DESERT BIGHORN SHEEP HERD MANAGEMENT PLAN

DRAFT

DATA ANALYSIS UNIT DBS-61
Dolores River

GAME MANAGEMENT UNITS
S-63 and S-64

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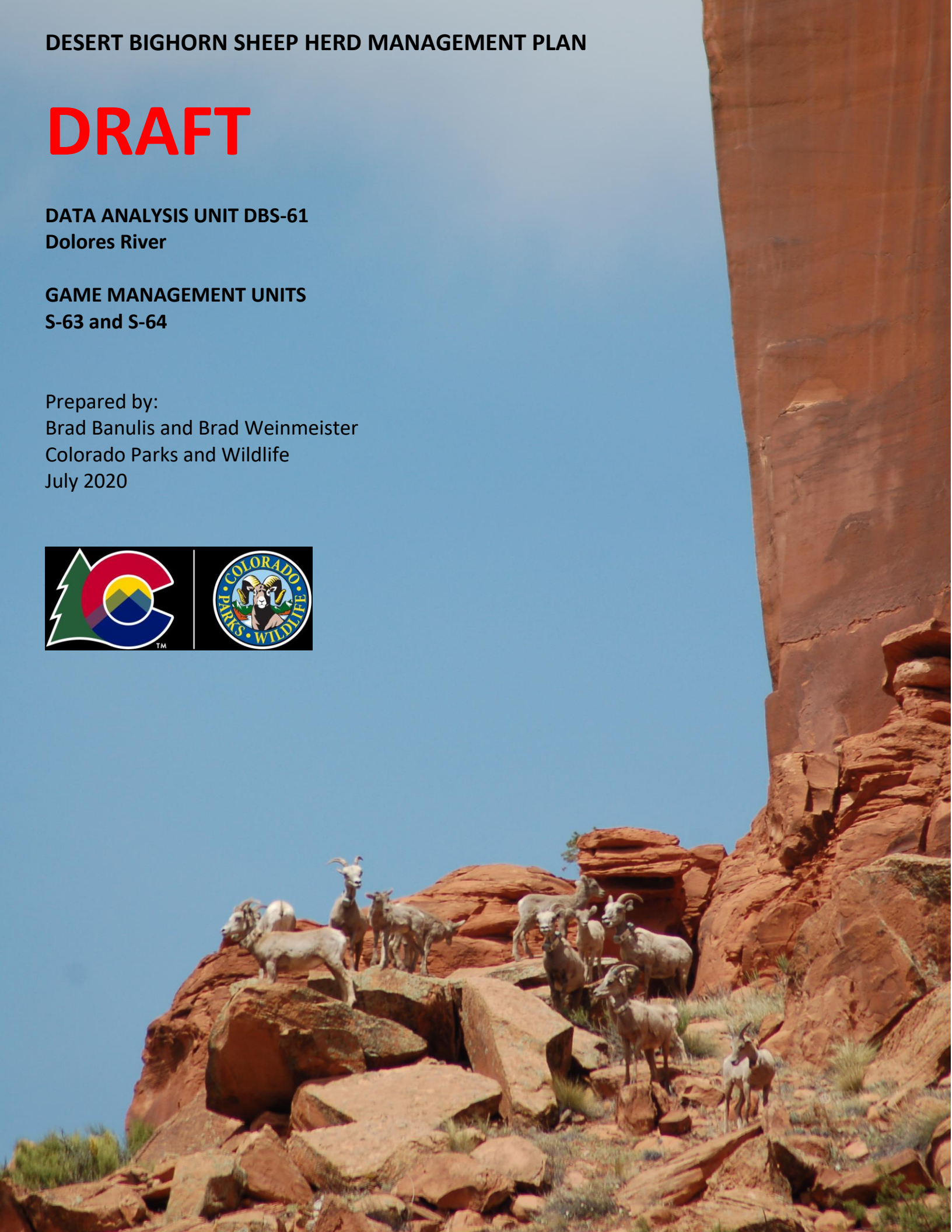

Dolores River Desert Bighorn Sheep Herd (DBS-61)

Executive Summary

GMUs: S-63 (Middle Dolores River) and S-64 (Upper Dolores River)
Tier Status: Tier 1
Land Ownership: BLM 45%, Private 29%, USFS 24%, State 2%,
2018 Posthunt Population Estimate: 175
Average Length of Longest Horn (harvested rams): 31 “

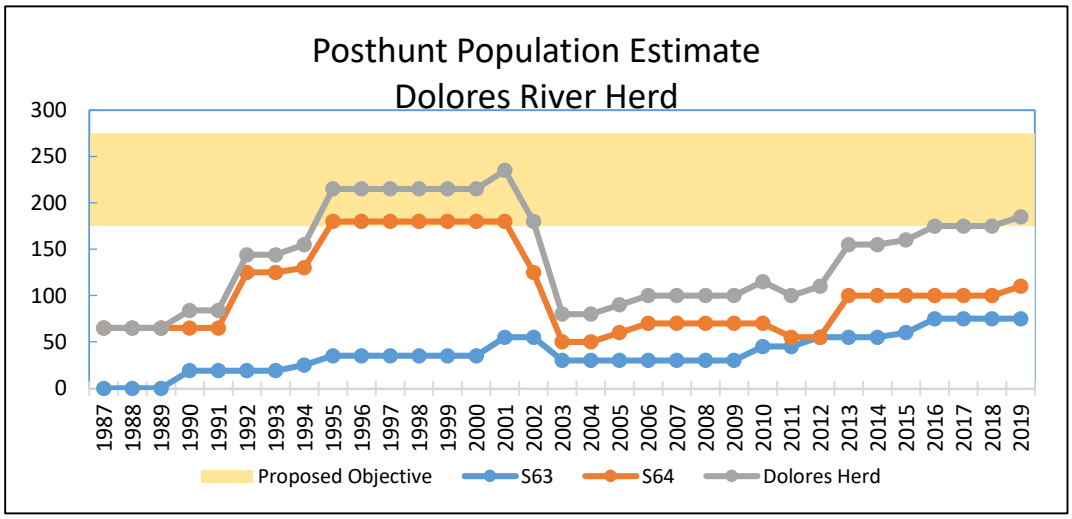

Figure 1. *DBS-61 posthunt population estimate 1987-2019.*

Background and Issue Summary:
The Dolores River Desert Bighorn sheep herd (DBS-61) is located in southwest Colorado and occupies the canyon country of the Dolores River, and its tributaries, downstream of McPhee Reservoir. It consists of Game Management Units (GMUs) S-63 (Middle Dolores River) and S-64 (Upper Dolores River). The majority of the occupied bighorn habitat occurs on lands managed by the Bureau of Land Management (BLM). DBS-61 is a Tier 1 bighorn population and should be given the highest priority for inventory, habitat protection and improvement, disease prevention and research.

Although bighorn sheep were likely indigenous, none were present in the past century. The current population was established beginning in 1986 with the release of 25 bighorn from Arizona. There have been a total of four transplants of desert bighorn into the Dolores Canyon. Population sources have been from Arizona (source for two transplants), Nevada, and Utah. Since the initial transplant, the population of bighorn in the Dolores Canyon has grown and peaked at an estimated 235 animals in 2001. At that time, there was a sharp decline in the population and the cause was never determined. The population has since gradually increased and is now estimated at 175.

Inventory of the population is done by coordinated ground surveys and helicopter surveys. The coordinated ground surveys are done annually in late spring. Helicopter surveys are done every three to five years. Timing of aerial surveys vary throughout the year. Data provides some indication of herd performance and distribution. Because of the low density of bighorn and vast amount of country, minimal numbers of bighorn are located and classified, providing inconsistent data between survey efforts.

The Dolores River Bighorn herd offers limited ram hunting. The first licenses (two) were in 1993 and were valid only in S-64. Ram hunting in S-64 has been continuous since then and began in S-63 in 2010 when licenses were valid for both units. There are currently (2019) five ram licenses available, two in S-63 and three in S-64. Success

rates generally run 100% annually. Ewes have not been hunted, but with an increasing population, the opportunity exists to introduce ewe licenses in the DAU.

Management Objectives

Public Involvement:

A public survey was used to guide recommendations presented in this HMP. Over 130 individuals participated in the survey either on the internet or by paper copies. The majority of respondents wanted to see an increase in the population size and were happy with the current management of ram hunting opportunity.

Population Size:

The current population estimate for DBS-61 is 175 bighorn and increasing. Factors adversely affecting the population include habitat quality, predation, and recreation disturbance. The population is still short of highest recorded size of 235. Based on available habitat and the current health of the population, the population has the potential to increase.

Three population objective alternatives are proposed, with alternative 2 being the staff recommendation:

1) ***Alternative 1- 150-250***, stable population objective with current population in the middle of the range
2) ***Alternative 2- 175-275***, stable to increasing objective with current population at bottom of objective range
3) ***Alternative 3- 200-300***, increasing objective with current population below objective range

Harvest Objective:

Ram Harvest: The length measurement of horns on harvested rams provide an index to the age and trophy quality of harvested rams. The greater the average horn length, the higher the trophy quality. This comes at the cost of restricting hunter numbers to produce more and bigger rams. A smaller average horn length allows more hunter opportunity at the cost of decreasing the number of rams in the population and subsequently the potential trophy quality. The current average length of the longest horn on harvested rams is 31".

Three alternatives for the length of the longest horn on harvested rams are proposed, with staff recommending alternative 2 which is similar to current management:

1) Maintain a running average horn length under 31 ½" of harvested rams over a three year period ***(stable to increasing hunting opportunity),***
2) Maintain a running average horn length between 28" to 33" of harvested rams over a three year period ***(stable hunting opportunity)***, or
3) Maintain a running average horn length over 30" of harvested rams over a three year period ***(stable to decreasing hunting opportunity)***

Ewe Harvest:

Ewe removal from the population via translocation or hunter harvest will be considered when the population meets the criteria set forth in Colorado's Bighorn Sheep Management Plan (George et al 2009). Ewe harvest is a population management tool to maintain healthy populations of bighorn sheep and for hunter opportunity. It also assists biologists in gaining more observational data from ewe hunters regarding herd composition and distribution.

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Introduction and Purpose

Colorado Parks and Wildlife (CPW) manages desert bighorn sheep for the use, benefit and enjoyment of the people of the state and its visitors, in accordance with the CPW's Strategic Plan (2010-2020), the Colorado Bighorn Sheep Management Plan (George et al. 2009), and mandates from the Parks and Wildlife Commission and Colorado Legislature. Colorado's wildlife resources require careful and increasingly intensive management to accommodate the many and varied public demands and growing impacts from people. To manage the state's big game populations, CPW uses a "management by objective" approach (Figure 2). Big game populations are managed to achieve specific objectives that are outlined within Herd Management Plans. These plans are based on Data Analysis Units (DAU) that generally represents a geographically discrete big game herd which includes the year-round range of the population. When delineating DAU boundaries, managers assume that there is minimal interchange of animals between adjacent DAUs. A DAU may be divided into several Game Management Units (GMU's) in order to distribute hunters and harvest throughout a DAU, or to take into consideration specific local management issues.

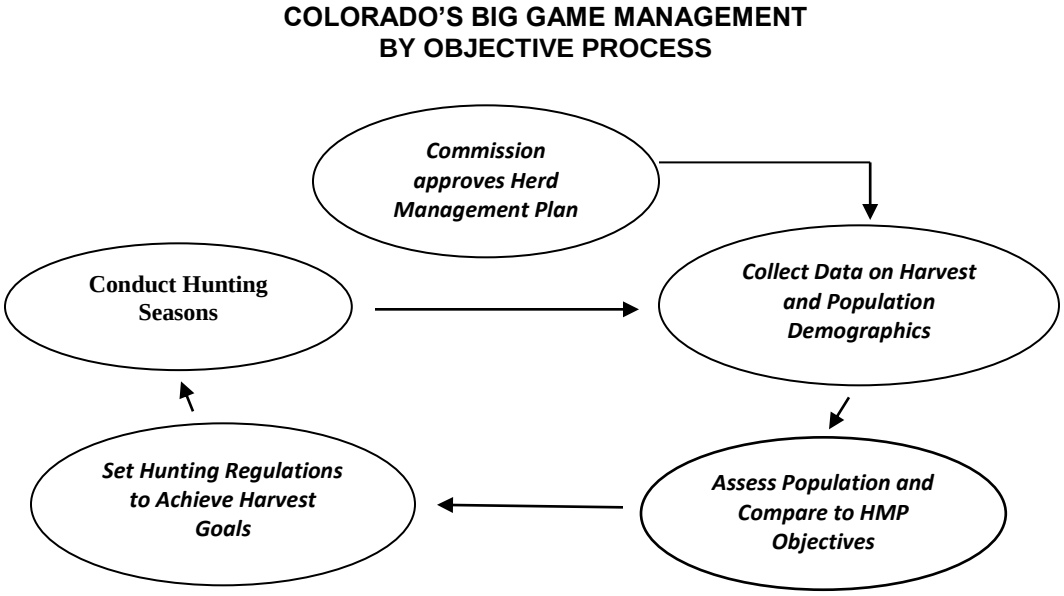

Figure 2. *Management by objective process used by CPW to manage big game populations on a DAU basis.*

The herd management planning process incorporates public input, habitat capabilities, and herd considerations into management objectives for each of Colorado's big game herds. The general public, sportsmen, federal land management agencies, landowners, outfitters, and agricultural interests are involved in determining herd management plan objectives through questionnaires, public meetings, comments on draft plans, and input to the Colorado Parks and Wildlife Commission. Limited license numbers and season recommendations result from this process.

Bighorn sheep management in Colorado contrasts markedly with other big game management. Sheep populations are typically much smaller and often more geographically isolated than deer, elk, or pronghorn herds. Very limited hunting opportunities exist in some herds which are closely scrutinized on an annual basis. Desert bighorn populations may be influenced to a greater degree by factors such as disease or severe drought that may be outside of the management influence of local biologists. Furthermore, annual monitoring of bighorn sheep in Colorado has been variable and depends exclusively on budgetary constraints and access. Some sheep herds may only be surveyed once every three or more years. For these reasons, some sheep herd management plans may rely on objectives

that are atypical of Colorado management plans and will not include male:female or population objectives. Based on the best available science and constituent input, managers will strive to establish tangible herd management plan objectives that will promote sustainable bighorn sheep populations and management on an annual basis.

DAU Description

The Dolores River Desert Bighorn Sheep Herd is located in the Southwest corner of Colorado with the Dolores River as the major river drainage. It is comprised of GMUs S-63 and S-64, the Middle and Upper Dolores respectively (Figure 3). The management area is 1,213 square miles and falls within Montezuma, Dolores, San Miguel, and Montrose Counties.

Inside the Dolores River Bighorn Herd designated boundary, elevations range from 4,900 ft to 9,500 ft although occupied habitat generally remains under 7,000 ft. The bighorn sheep inhabit the canyon country created by the Dolores River and its tributaries, which are characterized by red sandstone cliffs. The dominant vegetation type is the Colorado Plateau pinyon-juniper woodland and pinyon-juniper shrubland.

