BIGHORN SHEEP MANAGEMENT PLAN

Data Analysis Unit RBS-22

Central San Juans

Game Management Units S-22, S-36, S-52, & S-53

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EXECUTIVE SUMMARY

RBS-22 CURRENT STATUS

- ***DAU includes GMUs S-22 (San Luis Peak), S-36 (Bellows Creek), S-52 (Rock Creek), & S-53 (Bristol Head)***
- ***Post-hunt 2012 Population Estimate ~ 250 animals***
- ***Tier 2 State Standing: "Secondary core (Tier 2) bighorn populations are medium to large (i.e., ≥75 animals for ≥80% of the years since 1986 or since becoming fully established) populations comprised of one or more interconnected herds that are native or have resulted from translocations" (George et al. 2009).***
- ***Population is currently hunted in GMUs S-22 and S-53***

MANAGEMENT OBJECTIVES

Bighorn sheep management differs from other ungulate management in Colorado. A traditional DAU plan includes management alternatives that revolve around a desired population and male:female ratio objective. This plan does not rely on those types of management objectives, partly due to a lack of consistent, unit specific data, but more importantly, because of the potential influence of disease on population performance. These DAU objectives are somewhat non-traditional, but are quantifiable and realistic for future management.

Harvest Management

Ram and ewe hunting will continue in this DAU, on a GMU specific basis, so long as population performance allows. Future ram hunting opportunity will be considered in S-36. Success rates, hunter experience, and ages of harvested animals are all factors that should be considered when discussing bighorn harvest management alternatives. These harvest management objectives include both a desired age of ram harvested, and hunter success rate:

Maintain a 3-year average age of 7-8 for hunter harvested rams. This alternative will essentially maintain the current harvest regime in the DAU for the foreseeable future. Moderate ram license increases may be possible for some of the GMU's in the unit, which would be based on individual sub-herd vital rates. This alternative should continue to provide a quality experience, moderate levels of crowding, and diverse age-classes of rams

Maintain a 3-year average hunter success rate of 65-80%. This alternative will essentially maintain the status quo. Some increases to license allocation may be possible. This success rate range is above the three-year statewide average of 62%

Population Trend and Distribution

The current population estimate in RBS-22 is 250. Perhaps the most important limiting factor for this population is the potential for disease transmission following contact with domestic sheep. Considering bighorn distribution, population trend(s), and the potential risks of contact with domestic sheep, the following management objective was selected:

Manage for an Increasing Population and Increasing Distribution within the DAU. This alternative will:

- Allow the RBS-22 population to increase and expand their range. Rate of population increase will be dependent on annual lamb recruitment and is generally outside of direct management control.
- Assume an expected population of **> 275** animals. In the late 1980's and early 1990's when several of these sub-populations experienced catastrophic die-offs, the RBS-22 population was approaching 400 animals.

Population density is discussed in this plan, and is an important consideration in bighorn sheep management. The exact mechanism(s) leading to historic die-offs are unknown, however managers are acutely aware of the role density plays in epizootics. There is little concern at this time relative to bighorn density in this DAU, and there is no specific reason(s) to believe that 400 animals is this DAU's carrying capacity. However, if or when this population significantly increases, managers will initiate more rigorous annual assessment that includes the following considerations:

- If the population reaches or exceeds 350 animals, managers will allocate additional resources towards the population in terms of monitoring, agency collaboration, and harvest management
- Habitat utilization and density will be carefully evaluated to determine whether densities may be exceeding a sustainable level
- Proximity to domestic sheep and risk of contact with domestic sheep will continue to be evaluated regardless of population size
- On-going harvest management will be comprehensively evaluated in terms of ram & ewe harvest rates, hunter distribution, GMU license allocation, Sub-unit designation within GMU's, and hunting season structure
- ***The herd will not be capped at 350 animals; 350 is simply the tentative threshold at which management will be methodically re-evaluated***

- Assume that the risk of contact with domestic sheep will increase as the population increases; however, if individuals or small groups of bighorn are documented associating with domestic sheep or in areas where the risk of contact with domestic sheep is considered too high, in compliance with CPW policy, managers may respond with targeted hunting licenses, non-lethal harassment, or managed culling to ensure separation between species.
- Not require significant changes to current license allocation, but may accommodate future license increases if and when the population increases.
- Assume that watchable wildlife opportunities will be increased.

DAU Background & Issue Summary

Rocky Mountain bighorn sheep Data Analysis Unit (DAU) RBS-22 (Central San Juans) consists of Game Management Units (GMUs) S-22, S-36, S-52, and S-53. The DAU is approximately 2,503 km^2 and includes portions of Gunnison, Hinsdale, Mineral, Rio Grande and Saguache counties. Municipalities include Lake City, Powderhorn, and Creede. The DAU is primarily public land (90%), with 9% of the land being privately owned, and 1% being owned by the State of Colorado. The Central San Juans bighorn sheep herd is indigenous to the area; however the current population size is likely well below what it was historically. Historic population declines can be attributed to overharvest by unregulated subsistence and market hunting, loss of habitat resulting from human development and activity, competition for prime habitats with domestic livestock, and mortality resulting from disease(s) and parasites introduced by domestic livestock (George *et al*. 2009, Orear 1917). In three of the four GMUs, population reintroductions and augmentations have occurred dating back to the late 1970's that were intended to restore wild sheep to their historic range. As a supplemented native population, RBS-22 meets the criteria for Tier 2 designation. Population estimates have been inconsistently reported over time, and have varied from a high of 380 in 1988 to a low near 100 animals in 2001. Bighorn range in RBS-22 is dispersed and remote, making it difficult to coordinate effective ground surveys. Aerial surveys provide a more efficient way of searching for bighorn within this unit; however they are expensive and have not been conducted annually. More precise population estimates have been achieved in several Colorado bighorn herds by initiating mark-resight studies; however, those types of projects are costly, and rely on the ability to capture and mark a reasonable sample of animals from the target population. In the absence of more rigorous management studies, biologists will continue to generate population estimates using the most current and least biased information available to them. Currently the population appears to be stable to decreasing, with a 2012 post-hunt population estimate of approximately 250 animals.

The first official hunting season for bighorn rams in RBS-22 took place in S-22 during 1954, with 15 licenses issued and no sheep harvested (Bear and Jones 1973). The greatest number of licenses available in S-22 was in 1979 when 31 ram tags were issued. In 1980, an all-time high ram harvest of 29 animals occurred in S-22. A total of 118 rams

were harvested in this unit during the 1980's. For comparison, only 26 rams were harvested in S-22 from 2000 to 2012. Since 1994, the annual number of ram licenses in S-22 has not exceeded four; from 2008 through 2012, 16 ram licenses have been issued with 11 rams harvested. The three-year average hunter success rate is 83%. The first formal hunting season for bighorn rams in S-36 took place in 1990 with two licenses issued and one ram harvested. Two licenses were issued annually through 1993. Following a die-off in 1993 and poor lamb recruitment in subsequent years, hunting was closed in S-36. However, unit boundary modifications and limited ram hunting are currently being considered in this unit. No formal hunting season has ever occurred in S-52. Wildlife managers were poised to open a hunting season in S-52 in the late 1980's, but unfortunately the season never came to fruition as a result of the catastrophic die-off that occurred between 1989 and 1990. State regulated hunting began in S-53 in 1999 with one ram license issued. From 2008 to present, two ram licenses have been issued in S-53 with an average hunter success rate of 73%. In 2010, two ewe licenses were introduced in S-53 because the population trend was favorable and the hunting community was amiable to the novel hunting opportunity. In that unit, ewe hunter success rate has averaged 72%. RBS-22 provides high quality sheep hunting opportunities in southwest Colorado; harvested rams in this DAU have been on average, eight years old.

Habitat in this DAU is abundant and anecdotally in good condition, although much of the suitable and modeled suitable habitat remains unoccupied. The unit contains large expanses of habitat that should be capable of supporting a considerably larger population of wild sheep. The recently ignited West Fork Complex fire is of interest to bighorn sheep managers, and should improve habitat in the southwest portion of the DAU over time. Winter range carrying capacity is an important consideration for bighorn management in RBS-22. However, at present, winter range does not appear to be a limiting factor for this herd. Future winter range inventory and assessment, and animal monitoring are needed to identify, enhance, and preserve winter ranges throughout the DAU.

Domestic sheep grazing is a significant management issue in RBS-22. In 2009, the former Colorado Division of Wildlife (CDOW) was a signatory to a Memorandum of Understanding (MOU) for Management of Domestic Sheep and Bighorn Sheep (Appendix F). The MOU was crafted over an 18 month period by the US Forest Service, Bureau of Land Management, CDOW, Colorado Department of Agriculture, and the Colorado Woolgrowers Association. The purpose of the MOU "is to provide general guidance for cooperation in reducing contact between domestic and bighorn sheep in order to minimize potential interspecies disease transmission and to ensure healthy bighorn sheep populations while sustaining an economically viable domestic sheep industry in Colorado." CPW remains interested in continued collaboration with area sheep producers and federal agency staff that works towards the mutually beneficial purpose described in the MOU. There are several active sheep allotments within this DAU that are grazed on an annual basis. Active allotments occur on both the Rio Grande and Gunnison Ranger Districts, and on BLM lands within the DAU. Noteworthy allotments, in terms of their active status & proximity and/or overlap with wild sheep include the Miner's, Snow Mesa, and Table allotments. The Cold Springs allotment, on the Gunnison Ranger District, is also worthy of mention based on its proximity to occupied bighorn habitat. Multiple vacant allotments also occur within the DAU (Appendix A). The potential for contact between wild and domestic sheep exists within this DAU; therefore, on-going and future management actions should focus on maintaining effective separation between the species (WAFWA 2012). Contact between wild and domestic sheep in RBS-22 has been documented in the past, and potential for contact persists. Bighorn sheep are unique among Colorado's big game species with respect to the influence that infectious diseases have on population performance. The susceptibility of bighorn sheep to pathogens originally introduced by domestic livestock is regarded as the primary factor limiting bighorn sheep populations in Colorado. Respiratory disease is by far the most important health problem in contemporary bighorn populations. In addition to initial all-age die offs, pneumonia epidemics in bighorn sheep can lead to long-term reductions in lamb survival and recruitment resulting in stagnant or declining populations over many years (George *et al*. 2009).

