

BIGHORN SHEEP UNIT MANAGEMENT PLAN
ZION
August 2019

BOUNDARY DESCRIPTION

Iron, Kane and Washington counties—Boundary begins at the Utah-Arizona state line and I-15; north on I-15 to SR-14; east on SR-14 to US-89; south on US-89 to US-89A; south on US-89A to the Utah-Arizona state line; west on this state line to I-15. This hunt is comprised of all or largely private property. Excludes Zion National Park. **EXCLUDES ALL NATIVE AMERICAN TRUST LANDS WITHIN THIS BOUNDARY.** Excludes all CWMUs. USGS 1:100,000 Maps: Cedar City, Kanab, Panguitch, Saint George. Boundary questions? Call the Cedar City office, 435-865-6100.

LAND OWNERSHIP

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

Ownership	MODELED BIGHORN HABITAT	
	Area (acres)	%
Bureau of Land Management	243,026	46.2%
National Parks	125,882	24.0%
Private	116,411	22.2%
Utah State Institutional Trust Lands	28,431	5.4%
National Forest	9,438	1.8%
Utah State Parks	1,220	0.2%
Tribal	1,063	0.2%
Utah Division of Wildlife Resources	51	<0.1%
Utah Department of Transportation	20	<0.1%
Totals	525,542	100%

UNIT MANAGEMENT GOALS

Maintain desert bighorn sheep on the unit in an effort to keep 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. 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.

HISTORY AND CURRENT STATUS

Historically, bighorn sheep were thought to be abundant in the Zion area. By the 1950's bighorn sheep were extirpated from Zion National Park (ZNP) and adjacent areas. A variety of factors were likely responsible for the extirpation. A map of the Zion hunt unit boundary and current bighorn sheep distribution is provided in Figure 1.

In 1973, a group of 12 animals were transplanted in a cooperative agreement between UDWR and ZNP from Lake Mead and were placed in a 32.28 hectare holding pen. Management responsibilities of these sheep are shared between these two regulatory agencies. In 1976, the original 12 had reproduced and the sheep then numbered 22. Twelve of those 22 animals were released from the enclosure into Parunuweap Canyon (five air miles to the southeast). This release was considered to be a failure due to disease and predation. In 1978, the number of sheep in the enclosure had increased to 19. All these sheep were released from the enclosure by opening the gates. From 1979 to 1990, it was felt that the herd was dwindling. In 1991, a helicopter survey was conducted, and 35 bighorns were observed in ZNP. In 1995, the herd was estimated to be between 50 and 75 animals.

Since 1991, telemetry data has been collected in conjunction with various studies in ZNP. In 2008, increased sightings of bighorn sheep from ZNP, Barracks, Hildale, and Kanab areas were being reported to the UDWR. In December 2008, UDWR was asked to assist ZNP by doing an aerial survey in the predicted highest density areas in ZNP. During this survey it was determined that the population in ZNP was over 180 sheep.

This population has had good lamb production, high survival rates, and has the potential to expand its range into areas where domestic sheep grazing occurs on private lands. There is concern about stress and disease transmission due to high population densities. Habitat degradation may also become an issue in some localized areas.

Transplant summary:

Year	Number of sheep moved	Destination
Jan. 2014	19	Cottonwood Canyon, west of Kanab, Zion unit
Nov. 2014	23	Nokai Dome, San Juan unit
Nov. 2014	26	Horse Canyon, Beaver Dam Mountains, Pine Valley Unit
Nov. 2015	10	Horse Canyon, Beaver Dam Mountains, Pine Valley Unit
Dec. 2017	50	South San Juan unit

In June of 2018 coughing sheep were found in Zion National Park. A coughing sheep was euthanized and tested positive for *Mycoplasma ovipneumoniae* (M.ovi). Throughout

the summer and fall, symptomatic sheep were sighted both in ZNP and on BLM lands to the east of ZNP. Test results show that the strain of *M.ovi* is the same as that found in the Kaiparowits bighorn herd. This leads us to believe that the most likely source of *M.ovi* for the Zion herd is some type of commingling with bighorn(s) from the Kaiarowits bighorn herd. The population is currently being monitored for lamb production, sheep survival and dispersal using GPS collars.