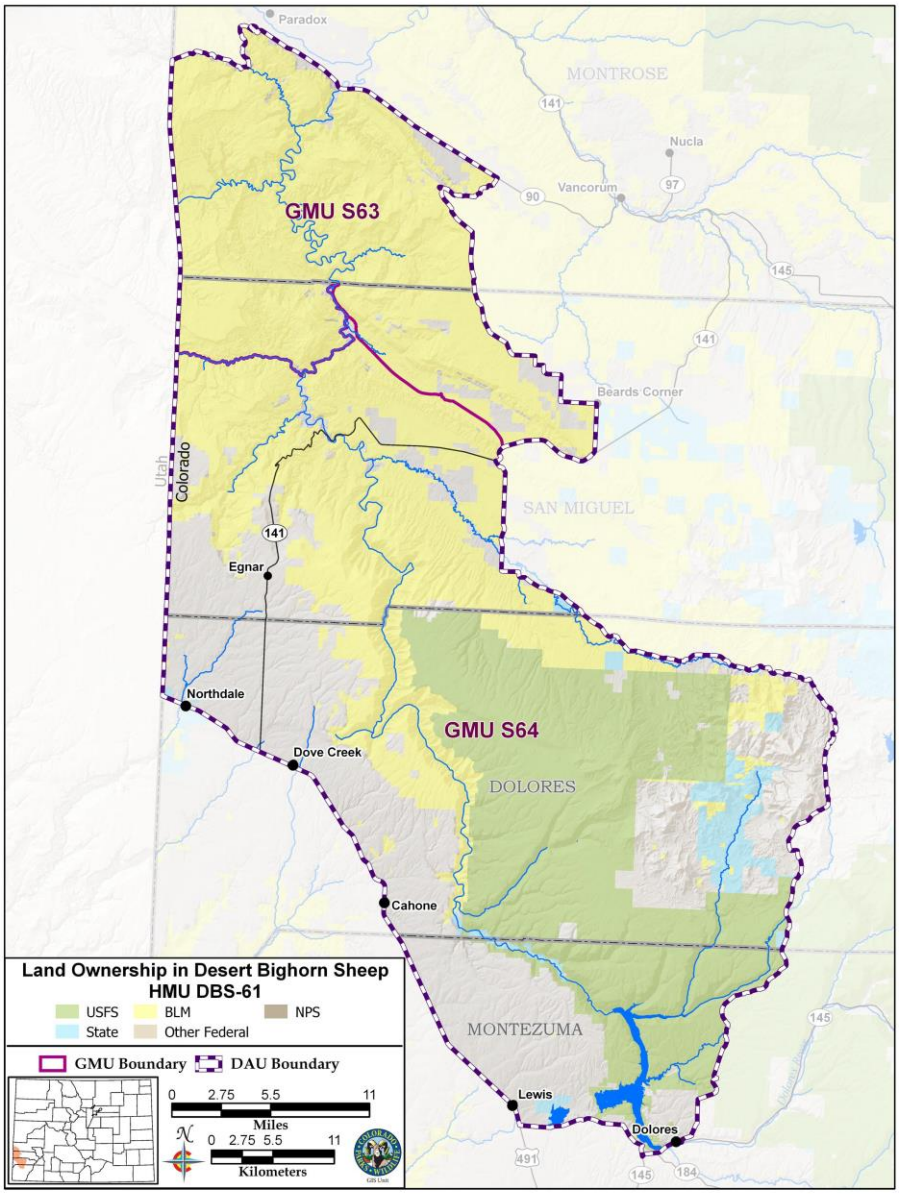

Figure 3. *Dolores River Desert Bighorn Sheep Herd Unit boundary, GMUs and landownership.*

Climate and precipitation

The Dolores River Sheep Herd is located within a high elevation, semi-arid environment. Average high temperatures vary from 37° F in January to 92° F in July. Average low temperatures range from 9° F during winter months to 56° F in the summer.

Average precipitation is 15" annually. The greatest rainfall occurs in late summer and early fall with 1 ½" per month. May and June are the driest months with an average of ½" of rain during June.

Population Prioritization

The Colorado Bighorn Sheep Management Plan (George et al 2009) established Tier 1 and Tier 2 designation of Rocky Mountain bighorn populations. Tier 1 populations should be given the highest priority for inventory, habitat protection and improvement, disease prevention and research. Desert bighorn populations were not included in this system at the time. In November 2013, the Parks and Wildlife Commission approved an addendum in which desert bighorn sheep populations were given the same emphasis as a tier 1 Rocky Mountain bighorn population. This is based on desert bighorn sheep having significant ecological, social, and recreational value. Desert bighorn are also highly sought after as a watchable wildlife species as well as by sporting and conservation groups. Further, desert bighorn numbers and distribution are more limited than Rocky Mountain bighorn sheep within Colorado, increasing their significance.

Habitat Resource and Capabilities

The herd management boundaries for DBS-61 cover 1,213 mi^2 (776,414 acres). The land ownership is made up of 45% (541 mi^2) Bureau of Land Management (BLM), 2% (28 mi^2) State owned, 24% (295 mi^2) US Forest Service, and 29% (350 mi^2) privately owned lands, as illustrated by Figure 3. Almost the entire occupied bighorn habitat is found on BLM, with 97% of occupied habitat in S-63 and 93% of occupied habitat in S-64 occurring on BLM land.

Livestock grazing on public lands in the Dolores River DAU is comprised of cattle. It is worth noting that currently there are no domestic sheep allotments on public lands in the DAU. There is a wild horse herd nearby in the Spring Creek Basin Wild Horse Herd Management Area along part of the eastern boundary of GMU S-64 in Disappointment Creek. There have been a few reports in recent years of wild pigs in LaSal Creek and along Highway 90 on the northern edge of S-63.

While, the majority of land within the DAU boundary is public, private land is interspersed within the DAU and within occupied range that at any time could be stocked with domestic sheep or goats. Across the Utah state line, there is active domestic sheep grazing on private and state owned lands west of Gateway within 20 miles of occupied desert bighorn range. Private landowners could also easily have individual or small numbers of domestic sheep or goats that bighorn could interact with DBS-61 bighorn. In 2013, a collared ewe from the desert bighorn transplant in S-63 was observed co-mingling with two domestic goats along Highway 90. The domestic goats had escaped pens on private property. The collared ewe was euthanized on March 21, 2013 following at least five days of co-mingling with the goats.

In 2014, CPW staff developed a habitat suitability model for desert bighorn sheep habitat based on telemetry and GPS data collected from desert bighorn in S-56 (Black Ridge Herd), S-62 (Dominguez/Uncompahgre Herd), and here in DBS-61 (Eichhoff 2014). Figure 4 depicts modeled suitable desert bighorn habitat within the DBS-61 boundary. Suitable desert bighorn habitat was modeled based on slope, terrain ruggedness, pinyon/juniper and oak canopy cover, riparian habitat, and

patch size. The modeled results align well with where bighorn have been found on the ground within the DAU. Currently, 154 mi^2 of suitable habitat are mapped as occupied range with an additional 117 mi^2 of suitable habitat not currently occupied. Most of the unoccupied suitable habitat is up river (southeast) from occupied habitat with dense tree cover and other habitat that is not contiguous with occupied habitat.

Desert bighorn sheep habitat in the Dolores River area was also modeled in the 1990's, prior to conducting any transplants. Craig McCarty completed an MS Thesis in 1993 that evaluated a Habitat Suitability Model for Desert Bighorns (Armentrout and Brigham 1988) using data collected in the Upper Dolores Canyon (also updated the HSI Model in McCarty and Bailey 1994). In addition, a Habitat Suitability Rating model was developed (1993), as well as a method for measuring visual obstruction by discrete objects (McCarty and Bailey 1992).

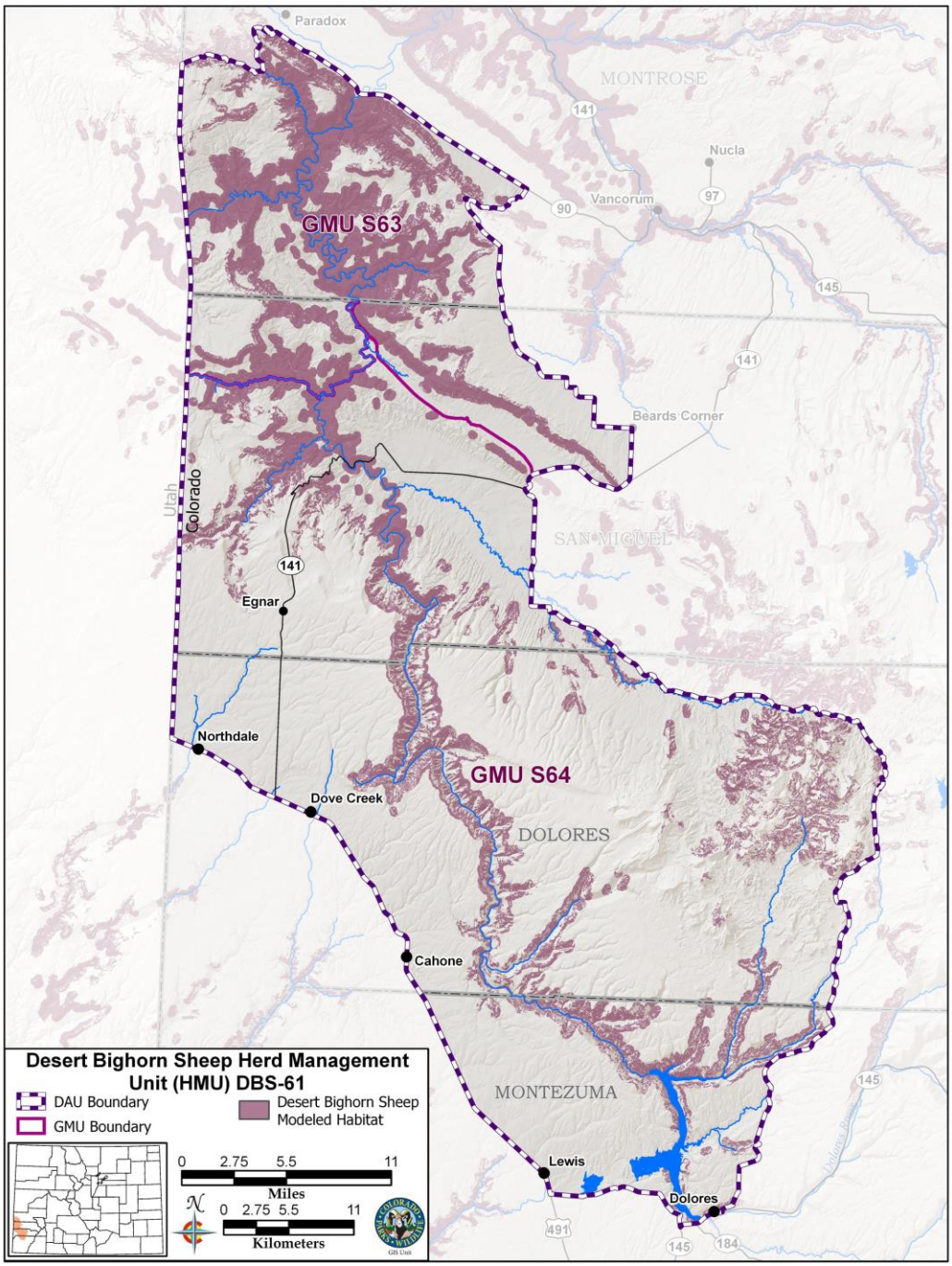

Figure 4. *Modeled desert bighorn sheep habitat in the Dolores River Bighorn Management Unit.*

HISTORY

Historic Occurrence

There is debate whether desert bighorn sheep were native to Colorado. Prior to translocations that began in 1986, there were no records of bighorn sheep occurring in Dolores River Area since settlement in the 1880's. Historically, mapping efforts included parts of the Colorado River and SW Colorado in desert bighorn range (Buechner 1960, Monson 1980, and Hall and Kelson 1959) and some suspected bighorn remains were found near the Colorado National Monument (Dalton and Spillett 1971) and in Montrose County (Kasper 1977). Evidence that desert bighorns might have been indigenous to the Dolores River comes mostly from archaeological sites in southwest Colorado that suggest Native Americans hunted bighorns in low elevation areas that would be more suitable for desert bighorns than Rocky Mountain bighorns.

Translocations

The Dolores River desert bighorn population was established by transplanting bighorns that were received from other states (Table 1). The first transplants of 35 bighorn occurred in the Upper Dolores River in 1986. The following year there was a second transplant of 21 bighorn. Bighorn for both of these transplanted came from the Lake Mead herd in Arizona. The transplants into S-64 were successful in establishing bighorns in the Upper Dolores drainage.

Two transplant efforts with bighorns from other states have taken place within S-63 along with 2 range expansion transplants. The first transplant from Nevada's Muddy Mountains, occurred in the Coyote Wash area (T46N, R19W, Section 28, SW ¼) between Slick Rock and Bedrock on October 29, 1990, consisting of 19 bighorn. A later transplant of 25 bighorn from Utah's San Rafael Swell, took place on February 6th and 7th, 2001 in Bull Canyon near Bedrock. Twelve of the sheep had radio collars and 11 had died by early April 2003. Lion predation appeared to be the primary cause of death for the sheep. The 12th sheep, which was the only collared male, was harvested in 2011.

Table 1. *Bighorn sheep transplants into Dolores River Bighorn Herd.*

Date	Source	Rams	Ewes	Lambs	Total
1986	Lake Mead, AZ	5	25	5	35
1987	Lake Mead, AZ	5	11	5	21
1990	Muddy Mtns, NV	1	14	4	19
2001	San Rafael Swell, UT	3	22	0	25

In 2010 and 2011, two range expansion projects were conducted, trapping desert bighorns from S-64 and releasing them in S-63. Based on the documented lion predation on the 2001 transplanted bighorns, CDOW (now CPW) staff developed a predator management plan to allow for the removal of lions that predated on collared transplanted sheep. In 2010, 15 (12 ewes and 3 rams) desert bighorns were captured in the upper Dolores, fitted with satellite GPS collars and transplanted to Spring Canyon in the Middle Dolores. In 2011, 15 bighorn (10 ewes, 3 rams, and 2 lambs) were captured in the Upper Dolores, fitted with satellite GPS collars (lambs were fitted with VHF drop-off collars), and transplanted to La Sal Creek in S-63. Satellite transmissions of locations and mortalities was not available in a timely manner due to collars not readily transmitting data based on location of animals in canyons. Due to lack of timeliness of data transmission, efforts were not made to remove any lions that depredated on collared sheep. The lions left the area of the carcass by the time the collars were recovered. Six of the transplanted bighorns were suspected to have been killed by lions within 3 years of the transplant. Based on observed collar survival and observed lamb births and recruitments, the range expansion project was deemed a success. The project also documented that there is extensive movement of collared animals along the entire Dolores River Corridor within S-63 and S-64.

Population History

This herd has been inventoried annually with an April ground count since 1994, and has had helicopter counts approximately every 3 years since 1993. Because of the low density of bighorn and vast amount of country, minimal numbers of bighorn are located and classified, providing inconsistent data between survey efforts. Data provides some indication of herd performance and distribution. The quality of the data is not enough to develop a population model.

In 1995, 142 sheep were classified during the May helicopter survey. In the late 1990's, the population was estimated to be approximately 215 sheep and peaked shortly thereafter at an estimated 235 bighorn (Figure 5). In 2000 the total count during inventories declined dramatically, and in 2001 very few lambs were observed and the population appeared to decline dramatically. Only 24 sheep were observed during the 2000 ground survey, and 25 during the 2001 helicopter survey (0 lambs with 14 ewes). The population estimate declined to a low of 80 in 2003 with low reproduction still observed (0 lambs among 9 ewes). The cause of the decline was undetermined. During this period (2001) the transplant in S-63 ensued which might have aided in the recovery of the population.

The population began to rebound in 2004 and 2005 and has been steadily increasing since. In 2005, even though total counts remained low, lamb crop increased significantly and was noted during the helicopter (83 lambs/100 ewes) and ground (60-80 lambs/100 ewes) surveys. The current population estimate (2018) is 175 with an increasing trend.

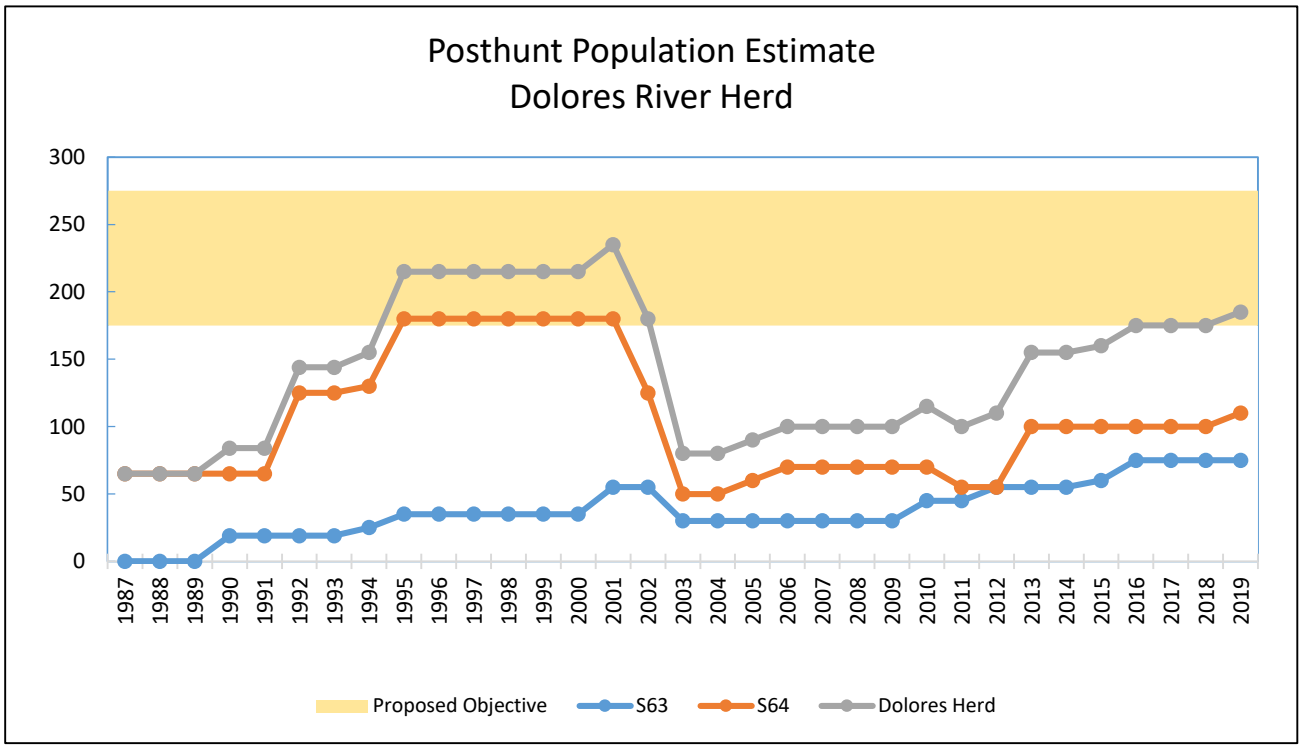

Figure 5. *Dolores River Bighorn Herd posthunt population estimate 1987 to 2019.*

Hunting and Harvest

Desert bighorn sheep licenses are highly sought after by hunters and are only offered to Colorado residents. This resource provides a unique opportunity and is extremely limited within the state.