Ample opportunity for public involvement and discussion occurred during this planning process, which continued until the plan was approved by the Colorado Parks and Wildlife Commission in November of 2013. Two primary issues were discussed during this planning process: wild and domestic sheep issues and future management implications, and bighorn sheep hunting opportunity. CPW recognizes that on-going collaboration with various stakeholders is paramount, and respects the diverse viewpoints represented during this process. As the primary wildlife management agency in the state, CPW is tasked with promoting wild sheep conservation across Colorado and in RBS-22. Bighorn sheep conservation is the emphasis of this draft management plan.

INTRODUCTION AND PURPOSE

Colorado Parks and Wildlife (CPW) manages Rocky Mountain 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, 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 1). Big game populations are managed to achieve specific objectives that are outlined within Data Analysis Unit (DAU) plans**. Each DAU 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 DAU's. 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.

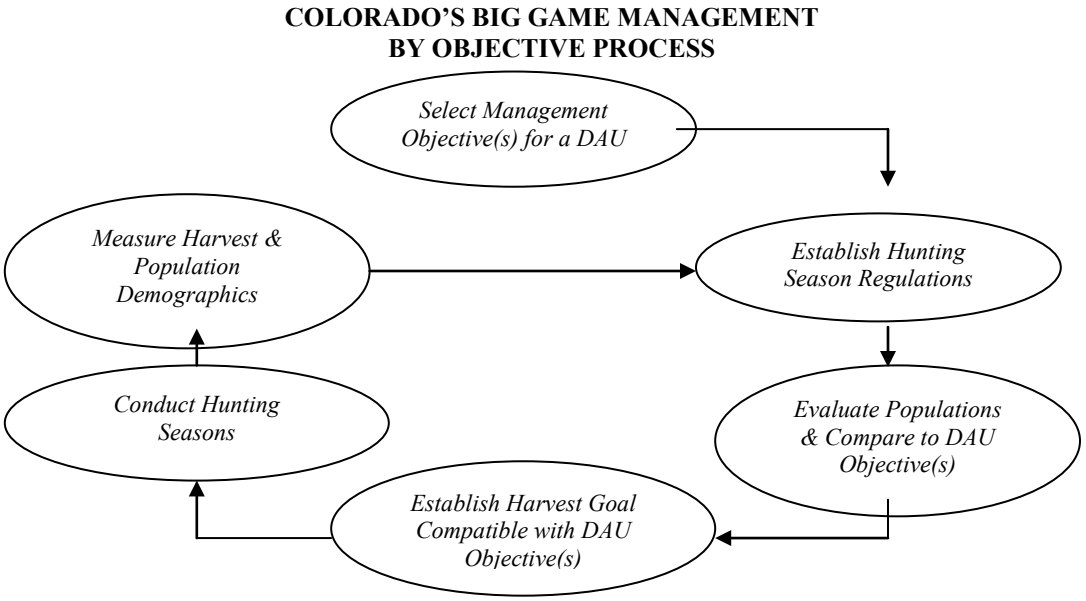


Figure 1. Management by objective process used by CPW to manage big game populations on a DAU basis.

The DAU 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 DAU 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. Bighorn populations may be influenced to a greater degree by factors such as disease or severe winters 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. Some sheep herds are not comprehensively surveyed every year, and may only be surveyed once every three or more years. For these reasons, some sheep DAU 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 DAU plan objectives that will promote sustainable bighorn sheep populations and objective management on an annual basis.

***DAU plans are intended to provide management direction for an extended period of time (typically 10 years); however they may be amended if circumstances necessitate revision. Bighorn sheep management is a regional priority and CPW is committed to adapting management when appropriate. CPW reserves the right to amend DAU plans at its discretion based on future biological or socio-political factors. Amendments to DAU plans will entail a public process in order to provide transparency and education regarding any proposed modifications.*

DAU Description

RBS-22 consists of GMU's S-22, S-36, S-52, & S-53 (Figure 2). It is approximately 2,503 km^2 and includes portions of Gunnison, Hinsdale, Mineral, Rio Grande, and Saguache counties. This DAU is relatively unpopulated, however some municipalities fall within the boundary including Powderhorn, Creede, and South Fork. Recently, sheep GMU boundaries were revisited in order to provide clarification where boundaries were ambiguous or where unit boundaries had not yet been defined. Those revisions may account for discrepancies with historic unit boundary descriptions. Records indicate that GMU S-52 was created by regulation in 1987, likely in an attempt to manage future hunter distribution and harvest between the lower Cebolla and the La Garitas. At the time, the resident S-52 herd had grown considerably and managers were exploring the potential for limited hunting. S-36 has been closed to bighorn sheep hunting since 1993, as a result of a disease epizootic. Since that time, the population has slowly increased and is currently estimated at 60-80 animals. S-36 rams tend to spend a significant amount of time in the southeastern edge of S-22 during the spring and summer, and then move back into S-36 for the fall rut. Because these rams are known to be part of the S-36 sub-herd, managers are planning to modify the S-36 unit boundary so that it includes Dry Gulch and Farmers Creek. This change attempts to distinguish the two sub-herds, while allowing managers to distribute hunting pressure, and provide novel hunting opportunity for rams in S-36.

GMU Boundaries

S-22 (San Luis Peak) Those portions of Hinsdale, Mineral, and Saguache counties, bounded on the north by USFS 788, Hinsdale County Roads 5, 15, and 45, Saguache County Road KK-14, and USFS 788 (Los Pinos Pass Road); on the east by the Continental Divide, USFS 787, and the La Garita Wilderness boundary; on the south by USFS Trails 787 (La Garita Stock Driveway), 790, 789 and 801, and the Rio Grande River; and on the west by Colorado state highway 149 (Spring Creek Pass), USFS 507, USFS Trails 803, 787 and 473.

S-36 (Bellows Creek) Those portions of Mineral, Rio Grande and Saguache counties bounded on the north by USFS Trails 801, 789, 790, and 787; on the east by the La Garita Stock Driveway, USFS Road 630 and Rio Grande County Roads 15 and 18; and on the south and southwest by US 160 and the Rio Grande River.

S-52 (Rock Creek) Those portions of Gunnison, Saguache and Hinsdale counties bounded on the north by BLM Roads 3035, 3036, (Cebolla Creek Road) 3047 (Huntsman Gulch Road) and 3043; on the east by USFS Road 806; on the south by USFS Road 788 (Los Pinos Pass Road), Saguache County Road KK-14, Hinsdale County Roads 45, 15, and 5; and on the south and west by the Powderhorn Primitive Area boundary, USFS Trail 462, the East Fork of Powderhorn Creek, and Powderhorn Creek.

S-53 (Bristol Head) Those portions of Mineral and Hinsdale counties bounded on the north by North Clear Creek, Colorado state highway 149, and USFS Trails 473 and 787; on the east by USFS Trail 803 and USFS Road 507; on the south by Colorado state highway 149 and the Rio Grande River; and on the west by Lost Trail Creek.

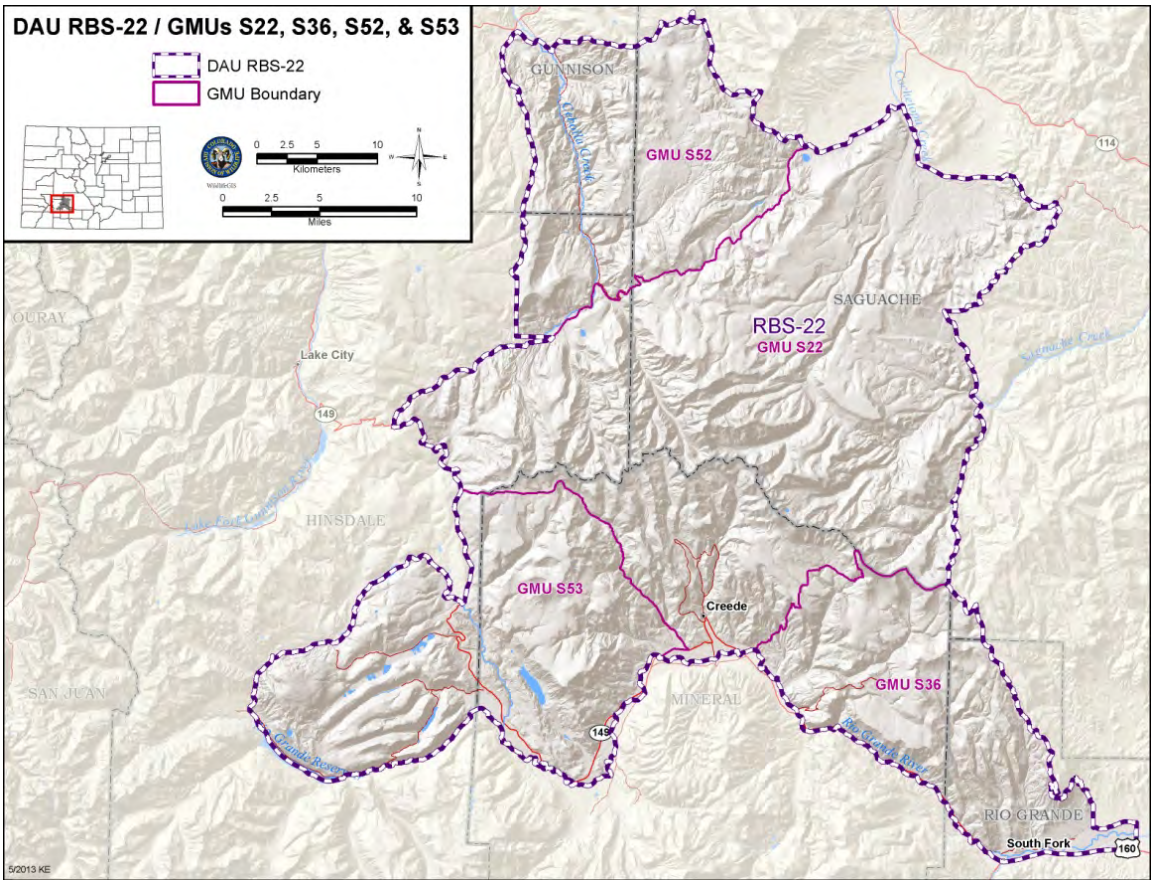


Figure 2. Geographic location of bighorn sheep Data Analysis Unit RBS-22 and Game Management Units S-22, S-36, S-52, & S-53