ISSUES AND CONCERNS

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 Pine Valley 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 Pine Valley unit. 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 Pine Valley unit 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

Population Management Objective:

- 1) Manage for 500-600 bighorn sheep within the core habitat area. Managing for approximately 550 sheep through this area (175 sheep inside NPS lands and 375 outside NPS lands) is within the recommended 1.9 bighorns / km² (Van Dyke 1983).

Population Management Strategies:

Transplant Plan: In the past this population has been used as a source herd for establishing new sheep populations in Utah. Sheep were moved from both BLM lands and National Park lands to establish populations on the San Juan and the Pine Valley units. With the positive M. Ovi diagnosis in June of 2018, it is unlikely that this herd will be suitable to serve as a source population in the near future. If the population reaches or exceeds the population objective, management practices including ewe hunts may be incorporated to maintain the population at 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. The current population will likely require a minimum of 30 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. Surveys of NPS lands are essential to understanding population dynamics of the Zion bighorn sheep herd. UDWR will continue to partner with ZNP in data collection and sharing. Coordination with the Zion National Park,

Kanab and St. George BLM will need to take place prior to all aerial survey efforts due to wilderness areas and the NPS sound-scape management. Kane and Washington County Sherriff's Offices will also need to be coordinated prior to flights if removal of feral domestics is needed (see spatial separation). Conduct ground classification as conditions permit to obtain annual production estimates. Sheep can easily be viewed in Zion National Park along Highway 9. This information is highly valuable as an indicator of population health and condition.

Trend Count and Classification Data

Year	Pop Est.	Total Count	ZNP	BLM	Lambs/100 Ewes	Rams/100 Ewes
2008	150	75	75	*	45.0	42.5
2009	460	230	116	114	38.2	37.4
2011	400	200	*	200	27.5	56
2013	840	504	243	261	32.7	63.4
2015	830	494	316	178	30.3	41.4
2018	807	484	333	150	40.2	43.2

*No survey conducted in that portion of the occupied habitat.

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

DISEASE MANAGEMENT

Disease Management Objectives:

- 1) Maintain a healthy population of desert bighorn sheep on the Zion unit.
- 2) Maintain 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.

Spatial Separation: 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. Working with land management agencies and private landowners to implement agency guidelines for management of domestic sheep and goats in bighorn areas should be a priority. There is significant domestic sheep grazing on private lands and USFS lands north of the area that bighorn sheep inhabit. Wild sheep should be removed if found within these areas. Farm flock sheep and private sheep grazing are known to be present in

Springdale, Hildale, Mt Carmel, and Kanab and pose the greatest risks at this time. Outreach efforts have been enacted to educate private stock holders of the risk of contact between bighorn and domestic sheep. These efforts should continue and expand to all the surrounding operators and communities. Feral domestic sheep and goats also pose a threat to spatial separation. There have been at least five documented feral goats from the town of Hildale in the past 8 years. Prior to aerial surveys, the local Sheriff's Office (Washington and Kane Counties) should be contacted to acquire permission for removal of feral domestics that pose a disease threat to wild sheep as per Utah Code 4-25-5. Manage for spatial separation between wild sheep and active domestic sheep allotments. Removal of wild sheep found near these areas is recommended to maintain separation and protect wild sheep. Outreach efforts should occur with domestic operators and private landowners.

Risk Management and Response Plan:

Historic areas Zion bighorn sheep have wandered from the core habitat area and been removed includes:

- Cedar Canyon
- Kanarraville
- Bear Valley near SR-20

High risk areas include private lands and USFS lands north of the park. Ashdown Gorge and the Vermillion Cliffs along the Parowan Front includes suitable bighorn sheep habitat and should be monitored periodically. All wandering wild sheep and stray domestic sheep and goat issues will be handled following the UDWR GLN-33. The need to disease test wandering bighorn sheep from this unit will be evaluated on a case by case basis. The DWR supports double fencing and other methods to maintain spatial separation where appropriate.

HABITAT MANAGEMENT

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 Zion unit.
- 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.

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

RECREATION MANAGEMENT

Recreation Management Objectives:

- 1) Provide high quality hunting opportunities on the Zion unit.
- 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 continue to be proposed on this unit. When sub-unit populations reach a population level that they can stand on their own, they will be proposed to be managed separately. Ewe hunts may be utilized as a tool for maintaining population objective.