Hunting for desert bighorn rams has occurred in S-64 within the Dolores River Herd since 1993 (Figure 6). Hunting in S-63 did not occur until 2010 when ram licenses became valid in S-63 and S-64 combined. Licenses remained valid for both GMUs through 2015. In 2016 license were specific to the

GMU. The number of ram licenses issued each year has varied from one to the current number of five. Ewes have not been hunted in the Dolores River Herd.

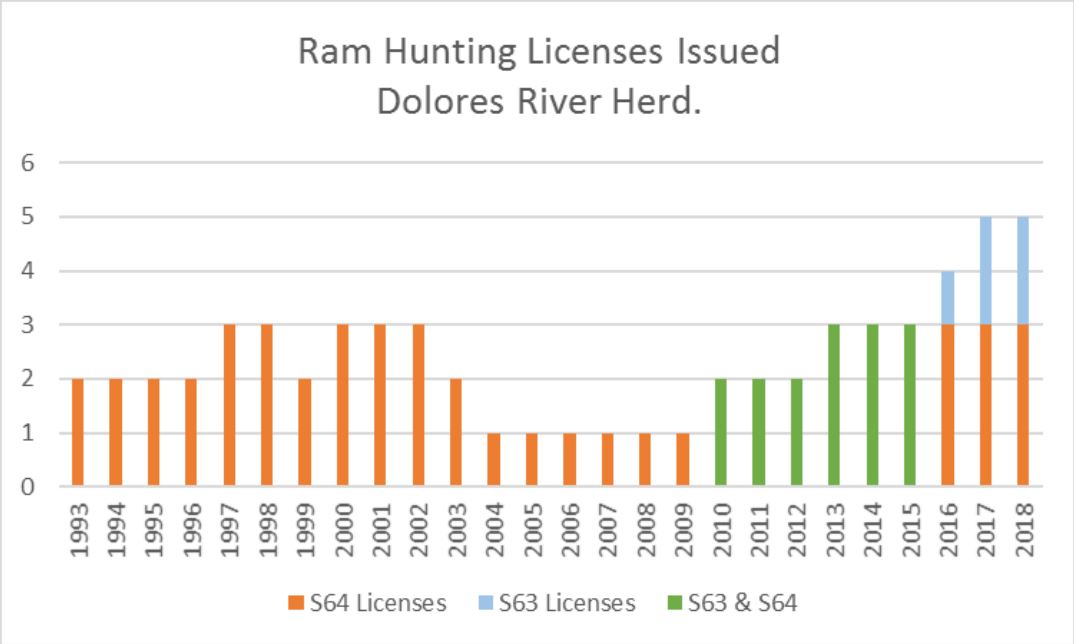

Figure 6. *Ram hunting licenses in the Dolores River Bighorn Herd from 1993 to 2018.*

In the 25 years that desert bighorn sheep have been hunted in the Dolores River Herd, only four years (1995, 2005, 2014, and 2016) have success rates been under 100%. This high success is due in part to the difficulty of obtaining a desert bighorn license (due to the limited numbers and high demand) and the dedication of hunters to obtain a license and hunt. Because of the high success rates, the number of harvested rams mirrors available license numbers. Five rams, which is the most to come out of DBS-61 in one year, were harvested in 2017 and 2018. There was only one year, 2005, when no bighorn were harvest in the DAU (Figure 7).

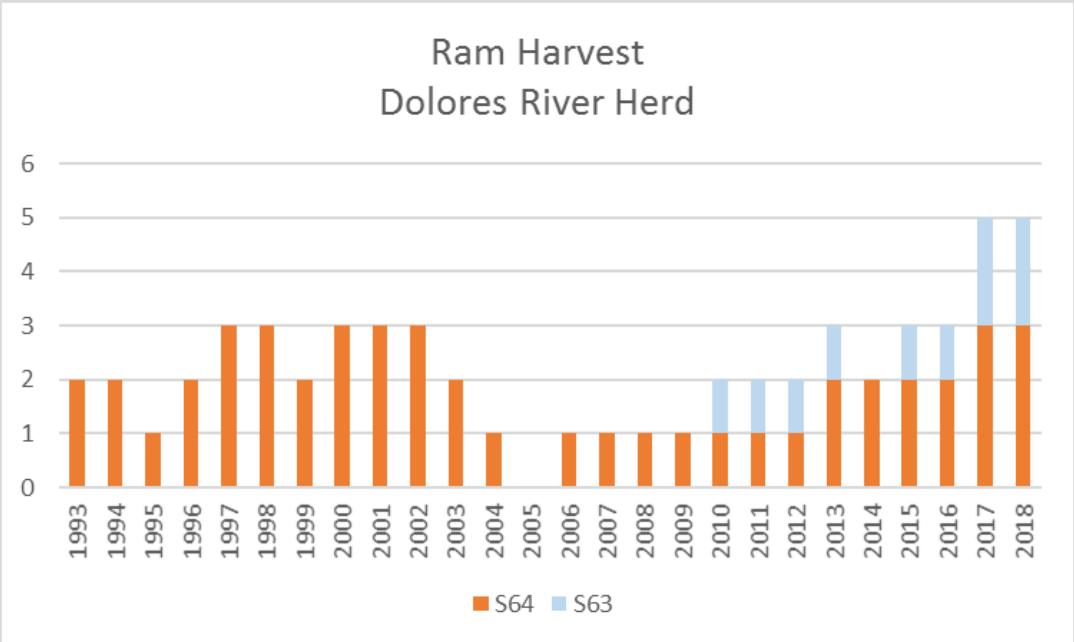

Figure 7. *Ram hunter harvest in the Dolores River Bighorn Herd from 1993 to 2018.*

The Colorado Bighorn Sheep Management Plan recommends a ram harvest of 2-5% of the post hunt population. In DBS-61 this would be a harvest of 3-9 rams annually with the population estimate of 175.

Given the current licenses and 100% success, five rams would be harvested out of the population annually which is mid-range of the guidelines.

Ewe licenses have not been available, so therefore no ewe harvest has occurred in DBS-61. With good lamb numbers and a growing population, ewe harvest could occur without any impact to the population. Recommendations for ewe harvest are presented in the Colorado Bighorn Sheep Management Plan (George et al 2009). These recommendations provide managers with the general framework for ewe removal through trap and transplant or establishing ewe hunting seasons (Table 2). In the plan, off-take rates revolve around a population objective and observed winter lamb:ewe ratios. It is evident that bighorn sheep populations in good health (ie. high winter lamb:ewe ratios and adult survival) are capable of sustaining relatively high levels of annual female harvest. Consideration will be given so that ewes in sub-herds that are most accessible to hunters are not overharvested, and that impacts are minimized on social structure and "legacy" movement patterns. The ewe season(s) and ram season may overlap, but the hunting of ewes should not interfere with the quality of the hunt experienced by ram hunters. In the absence of a specified population objective, managers will adapt harvest on an annual basis based on the best available data and information available, and whether or not the herd is at, or exceeds the expected population size objective.

Table 2. *Recommended ewe removal rates via hunting and translocations from Colorado's Bighorn Sheep Management Plan.*

Estimated Population in Relationship to Objective	***Observed Winter Lamb:Ewe Ratio***	***Ewe Removal or Harvest Rate as a Percentage of Total Population***	***Comments***
≥25% below	*NA*	*No ewe removals*	*Exceptions allowed for disease management*
<Objective, but within 25%	*≥40:100*	*Up to 5% of total post hunt population ≥1 year old*	*Or up to 12% of pre hunt ewe population*
At Objective	*≥40:100* *20-39:100* *<20:100*	*5-10% of total post hunt population ≥1 year old* *<5% of total post hunt population ≥1 year old* *No ewe removals*	*Or 12-24% of pre hunt ewe population* *Or <12% of pre hunt ewe population* *Exceptions allowed for disease management*
Over Objective		*≥10% of total post hunt population >1 year old*	*≥24% of pre hunt ewe population*

DISTRIBUTION

The current distribution of the bighorns in the DAU is below an elevation of 7,000 ft along the Dolores River and its tributaries, primarily downstream (generally north) of the Dove Creek pump station to Bedrock (Figure 8). Within the canyon, bighorn are regularly seen from the river to the top of the rim. Beyond the canyon rim, habitat diminishes significantly and it is rare to find a bighorn. Away from the Dolores River, there are regular sightings along State Highway 141 south of Slickrock, in Summit Canyon, Bishop Canyon, McIntyre Canyon, Grassy Hills, Bull Canyon, Gypsum Ridge, Spring Canyon, Coyote Wash, and LaSal Creek. Concentration areas are at Joe Davis Hill and within 3 miles up and down river of Coyote Wash on the Dolores River as well as from LaSal Creek confluence to Bedrock.

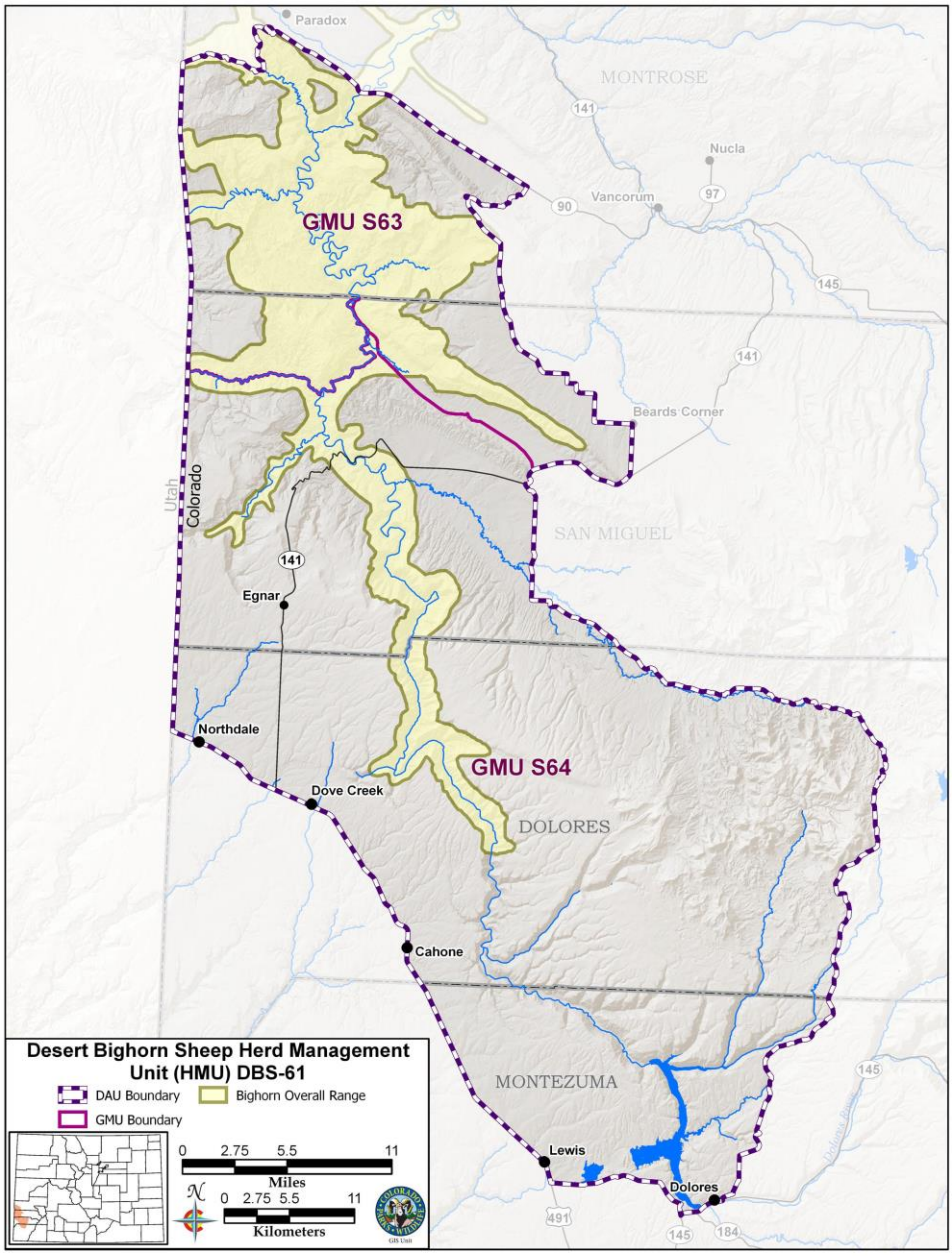

Figure 8. *CPW mapped bighorn sheep overall range in the Dolores River DAU.*

Interaction with Other Bighorn Sheep Herds

The closest population of desert bighorn sheep to the Dolores River Herd occurs in Utah along the Colorado and Green River near Moab. Moab is 31 straight line miles from the nearest mapped overall range in the Dolores River Herd. By way of the Dolores River to the Colorado River, the distance is over 70 miles. There were reports of a bighorn that was transplanted into the Upper Dolores that wandered downstream to Moab, and mixed with an existing herd in Canyonlands National Park. These possible travels suggest that movement along the Dolores River over long distances are possible. Although possible, interactions are likely to rarely occur due to the distance between the populations.

In addition, to the desert bighorn populations in Utah, the Dolores herd is in proximity to two other Colorado Desert bighorn populations, the Uncompahgre (S-62) herd to the east and the Black Ridge herd (S-56) to the north. Interaction between these herds have not been documented; however, canyon and rock rim corridors do connect all of these herds but animals would also have to cross some unsuitable habitat as well. Both S-56 and S-62 have known disease issues within the bighorn populations. At the center between the S-56, S-62, and S-63 populations, is an area identified as the

lower Dolores around Gateway, Colorado. This area appears to have suitable bighorn habitat and was identified in the 1989 Colorado Desert bighorn management plan as an area for transplanting bighorns. However, based on the disease profiles of S-56 and S-62, CPW currently does not want to promote the possible connection of these three populations, as the bighorns in S-63 and S-64 appear relatively disease free. In addition to the proximity to S-56 and S-62, to the west of Gateway there is currently domestic sheep grazing on public and private lands within 5 miles of the Utah state line.

Interaction within the Herd

In 2010 and 2011 thirty desert bighorns were moved from S-64 to S-63. Twenty-seven of the transplanted animals were fitted with satellite GPS collars to monitor survival and habitat use. The collars were also helpful in determining how many bighorns went straight back to their capture location in S-64 as well as documenting the fluid movement of bighorn sheep back and forth between both sheep game management units. Bighorns from the 2010 transplant into Spring Canyon were more likely to move back and forth between S-63 and S-64. The bighorns transplanted into LaSal Creek in 2011 were most likely to stay in S-63. The reason why the difference in movements between the two transplants may be due to the closer proximity of the 2010 release site to the capture locations. Figure 9 illustrates the movements of nine transplanted desert bighorns that moved back and forth between S-63 and S-64. Four ewes from the 2010 transplant moved back to S-64 right after release into S-63 and never went back. However, three ewes from the 2010 trap and transplant and 2 rams from the 2011 trap and transplant effort moved back and forth between the GMUs.