Physiography

This DAU encompasses a very large geographic area with elevations ranging from approximately 8,000 feet near the towns of Powderhorn and South Fork, to over 14,000 feet in the La Garita Mountains. Some of the more prominent rivers and creeks include the Rio Grande River, Cebolla, Rough, Mineral, and Spring Creeks; Cochetopa, Stewart, and Saguache Creeks; and Miners, Willow, Farmers, Bellows, and Blue Creeks. The unit consists of large expanses of remote, mountainous terrain, including one designated wilderness area, the La Garita Wilderness. Vast expanses of alpine and subalpine ecosystems juxtaposed with lower elevation winter ranges provides excellent year-round habitat for bighorn. Elevation and season have a profound effect on climate in RBS-22. Low elevation valleys generally receive less annual precipitation, while higher elevation mountainous environments are prone to heavy snow accumulations and much shorter growing seasons. By October each year, snow generally begins accumulating which may persist until June or July of the following year.

Vegetation

Plant communities are diverse in RBS-22 and vary depending on many factors including elevation, aspect, precipitation, and soils. Like many migratory herds in the state, bighorn in this DAU use several habitat types throughout the year based on forage conditions and availability. For example, in the South San Juans, bighorns tend to use subalpine meadows in the early spring; alpine meadows often are occupied during the summer according to forage availability (Wallace 1940). Historic, but applicable information on specific plant species consumed by bighorn sheep can be found in reports by Wallace (1940) as well as Moser and Pillmore (1956). Table 1 lists various plant species that are likely to be present in seasonal bighorn habitats across the DAU (Johnston 2001).

Table 1. Excerpt from ECOLOGICAL TYPES OF THE GUNNISON BASIN (Johnston 2001).

Zone	***Dominants***	***Elevation on north and east slopes, ft***	***Elevation on south and west slopes, ft***
Alpine	*Gravity and freeze-thaw processes, mostly very low herbaceous plants such as curly sedge, alpine avens, tufted hairgrass*	*>11,800*	*>12,200*
Subalpine	*Subalpine fir, Engelmann spruce, aspen, lodgepole pine, Douglas-fir, bristlecone pine, mountain big sagebrush, Thurber fescue, planeleaf and Wolf willows, Idaho fescue*	*9,700-11,800*	*10,100-12,300*
Montane	*Douglas-fir, ponderosa pine, lodgepole pine, aspen, Arizona fescue, big sagebrush, Saskatoon serviceberry, blue and serviceberry willows*	*9,100-10,700*	*9,400-11,100*
Mountain Shrub	*Douglas-fir, big sagebrush, muttongrass, Utah serviceberry, Gambel oak, yellow-Geyer-Bebb willows, narrowleaf cottonwood*	*7,600-10,100*	

Similar to many DAU's in the state, bighorn sheep are often found along forest edges in RBS-22 and will travel through forests occasionally. The species tends to prefer more open country; natural disturbances, including beetle kill and wild fire have the potential to increase the availability of open habitat for bighorns. Removal of forest canopy and understory through disturbance may create novel travel corridors facilitating bighorn movement and colonization into unoccupied suitable habitat. Such clearings may also reduce the risk of predation for bighorn sheep by improving visibility of their surroundings. Furthermore, reduced tree canopy cover allows more sunlight to reach the forest floor, stimulating herbaceous plant growth which provides additional forage for bighorn sheep over time. Resetting forest succession should benefit bighorn sheep in the long term.

Climate

Much of the occupied bighorn sheep habitat in RBS-22 is prone to severe winters characterized by heavy snowfall and low temperatures, particularly at high elevations. Typical for southwest Colorado, the lower elevations receive moderate amounts of snowfall each year; the average annual snowfall in the town of Powderhorn has historically averaged around 12 inches, while the town of Creede, on the southern end of the DAU has an average annual snowfall of nearly 13 inches. High elevations receive substantially more, often in excess of 100 inches annually. Snow may persist into the summer months, particularly on north and east facing slopes, impacting plant phenology and availability. Spring weather is quite variable; however strong winds and sporadic precipitation (rain, sleet, snow) are common. Summers are short at the highest elevations, with monsoon season typically occurring from late July through September. During the monsoon season, severe thunderstorms and rapid changes in weather are frequent. Occasionally lightning strikes from summer thunderstorms ignite forest fires, especially in areas with high fuel loads and during periods of extended drought. By the end of September each year it is not uncommon to have had the year's first snowfall at high elevations.

Current Land Uses

Land Status

The majority (90%) of RBS-22 is public land managed by the US Forest Service & Bureau of Land Management (Figure 3). The second largest landownership category in the unit is private land, which accounts for approximately 9% of the geographic area. A very small portion of the unit is administered by state jurisdictions (1%).

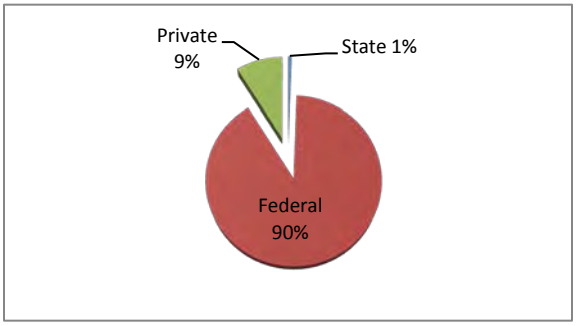


Figure 3. Landownership in RBS-22.

Development

This DAU is predominately public land and therefore development potential is relatively low. Consistent with the trend throughout the west, many of the smaller communities in the DAU are appealing to second home owners and retirees. The Creede and South Fork areas, in particular, have experienced a moderate level of development over the last ten to twenty years; some of it occurring on or adjacent to bighorn habitat. A net loss of habitat and fragmentation of habitat results not only from the actual building envelope, but also from disturbances caused by more persistent human presence, including vehicle traffic, recreation, and pets. From a bighorn health standpoint, if the number of year-round homeowners increases, of particular concern is the potential for contact with livestock or other pets such as llamas, goats, sheep, cattle, or horses.

Livestock grazing

Domestic livestock grazing is a historic land use in the DAU that continues today. Active grazing allotments for both cattle and domestic sheep occur throughout this unit. Appendix A includes allotment information for the Rio Grande Divide Ranger District. The table includes allotment status (ie. vacant or active), stocking rate, and the approximate season of use. Domestic sheep/wild sheep issues are discussed more comprehensively later in this management plan.

Recreation

Wildlife managers are increasingly concerned with the impacts to wildlife from recreation. Recreational demands and activity in Colorado have increased considerably over the last twenty years. The areas within RBS-22 are destinations for virtually every type of recreational activity the state offers. Those include four-wheeling, OHV riding, rock and mountain climbing, skiing, snowmobiling, biking, camping, hunting, fishing, hiking, backpacking, horseback riding, wildlife watching, rafting, and boating. Recreation has the potential to restrict the overall range of bighorn sheep and fragment habitats, which ultimately could lead to population level effects.

Mining

Mining activity has been extensive throughout the San Juan region since the late 1800's. Although gold and silver mining in the area decreased significantly over the last 50 years, renewed interest in silver mining in the Creede area began in 2008 (USDA Forest Service 2013). Impacts of resumed mining operations should be minimal depending on the location and methods used. Otherwise, mining and oil and gas development do not appear to be major issues for bighorn sheep in this unit (Ghormley 2010). The potential for increased mining exploration exists, especially for silver, which remains of high economic value.

Historical Occurrence and Distribution

S-22 The San Luis Peak bighorn herd is indigenous to the region encompassed by GMU S-22. Informal surveys for bighorn sheep in this unit date back to the 1930's (Ghormley 2010), with anecdotal reports of wild sheep going back to the early 1900's. No documented translocations have occurred in the unit, further corroborating their native origin. The unit contains great expanses of suitable habitat which likely supported a much larger herd of wild sheep prior to European settlement. Though poorly documented, most accounts suggest that historically one population of bighorn sheep inhabited an overall range that included GMUs S-22, S-36, S-52 and S-53. The northern reaches of this DAU (*i.e., S-52*) would have provided excellent winter range habitat for bighorn sheep migrating from higher elevations; the same is true of the southern reaches between Creede and South Fork. The greater La Garita/San Juan region includes some of the most productive bighorn habitats in the state, and it is logical to assume that bighorn populations were connected historically at a much grander scale, with possible exchange also occurring between adjacent GMU's, S-33, S-28, S-16, and S-15.

