT STATUS**

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Bighorn sheep do not currently exist on the Mineral Mountains.

## **ISSUES AND CONCERNS**

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Potential Habitat: We modeled potential bighorn sheep habitat on the Mineral Mountains using methodology outlined by O'Brien et al. (2014). Bighorn sheep select habitat based on the proximity of steep-sloped escape terrain, forage availability, ruggedness, and horizontal visibility (Bleich et al. 1997, Valdez and Krausman 1999, Sappington et al. 2007). Bighorn sheep habitat is located throughout the mountain range (Figure 1). Additional habitat exists in areas that have become dominated by old growth pinyon and juniper forests as well as other conifer stands that have reduced value to bighorn. Aggressive habitat restoration efforts to return these areas into productive early successional stages will further expand bighorn sheep habitat throughout the Mineral Mountains.

Livestock Competition: Interactions of bighorn sheep with domestic cattle are anticipated seasonally. Dietary overlap between cattle and bighorns has not surfaced as a concern with other bighorn populations in the state and is not expected for the Mineral Mountain herd. Desert bighorn annual use of forage classes, when compared to cattle, differ significantly (Dodd and Brady 1988). Likewise, bighorn sheep generally avoid areas where cattle are present (Bissonette and Steinkamp 1996), and also select areas with a much higher degree of slope (Ganskopp and Vavra 1987), which also minimizes competition for water. Desert bighorn sheep have the ability to utilize metabolic water formed by oxidative metabolism, preformed water found in food, and surface water, including dew. The amount of surface water required by desert bighorns is dependent on many factors, including body size, activity, forage moisture content, temperature, and humidity (Monson and Sumner 1980). In hot, dry periods, bighorns will water daily if possible but have remained independent of surface water for periods of 5-8 days (Blong and Pollard 1968, Turner and Boyd 1970, Turner 1973, Welles and Welles 1961, 1966). Across all seasons, desert bighorns drink on average every 10-14 days (Welles and Welles 1961). It has been reported, in extreme cases, that desert bighorns did not drink for a period of several months (Monson 1958, Mendoza 1976). Koplín (1960) found that a captive herd of desert bighorn sheep that were fed a dry ration and provided unlimited water drank an average of 4.9 liters (1.3 gal) per day.

Disease: Disease, especially bacterial pneumonia, has been responsible for numerous declines in bighorn populations throughout North America (Cassirer and Sinclair 2007). Pneumonia outbreaks typically affect all age/sex cohorts and are usually followed by several years of annual pneumonia outbreaks in lambs that dramatically reduce population growth (Spraker et al. 1984, Ryder et al. 1992, George et al. 2008). These events are attributed to the transfer of pathogens from domestic sheep (*Ovis aries*) or goats (*Capra aegagrus hircus*) to wild sheep through social contact (Singer et al. 2000,

Monello et al. 2001, Cassirer and Sinclair 2007). Disease-induced mortality rates in bighorn sheep vary substantially by population due to multiple processes including contact rates, social substructuring, pathogen virulence, and individual susceptibility (Manlove et al. 2014, 2016). Therefore, spatial separation from domestic sheep and goats is the most important factor in maintaining overall herd health. It is not the intent of this plan or the DWR to force domestic sheep operators off of their ranges or out of business. Rather, the intent is to look for opportunities that will protect bighorn sheep populations while working with the domestic sheep industry.

Predation: Cougar predation may limit bighorn sheep in locations where predator populations are largely supported by sympatric prey populations (Hayes et al. 2000, Schaefer et al. 2000, Ernest et al. 2002), which, in this case, includes mule deer, domestic cattle, and elk. It has been hypothesized that declines in sympatric ungulate populations can increase predation on bighorn sheep as cougars switch to bighorns as an alternate prey source (Kamler et al. 2002, Rominger et al. 2004). It is anticipated that cougars will be the main predator of bighorns on the Mineral Mountains. If predation becomes a limiting factor, predator control work will be administered within the guidelines of the DWR Predator Management Policy. Predator management is coordinated with USDA Wildlife Services. Predator reduction work already occurs on the Mineral Mountains in conjunction with livestock losses, and therefore any additional work that may be done would be mutually beneficial to both livestock and other big game species.

## **POPULATION MANAGEMENT**

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### **Population Management Objectives:**

- 1) Achieve and maintain a population objective of 175 total desert bighorn sheep.