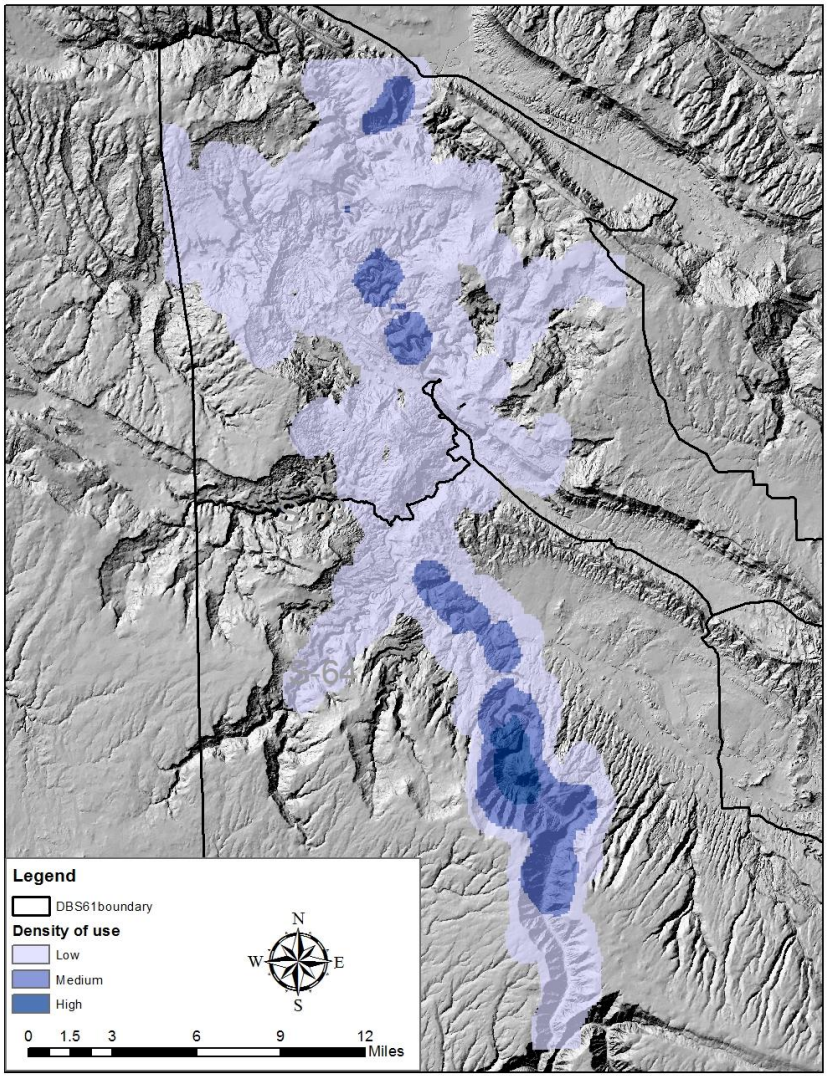

Figure 9. *Map illustrating the amount of use across DBS-61 by 7 ewes and 2 rams that moved between S-63 and S-64 after transplant.*

Management Issues

Disease

Pasteurellosis (infections caused by bacteria classified in the genera *Mycoplasma, Manheimia*, *Bibersteinia*, and *Pasteurella*) is a moderate management concern for DBS-61. In 2003, a few reports were received of coughing sheep, but their overall condition was reported to be good. No carcasses were found that appeared to be disease related mortalities. During the 2010 range expansion transplant, 15 bighorns were tested for Mycoplasma, but none tested positive through culture or PCR. However, following the 2011 transplant, all 30 blood samples were retested through PCR analysis and 20% of the samples showed exposure to Mycoplasma. Current testing needs to be conducted to determine if *Mycoplasma* is still a concern for bighorns in DBS-61.

Domestic sheep have not been grazed on public land in the area of the Upper Dolores or Middle Dolores for many years. This minimizes, but does not eliminate, the risk of transmission of respiratory disease from domestic sheep to wild sheep through direct contact (WSWG 2012, MOU 2014). Individual landowners may have individual or small flocks of domestic sheep or goats that bighorn could interact with.

Some of the original transplanted sheep may have had exposure to contagious ecthyma at capture, though no clinical symptoms have been observed in the Dolores. Epizootic hemorrhagic disease (EHD) and Blue tongue occur in deer and elk in the area and it is possible that it also occurs in the Dolores River desert bighorns. Desert bighorn in the S-62 (Uncompahgre) population have tested positive for exposure to EHD and Blue Tongue

There is no evidence of a lungworm problem in the Dolores River bighorn although fecal larvae loads have only been examined in 1994. In that year, larval loads were small (0-30 larvae/gram) with 50% of the samples having some fecal larvae. The Dolores River bighorn have not been consistently treated with fenbendazole, although several times prior to 2010 treated blocks have been placed in the vicinity of sheep. The blocks have generally persisted for over a year, therefore utilization appears to be small.

Predation

The effect of predation on the Dolores River Sheep Herd is mostly unknown. While it is easy to see predation effects on individual animals, it is more difficult to assess influences of predation on prey populations. Studies have shown that the relation between predators and prey populations varies and is often unique for individual populations of prey. It may even differ temporally within prey populations based on changes in other factors influencing the population.

Mountain lions are found in the Dolores River bighorn sheep range and cases of lion predation on wild sheep have been reported. Smaller, isolated herds are more prone to be influenced by predation especially when combined with other impacts such as poor quality habitat, disease, or drought. CPW biologists speculate that lion predation was a contributing factor to the population decline from 1999-2003 and the poor success of the transplant effort into S-63 in 2001. Six of the 30 bighorns transplanted from S-64 to S-63 died to due confirmed or suspected lion predation. Because of the steep and rugged terrain, along with low snowfall, lion hunters typically avoid the canyon area where the bighorn are found and where lion harvest would be most beneficial to bighorn. Predator control, if considered, should be a short term action to address specific impacts to the bighorn population by lions

Other predators include coyotes, bobcats, and golden eagles, which may account for some bighorn mortality, particularly of juveniles. Black bears are also common in the area and may take the occasional bighorn when presented with the opportunity. Collar data from the 2010-2011 transplant effort documented at least scavenging of multiple sheep mortalities by bears as well as one mortality

that appeared to most likely be caused by bear predation. In July and August, the New Mexico privet along the Dolores River corridor can produce large berry crops even on years when other higher elevation berries freeze out. During this time, bears appear to migrate to the Dolores River to consume berries. The July timeframe is also a time of year when bighorn may be more likely to have to get water from the Dolores River creating the potential for more conflict.

Habitat Quality

Habitat quality along the Dolores River is considered to be good for desert sheep. The rough physiography provides ample escape cover and forage quantity/quality generally appear to be adequate. Although no food habits studies have been done locally, important forage species likely include mutton grass, Indian rice grass, galleta grass, winterfat, four-wing saltbush, black sagebrush, Mormon tea and bigelow sagebrush. Water is considered adequate in most areas of the occupied range, but might be a limiting factor in dispersal of bighorn into drier parts of the range. Habitat concerns for bighorns include pinyon-juniper (PJ) woodland expansion and noxious weed invasion, primarily by knapweed, cheat grass, and tamarisk. Although it is not unusual to see bighorns in fairly dense PJ woodlands and PJ can provide thermal cover, PJ expansion in desert sheep habitat is considered detrimental because of reduced forage production and decreased visibility which can lead to increased predation rates.

During the drought that occurred during 2000-2004, primary water sources were likely the river itself. In order to access the river, sheep were forced to abandon the escape cover along the cliffs and travel through extensive areas of PJ and oakbrush, tamarisk, box elder, privet, willows and cottonwoods. This movement pattern may have significantly increased predation (primarily by mountain lions) and exacerbated other drought related effects such as poor nutrition, health, and recruitment. During drought years, bighorn distribution does change with animals more spread out over the available habitat.

The effect of competition with domestic livestock on Dolores River bighorns is unknown. As mentioned earlier, cattle grazing occurs in bighorn sheep habitat in the Dolores Canyon. In the late 1990's, cattle management was altered to include trailing cattle through the canyon in the spring and fall to try to control cheatgrass and reduce grazing on native grasses. Trespass cattle in the canyon are not uncommon. In S-63, most of the BLM is grazed by cattle every other year, however, the coyote wash area tends to be grazed every year.

Interspecific competition with other wildlife species is probably minor. Deer and elk densities in the DBS-61 bighorn range are generally low, though significant numbers of both deer and elk cross the canyon during spring and fall migrations and some of the mesas above the canyons are winter range.

CPW worked cooperatively with a grazing permittee to provide additional water sources (using a solar pump) in Summit Canyon to improve cattle distribution and to allow wild sheep use.

Recreation Impacts

Increased recreational use along the Dolores River is a concern. The bighorn sheep range is experiencing an ever increasing number of hikers, dogs (accompanying people), rock climbers, horseback riders, OHVs, mountain bikers, and rafters on the Dolores River. There is continued pressure on local, state, and federal agencies to develop areas for recreation opportunity, specifically non-motorized trails and motorized trails and roads. Recreation is known to displace desert bighorn sheep, from what would otherwise be usable habitat (Papouchis et al 2001). Disturbance from recreation activities should be considered, especially during critical times such as lambing and stress causing events such as drought.

The BLM implemented a road-closure at the Pyramid and Joe Davis Hill from February 1 to June 30 annually. This is during the lambing and early nursery period with a goal to minimize recreational disturbance. However, the gate on the road that affects the closure has a history of being left open (or illegally opened) during the closure period and people continue to use the road. Compliance with the closure has been better in recent years as CPW and BLM continue to work together to protect essential areas from human disturbance.

Development and Fragmentation Impacts

The majority of the desert sheep range in the Dolores River population is on BLM land. Residential and urban development is not considered to be a direct, major threat to the bighorn except in a few areas. Private land areas where development could be a potential problem are the lower portions near Disappointment Creek and Slick Rock.

Although bighorns do frequently cross Highway 141 near Slick Rock, vehicle-related mortality appears to be rare. The visibility of the herd due to the highway may have been a contributing factor to a ram being shot illegally and wasted.

Currently, mining, mineral exploration, and oil and gas development are not major threats to the Dolores River bighorns. There is some carbon dioxide extraction occurring above the Dolores River canyon rim that has not encroached into bighorn habitat. There are some natural gas wells on Wray Mesa adjacent to bighorn range. Over the last 15 years, there has also been proposals to develop gas wells near Hamm Canyon, which is mapped lambing area, but nothing has occurred as the companies that own the gas leases keep changing hands. Uranium mining was extensive in the area in the 1960's and 1970's but is currently stagnant. If demand for uranium increases and mining is resumed, there could be some negative impacts to bighorn sheep.

Hunting Impacts

Hunting of the Dolores River Population has been very conservative and the impacts on the bighorn population are considered to be minimal. A conservative number of ram licenses have been issued each year. Harvest rates are within guidelines of the Colorado Bighorn Sheep Management Plan and are not believed to have an impact to overall population size. Harvest of females could have more influence on populations, but there has not been any ewe hunting in DBS-61.

Illegal Kills

There is little direct evidence that illegal take of bighorns in the Dolores River Herd is a population level problem. A few cases of illegal take are known to have occurred, but population impacts are minimal. Bighorns are highly visible in some areas providing an opportunity for poaching to occur.

Management Strategies

Following is a list of management needs for the DBS-61 herd. Within each management need, there are proposed actions necessary to achieve the goals of this HMP:

Improve population inventory and monitoring

Air and ground survey efforts are used to inventory the bighorn population. Observations from these surveys are used to evaluate lamb recruitment and ram ratios, which influence management decisions. The Dolores River drainage is a large landscape in a very remote part of Colorado where bighorn sightability is low. Funding for helicopter surveys is expensive and generally not sufficient to fly all

suitable bighorn habitat effectively, and ground surveys are difficult to complete based on the remoteness, ruggedness and expanse of the area. However, current population estimates are based on staff air and ground surveys as well as other observations from hunters, the public, and other agency staff. To manage to population objectives effectively and monitor population productivity, CPW needs to collect a greater amount of population data in this remote and rugged landscape.

Proposed Action:

1) Pursue additional funding opportunities to conduct aerial surveys and attempt to determine the best time of year to complete surveys effectively and efficiently
2) Work with other agencies, hunters, and wildlife watchers to collect bighorn observations throughout the year along the Dolores River drainage
3) Pursue evaluating the effectiveness, implementation, and cost to monitor Dolores Desert bighorn sheep age and sex structure with remote camera traps, drones, or aerial infrared surveys

Use as a source herd for translocations

There have not been any translocations of bighorn from the Dolores River Herd. As the population continues to grow, it is feasible that it could be provide some animals for future transplants. However, due to its limited size the Dolores River Herd will not be able to support extensive transplants from the population. In addition, the remoteness and ruggedness of the area would make trapping animals difficult.

Proposed Action:

4) With an increase in the population, monitor the potential for translocating a limited number of animals from the population to meet demands and goals within the State utilizing the ewe removal recommendations from the statewide bighorn sheep plan

Need for supplementation or range extension translocations

In 2010 bighorn were captured in S-64 and moved into S-63 to distribute animals across the DAU. Radio collar data provided by the transplanted sheep indicate bighorn frequently move throughout the DAU. This, along with observations, indicate bighorn are using available habitat in the DAU and translocations for range extensions are not required. Given the current population size, growth and recruitment, a supplementation would provide little benefit.

Proposed Action: none

Need for translocations to increase genetic diversity

The Dolores River Herd was created by translocating 100 individual bighorn from multiple source populations. This number of bighorn was more than an adequate for a strong genetic base. Based on population performance, lack of genetic diversity does not seem to be restricting the population.

Proposed Action: none

Habitat improvement

Bighorn prefer areas of rugged, open country found throughout the DAU. Forested areas are common on the landscape and are used occasionally by bighorn. Converting some of the areas of pinyon-juniper and shrub oak to open shrub and grass would be beneficial to bighorn in DBS-61.

Habitat improvement projects could be difficult given the remoteness and ruggedness of the terrain. Traditional mechanical treatments may not be feasible across most of the canyon landscape and thinning by hand crew would also be difficult in many areas. Prescribed fire using helicopters to remotely start fires at the bottom of dense PJ slopes and allow the fire to move up slope to open grass benches or previously mechanically treated benches could be feasible if BLM is interested. Access is necessary for equipment and personnel to contain the burn. A natural fire could be beneficial. Numerous trees have been ignited over the years with very little spreading. It is unknown if all of these trees were put out or the canopy is too thin to spread fire. When natural ignitions occur, CPW would encourage land management agencies to allow it to burn as long as human life and property was not endangered. Federal agencies are tolerating more of this type of fire management in remote areas where there is little threat to humans and their property.

A water well with a solar pump was established in Summit Canyon. In typical years with average or above moisture, there is little use of the well by bighorn sheep. However, in dry years, wild sheep use increases. Water developments in other areas with limited water could benefit bighorn sheep. Solar wells are one option as are rain collecting guzzlers. Care should be used in developing watering areas to avoid a death trap. This is caused by concentrating bighorn sheep and other prey in areas, making them more easily accessible to predators. The gains of providing a limited resource could be negated by the increase of predation.

Proposed Action:

1) Allow natural fires to burn, creating new habitat for bighorn sheep when human life or property is not at risk.
2) Identify areas that would benefit from water development and install water projects, encouraging an increased distribution of bighorn in the DAU. Concentrating bighorn sheep and creating “death zone” will be avoided.
3) Treatment and removal of invasive vegetation on public and private lands to maintain quality bighorn habitat.
4) To maintain suitability of occupied bighorn habitat and improve adjacent habitat, treat/thin PJ and oakbrush when canopy cover exceeds 15%(McCarty 1993).

Critical habitat protection

Critical habitat identified for the bighorn in the DBS-61 include lambing areas and watering areas. Recreation use is the biggest threat to these habitats. Lambing is an important part of the life cycle of desert bighorn sheep. Ewes habituate to lambing areas and return annually to the same location to birth. Human disturbance in these areas during lambing can be detrimental to the bighorn population. Lambing/production area has been identified along the river corridor in both S-63 and S-64. One lambing area identified within the DAU, located by Joe Davis Hill. As mentioned earlier, BLM officials have closed the road in the area seasonally to motorize vehicles to minimize human disturbance to ewes with lambs. They have also restricted commercial camping during the lambing season in the same area as the road closure. Other lambing areas in the area are more remote.

Proposed Action:

1) Identify areas of critical habitat and potential threats.
2) Closure of roads, trails, and other concentrated recreation areas on public lands in critical habitat and setting aside areas of critical habitat from recreation use.
3) Implement seasonal closure on roads, camping areas, climbing routes, and mineral extraction activities from February 1 to May 1 in mapped bighorn lambing areas.
4) Identification of and support for development of recreation areas outside of critical habitat, which will meet the demand for recreation development while minimizing the impacts to bighorn sheep.