S-36 Bighorn sheep have been documented in the South San Juans since 1822 (Coues 1970). The extent of bighorn occupancy prior to written records is unknown. However, the S-36 herd is designated as part of the native San Luis Peak population (George et. al 2009). When the Creede mining rush occurred in the early 1890s, the number of bighorns declined, likely related to altered habitat conditions and subsistence hunting. Prior to this influx of people in 1889, the number of bighorn sheep observed in Wason Park was documented at 50 (USDA Forest Service 1996). Several years afterward in 1931, 40 bighorns were noted there (Ghormley 2010). Until the 1950s bighorn sheep were known to occupy Bellows Creek (Bear and Jones 1973). In 1969-1970, three rams were observed in the area but following unsuccessful search efforts in what is now GMU S-36, these bighorns were assumed to be migrants (USDA Forest Service 1996). S-36 was formerly referred to as S-55W indicating connectedness with S-55 (Natural Arch population) to the east. In the 1980s, bighorns were transplanted from other populations into S-36. As a result, S-36 is presently considered a supplemented herd, which is defined as an "indigenous herd that has been supplemented with translocated bighorn" (George *et al*. 2009).

S-52 As previously mentioned, this population was likely indigenous and was an extension of the San Luis Peak herd. In a project work plan from the mid-1970's by George Bear and Robert Schmidt, there is reference to this connectivity: "Information gathered from local residents indicates that in the early 1900's it was common for lambs and ewes to migrate from the alpine range to Cebolla Creek for the winter. However, since the die-off in the 1950's only a few rams migrate to the lower range during the winter months, while the lambs and ewes remain in the high country" (Project W-R-S-45-'79). Interaction between native rams and transplanted sheep was later documented by George Bear (1979). After being transplanted to the Cebolla State Wildlife Area (now Phil Mason SWA) in 1976, transplanted sheep associated with two native rams. That March, the native rams as well as two transplanted rams and one lamb migrated to the alpine range in the La Garitas. The following winter, three newly transplanted ewes migrated with resident rams to alpine range on Baldy Chato. One transplanted ewe was later observed near Creede during a subsequent winter. These observations demonstrated that migratory behavior and routes had already been established between the La Garitas and the lower Cebolla region by native sheep. Comprehensive historic documentation of bighorn in present-day S-52 is limited; however, there is clearly an abundance of potential bighorn sheep habitat in the Cebolla Creek drainage and surrounding area. Potential bighorn habitat also occurs further north and west of the Cebolla, and it is probable that wild sheep inhabited the Calf Creek and Cannibal Plateau areas historically. Several observations of transient bighorn sheep in these areas over the last 10 years help substantiate that assertion.

S-53 Knowledge on the status of bighorn sheep in the Bristol Head area prior to European settlement in the late 1800s is scarce. Reports by early explorers dated around 1822 confirm the presence of bighorn sheep in the South San Juans (Coues 1970). Documentation of bighorn sheep in the area during the late 1800s, and early 1900s mainly focuses on the neighboring Pole Creek Mountain herd to the west, part of the RBS-21 population. Given the close proximity between these two populations, their distributions were likely linked. Local residents, interviewed by Wildlife Conservation Officer Glen Hinshaw, recalled sightings of bighorns at Bristol Head dating back to 1890 (Shepherd 1977). Federal surveyors noted 14 bighorn at the source of Boulder Creek in 1910. On Bristol Head, five to seven bighorns were recorded for many years until they were harvested in 1922-1923 (Bear and Jones 1973). Not much is known about the status of the S-53 herd during the mid 20th century. Forty-eight bighorn sheep were reported on Pole Creek Mountain in 1940. They all appeared healthy except for one coughing ewe (Wallace 1940). It was speculated that bighorns may have persisted east of Pole Creek Mountain because of a private landowner near

Rio Grande Reservoir and the inaccessibility of bighorn winter range for people (Wallace 1940). Bighorns at Bristol Head likely were poached out by 1940 according to G. Hinshaw (Shepherd 1977). Some locals thought that bighorns were functionally extinct from the area following the creation of Santa Maria reservoir (Wiggins *et al.* 1978). Bighorn continued to be observed on Pole Creek Mountain in the 1960s and 1970s (Bear and Jones 1973), but the status of S-53 during this time is unknown. In the 1980s, bighorn sheep were transplanted from other populations into S-53. The herd remained stable in the 1990s, increased gradually in the early 2000s, then increased more rapidly in the mid-2000s. Accordingly, S-53 is designated as a transplanted herd, indicating it "has resulted entirely or primarily from translocated bighorns" (George *et al*. 2009).

Current Occurrence and Distribution

The trend for the overall RBS-22 population has been stable to decreasing over the last five years. The DAU contains large expanses of suitable habitat that should be capable of supporting a considerably larger population of wild sheep. In this DAU, bighorns inhabit a variety of habitat types, from high elevation alpine ecosystems to lower elevation aspen/mixed conifer/fescue communities. For some sheep groups, altitudinal migrations occur in response to snow accumulation and forage availability, while other sheep spend the majority of the year at high or low elevations without noteworthy migrations. Figure 4 illustrates the estimated overall range for bighorns in RBS-22.

S-22 This population has been on a declining trend over the last five years as a result of poor lamb recruitment. The La Garita Mountains offer abundant wild sheep habitat, however, bighorn have shown strong fidelity to particular areas in recent years. On the other hand, in some areas where bighorn used to be frequently observed, such as near Machin Lake, fewer observations have been made. Wild sheep distribution in this unit appears to be similar to what was reported historically, however their overall range has likely constricted. Evidence of range constriction is found in a historic bighorn distribution map from the USFS "Cebolla District." That map indicates that bighorn were present in the North Fork of Saguache Creek above Stone Cellar, where today bighorns do not occur. There are likely many factors contributing to bighorn distribution in this unit including population size, sub-group site fidelity, human recreation, domestic sheep grazing, and as is the case with most wild ungulates, forage quality and availability. S-22 is relatively remote and includes a sizeable wilderness area. Routine observations of bighorn are not possible, and managers have relied on periodic helicopter surveys, incidental ground observations, and hunter reports to document bighorn distribution over time. In recent years, bighorn have been documented in a variety of areas within S-22 on both sides of the Continental Divide. Notable use areas in the unit include the Rough and Mineral Creek drainages; the Mineral Mountain region; the Spring Creek drainage, particularly the east side, including San Luis Peak, Stewart Peak, Baldy Alto, and Baldy Chato; the Stewart Creek drainage, Organ Mountain, and the headwaters of the Cochetopa including Canyon Diablo; and the heads of East Willow Creek, Oso Creek, Miners Creek, and Baldy Cinco. This list is not intended to be all-inclusive or prioritized. Rather, it is an attempt to document some of the important geographic areas where sheep have been observed over the last five years. In the future, if this population increases, it is likely that bighorn use would increase across the GMU within suitable habitats.

S-36 The Bellows Creek herd remains stagnant following an epizootic in the early 2000s, which is reflected in population estimates. Based on recent population surveys, bighorn sheep appear more widely distributed in the unit compared to the late-1800s through the mid-1900s, when numbers were reduced due to anthropogenic impacts (Bear and Jones 1973). Transplanted bighorns may have contributed to the re-colonizing of some historic bighorn range (Bear 1979). However, disease seems to have prevented this herd from increasing enough to restore interactions with other herds to a noticeable level (Beecham *et al*. 2007). As with S-22, other factors likely are affecting herd numbers and distribution such as fragmentation of subgroups, human activities across the landscape, and habitat condition. Documenting the range of bighorns in RBS-22 is challenging given the rugged and often remote terrain bighorn sheep occupy throughout the year. Ground survey efforts by the United States Forest Service Divide Ranger District and Colorado Parks and Wildlife provide minimal counts in accessible areas. Expensive helicopter surveys provide a GMU-wide perspective, but rarely occur more than once a year. Based on annual surveys and observations by District Wildlife Manager Brent Woodward, bighorn sheep generally have been found in the area from Mammoth Mountain south to the head of Blue Creek. Bighorn are routinely found in Farmer's Creek, West and East Bellows Creek, Spring Gulch, Wagon Wheel Gap, and Blue Creek.

S-52 This population has been depressed for the last five to ten years, also as a result of chronically poor lamb survival and recruitment. The remaining resident sheep continue to use a variety of historic habitat centered around the Cebolla drainage. Bighorn use has been documented recently in the following areas: Rock Creek and north of Rock Creek to approximately Bar Gulch, Fish Canyon, Park Creek, Devil's Hole, the Phil Mason State Wildlife Area, the Cathedral/lower Los Pinos Pass area, and throughout the west side of the Cebolla from Fish Canyon, south past Cathedral. Bighorn are also observed frequently south and west of Cathedral on the north side of the Cebolla. It is also worth mentioning that occasionally bighorn are reported further north in the Cebolla near the town of Powderhorn, and in other nearby areas. These animals are likely making sporadic and unpredictable forays not uncommon in wild sheep. In November of 2008 a mature ram was hit and killed by a vehicle on highway 149 in Milkranch Gulch northeast of Powderhorn. In recent years, bighorn rams have also been observed above Powderhorn Lakes, and off highway 149 to the northwest of Powderhorn near the former elk ranch. These rams are likely coming from S-52 or the lower Lake Fork herd to the northwest (*currently designated GMU S-81*), but could also be coming from the S-33 population in the upper Lake Fork. These reports are significant because despite the current stagnation of some local populations, these occasional forays continue to facilitate interaction between GMU's and subpopulations. These interactions have pros and cons; the pros being genetic exchange and potential for range expansion or colonization, the con being the potential for disease transmission between herds that are carrying or have been exposed to various pathogens. Foray behavior must be acknowledged during management planning by state and federal agencies.

