BIGHORN SHEEP UNIT MANAGEMENT PLAN
HENRY MOUNTAINS WMU #15
August 2019

BOUNDARY DESCRIPTION

Garfield, Kane and Wayne counties--Boundary begins on SR-95 at a point two miles south of Hanksville; south on SR-95 to Lake Powell; south along the west shore of Lake Powell to SR-276 at Bullfrog; north on SR-276 to the Burr Trail-Notom road; north on this road to the Capitol Reef National Park boundary; north on this boundary to the Burr Trail-Notom road at The Narrows and Divide Canyon; north on this road to a point two miles south of SR-24; east along a line that is two miles south of SR-24 to SR-95. EXCLUDES ALL NATIONAL PARKS. USGS 1:100,000 Maps: Escalante, Hanksville, Hite Crossing, Loa. Boundary questions? Call the Price office, 435-613-3700.

LANDOWNERSHIP IN BIGHORN SHEEP HABITAT

Table 1. Land ownership and approximate area of modeled bighorn sheep habitat for the Henry Mountains bighorn sheep management unit.

Ownership	MODELED BIGHORN HABITAT	
	Area (acres)	**%**
Bureau of Land Management	296,784	77.2%
National Parks	51,497	13.4%
Utah State Institutional Trust Lands	34,117	8.9%
Private	1,912	0.5%
State Sovereign Land	2	<0.1%
Totals	**384,311**	**100%**

UNIT MANAGEMENT GOALS

The Henry Mountains Wildlife Management Unit is in the high desert of southeastern Utah and is part of the Colorado Plateau. The unit reaches from the western banks of Lake Powell to the Burr trail road and eastern border of Capital Reef National Park with elevations from 3700 feet to 11500 feet. Desert bighorns are native to this area, were hunted by indigenous people, and have been noted by explorers from the 1700's and 1800's. Early residents of the area also saw bighorns into the 1900's. UDWR personnel saw two bighorn on Mt. Ellen in 1964 and 24 more in 1967 (BLM, Henry Mountain Desert Bighorn Habitat 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 grazing and local economies.
3) Maintain a population that is sustainable within the available habitat in the unit boundary.

HISTORY AND CURRENT STATUS

Desert bighorn sheep were first transplanted to the Henry Mountains unit in 1985 and the first hunt was held eleven years later in 2006 with three hunters afield. The highest count was recorded in 2016 with 92 sheep observed. Hunters have encountered coughing sheep and in 2017 a disease assessment was performed on the herd which indicated exposure to bacterial pneumonia. The most recent survey was performed in 2016 and the current estimate of abundance is 153 bighorn sheep. These bighorns occupy the Little Rockies, Trachyte, and eastern portion of Mt Hillers where habitat is suitable (Figure 1).

ISSUES AND CONCERNS

Potential Habitat: We modeled potential bighorn sheep habitat on the Henry Mountains unit 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 unit in suitable rugged locations (Figure 1).

Livestock Competition: Bighorn sheep 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). For these reasons, competition between cattle and bighorns should not be a significant concern within this unit. Because of the risk of pathogen transmission between bighorns and domestic sheep, the areas where domestic sheep are present are not suitable for bighorn sheep.

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 public lands 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 and individual grazers.

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 a limited amount of mule deer. 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 in the Henry 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.

POPULATION MANAGEMENT

Population Management Objective:

1) Manage for a population objective of 200 desert bighorn sheep within suitable habitat across the unit. If this objective were achieved, wild sheep densities would be 0.08/sq km which is well below the recommended 1.3-1.9/sq km (Van Dyke 1983).

Population Management Strategies:
1) Monitor the bighorn sheep population using aerial surveys and GPS collared animals to assess population trends and health.
2) Augment the population as needed through transplant efforts matching disease profiles of the source herd with the resident herd.
3) Initiate predator management as specified in predator and bighorn sheep unit management plans. Wildlife Services or other contracted personnel may be needed in remote or hard to access areas to help reduce cougar numbers.
4) Document instances of interaction between wild sheep and domestic sheep and goats to allow conflicts to be evaluated and dealt with in a timely manner. Follow established guidelines for dealing with domestic sheep and goats that wander into bighorn sheep units.