5) Education and outreach. The majority of people are unaware of the influence different forms of recreation use have on wildlife. For example, trail users believed other users have a higher effect on wildlife then their user group (Taylor and Knight 2003). Most of these individuals, once they learn about their influence, were willing to change their behavior to lessen their impacts. Through education and outreach people can learn about the impacts of development on wildlife and can make informed decisions.

Disease and parasite monitoring and treatment

In regards to disease, prevention is the best cure. Pasteurellosis (infections caused by bacteria classified in the genera *Mycoplasma, Manheimia*, *Bibersteinia*, and *Pasteurella*) often is associated with individual deaths, large-scale mortality events and depressed lamb recruitment in bighorn populations (George et al 2008). Healthy appearing domestic sheep can carry these bacteria strains and transmit them to wild sheep through direct contact (MOU 2014). Maintaining separation from domestic sheep is currently the best practice to prevent the introduction of these pathogens (WSWG 2012, MOU 2014). A major contributor of separation in the DBS-61 herd is the fact that there are no active domestic sheep allotments on federal lands within the DAU. Maintaining this management practice provides the best disease management strategy in the Dolores River Herd. Additional education could be done with local landowners about the potential for disease transmission from 4-H and other small flocks of domestic sheep and goats. One transplanted desert bighorn ewe had to be put down after it was observed cohabitating with two domestic goats that had left their corral a year prior.

Proposed Action:

1) Monitor the health of DBS-61 bighorn sheep by collecting biological samples from bighorn during any capture effort.
2) Collect samples from hunter harvested bighorn to monitor disease presence.
3) Use BMPs to continue to maintain effective separation of bighorn and domestic sheep.
4) Create an outreach program to educate local landowners with domestic sheep or goats about the significance of disease and its impact on wild sheep.
5) Maintain public land grazing allotments that are within or adjacent to occupied bighorn habitat as cattle or horse allotments.

Public Involvement

Public Survey

A public survey was done by CPW to gather views on the Dolores River Bighorn Herd. The survey was available on the internet, and hard copies (as requested), from November 21, 2017 to January 2, 2018. There were 139 responses to the survey (Appendix A).

The majority of those who took the survey were Colorado residents, lived outside of the DBS-61 boundaries, and had not hunted bighorn sheep in Colorado, nor applied for a Colorado bighorn sheep license. Seventy-five percent of the people participated in hunting, and the same percent participated in wildlife watching. Outdoor recreation use was popular with 51%. Other participants representing 5% or less were livestock producers, miners, construction workers, anglers, or individuals who just had a general interest in wildlife management. When asked how important it was that there continued to be wild desert bighorn sheep in Colorado in the future, 99 (or 71%) responded that it was very important.

When deciding how to use and manage land in DBS-61, local, state and federal agencies have much to consider. Of these considerations, involved people felt bighorn sheep populations were the most important, followed in descending order by deer and elk populations, non-motorized recreation, livestock grazing, motorized recreation, mineral extraction and mining, and finally residential and commercial

development. Some of the factors believed to be limiting the Dolores River Bighorn Herd were predation, disease, habitat quantity and quality, water availability, drought, motorized recreation and mineral development/extraction. Hunting, water based recreation, non-motorized recreation all ranked low as factors limiting the population.

For managing ram harvest, the majority (56%) wanted to maintain the current ram hunting opportunity. Increasing opportunity and decreasing opportunity were equally split at 16% each. When asked about population size, 47% wanted a small increase and 39% wanted a large increase. Less than 2% felt the population should be decreased.

Comments on Draft Plan

A draft of this plan was available for public review and comments for 30 days in December 2019. Comment letters were received from the Tres Rios Field Office of the BLM and the Colorado Wool Growers Association (CWGA) (Appendix B). Additionally emails were received from Greg Larson representing the Uncompahgre BLM field office and two private citizens. Overall, there was a desire to balance the population of desert bighorn sheep with recreation and with sheep and goat on nearby private properties. The Tres Rios Field Office and CWGA supported population objective alternative 2, which was identified as the preferred alternative by CPW staff. The BLM also encouraged working cooperatively with CPW to address habitat needs of bighorn sheep and to find a balance in identifying and protecting important bighorn sheep habitat with recreation use.

Population objective range

The Desert Bighorn Sheep Management Plan (BLM and CDOW, 1989) set a long term population objective of 200 sheep in this habitat unit, and 300 sheep for the entire Dolores River canyon. The original plan identified a minimum of 67,000 acres of potential habitat based on suitable habitat being within 1.7 km from the Dolores River. Based on collar data and observational data we have seen animals use habitat farther away from the Dolores River than 1.7km. The 2014 habitat suitability layer identified up to 173,728 acres of suitable desert bighorn habitat, with almost 60% of that being occupied. The current posthunt 2018 population estimate for DBS-61 is 175.

Desert bighorn population estimates are based on classification survey efforts, reported observations from hunters, the public, and other agencies, observed lamb recruitment trends, and monitoring precipitation trends. Based on the lack of consistent survey data due to funding availability, the vastness of the landscape, and low sightability of bighorn sheep, CPW has not created a population model for this herd, therefore, population estimates are not very precise and objective ranges are large. Proposed population objective ranges are:

Alternative 1- 150-250, stable population objective with current population in the middle of the range
Alternative 2- 175-275, stable to increasing objective with current population at bottom of objective range
Alternative 3- 200-300, increasing objective with current population below objective range

Staff is proposing Alternative 2 as the preferred alternative with the current population being at the lower end of the range and a management direction to grow the population. Alternative 2 best represents current management of the Dolores River Herd.

Harvest Objectives and Management

Ram and ewe hunting will continue in the Dolores River bighorn herd as long as population performance allows. Hunter crowding, hunter experience, age of harvested rams, and maintaining watchable wildlife opportunities are all factors that are to be considered when discussing bighorn harvest management. The harvest management objectives in this DAU will focus on average length of longest horn on harvested rams and allowing ewe harvest to manage population size and winter range densities.

Length of horn

Horn length is a measurable management objective to guide hunting harvest of bighorn rams. Horn length is determined by measuring from the base of the horn (closest to the skull) around the outside diameter of the horn to the tip. The length of the horn represents the age and trophy quality of rams and is less subjective than curl size or age of ram when used as a metrics. The older the animal, typically the longer the horn. This could vary somewhat due to older rams "brooming" their horn tips. Limiting the number of hunters (and harvest) allows for older age rams in the population. These rams will have the longest horn length. To increase hunting opportunity, a greater number of rams would be harvested which would lower the overall age of rams in the population. This management type would see shorter horn length measurements on harvested rams.

During Colorado's mandatory check of harvest bighorn, horn length is measured on both horns of harvested sheep. In RBS61 from 1993 to 2018, the average length of the longest horn on harvested rams was 31 inches. The shortest length was 19 ½ and the longest was 37 ¼.

The following alternatives are available for DBS-61 regarding length of longest horn as a management objective:

1. Maintain a running average horn length (of the longest horn) under 31 ½" of all harvested rams over a three year period ***(stable to increasing hunting opportunity)***,
2. Maintain a running average horn length (of the longest horn) between 28" to 33" of all harvested rams over a three year period ***(stable hunting opportunity)***, or
3. Maintain a running average horn length (of the longest horn) over 30" of all harvested rams over a three year period ***(stable to decreasing hunting opportunity)***.

Local staff are recommending Alternative 2 to maintain similar hunting opportunity to what has currently been available.

Ewe off take

Ewe removal from the population via translocation or hunter harvest will be considered when the population meets the criteria set forth in Colorado's Bighorn Sheep Management Plan (Table 3). Ewe harvest can be an effective herd management tool, but it can also be helpful by placing additional hunters in the field to provide observation data of the herd composition and distribution. This is especially true in the Dolores Canyon because of the remoteness of the area and limited survey data. CPW does not currently conduct winter classification of Desert bighorn sheep, so spring/summer lamb:ewe ratios would be used for evaluation instead.

Table 3. *Recommended ewe removal rates via hunting and translocations from Colorado's Bighorn Sheep Management Plan.*

Estimated Population in Relationship to Objective	***Observed Lamb:Ewe Ratio***	***Ewe Removal or Harvest Rate as a Percentage of Total Population***	***Comments***
≥25% below	*NA*	*No ewe removals*	*Exceptions allowed for disease management*
<Objective, but within 25%	*≥40:100*	*Up to 5% of total post hunt population ≥1 year old*	*Or up to 12% of pre hunt ewe population*
At Objective	*≥40:100* *20-39:100* *<20:100*	*5-10% of total post hunt population ≥1 year old* *<5% of total post hunt population ≥1 year old* *No ewe removals*	*Or 12-24% of pre hunt ewe population* *Or <12% of pre hunt ewe population* *Exceptions allowed for disease management*
Over Objective		*≥10% of total post hunt population >1 year old*	*≥24% of pre hunt ewe population*

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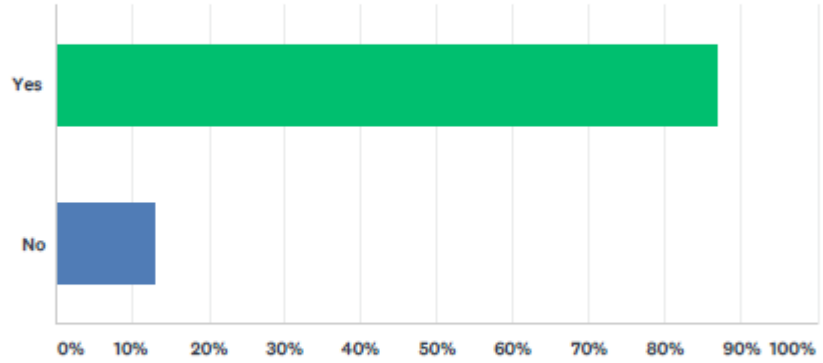
APPENDIX A

Survey Questions and Responses

Desert Bighorn Sheep (GMU 63 & 64) 2017

Q1 Are you a resident of Colorado? (Please check one response.)

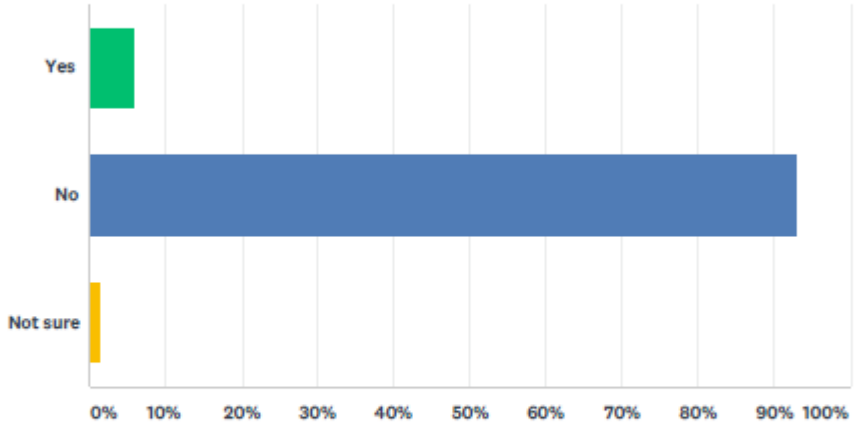
Answered: 139 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	87.05%	121
No	12.95%	18
TOTAL		139

Q2 Do you live within the boundaries of GMUs S63 or S64? (Please see map above and select one response.)

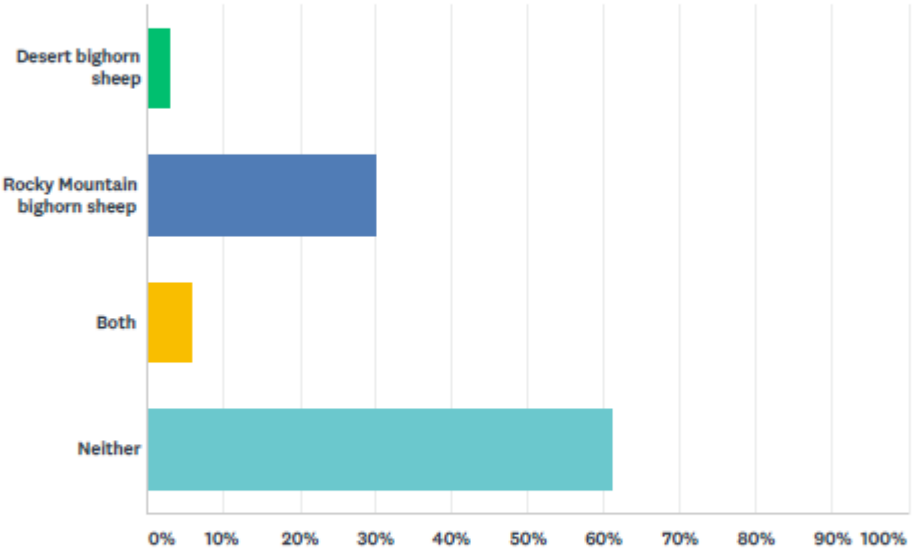
Answered: 139 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	5.76%	8
No	92.81%	129
Not sure	1.44%	2
TOTAL		139

Q3 Have you ever hunted Desert bighorn sheep or Rocky Mountain bighorn sheep in Colorado? (Please select one response.)

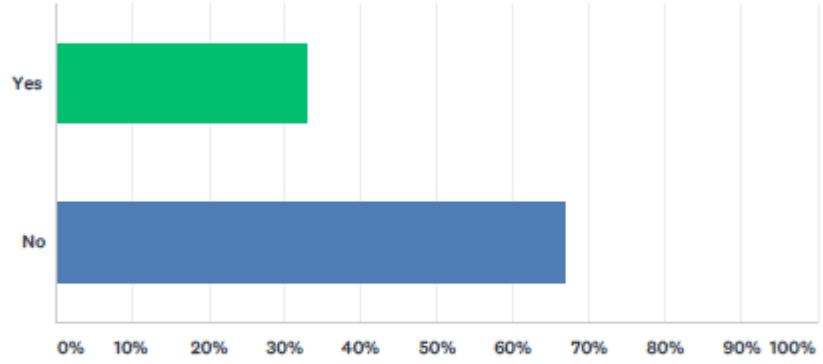
Answered: 139 Skipped: 0



ANSWER CHOICES	RESPONSES	
Desert bighorn sheep	2.88%	4
Rocky Mountain bighorn sheep	30.22%	42
Both	5.76%	8
Neither	61.15%	85
TOTAL		139

Q4 Have you ever applied for a bighorn sheep hunting license in GMU S63 or S64 in the past? (Please select one response.)

Answered: 139 Skipped: 0

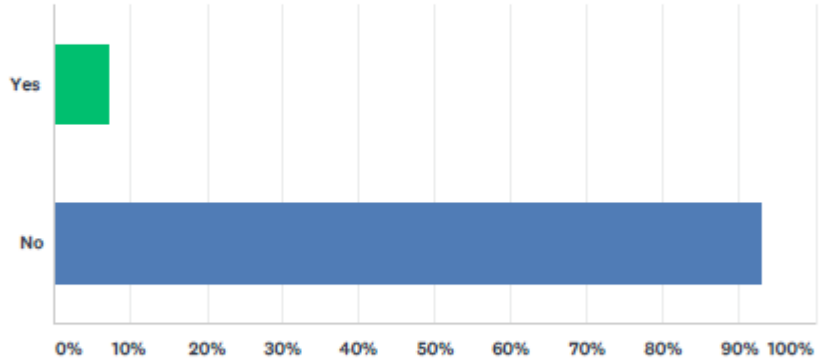


ANSWER CHOICES	RESPONSES	
Yes	33.09%	46
No	66.91%	93
TOTAL		139

Desert Bighorn Sheep (GMU 63 & 64) 2017

Q5 Have you harvested a Desert bighorn ram in Colorado? (Please select one response.)