S-53 This sub-herd has remained relatively stable over the past five years. Lambs and yearlings are regularly observed in the unit during surveys indicating a moderate level of annual recruitment. However, the herd does not appear to be increasing substantially, but numbers of bighorns seem to be maintained. Bighorns subgroups are somewhat widely distributed throughout this unit, likely as a result of where transplants have been introduced over time (George *et al*. 2009). While bighorns occur broadly within the unit, they tend to be broken into two main subgroups, which are generally east or west of Highway 149. This isolation reduces the potential for interaction of bighorns that likely occurred historically in S-53 (Beecham *et al*. 2007). Similar to other herds in RBS-22 several factors may be contributing to the current distribution of bighorns in S-53. Unlike S-36, there is no definitive evidence of large die-offs due to respiratory disease. However, there have been CPW documented instances of individual sheep dying of pneumonia related symptoms in 1988 (yearling ram), 1996 (old ram), and 1997 (old ram). Monitoring of this herd occurs through ground and helicopter surveys. These efforts have found that S-53 sheep are predominately found in two general locations, as reported by District Wildlife Manager Brent Woodward: 1) Bristol Head Peak and Long Ridge and 2) in the Box Canyon of the Rio Grande River and River Hill. The bighorn sheep on Bristol Head/Long Ridge area are found primarily at the head of Shallow Creek, Fir Creek, Bristol Head Peak, Seepage Creek, Clear Creek and Long Ridge. The bighorn sheep in the Box Canyon/River Hill band are found primarily in Crooked Creek, Long Canyon, Road Canyon, Box Canyon, Sawmill Canyon, and north of Rio Grande Reservoir.

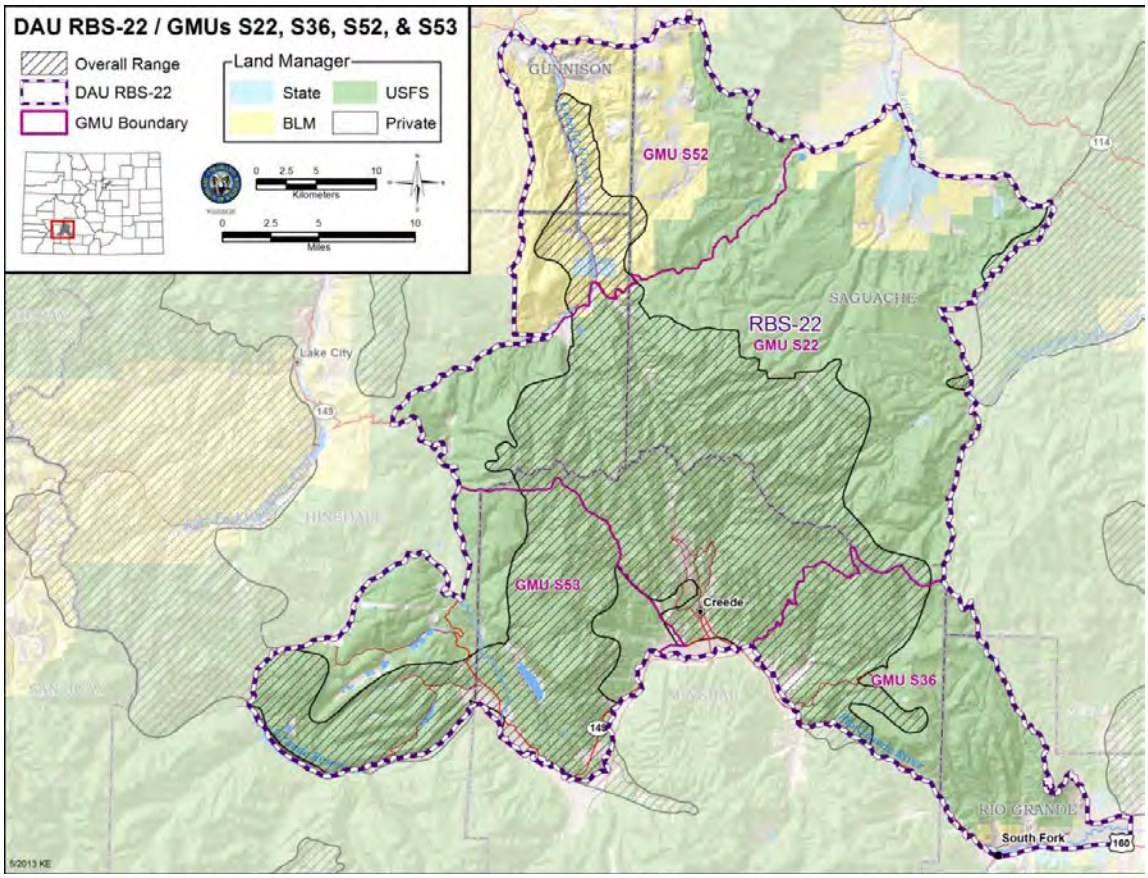


Figure 4. Estimated overall range for bighorn sheep in RBS-22.

Habitat Capability in RBS-22

In 2008, Colorado Division of Wildlife biologists finalized Colorado's Bighorn Sheep Capture and Translocation Guidelines (George *et al.* 2008b). These guidelines include a process for modeling bighorn sheep habitat using a GIS. To run these models, "habitat attributes" were defined, which were rooted in scientific literature, as well as the USFS Full Curl model (Beecham *et al.* 2007). These models provide managers with a course filter for evaluating bighorn habitat across a geographic area. They are useful for evaluating potential transplant sites, but are equally valuable for comparing potential habitat versus occupied habitats where sheep are already present. These models will be refined as new data becomes available; however, they have proven a useful tool for biologists in Colorado and have been substantiated using radio collar data. The sections below compare *mapped* and *modeled* seasonal habitats within RBS-22.

Habitat in this DAU is abundant and anecdotally in good condition, although recent drought conditions are likely impacting the availability and nutritional quality of forage. There is 780 km^2 of modeled suitable habitat within RBS-22, which accounts for 31% of the DAU. Current CPW mapped overall range for bighorn is 1,112 km^2, which equates to 142% of the modeled suitable habitat (Figure 5). For modeling iterations, *suitable habitat* includes lands with slopes equal to or greater than 60%, including the contiguous land within 300 meters and lands within 1,000 meters of escape terrain on at least two sides. Areas with dense vegetation, human developments, or areas blocked by man-made or natural barriers are excluded from the model (George *et al*. 2008b).

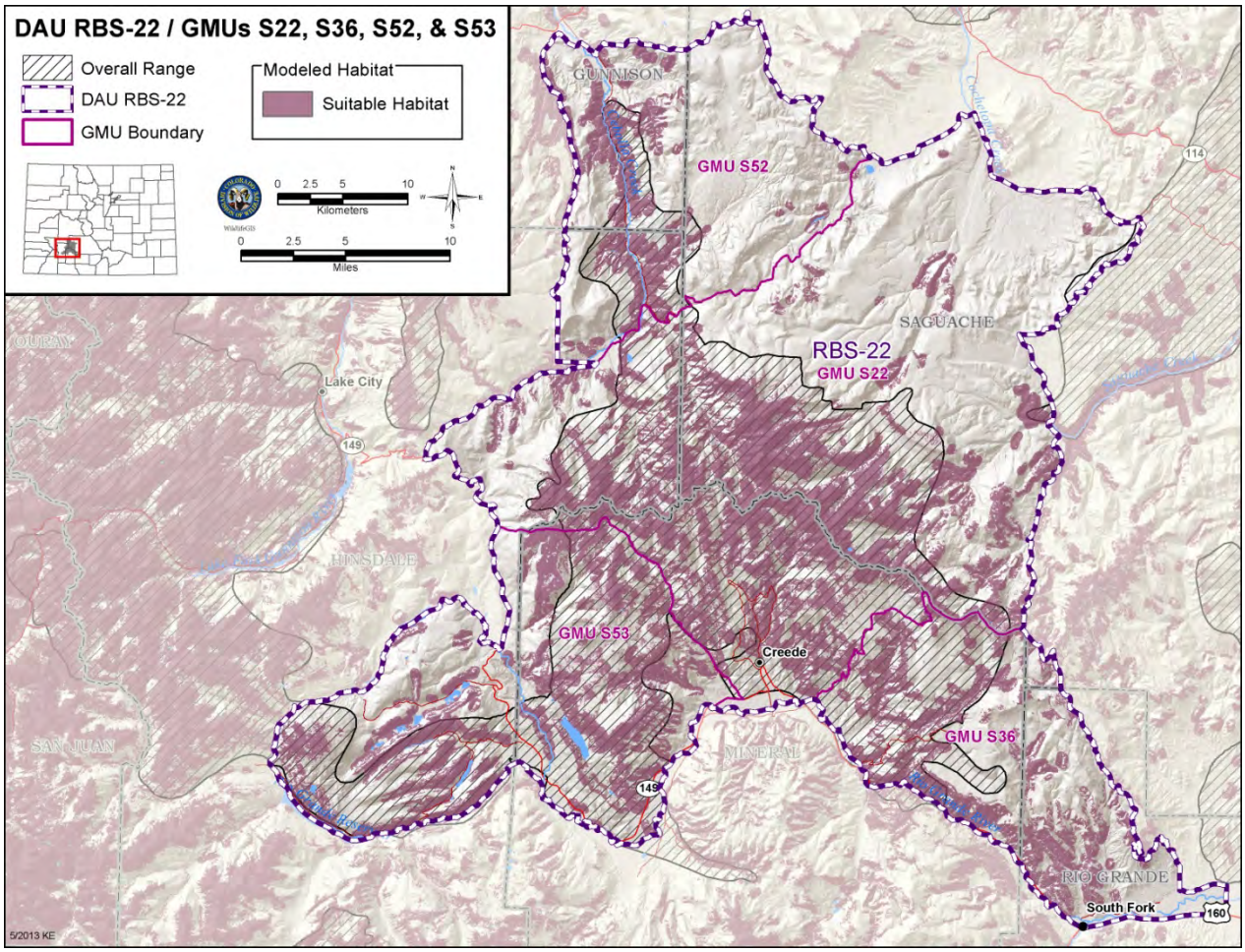


Figure 5. Modeled suitable habitat for Rocky Mountain bighorn sheep compared to occupied habitat in RBS-22.