Population Monitoring Plan:

1) Continue flight surveys on the unit on a three-year rotation in conjunction with the Dirty Devil unit.
2) This population will likely require 12 hours to conduct a complete trend count.
3) Conduct ground classification as conditions permit to obtain annual production estimates.
4) Monitor any GPS-collared bighorns to generate annual estimates of survival and when possible determine cause-specific mortality.
5) All population data will be collected and submitted on standardized forms, including all GIS data (waypoints, flight paths, etc.).

Trend and Classification Data:

Year	Pop Est	Total Count	Total Ewes	Total Lambs	Total Rams	Rams > 6 yrs old	Lambs/100 Ewes	Rams/100 Ewes
2008	90	54	30	3	21	10	10	70
2010	40	24	13	6	5	4	46	38
2012	105	63	25	13	25	12	52	100
2014	122	73	34	14	25	7	41	74
2016	153	92	46	14	32	7	30	70

Transplant Plan

1) This unit should be managed to increase the current population. Based upon the results of the population disease profile, augmentations may be warranted in the future to achieve population goals, improve genetic diversity, and expand herd distribution.
2) Favorable areas for transplants include Mount Hillers, Pennell, and Ellen, Tarantula Mesa, Clay Point, Clay Canyon, Granite Creek, Fourmile Canyon, and Bullfrog Creek below Eggnog.
3) If the population is above objective, it may be considered for a source population but is unlikely given its current population and disease status.
4) Predator management prior to transplants should occur and be coordinated with Wildlife Services.

Predator Management

1) The Henry Mountain unit is managed under a predator management plan and is a harvest objective unit.
2) If necessary, the Henry Mountains unit could be managed as a Bighorn Sheep Cougar Management Area with a Harvest Objective management strategy and no minimum harvest.
3) Over the last three years, the average amount of cougars killed per year on this unit is 4.
4) During a 2 year BYU bighorn research study on the North San Rafael unit, cougar predation has been shown to adversely impact the bighorn population. Fifty percent of collared bighorn sheep mortalities were attributed to cougar predation. Cougar populations should be managed at levels which will allow for the establishment of sustainable bighorn populations and allow bighorn population objectives to be met.
5) Managing cougars on this unit is difficult because of topography, remoteness, and access. Reasonable but aggressive efforts to harvest cougars and protect this big game herd are being taken and should continue along with the previously mentioned bighorn management strategies, coordination with Wildlife Services, and through established UDWR policy and procedures provided in the statewide bighorn sheep and cougar management plans.

DISEASE MANAGEMENT

Disease Management Objective:

1) Maintain a healthy population of desert bighorn sheep on the Henry Mountains unit.
2) Strive for spatial separation from domestic sheep and goats.

Disease Management Strategies:

Disease Monitoring: 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. A disease assessment was conducted in 2017 on this unit. A total of 15 female and 4 male bighorn sheep were sampled on the Henry Mountains for disease testing. The animals were captured at Hillers (4), North Wash (1), Peshliki (4), and Trachyte (10). This population is positive for Mycoplasma ovipneumoniae, which is considered an important pathogen in the bighorn sheep respiratory disease complex.

Spatial Separation: Work with land management agencies and private landowners to implement agency guidelines for management of domestic sheep and goats in bighorn areas. One of the greatest disease risks posed to the Henry Mountains unit for desert bighorns is from escaped or wandering domestic sheep and goats from nearby "hobby farms" along SR276. Correspondingly the same risk is posed from desert bighorns wandering into domestic sheep and goat areas, being exposed, then returning to a bighorn herd.There is 1 BLM domestic sheep grazing allotments that challenges effective separation
1) Trachyte – This BLM allotment is directly adjacent to occupied wild sheep habitat. Currently this is only grazed by cattle which is supported; however sheep may be grazed under a previous BLM management plan.
Outreach efforts should take place with permittees and BLM employees concerning domestic and wild sheep interactions. To protect the Henry Mountain and Dirty Devil desert bighorn populations, active removal of bighorn sheep within or close to the Trachyte allotment should be a priority if domestic sheep are ever permitted on the Trachyte allotment.