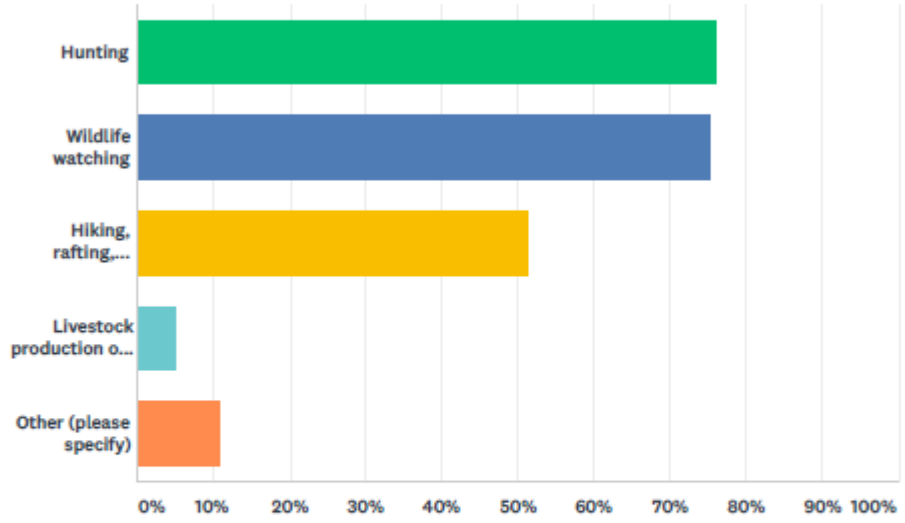
Answered: 139 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	7.19%	10
No	92.81%	129
TOTAL		139

Q6 Which of the following activities do you participate in that may affect your interest in bighorn sheep in this area? (Please check all that apply.)

Answered: 138 Skipped: 1

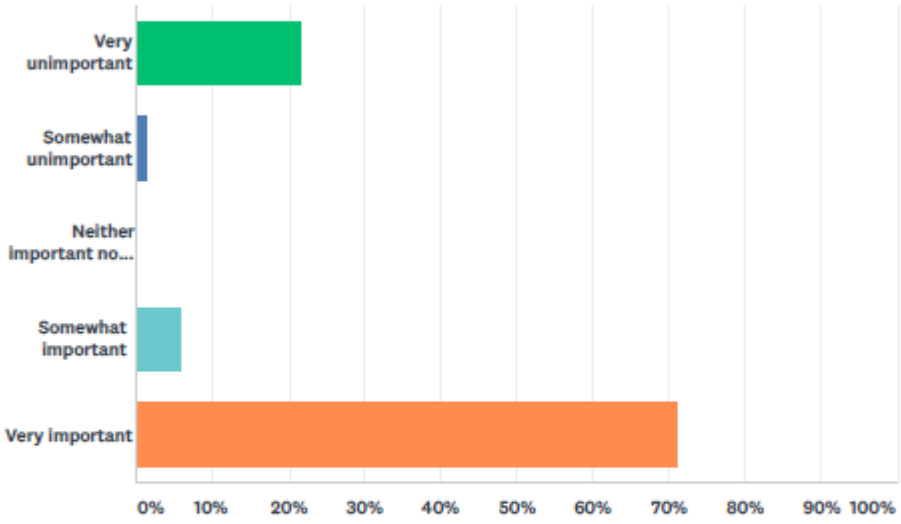


ANSWER CHOICES	RESPONSES	
Hunting	76.09%	105
Wildlife watching	75.36%	104
Hiking, rafting, climbing, or other outdoor recreation	51.45%	71
Livestock production or grazing	5.07%	7
Other (please specify)	10.87%	15
Total Respondents: 138		

#	OTHER (PLEASE SPECIFY)	DATE
1	ATV Riding and Camping	1/2/2018 12:30 PM
2	Mining - uranium and vanadium	12/19/2017 4:51 PM
3	photography	12/8/2017 10:49 AM
4	restoration of big horn sheep in Colorado	12/5/2017 2:23 PM
5	General wildlife conservation	12/5/2017 12:20 PM
6	Rertired wildlife biologist concerned re bighorn disease issues	11/29/2017 12:34 PM
7	Intact ecosystem's	11/27/2017 5:24 PM
8	work construction	11/27/2017 1:49 PM
9	retreiver training	11/27/2017 9:27 AM
10	Interest in proper wildlife and habitat management	11/26/2017 10:53 PM
11	Fishing	11/26/2017 7:22 PM
12	Keep the West Wild	11/26/2017 4:17 PM
13	Hoping my wife might be able to draw a tag someday.	11/26/2017 12:34 PM
14	I buy licenses which support their management and conservation.	11/23/2017 3:20 PM
15	Fishing in rivers in these areas.	11/22/2017 3:30 PM

Q7 How important is it to you that there continue to be wild desert bighorn sheep in Colorado in the future? (Please select one response.)

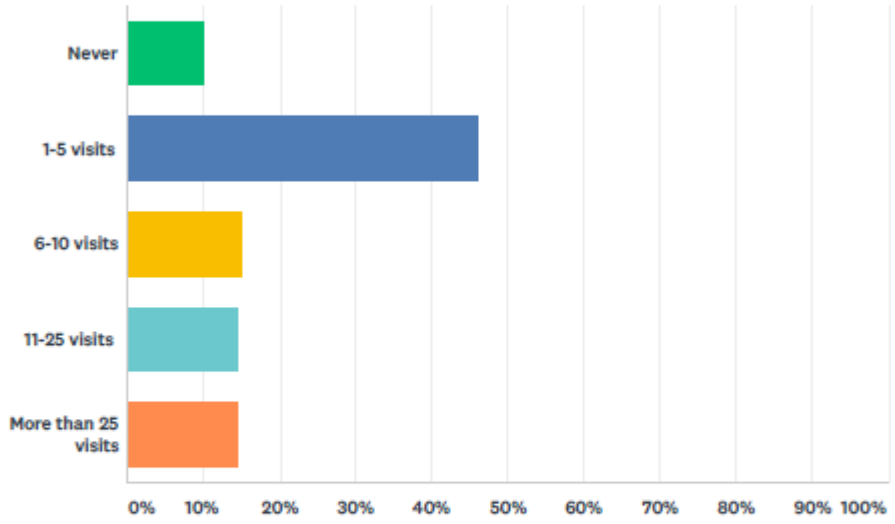
Answered: 139 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very unimportant	21.58%	30
Somewhat unimportant	1.44%	2
Neither important nor unimportant	0.00%	0
Somewhat important	5.76%	8
Very important	71.22%	99
TOTAL		139

Q8 Approximately how many times have you visited the S63 or S64 Dolores River area in the last 10 years? (Please select one response.)

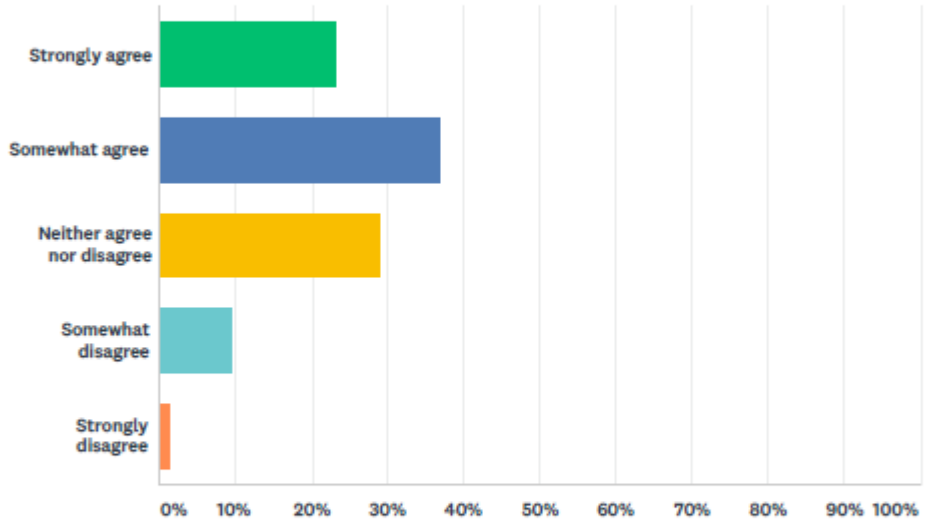
Answered: 139 Skipped: 0



ANSWER CHOICES	RESPONSES	
Never	10.07%	14
1-5 visits	46.04%	64
6-10 visits	15.11%	21
11-25 visits	14.39%	20
More than 25 visits	14.39%	20
TOTAL		139

Q9 To what extent do you agree or disagree with the statement below:"I believe that CPW is currently doing an adequate job of managing desert bighorns in GMUs S63 and S64." (Please select one response.)

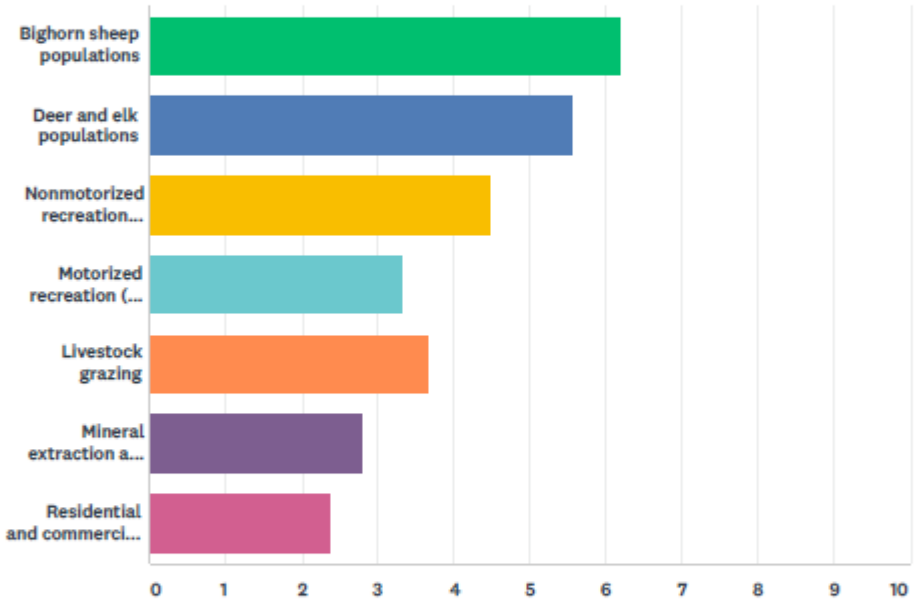
Answered: 138 Skipped: 1



ANSWER CHOICES	RESPONSES	
Strongly agree	23.19%	32
Somewhat agree	36.96%	51
Neither agree nor disagree	28.99%	40
Somewhat disagree	9.42%	13
Strongly disagree	1.45%	2
TOTAL		138

Q10 When deciding how to use and manage land in GMUs S63 and S64, city, county, state, and federal agencies have to consider the following things. Please tell us which of these considerations you feel should be most important in future land use decisions in Dolores, Montezuma, Montrose, and San Miguel counties. (Please rank the following by choosing a number from 1 to 7 indicating how important you feel each item should be, where 1 is the most important item and 7 is the least important.)

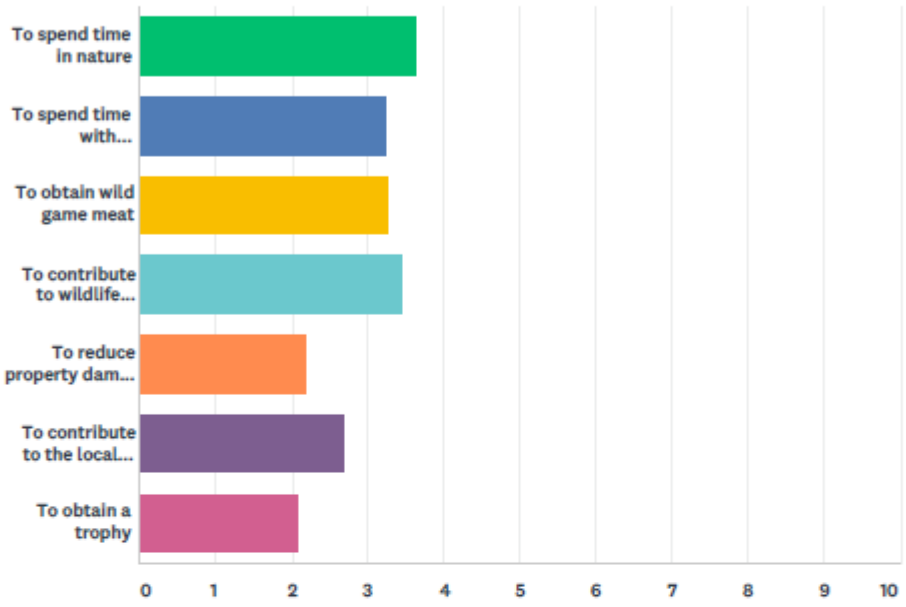
Answered: 138 Skipped: 1



	1	2	3	4	5	6	7	TOTAL	SCORE
Bighorn sheep populations	63.71% 79	20.97% 26	4.84% 6	0.81% 1	3.23% 4	3.23% 4	3.23% 4	124	6.19
Deer and elk populations	18.25% 23	54.76% 69	12.70% 16	6.35% 8	0.00% 0	3.97% 5	3.97% 5	126	5.57
Nonmotorized recreation (hiking, rafting, climbinb etc.)	6.98% 9	7.75% 10	51.16% 66	10.85% 14	12.40% 16	5.43% 7	5.43% 7	129	4.48
Motorized recreation (OHV riding, offroad driving etc.)	1.60% 2	4.00% 5	6.40% 8	34.40% 43	29.60% 37	14.40% 18	9.60% 12	125	3.32
Livestock grazing	6.98% 9	3.10% 4	13.95% 18	28.68% 37	27.13% 35	13.95% 18	6.20% 8	129	3.67
Mineral extraction and mining	5.30% 7	4.55% 6	6.06% 8	12.88% 17	15.91% 21	29.55% 39	25.76% 34	132	2.79
Residential and commercial development	4.48% 6	5.22% 7	3.73% 5	7.46% 10	11.19% 15	25.37% 34	42.54% 57	134	2.38

Q11 How important to you is each of the following reasons to hunt? (Please check one response for each statement.)

Answered: 135 Skipped: 4



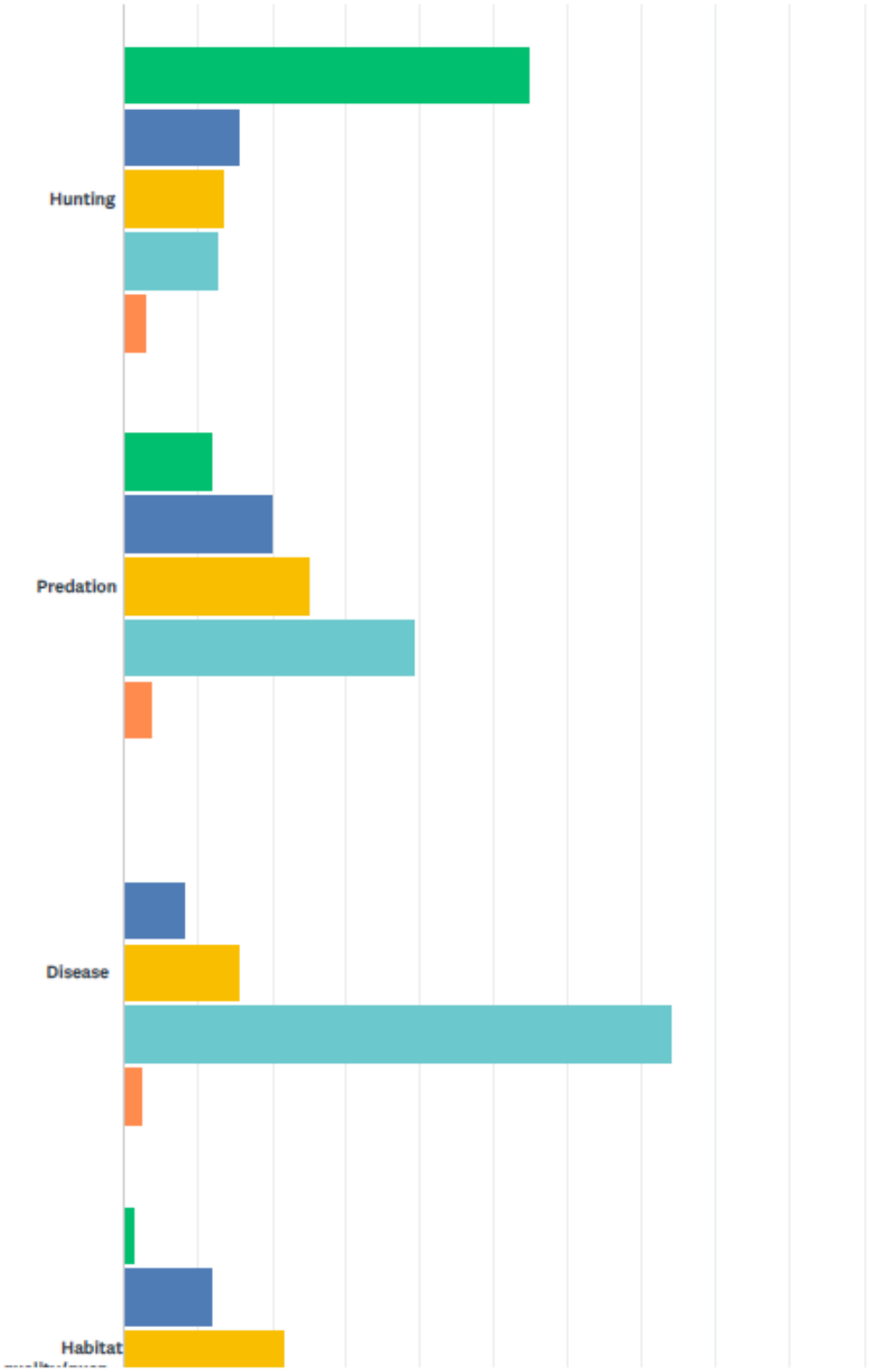
	NOT IMPORTANT	SLIGHTLY IMPORTANT	MODERATELY IMPORTANT	VERY IMPORTANT	TOTAL	WEIGHTED AVERAGE
To spend time in nature	3.70% 5	1.48% 2	21.48% 29	73.33% 99	135	3.64
To spend time with family/friends	5.93% 8	13.33% 18	31.11% 42	49.63% 67	135	3.24
To obtain wild game meat	6.67% 9	10.37% 14	33.33% 45	49.63% 67	135	3.26
To contribute to wildlife management	4.44% 6	7.41% 10	25.93% 35	62.22% 84	135	3.46
To reduce property damage cause by wildlife	31.11% 42	31.85% 43	24.44% 33	12.59% 17	135	2.19
To contribute to the local community (e.g., financial benefits from hunters)	14.81% 20	24.44% 33	37.04% 50	23.70% 32	135	2.70
To obtain a trophy	38.52% 52	22.96% 31	28.89% 39	9.63% 13	135	2.10