Winter Range

Winter range is a key limiting factor for bighorn sheep, particularly for animals that winter at high elevations. However, current animal densities and modeling exercises suggest that this herd is well below winter range carrying capacity. Sheep typically winter on steep, south and west facing slopes where escape terrain is nearby, and wind and sun keep areas comparatively free of snow. Snow accumulations restrict available winter habitat and dictate where sheep will be during any given year. Currently, bighorns are known to winter across 9% (234 km^2) of the DAU, which is only 47% of the modeled available winter range. Within modeled suitable habitat, there are 310 km^2 of modeled winter habitat (132% of CPW mapped winter habitat, Appendix C). Modeled winter range includes lands with southern (SE, S, SW) aspects and < 25cm snow pack (snow pack data was not available for the GIS model), as defined by George *et al*. (2008b).

Managers admittedly do not know where all of the winter range areas are within this DAU, however known winter ranges have been documented across the unit. It is not unusual in Colorado for bighorn to winter in alpine habitats, sometimes at high densities, where small patches of vegetation remain exposed as a result of high winds. During winter, S-53 bighorns have been found at higher elevation areas including Finger Mesa, Lost Lakes, Rio Grande Reservoir, Road Canyon, Minnie Gulch, Shotgun Mountain, Antelope Mountain, River Hill, Crooked Canyon, Long Ridge, and Seepage Creek. Conversely, some bighorns in this DAU migrate to lower elevations for the winter (USDA Forest Service 1996, Beecham *et al.* 2007), particularly in S-36 where they may be highly visible. S-36 bighorns are often observed in West Bellows Creek, East Bellows Creek, and Spring Gulch during the winter. In S-22, winter surveys have not been conducted in recent years, however, several known winter ranges include the east side of Spring Creek, particularly in the Baldy Chato/Sheep Creek area; the northern reaches of Mineral Creek on the east side (south and west facing aspects); and on the south side of the Continental Divide at the head of Oso Creek. Despite the lack of comprehensive winter distribution information, managers recognize that there are many

areas in this unit that could potentially support wintering sheep. Historic surveys report bighorn wintering on San Luis Peak, Organ Mountain, and Baldy Alto. Bighorn sheep may have been pushed to winter at higher elevations by settlers in the early 1900s (USDA Forest Service 1996). Bear and Jones (1973), reference bighorn wintering above 12,500 feet on the "windswept ridges of Baldy Chato, Baldy Alto, and Organ Mountain." They further state that "a few bighorns winter at timberline on Mineral Mountain, and a small group (rams) winter in the cliffs just north of Cathedral." Obtaining current winter occupancy information in this unit should be a priority. Known winter range areas should receive a high level of protection in perpetuity.

Winter range density: Winter range capability is always an important factor to consider with big game management, particularly in the Rocky Mountains. A population is only capable of growing within the bounds of its winter range, which is the situation in this DAU. Although there is much to learn about bighorn winter habitats in RBS-22, modeling exercises provide a coarse examination of what may be out there. As referenced previously, there is approximately 310 km^2 of potential winter range in the DAU, of which 234 km^2 are currently mapped as occupied. Models are only as good as the inputs that drive them, and managers strive to improve models whenever new data becomes available. One of the current limitations of these bighorn models is that they do not adequately take into account snow cover; therefore they are likely to overestimate the amount of winter range available, especially during severe winters. Related to winter range, density is also an important consideration for big game managers, and is of particular interest with bighorn sheep. Managing for maximum density is never advisable as it increases the level of intraspecific competition and stress, may contribute to habitat degradation, reduce population vigor, and increase susceptibility to disease. Winter range carrying capacity is a key limiting factor for wild sheep populations, and calculating the density of bighorn on modeled winter range provides a practical metric for future herd management. By applying the current population estimate of 250 animals to a modeled winter range of 310 km^2, a density estimate of 0.81 bighorn/km^2 is derived in RBS-22. Research conducted on Ram Mountain in Alberta, Canada, documented that when the local bighorn population exceeded a density of 6.2 bighorn/km^2 the population crashed (Jorgenson *et al.* 1997, Festa-Bianchet 2003). This decline apparently was not disease related, which suggests that it occurred in response to some undetermined density dependent factor(s). Similar studies have not been done in Colorado, but clearly the Ram Mountain studies demonstrate the importance of maintaining a population density that is well below carrying capacity. Even if we assume that the model is overestimating the amount of suitable winter range by 50%, the density of bighorn on winter ranges in RBS-22 is still only 1.6/km^2. If the density threshold from Ram Mountain is applied to RBS-22, it is evident that local winter ranges may be capable of supporting a much larger population of bighorn than what is currently present. A 6.2 bighorns/km^2 density on modeled winter range in RBS-22 equates to a wild sheep population of > 1,900 animals.

Winter range is paramount to the future viability of this sheep population; therefore, we would make the following future management recommendations:

- ***Wildlife managers should actively participate in land-use planning and collaborate with local jurisdictions and federal land managers to conserve and improve known bighorn winter ranges across this DAU***

- ***Radio collar studies, using GPS technology, would be extremely valuable for assessing habitat utilization and specific migratory corridors throughout the year***

- ***When conditions are safe, winter (post-hunt) helicopter or fixed-wing reconnaissance should occur in an attempt to explore potential high-elevation winter ranges that are unknown at this time***

- ***Collaborative habitat treatments should be considered in areas where forest and/or shrub encroachment is reducing habitat suitability for bighorn, or in areas where range expansion is desirable. Possible effects of beetle kill and drought should be taken into account for winter range conditions as appropriate***

- ***Noxious weed prevalence should be monitored and eradication efforts implemented when and where necessary. Lower elevation winter ranges are perhaps most susceptible to noxious weed invasion and should be monitored closely***

- ***If funding and resources become available, a more comprehensive winter range carrying capacity analysis could be conducted throughout this DAU in coordination with the USFS, BLM, private***

landowners, and CPW. At the current population level, CPW does not believe winter range is limiting the productivity of this herd. However, because of the importance of winter range, CPW would be supportive of a winter range evaluation that is intended to preserve and enhance key winter ranges, identify previously unknown winter ranges, and identify current and future threats to bighorn winter ranges. This analysis might be broken into three components: 1. A thorough inventory of available winter range, 2. A quantitative assessment of winter range quality and productivity and 3. An assessment of possible limiting factors or threats to those winter ranges. This type of assessment would be costly and require significant personnel commitments from each of the listed cooperators. Ongoing monitoring should regularly reassess winter range conditions in comparison to carrying capacity once it is established

Lambing

As discussed with winter range, not all lambing areas have been identified in this DAU. Potential lambing areas are difficult to access during May and June because of terrain and snow cover. During lambing season bighorn ewes tend to segregate from one another while seeking out isolated areas in extremely rugged terrain. Bear and Jones (1973) indicated that lambing areas in S-22 included the "south exposures and rugged cliffs of Baldy Chato, Baldy Alto, and Organ Mountain;" more recent observations suggest that bighorn continue to use these areas for lambing. Suspected lambing areas also occur on Mineral Mountain and further west in the headwaters of Mineral Creek. Bighorns in S-36 can be found lambing between Silver Park and Bellows Creek and at Wagon Wheel Gap (Ghormley 2010). In S-52, potential lambing habitat is ubiquitous, however, ewes have been documented lambing in Sanders Draw/Phil Mason SWA, Rock Creek, Fish Canyon, and on the west side of the Cebolla near Cathedral. Lambing locations within S-53 include the area between the Rio Grande River and Antelope Mountain, northwest of Rio Grande Reservoir just east of Lost Trail Creek, east of Rio Grande Reservoir, and south of Regan Lake (Ghormley 2010).

Bighorns are exceptionally sensitive to disturbance during lambing season, and it is atypical for managers to conduct helicopter surveys during this time of year. Some known lambing areas are identified in Appendix D that are overlaid with modeled lambing areas. Modeled lambing habitat includes all suitable habitat in > 2 ha patches with slopes ≥ 60% and within 1,000 meters of water, and with southern, eastern, or western aspects (George *et al*. 2008b). Known lambing areas represent only 3% (87 km^2) of the DAU, which accounts for 48% of the modeled lambing habitat. As stated previously, future radio collar studies could yield extremely valuable information on lambing and other important habitats within this DAU, while being minimally intrusive throughout the year.

1999 S52/S22 Habitat Assessment

In December of 1999, former Division of Wildlife technician Leslie Spicer produced an internal report titled "San Luis Peak Bighorn Sheep Observations and Ocular Survey and Habitat Assessment of the Historic Rock Creek Bighorn Sheep Home Range." This report was intended to provide managers with up to date information on local bighorn prior to proposed transplant efforts in S-52. At the time, the S-52 population had essentially died out and there was on-going discussion about restoring the herd through transplants. Spicer's project had multiple objectives, including:

- Assess the historic home range present habitat condition
- Identify potential lambing habitat within the study area
- Identify any habitat improvements that could be implemented prior to the reintroduction of bighorn sheep to the area

Only ten days were budgeted for this effort, and it was mostly a qualitative analysis; nonetheless, Spicer was able to present some meaningful herd history and management recommendations in her report. First, she corroborated with long-time residents that historic exchange and movement had occurred between S-22 & S-52, and that it was likely still occurring at some level. She also provided maps and discussion of potential lambing areas in GMU S-52, as well as information relative to historic habitat manipulation in S-22. Her research documented that prescribed burns had been attempted during the mid-1990's on the slopes east of Spring Creek from "Cathedral Rock" to Baldy Chato in an effort to create a migration corridor between the La Garitas and the lower Cebolla drainage. Apparently those efforts were unsuccessful due to poor burn conditions. She also documents an earlier effort by the USFS around 1990 to create a corridor by mechanical thinning of timber along the rim of Spring Creek. "The lower branches of the timber were cleared opening a 'tunnel like' corridor approximately 25 feet wide." She provides no further

information as to whether bighorn ever used the corridor, but clearly there was interest in the 1990's to encourage movement of bighorn between high and low elevations. These efforts were likely in response to the apparently catastrophic respiratory disease related die-off that occurred in 1990, and an interest in naturally augmenting the population recovery in S-52. Furthermore, Spicer references what she surmised were important bighorn habitats in S-52, and also outlined potential areas for prescribed burns. Not surprisingly, her burn recommendations target north and east facing slopes where coniferous forest presented a potential barrier to movement for wild sheep. Some of those areas included Rock Creek, Devil's Hole, the Cathedral/lower Los Pinos Pass area, Sander's Draw, what is now the Phil Mason State Wildlife Area, and the west side of the Cebolla from approximately Cathedral west towards Wood Gulch and Calf Creek.