Risk Management and Response Plan:

All wandering wild sheep and stray domestic sheep and goat issues will be handled following the UDWR GLN-33. Mapping of wild sheep removal zones for the Henry Mountain unit are included as an appendix to this guideline. The need to test wandering sheep from this unit will be evaluated on a case by case basis.

HABITAT MANAGEMENT

Habitat Management Objectives:

1) Maintain or improve sufficient bighorn sheep habitat to achieve population objectives.

2) Continue to identify crucial bighorn sheep habitats and work with land managers to protect these areas.
3) Assist land management agencies in monitoring bighorn habitat to detect changes in habitat quantity or quality.
4) Work with land managers to minimize and mitigate loss of bighorn habitat due to human disturbance and development.
5) Work with land management agencies to implement agency guidelines for management of domestic sheep and goats in bighorn areas to minimize the risk of disease transmission.

Current and Potential Wild Sheep Distribution:

A map of the currently occupied habitat is included in Figure 1. Potential additional habitat includes Mount Hillers, Pennell, and Ellen, Tarantula Mesa, Clay Point, Clay Canyon, Fourmile Canyon, Granite Creek, and Bullfrog Creek below Eggnog.

Potential Threats to Habitat:

1) Human disturbance including, vehicular off-road travel, natural resource extraction, organized competitive athletic events, and camping near springs and water sources can result in abandonment or degradation of bighorn habitat. Due to the rugged nature and lack of roads near sheep habitat, human disturbance of bighorn is lessened. If disturbance becomes an issue, UDWR will work with and support federal agencies (BLM, USFS) on travel management plans and other land use plans, and outreach efforts will be made as well to get local support to reduce human disturbance to bighorn sheep habitat
2) Severe and long-term drought has likely affected bighorn habitat ultimately impacting population trend and distribution on the unit.

Vegetation Management Projects:

1) Initiate vegetative treatment projects to improve bighorn habitat lost to natural succession or human impacts.
2) Cooperate with the BLM and SITLA to utilize controlled burns and/or mechanical treatments to remove conifer encroachment and improve bighorn habitat across the unit.
3) Identify specific habitat restoration projects to benefit bighorn sheep

Water Management Projects:

1) Work with the BLM, SITLA, and permitees to locate and improve water sources across bighorn habitat.
2) Cooperatively modify or improve existing water developments and guzzlers for bighorns.
3) Identify areas in otherwise favorable habitat where water developments/guzzlers would benefit desert bighorns by expanding their range, improving production, and possibly decrease drought related stressors.

RECREATION MANAGEMENT

Recreation Management Objectives:

1) Provide hunting opportunities on the Henry Mountains unit that are a quality experience.
2) Increase public awareness and expand viewing opportunities of bighorn sheep.

Recreation Management Strategies:

1) Recommend permit numbers based on 12-25% of the counted ram population (yearling and older) or 30-60% of the counted rams 6 years of age or older.
2) When feasible, use subunits and multiple seasons to maximize hunting opportunities, distribute hunters, and minimize hunter conflicts.
3) Recommend hunting seasons to provide maximum recreational opportunity while not imposing on DWR management needs.
4) Use hunting as a tool to regulate density of bighorn sheep to reduce risk of pathogen transmission.
5) Monitor size and age class of all harvested rams.
6) Work with federal land management agencies' local access coordinators to maintain and improve access for hunting and viewing of bighorn sheep. Explore seasonal openings, modified motorized boat rules, and administrative access for surveys or maintenance.
7) Explore providing a greater variety of hunting opportunities by utilizing more primitive weapons, variation in season length, and more variable season dates.
8) Use ewe hunts to establish lower densities that will reduce the risk of pathogen transmission as well as provide recreational opportunity.

10 Year Harvest Statistics

Year	Permits	Mean Days Hunted	Success	Satisfaction
2009	1	8.0	100%	5.0
2010	2	14.0	50%	4.5
2011	2	7.0	100%	5.0
2012	2	12.5	50%	2.5
2013	2	13.5	100%	4.5
2014	3	10.0	66.7%	4.0
2015	3	10.3	66.7%	3.7
2016	3	25.3	100%	2.3
2017	4	18.5	100%	4.3
2018	4	18.8	75%	4.5

<u>Non-Consumptive Uses:</u> The DWR will look for opportunities to increase public awareness and expand viewing opportunities of bighorn sheep through viewing events and public outreach. This is a difficult task considering the remoteness of the habitat currently being used by the bighorn sheep herd. Significant viewing opportunities are available along the Hastings Road north of Green River.