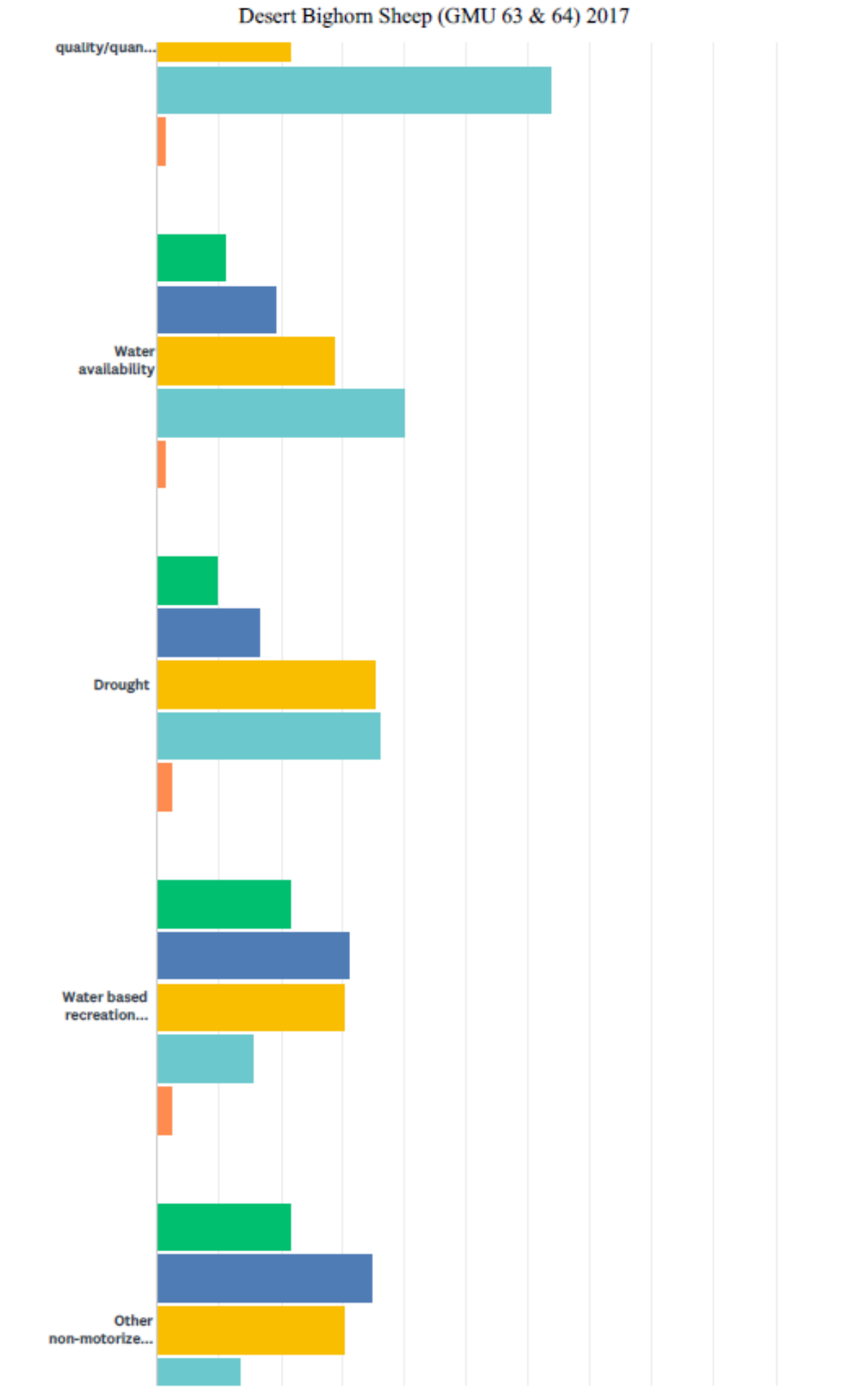
#	OTHER (PLEASE SPECIFY, AND TEULL US HOW IMPORTANT/UNIMPORTANT THIS IS TO YOU)	DATE
1	Hunt with a camera for good photos	1/2/2018 12:34 PM
2	I don;t hunt	12/3/2017 7:36 AM
3	Very important that future generations are able to participate in fair chase hunting on public lands.	11/28/2017 5:09 PM

4	I personally don't hunt, but see the value in controlling populations through thoughtful management.	11/28/2017 6:11 AM
5	To contribute to overall ecosystem health - very important	11/27/2017 5:13 PM
6	Preserve the tradition of hunting	11/27/2017 8:28 AM
7	I would LOVE to draw a desert sheep tag so I can enjoy the area.	11/26/2017 12:41 PM
8	To stimulate the local economy	11/25/2017 6:06 PM
9	VERY IMPORTANT: to provide healthier and more humane alternative souces of meat compared to obtaining meat from massive feed lots and slaughterhouses	11/25/2017 9:50 AM
10	It is very important to me to spend time in wild places with the great game animals that call this state home. We should always strive to better our habiat and balance the need for habitat with human needs.	11/22/2017 4:15 PM

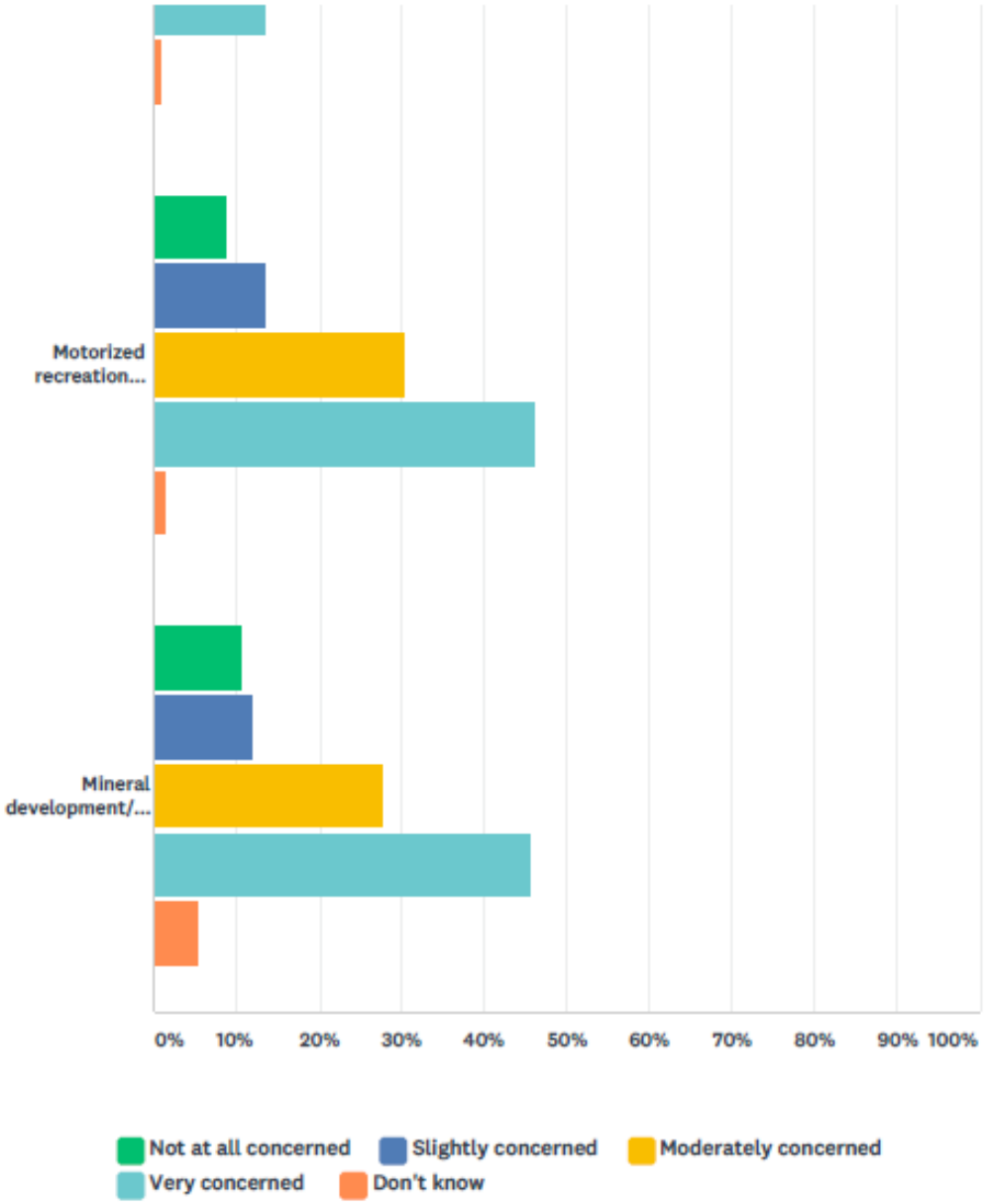
Q12 How concerned are you about the following factors currently limiting the desert bighorn sheep population in the Dolores River? (Please select one response per item.)

Answered: 135 Skipped: 4




Desert Bighorn Sheep (GMU 63 & 64) 2017
quality/quan...
Water availability
Drought
Water based recreation...
Other non-motorize...

Desert Bighorn Sheep (GMU 63 & 64) 2017



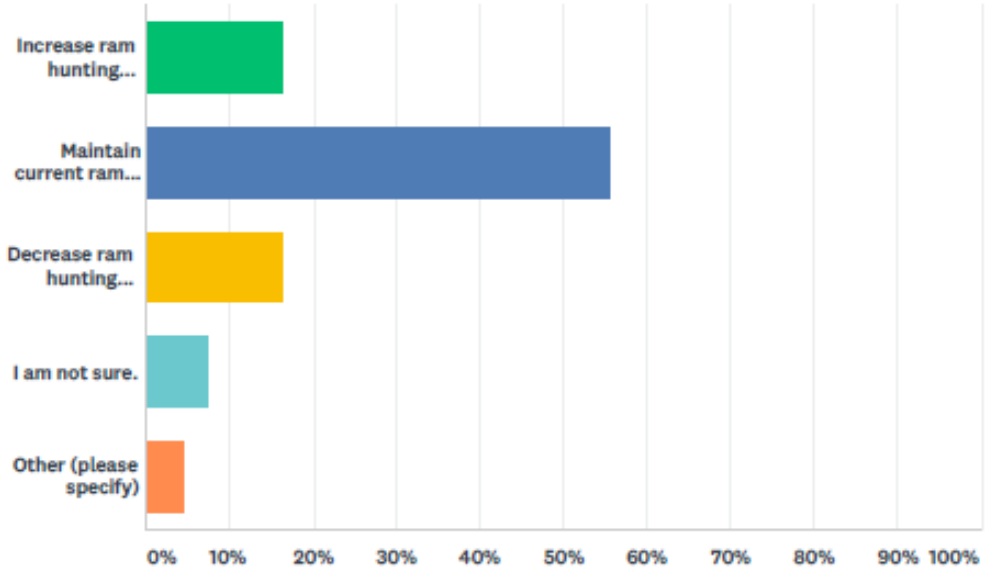
	NOT AT ALL CONCERNED	SLIGHTLY CONCERNED	MODERATELY CONCERNED	VERY CONCERNED	DON'T KNOW	TOTAL RESPONDENTS
Hunting	54.89% 73	15.79% 21	13.53% 18	12.78% 17	3.01% 4	133
Predation	11.85% 16	20.00% 27	25.19% 34	39.26% 53	3.70% 5	135
Disease	0.00% 0	8.15% 11	15.56% 21	74.07% 100	2.22% 3	135
Habitat quality/quantity	1.48% 2	11.85% 16	21.48% 29	63.70% 86	1.48% 2	135
Water availability	11.11% 15	19.26% 26	28.89% 39	40.00% 54	1.48% 2	135
Drought	9.77% 13	16.54% 22	35.34% 47	36.09% 48	2.26% 3	133
Water based recreation (ie., rafting)	21.48% 29	31.11% 42	30.37% 41	15.56% 21	2.22% 3	135

Other non-motorized recreation (ie., hiking, climbing, biking)	21.48% 29	34.81% 47	30.37% 41	13.33% 18	0.74% 1	135
Motorized recreation (ie., OHV use, Jeeping)	8.89% 12	13.33% 18	30.37% 41	45.93% 62	1.48% 2	135
Mineral development/extraction	10.45% 14	11.94% 16	27.61% 37	45.52% 61	5.22% 7	134

#	OTHER (PLEASE SPECIFY AND INCLUDE HOW CONCERNED YOU ARE.)	DATE
1	Legislature slow to understand and respond	1/2/2018 12:34 PM
2	Predator control would help this herd. Please see what NM did with their lions and how sheep populations flourished. At least try it here.	12/5/2017 10:19 PM
3	Fracking or property development - very concerned (that it will be allowed)	12/5/2017 10:06 PM
4	I am very concerned about domestic sheep and goats spreading disease and killing wild sheep.	11/28/2017 1:14 PM
5	Too many rafters on this and other rivers, like Arkansas River,. Concerns me a lot	11/26/2017 7:32 PM
6	Bears are predators too	11/25/2017 6:06 PM

Q13 Which of the following alternatives would you prefer to guide CPW's decisions about ram harvest and sex ratio in the next 10 years in GMUs S63 and S64? (Please select one response.)

Answered: 135 Skipped: 4

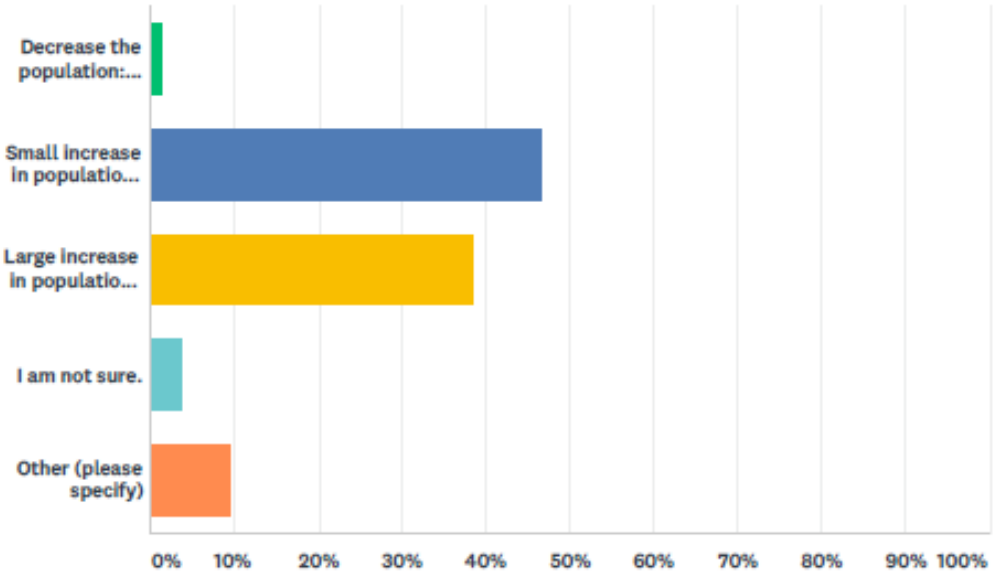


ANSWER CHOICES	RESPONSES	
Increase ram hunting opportunity, which would decrease the number of rams relative to the number of ewes in the herd. This may increase hunter crowding and reduce the age of rams harvested, but would allow more hunters to draw a permit each year.	16.30%	22
Maintain current ram hunting opportunity and sex ratio, which would limit crowding and encourage harvest of rams of different ages, but require more time to draw a permit.	55.56%	75
Decrease ram hunting opportunity, which would increase the number of rams relative to ewes in the herd. This would lead to reduced crowding and harvest of older rams, but reduce the chance to draw a permit.	16.30%	22
I am not sure.	7.41%	10
Other (please specify)	4.44%	6
TOTAL		135

#	OTHER (PLEASE SPECIFY)	DATE
1	manage for a minimum age at harvest of 8 years	12/13/2017 12:03 PM
2	I would support a moderate increase in tags. perhaps one more tag for each unit.	12/3/2017 9:04 AM
3	Stop hunting for 5 yrs and give the herds a chance to grow--let's see what nature does for a change instead of "managing" everything for our humans needs!	11/27/2017 1:55 PM
4	Decision needs to be made on predation, habitat quality and sound information on age/sex/lamb-ewe ratios.	11/26/2017 11:00 PM
5	We have professional biologists	11/26/2017 4:55 PM
6	Increase ram permits slowly as population allows.	11/26/2017 1:06 PM

Q14 Which of the following alternatives would you prefer to guide CPW's decisions about the number of bighorn sheep in GMUs S63 and S64 for the next 10 years? (Please select one response.)