### **Population Management Strategies:**

Transplant Plan: Transplant(s) of wild bighorn sheep will be used to establish a viable herd. Initial transplant should occur with a minimum of 40 bighorns. The source population will likely be from the Muddy Mountain of Nevada and/or the Zion unit of Utah. Newly transplanted bighorns will be monitored for general movements and annual survival. Interested parties have been notified and given opportunity for discussion. This includes the Beaver County Commission, Millard County Commission, BLM, and grazing permittees. If the population reaches or exceeds the population objective, management practices including transplants and ewe hunts may be incorporated to maintain the population at objective. Aggressive management practices will be taken if the population exceeds 210 individuals (120% of objective).

Monitoring: Monitoring of bighorn sheep will be conducted every 2-3 years by aerial survey to determine lamb recruitment, population status, ram-to-ewe ratios, range distribution, and ages and quantity of rams. This population will likely require 8 hours to conduct a complete trend count and survey adjacent areas to evaluate wild sheep dispersal. Additional ground classification may be conducted as conditions permit. GPS collars with mortality signals will be used to document cause-specific mortality and

identify annual survival estimates. Space use will be monitored to assess potential overlap and competition with cattle. GPS collars will be added to the population as the original collars complete their usable lifespan. If bighorn sheep are found wandering into areas where there is high risk of contact with domestic sheep or goats, the DWR may remove these animals in accordance with the Utah Bighorn Sheep Statewide Management Plan.

Predator Management: Predator management will be coordinated with USDA Wildlife Services prior to bighorn release. If predation becomes a limiting factor on bighorns, predator control work will be administered within the guidelines of the DWR Predator Management Policy.

## **DISEASE MANAGEMENT**

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### **Disease Management Objectives:**

- 1) Maintain a healthy population of desert bighorn sheep on the Mineral Mountains range.
- 2) Maintain spatial separation from domestic sheep and goats.

### **Disease Management Strategies:**

Disease Monitoring: Source herds used for establishing this population will be tested for pneumonia related pathogens prior to release to ensure healthy source stock. The DWR may perform periodic live captures to assess herd health, as well as take advantage of opportunistic sampling of hunter harvested bighorns or bighorns that are found dead.

Spatial Separation: Active domestic sheep allotments and hobby farms with domestic sheep will be evaluated for potential overlap with bighorn habitat prior to a bighorn transplant. The DWR will delineate areas where there is high risk for domestic sheep and goats to come in contact with wild sheep or where wild sheep may stray and come in contact with domestics. These areas will be considered areas of concern. Lethal or non-lethal removal of bighorns may be warranted in these areas to prevent comingling. The need to test wandering sheep from this unit will be evaluated on a case by case basis. The BLM and DWR will explore the possibility of using fencing to prevent comingling with trailing domestic sheep.

## **HABITAT MANAGEMENT**

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### **Habitat Management Objectives:**

- 1) Maintain or improve sufficient bighorn sheep habitat to achieve population objective.
- 2) Support and encourage regulated livestock grazing and maintain/enhance forage production through range improvement projects on the Mineral Mountains.
- 3) Improve habitat and water availability where possible.

### **Habitat Management Strategies:**

Monitoring: The DWR will assist land management agencies in monitoring bighorn

habitat to detect changes in habitat quantity and quality.

Habitat Improvement: Vegetative treatment projects to improve bighorn habitat lost to natural succession or human impacts will be sought out and initiated. The DWR will cooperate with the BLM to utilize seeding, controlled burns, and/or mechanical treatments for conifer removal in order to increase and improve bighorn habitat across the unit. Habitat restoration projects will be planned and executed through the Utah Watershed Restoration Initiative program, allowing for public input to ensure that projects that are beneficial to both bighorn sheep and sympatric cattle are given priority.

Areas identified as priorities for habitat improvement are as follows:

- seeding of Porcupine area
- seeding of Honeyboy area
- pinyon/juniper removal in the Granite Peak area

Water Improvement: The DWR will work with the BLM and private stakeholders to locate and cooperatively modify or improve existing water sources or install new water developments across bighorn habitat.

Areas identified as priorities for water improvement are as follows:

- Hodgsen well and troughs
- Shagwell solar well
- Bailey Springs pipeline extension
- Cherry Creek pipeline extension
- Bailey Mountain guzzler replacement
- Shag Spring
- Rock Corral

## **RECREATION MANAGEMENT**

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### **Recreation Management Objectives:**

- 1) Provide high quality hunting opportunities when the Mineral Mountains population has established.
- 2) Increase public awareness and expand viewing opportunities of bighorn sheep.

### **Recreation Management Strategies:**

Hunting: Hunting and permit allocation recommendations will be made in accordance with the Utah Bighorn Sheep Statewide Management Plan. A bighorn hunt will be proposed on this unit when there is a harvestable and sustainable age class of rams. Ewe hunts may be utilized as a tool for maintaining population objective.