Harvest Statistics for the Zion Unit

Year	Draw Permit Harvest	Conservation Permit Harvest	Mean Days Hunted	Harvest
2010	5	2	8.2	100%
2011	7	2	7.4	100%
2012	8	2	6.8	100%
2013	9	3	9.7	100%
2014	12	2	10.8	100.0%
2015	12	3	5.9	92.3%
2016	9	2	4.6	90.0%
2017	9	3	6.5	100%
2018	10	4	6.6	100%

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

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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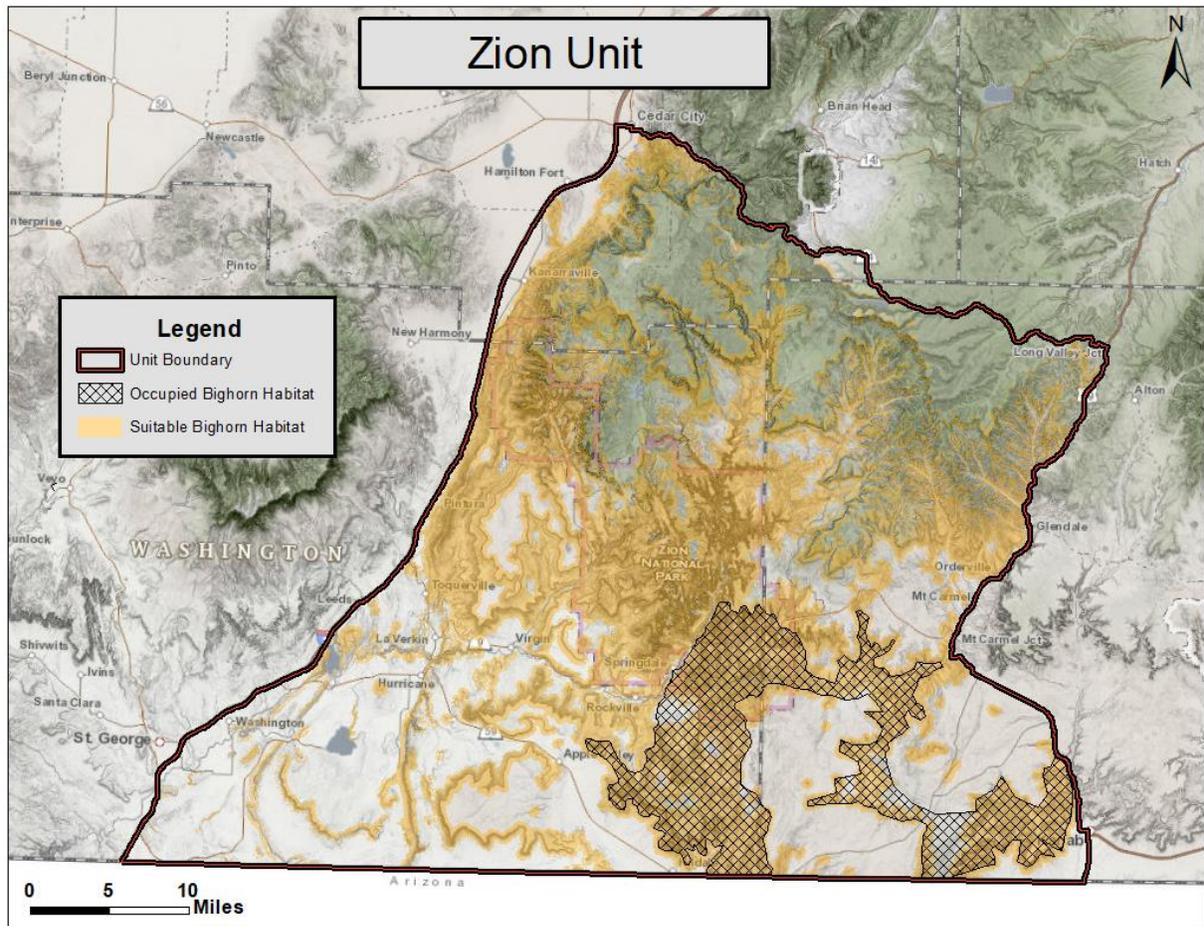


Figure 1. Zion unit management boundary, modeled suitable bighorn sheep habitat, and currently occupied bighorn habitat. Washington and Iron Counties, UT, USA.