Answered: 135 Skipped: 4



ANSWER CHOICES	RESPONSES	
Decrease the population: Reduce the number of bighorns by increasing hunter harvest. This would temporarily increase the number of hunting licenses available and it would maintain or reduce the current risk of diseases among wild sheep. It would reduce the opportunity to view wild sheep.	1.48%	2
Small increase in population: Small increase in the number of bighorn sheep, which will allow for small increases in the number of hunting licenses available in future years. This would maintain similar opportunity to view wild sheep, but may increase the risk of disease among wild sheep.	46.67%	63
Large increase in population: Increase wild sheep numbers by up to 50%. This may allow for long term increases in the number of hunting licenses available each year for rams and ewes in the future. This would also increase opportunities to view wild sheep, but may also increase the risk of disease among wild sheep.	38.52%	52
I am not sure.	3.70%	5
Other (please specify)	9.63%	13
TOTAL		135

#	OTHER (PLEASE SPECIFY)	DATE
1	----	1/2/2018 12:34 PM
2	I like large increase, but only based on habitat capability	12/6/2017 9:54 AM
3	Increase population with predator control	12/5/2017 10:19 PM
4	The money from hunting licenses is critically important to CPW I understand that but I do not know enough at this moment regarding the carrying capacity, habitat, current status of the bighorn to give you an educated response.	12/5/2017 10:06 PM
5	maintain status quo	11/29/2017 1:38 PM
6	If habitat is under utilized, support increasing population.	11/29/2017 12:47 PM

7	Increase wild sheep numbers and remove ALL domestic sheep and goats 100 miles within the wild sheep area	11/28/2017 1:14 PM
8	Increase in population with increase in habitat, introduction to northern canyons. Reduce risk of disease by not allowing interaction with domestic animals including sheep. Increase range with more water options.	11/27/2017 9:04 PM
9	Prioritize wildlife over domestic sheep grazing and other commercial activities, allow for natural herd growth to landscape capacity	11/27/2017 9:14 AM
10	Monitor herd health and competition with domestic sheep and mountain lion populations.	11/26/2017 11:00 PM
11	increase the population by up to 50%, by augmentation from other herds from outside the state. This may offer animals with better genes for horn growth, disease resistance, habitat and environmental existence, etc.	11/26/2017 8:14 PM
12	Increase the population so it is stable and able to withstand pressures from man and nature	11/26/2017 4:29 PM
13	rely on biologist estimate of herd's health	11/23/2017 3:20 AM

Desert Bighorn Sheep (GMU 63 & 64) 2017

Q15 Please enter the five-digit zip code of your residence:

Answered: 133 Skipped: 6

Q16 In what year were you born? (enter 4-digit birth year; for example, 1976)

Answered: 133 Skipped: 6

Q17 Please enter your email address below if you would like to receive updates on this plan? (i.e., when a draft is released for public comment or notification of final approval for the plan).

Answered: 84 Skipped: 55

Q18 Please use the space below to write any additional comments or observations about bighorn sheep management in S63 and S64.

Answered: 38 Skipped: 101

#	RESPONSES	DATE
1	I would like to see an auction tag for a ram that is sold at the Wild Sheep Convention in Reno, NV yearly with proceeds going to managing bighorns in S63 & S64. Or a raffle tag promoted by the Rocky Mountain Bighorn Society just like just like sheep (Rocky Mtn) and goat are done now to raise revinue for Desert sheep. I feel we should receive preferance points or better yet an entry in the sheep draw for every point the enterer has.	1/2/2018 12:41 PM
2	I hunted unit S63 in 2017. My main cause of concern is the abundance of predators. Specifically mountain lion. I did come across several sets of Bear Tracks in the areas containing sheep. Just about every water source had a set of lion tracks. I don't believe that there are too many tags for the area. As in most years they are not all filled. There is room for a larger sheep population in these two units specifically S63. Feel free to call me anytime to ask details about my hunt and scouting. My phone number is [redacted]	12/19/2017 7:26 PM
3	I've enjoyed seeing the bighorn sheep around the Slick Rock area for years. I think CPW is doing a good job in managing the herd and their habitat. Don't be too quick to change what been working.	12/19/2017 5:01 PM
4	CPW should be working closely with the land management agencies to eliminate domestic sheep and goat grazing anywhere near a bighorn sheep population. It would be advisable to also meet with 4H clubs and educate them on the disease issue so the expansion of sheep and goat hobby farmers are educated to the risks to our sheep populations.	12/13/2017 12:06 PM
5	Thank you for everything you all do at CPW.	12/5/2017 10:06 PM
6	I was lucky enough to accompany my son on his desert sheep hunt this year. His tag was for the northern unit. incredible country, great animals, and a truly wonderful experience. I hope to return to the area again, and will continue to apply for these units. thanks for all that you are doing for these great animals.	12/3/2017 9:16 AM
7	Ensure that domestic are strictly prohibited from the areas in which desert bighorn use as habitat, including the needs for the males to foray. This is of extreme concern in the Weminuche Wilderness and adjacent lands and CPW is not aggressive enough in protecting the bighorms there - more must be done and if domestic sheep must be removed from the area to protect the NATIVE bighorns then that should be done as soon as possible. CPW needs to step on to the plate on this one and push back on the woolgrowers, etc - I'm quite sure the vast majority of citizens in the area would prioritize protecting the native bighorns over scant economic returns that come from the subsidized and destructive sheep grazing - problems with native sheep, watershed issues, over grazing in the tundra, erosion on trails, guard dog issues, etc.	12/3/2017 7:42 AM
8	try to insure the future of hunting for generations to come.	12/1/2017 11:09 AM
9	Based on the abundance of ideal habitat in this area, I think we should try to increase desert bighorn's to a point where hunting, predation and disease will not have a significant impact on their population. I don't believe based on the low numbers reported we are at that point. I encourage hunting, but hunting smartly. If, based on research, it makes sense to keep the number of rams in check by allowing hunters to harvest, then I agree. But if we give out permits just because hunters are making requests and want the opportunity, then I feel that making them wait until populations are stronger will be better in the long run for those hunters. I appreciate the opportunity to share my thoughts.	11/30/2017 12:52 PM
10	Thanks you for he opportunity to comment.	11/29/2017 12:48 PM
11	Limit the amount of rafters camping along the river most others move thru and don't make sheep stress about getting to the river. The camping along the river should be monitored time and size of camp.	11/28/2017 5:26 PM

12	CPW is doing a pretty good job managing wildlife within our state. But CPW needs to do a better job of working with BLM and NGOs to remove all domestic sheep and goats within a 100 miles of any wild sheep.	11/28/2017 1:16 PM
13	If the habitat will carry them, why not increase the number of desert bighorns in the area? If not then the answer is simple, keep numbers at what the range will handle. Non hunters need to help sustain wildlife through some sort of funding as well, not just hunters' license fees and excise taxes.	11/28/2017 9:09 AM
14	I drive the river road from Dove Creek to Disappointment as often as I can , though it is becoming more difficult all the time . The only time I have seen the sheep on the run was when some Idiot on a mountain bike was racing through the hills and when a hiker was climbing over the rocks where they had taken refuge . I strongly believe these activities should be restricted to established trails and roads in this area . The only ones that need to be off road is the hunters during the designated season .	11/28/2017 8:14 AM
15	Anyone who wants to hunt Big Horn Sheep should first read Ellen Meloy's writings.	11/28/2017 7:41 AM
16	I believe the CPW is doing a great job managing the desert sheep now. Many thanks!	11/28/2017 6:41 AM
17	I support any measures to increase herd size and the potential for herd stock to expand northward to provide connectivity to the herds in McInnis and Dominguez Canyons	11/27/2017 5:31 PM
18	I support increased herd size and potentially working to expand that herd northward to provide connectivity to the herds in McInnis and Dominguez Canyons. It would be great to have a sizable desert bighorn population on the West Slope, increasing genetic variability and increasing the overall resilience of bighorns in face of disease, climate change or change of land uses.	11/27/2017 5:15 PM
19	Keep up the great work managing these game populations. Your efforts provide tremendous outstanding hunting opportunities in CO.	11/27/2017 3:02 PM
20	Amazing animal, and I appreciate CPW's effort to maintain the Dolores River population.	11/27/2017 12:41 PM
21	Start a more aggessive lion control like New Mexico and some of the other western states are doing.	11/27/2017 9:43 AM
22	End domestic sheep grazing on public lands in all historic bighorn habitat in CO. CPW should be an advocate for wildlife, not for an industry which contributes minimally to the economy and employment in CO. CPW should not renew the MOU with CO Wool Growers.	11/27/2017 9:18 AM
23	Herd management needs to be closely tied to BLM allotment management plans, predator control (more necessary on lion and coyote), habitat enhancement (getting more forbs into vegetative component), reducing conflicts with hikers, boaters, dog control and timing of recreational uses during lambing and nursing period.	11/26/2017 11:03 PM
24	Lion and bear control- statewide. Along with additional predators. 8-10+ yr old rams have been undetected in the last 10 years of observation in these two units. Explanation of this dilemma would be of dire importance.	11/26/2017 8:38 PM
25	To many lions and bears, I would check sheep movement in the upper Dolores range and summit canyon range always fresh bearcand lion tracks	11/26/2017 7:50 PM
26	N/A	11/26/2017 7:38 PM
27	Keep oiled gas and mineral development to of this area and do not allow electric or motorize recreation in the area.	11/26/2017 4:34 PM
28	Been applying for a sheep tag for 18 years. Hopefully I will draw a tag soon	11/26/2017 2:47 PM
29	I think it is going well at this time. Just wish I could draw a permit after 25 years applying!	11/26/2017 1:07 PM
30	I think CPW does a great job of managing our wildlife herds. Keep up the good job. Thanks for the opportunity to voice an opinion.	11/26/2017 12:44 PM
31	Remove the domestic sheep! All of them.	11/26/2017 12:40 PM
32	Bears are damaging all prey species populations	11/25/2017 6:07 PM
33	The proposed plan should take into account the opinions and practices of the Native American tribes than inhabit GMUs S63, S64, and all adjacent GMUs within a 50-100 mile radius	11/25/2017 9:53 AM
34	Can we manage the human population too, please? I'd rather see more wildlife than humans in Colorado. Humans are more of a threat to health, water, etc than the native wildlife.	11/24/2017 5:33 PM

35	Let the biologists determine management strategy based on maximizing herd size with carrying capacity, then 2nd priority increasing ram:ewe ratio to increase population of older age class rams.	11/23/2017 3:26 PM
36	I love to view sheep when going through these areas and depend on scientific facts to manage the herd. Best of luck with biological studies	11/23/2017 3:23 AM
37	My big comment is to please take care of the habitat and probably limit OHV use and be mindful of any mineral extraction.	11/22/2017 4:16 PM
38	I spend a fair deal of time in this area, particularly in winter and in the shoulder seasons, with much of that time focused around the Dolores/Slickrock Canyon WAS A as well as the Big Gypsum Valley and Rock Creek areas to the south and North. I believe the area as a whole has the potential to support a substantially larger herd (even more than a 50% increase) and would prefer if CPW focused resources on increasing the herd size northward to increase connectivity with the herds in the McInnis and Dominguez Canyon areas. I believe that landowners between the Paradox and Gateway areas would be amenable to the idea and if need be, NGO's would be willing to help with compensation. Native wildlife needs to be restored across the west slope and perhaps none are more deserving than bighorn sheep.	11/22/2017 3:29 PM

Appendix B
Comment Letters

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cwgawool@aol.com • coloradosheep.org

Colorado Parks & Wildlife
Brad.Banulis@state.co.us
Brad.Weinmeister@state.co.us

December 20, 2019

Re: Dolores River Desert Bighorn Sheep Herd Management Plan – DAU DBS – 61

The Colorado Wool Growers Association (CWGA) appreciates the opportunity to provide comments on the Dolores River Desert Bighorn Sheep Herd Management Plan. The CWGA supports the Preferred Alternative 2: Population target range 175-275 sheep, with the caveat that expanding desert bighorn sheep individuals and herds ***do not*** negatively impact sheep and goat owners on private property or preclude the option the changing livestock classification on BLM and USFS permits from cattle to sheep.

The concept that domestic sheep introduced a novel pathogen to bighorns when the West was settled seems likely but is purely speculative and ignores that fact that other wildlife species can serve as disease reservoirs.

The Mycoplasmas: Molecular biology, Pathogenicity, and Strategies for Control textbook states: "assumptions about restricted host range of mycoplasmas, based on the host from which they were first or frequently isolated, are usually made in the context of nearly complete absence of representative sampling of the vast majority of potential hosts."

Predation, drought, nutrition, habitat, population density, and intense recreational pressure appear to play a much larger role in bighorn herd health than does livestock grazing.

The CWGA supports taking reasonable steps to minimize potential contact, but we do not support managing for "zero risk". We support educational efforts *(Reducing Interactions Between Bighorn & Domestic Sheep brochure)* to inform both small and large sheep farms and ranches of efforts they need to take to minimize contact, but we do not support telling sheep owners that they need to stop raising sheep or change to other species of livestock.

Respectfully,

Ernie Etchart
President

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Tres Rios Field Office
29211 Highway 184
Dolores, Colorado 81323

In Reply Refer To:
6840 – TRFO Comments DBS61 Draft Plan

JAN 0 2 2020

Brad Banulis
2300 S. Townsend Ave.
Montrose, CO 81401

Mr. Banulis:

Thank you for the opportunity to comment on the Draft Desert Bighorn Sheep Herd Management Plan for the Dolores River. The Bureau of Land Management (BLM) Tres Rios Field Office (TRFO) supports population objective alternative 2, the CPW staff recommendation

The plan identifies increased recreational use along the Dolores River as a concern. The BLM motorized road closure at the Pyramid and Joe Davis Hill is stated as February 1 to June 30, however the TRFO Resource Management Plan states the closures is from February 1 through April 30 annually. The BLM appreciates the recognition of the increased efforts to implement the closure in the Dolores River Canyon.

The TRFO staff are very interested in working with Colorado Parks and Wildlife (CPW) to improve habitat for desert bighorn sheep in the Dolores River Canyon. I would encourage CPW to work with our staff to identify areas where prescribed fire or other habitat treatments may be most beneficial for wildlife. Additionally, it would be very helpful if CPW could offer suggestions for any future water developments or guzzlers that could help improve desert bighorn sheep distribution.

The TRFO shares CPW's interest in protecting critical habitat for desert bighorn sheep. Identification of impacts occurring in critical areas is essential for sustainable management. If CPW documents any areas where recreational climbing, rafting, mineral extraction, or other forms of disturbance are occurring please contact Nathaniel West, TRFO Wildlife Biologist.

I recently signed a travel management Decision for Archuleta, La Plata and Montezuma Counties. Thank you for CPW's support in analyzing the BLM-managed travel network in this area. My staff are in the initial stages of travel management planning for Dolores, San Miguel and part of Montrose Counties (TAP 2). I would encourage CPW to participate as a cooperator to help identify travel management concerns that may be able to be addressed during travel management.