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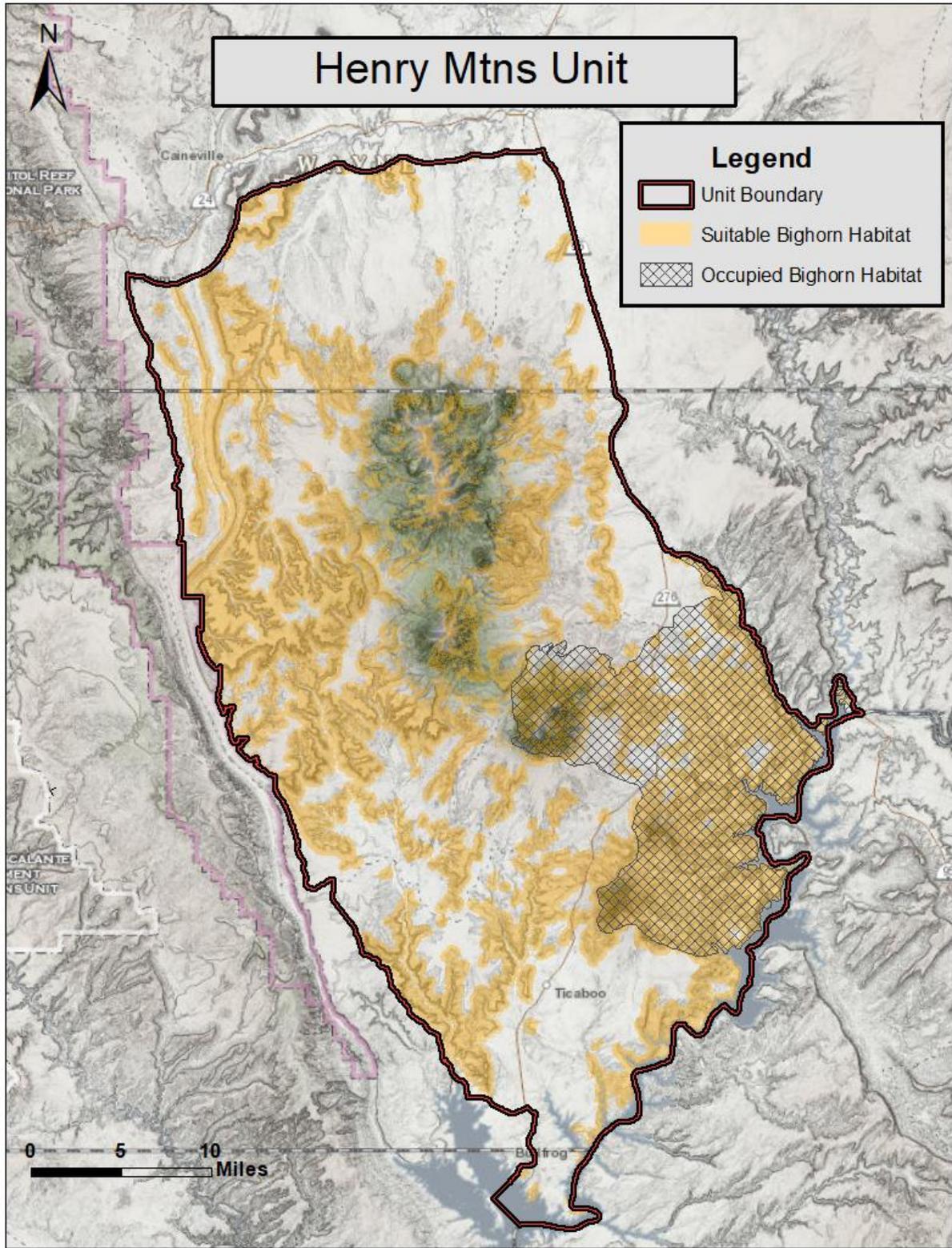
Figure 1. Henry Mountains unit management boundary, modeled suitable bighorn sheep habitat, and currently occupied bighorn habitat.