S-36 Habitat Assessment

According to the USDA Forest Service, habitat within S-36 should be sufficient to support the current bighorn population and could sustain increased numbers of bighorns (Ghormley 2010). Lower East Bellows is considered somewhat remote with a functioning ecosystem that can be managed (USDA Forest Service 1996). Prescribed burning would be beneficial for forage production. Pool Table, Blue Creek, and Palisade Cliffs are potential sites for prescribed burning (Ghormley 2010). Hydro-axing is also recommended at Pool Table to boost forage abundance (Gomez 2010). Forage quantity and quality are important, but water availability is also vital to bighorn sheep survival. Some of the water sources in S-36 are shared between domestic cattle and bighorn sheep; water quality should be examined regularly and maintained to provide adequate water for bighorns (Gomez 2010).

S-53 Habitat Assessment

Bighorn habitat in S-53 is considered ample enough to maintain the current numbers of bighorns and have an increasing population (Ghormley 2010). Locations within S-53 have varying levels of wilderness. Finger Mesa is relatively remote; Box and Road Canyons contain Forest Service roads but not all the use is motorized. Bristol Head has some mining and recreation activities, which detract from the remoteness of the habitat (USDA Forest Service 1996). All of these anthropogenic influences can directly or indirectly affect bighorn sheep habitat by reducing its quantity and quality. Habitat improvements could be made through strategic land management along with prescribed burning to open up bighorn corridors, expand winter range, and stimulate forage production. Suggested sites for prescribed fire include Long Ridge, Seepage Creek, Bristol Head to Kid Peak, and Road Canyon (Ghormley 2010, Gomez 2010). Naturally-ignited fires also can improve habitat. On June 5, 2013 lightning initiated the West Fork fire complex. Within this complex, the Papoose fire burned into the southwest portion of S-53, including Road Canyon to Crooked Creek. Resulting impacts for bighorn habitat will require ongoing assessment.

Herd Management History

History of Population Inventory

The wild sheep population in RBS-22 is historically native. Over the last 100-125 years, the population was reduced significantly, and many sub-herds may have been extirpated. Historic population declines most likely can be attributed to overharvest by unregulated subsistence and market hunting, loss of habitat resulting from human development and activity, competition for prime habitats with domestic livestock, and mortality resulting from disease(s) and parasites introduced by domestic livestock (George *et al*. 2009, Orear 1917). Native herds in this DAU have been augmented over the last 40 years through a variety of transplants, but core remnant populations persist in native habitat.

When discussing population inventory in RBS-22, there must be a distinction made between a population census and a population survey. Essentially no census (i.e., complete count) has occurred in this DAU, however many surveys have been conducted. Aerial surveys are arguably the most effective type of survey in a vast geographic area like RBS-22, however they are not without potential bias. Annual population estimates are often based on survey observations, as well as any other reliable information that is available, such as public and agency reports. It is important to point out that the effectiveness of aerial surveys is dependent on many factors including observer experience, weather, animal distribution, geography, and the number of hours available for surveying. The same is true for ground surveys, which are less reliable and in many cases provide extremely biased estimates. Aerial surveys have been conducted in these units with varying results, while very few comprehensive ground surveys have been attempted. Numerous observations of bighorn have been recorded over the last 50 years by folks on the

ground; however, they should not be interpreted as formal population surveys. Population estimates typically lack a measure of accuracy and precision; therefore, managers should focus on trends, and how those trends relate to management objectives. A multiple-year trend is particularly important for bighorn sheep, as many populations are not surveyed on an annual basis, and survey effort & success is highly variable.

S-22 & S-52 Comprehensive, historic population estimates for these populations are lacking. Early records for this herd indicate that an average of 55 bighorns were "censused" from 1930 through 1941 (Ghormley 2010). Ghormley references a 1967 USDA Forest Service report which indicates that the "January 1, 1942 census for Unit 22 estimated the population at 50 animals (10 rams, 40 ewes and lambs). Furthermore, Ghormley writes "more intensive census conducted in 1956 estimated a potential population decline to 35 animals. Census figures from 1965-1967 indicate an average of about 55 animals (2010)." Sporadic "counts" were found dating back to 1952 when 32 animals were reported, assumingly derived from some type of ground survey. There is reference to the herd showing a "marked increase in numbers during the last few years" in the early 1970's (Bear and Jones 1973). Bailey (1990) includes population estimates for "San Luis Peak" dating back to 1971, at which time the estimate was > 131. The following population estimates are provided for subsequent years: 1976 (*125*), 1981 (*175*), 1984 (*300*), and 1988 (*300*). Beginning in 1986, better documentation of estimates starts to occur, however those estimates are at times questionable. For example, it is sometimes difficult to determine whether population estimates include both S-22 & 52 when they are not specifically broken down by unit. Nonetheless, by most accounts, sometime around 1988 the population in these two GMU's (and possibly the DAU) appears to have reached its peak (*i.e., within the context of recent, recorded history*). That year wildlife managers classified 230 bighorns during aerial surveys in these two GMU's.

There is no way to account for discrepancies found in historic reporting, however over time, population trends may be inferred from the number of animals observed during surveys. Figures 5 & 6 depict the total number of bighorn sheep observed during surveys over time. The survey count trends suggest that in S-22, the bighorn population increased over time from the 1950's through the late 1980's. By the late 1980's, the herd reached its recent peak before declining throughout the 1990's. Herd size appeared to stabilize in the 2000's, albeit well below 1980 levels, while most recently the S-22 population has been in an apparent slow state of decline. Following transplant efforts in the late 1970's, the S-52 herd clearly increased to what likely exceeded 100 animals by the mid to late 1980's. In 1990, this sub-population crashed following an epizootic, and despite more recent transplant efforts has essentially never recovered. The post-hunt population estimates for S-22 and S-52 in 2012 were 70, and 20 respectively. Tables 3 & 4 provide the preponderance of survey data for GMU's S-22 and S-52.

Table 3. Pre and post-hunt survey data (aerial & ground) for S-22, 1952-2012.

Date	Pre/Post-Hunt	<3/4	≥3/4	Yrlng Rams	2-Year Ram (~1/2)	Adult (5/8+)	Total Rams	Yrling Ewews	Adult Ewes	Total Adults	Lambs	Unclass-ified	Total Sheep Classified
1952	-											32	32
2/17/1953	post-hunt						11	6	9	20	0		26
6/23/1966	pre-hunt						8	6	17	25	9		40
7/3/1967	pre-hunt	6	2				8	5	36	44	21		70
7/6/1967	pre-hunt		1		2		3	5	36	39	21		65
3/3,4,9/1969	post-hunt	6	2				8		4	12	2		17
3/17/1969	post-hunt		2	5	1		8		4	4	2		14
11/28/1969	post-hunt		4		1	1	6		2	8	2		10
1969	-											39	39
3/24/1970	post-hunt	14	6				20		19	39	12	28	79
5/19/1970	pre-hunt						12		20	32		2	34
6/16-18/1970	pre-hunt						12	13	26	38	13		64
2/27/1971	post-hunt		8		9		17		33	50	21	3	74
7/24-26/1971	pre-hunt							17	48	48	34		96
9/20/1971	pre-hunt	15	10				25		65	90	34	9	133
11/16/1972	post-hunt						7		13	20	10		30
12/2/1974	post-hunt		7	3	7	1	18		36	54	24		78
5/19/1976	pre-hunt		14		6		20		85	105	2		107
8/18/1976	pre-hunt			8		5	13		48	61	13		74
8/13/1977	pre-hunt			5		23	28		42	70	19		89
3/7/1978	post-hunt		21	10	17		48					106	154
3/30/1978	post-hunt	19	25				44		125	169			169
8/19/1978	pre-hunt			27		55	82		79	161	20		181
8/6/1979	pre-hunt			28		34	62		23	85	5		90
8/26/1981	pre-hunt								19	19	4		23
9/2/1981	pre-hunt		1	3	3		7		42	49	17		66
1/11-13/1982	post-hunt		2		3	2	7		29	36	11		47
2/11-12/1986	post-hunt						4		28	32	12		44
1/29/1987	post-hunt			1	8	3	12		39	51	10		61
8/9-10/1988	pre-hunt			6	13	17	36		139	175	55		230
4/20/1990	post-hunt		1		4	2	7		50	57	29		86
8/17-18/1990	pre-hunt		11	6	16	9	42		71	113	13		126
7/31/1991 & 8/2/1991	pre-hunt		11	3	3	10	27		69	96	41		137
8/13-14/1992	pre-hunt			3	5	10	18		59	77	20		
9/3-4/1993	pre-hunt			3	2	2	7		50	57	1		58
8/16-17/1994	pre-hunt		3		6	2	11		46	57	4		61
8/22-23/1995	pre-hunt		6		1	2	9		41	50	12		62
11/8/1999	post-hunt						2		12	14	3		17
summer 2005	pre-hunt						34		25	59	3		62
8/19/2006	pre-hunt		19	2	1	22	44		23	67	8		75
7/14-16/2008	pre-hunt			1	1	2	17		3	20	1	15	36
8/12/2008	pre-hunt			2	4	28	34		26	60	10		70
8/26/2010	pre-hunt				4	10	14		4	18	1		19
8/24/2011	pre-hunt			1	6	9	16		28	44	4		48
8/6/2012	pre-hunt					7	7		37	44	10		54