Non-Consumptive Uses: The DWR will look for opportunities to increase public awareness and expand viewing opportunities of bighorn sheep through viewing events and public outreach.

## **PUBLIC INVOLVEMENT**

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### **Public Involvement Objective:**

- 1) Provide opportunities for local stakeholders and cooperating agencies to be involved in the management process and to jointly resolve potential issues involving bighorn sheep.

### **Public Involvement Strategies:**

Plan Revision: If the population objective or other key components of this plan are to be revised in the future, affected cooperating agencies, local stakeholders, and grazing permittees will be invited to take part in the decision-making process.

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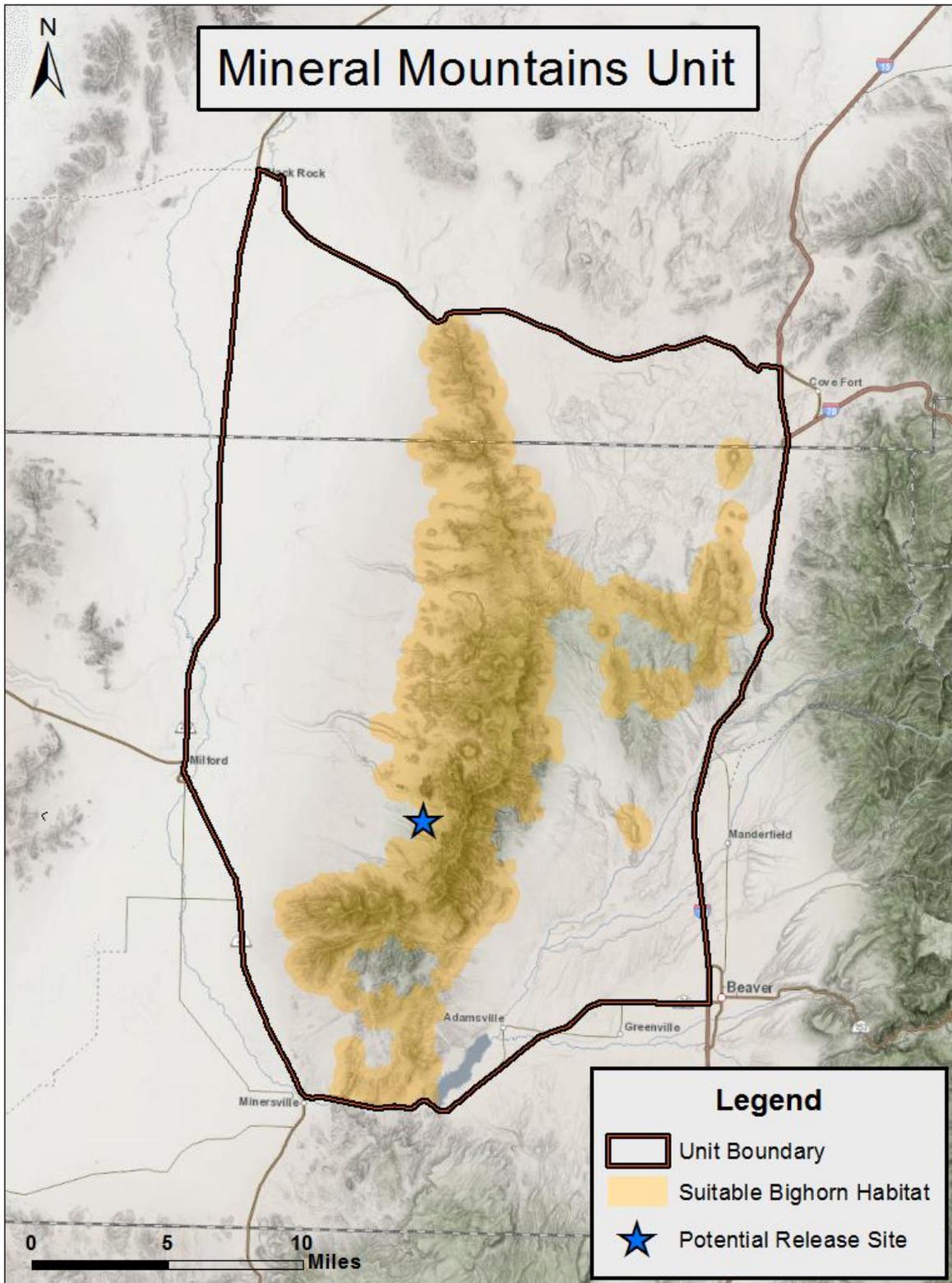


Figure 1. Mineral Mountains bighorn sheep habitat and management unit boundary, Millard and Beaver Counties, UT, USA.