Figure 5. Total number of bighorn classified during surveys in S22, 1952-2012

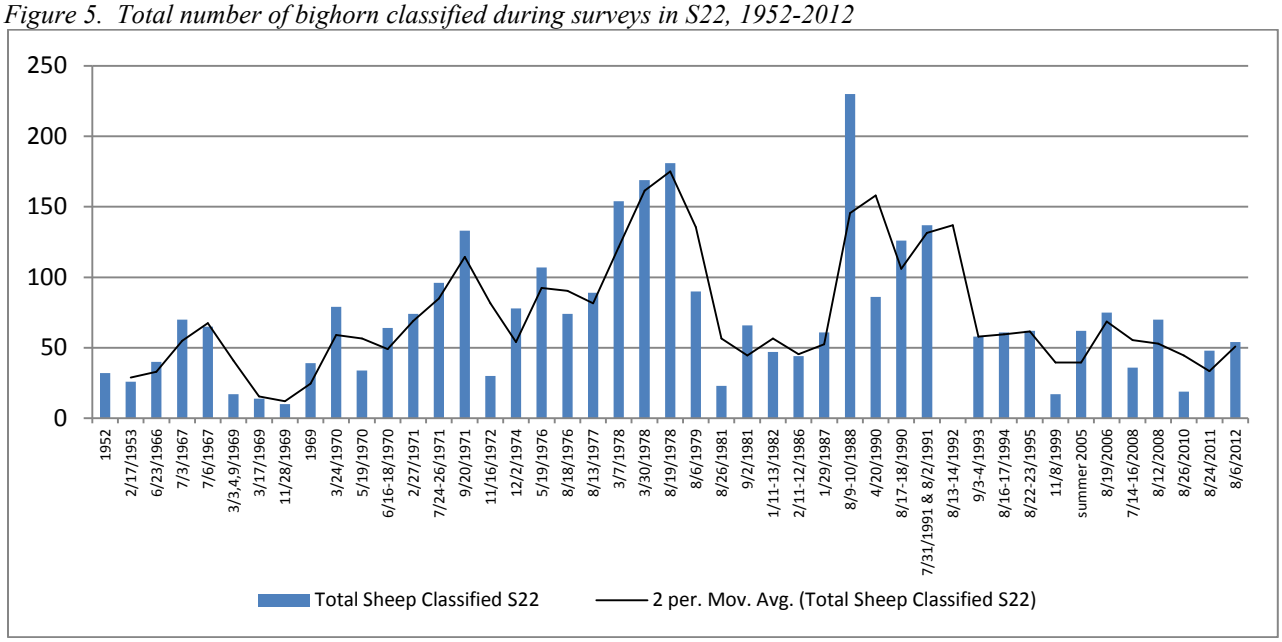
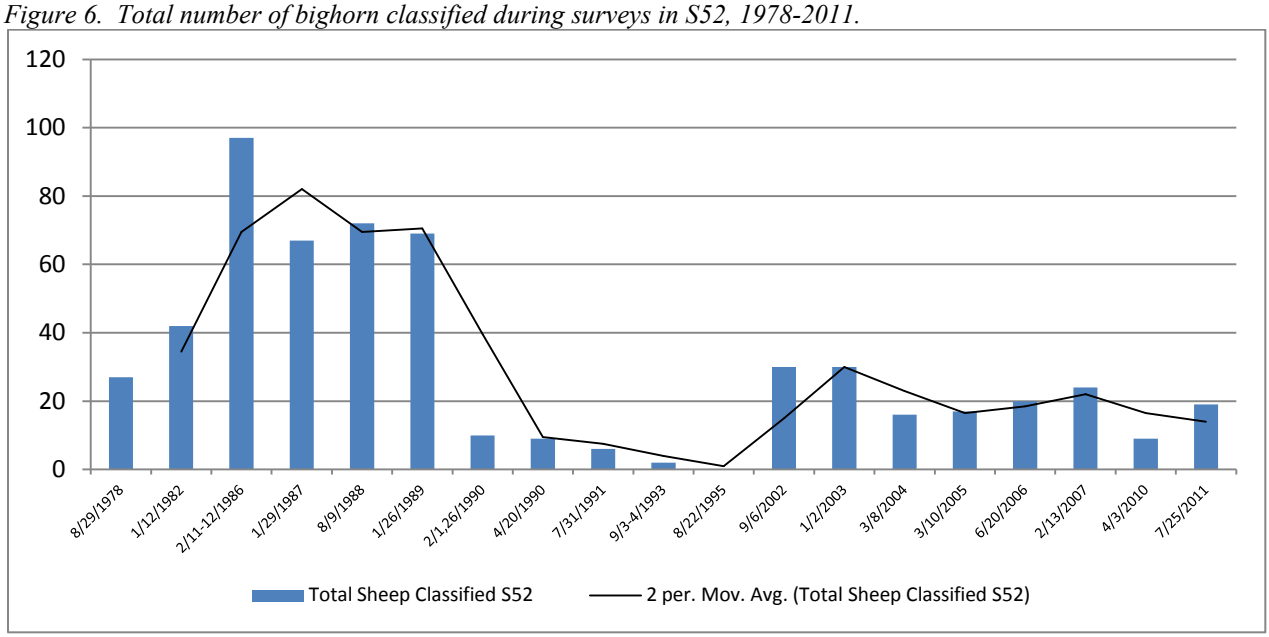


Table 4. Pre and post-hunt survey data (aerial & ground) for S-52, 1978-2011.

Date	Pre/Post-Hunt	<3/4	≥3/4	Yrlng Rams	2-Year Ram (~1/2)	Adult (5/8+)	Total Rams	Yrling Ewes	Adult Ewes	Total Adults	Lambs	Unclass-ified	Total Sheep Classified	Lambs: 100 Ewes
8/29/1978	Pre-hunt						0		21	21	6		27	28.6
1/12/1982	Post-hunt	8				12	20		15	35	7		42	46.7
2/11-12/1986	Post-hunt						21		1	22		75	97	-
1/29/1987	Post-hunt	11		2		8	21		33	54	13		67	39.4
8/9/1988	Pre-hunt			4	4	16	24		34	58	14		72	41.2
1/26/1989	Post-hunt			3	8	20	31		26	57	12		69	46.2
2/1,26/1990	Post-hunt						9		1	10			10	-
4/20/1990	Pre-hunt	1	1		1	1	4		3	7	2		9	66.7
7/31/1991	Pre-hunt								4	4	2		6	50.0
9/3-4/1993	Pre-hunt								1	1			2	-
8/22/1995	Pre-hunt												0	-
9/6/2002	Pre-hunt						2		11	13	7	10	30	63.6
1/2/2003	Post-hunt						7		21	28	2		30	9.5
3/8/2004	Post-hunt						4		12	16			16	-
3/10/2005	Post-hunt						1		11	12	5		17	45.5
6/20/2006	Pre-hunt						2		10	12	8		20	80.0
2/13/2007	Post-hunt		3		4	2	9	1	12	21	2		24	16.7
4/3/2010	Post-hunt						2		7	9			9	-
7/25/2011	Pre-hunt	6	3				9		9	18	1		19	11.1

Figure 6. Total number of bighorn classified during surveys in S52, 1978-2011.



S-36 & S-53 Most of the historical population data in S-36 and S-53 comes from informal sightings rather than formal surveys. Since the majority of the bighorns in these units were believed to be extirpated by the 1950's, few searches were conducted after that time (Bear and George 1973, USDA Forest Service 1996). Transplants in the 1980's re-established these herds and renewed interest in monitoring bighorn sheep in the units. Population estimates were made following transplants, which were not based on formal censuses. Known aerial and ground survey records date back to 1991 for S-36 and 1993 for S-53 (Table 5 and 6). Summer and winter aerial surveys have been conducted by CPW. USDA Forest Service Rio Grande National Forest Divide Ranger District collected summer ground survey data in 2010 and 2012 as part of Auction and Raffle projects (Gomez 2010). High counts from Forest Service surveys were designed to eliminate double counting bighorns over multiple months. On average approximately 50-60 bighorns were observed during surveys in S-36 and S-53. These counts seemed to vary due to weather, bighorn distribution, topography, and survey time. Acceptable minimal winter lamb:ewe ratios are ≥20:100; preferred ratios for a growing population are ≥40:100 (George *et al.* 2009). Observed lamb:ewe ratios in S-36 (Table 5) indicate that recruitment is above the desired minimum threshold but not at a level where the herd is expected to grow significantly. S-36 sex & age ratios have remained relatively stable since 1991; however, S-36 minimum counts have shown a slight decline over time (Figure 7). Bighorn habitat use in S-36 may have shifted slightly, decreasing the numbers observed in traditional areas. S-53 minimum counts have increased slightly since 1993 (Figure 8). Sex & age ratios also have apparently improved over the past three years in S-53 (Table 6). Recent increased lamb:ewe ratios may indicate recruitment in S-53 may have risen somewhat. The S-36 herd seems to be struggling more than the S-53 population, which may be indicative of ongoing disease issues in S-36 from the 1990s.

Table 5. Pre and post-hunt survey data (aerial & ground) for S-36, 1991-2012.

Date	Pre/Post-Hunt	<3/4	≥3/4	Yrlng Rams	2-Year Ram (~1/2)	Adult (5/8+)	Unclassified Rams	Total Rams	Yrling Ewews	Adult Ewes	Total Adults	Lambs	Unclass-ified	Total Sheep Classified
6/30/1991-9/1/1991	pre-hunt						45	45		20	20	14		79
9/6/1991 - 9/11/1991	pre-hunt		6	10	6			22		65	71	28		115
1/15/1992	post-hunt		1		8			9		28	29	13		50
12/15/1993 - 12/29/1993	post-hunt			1			9	10		40	40	9		59
2/28/1996	post-hunt							0		21	21			21
2/10/2004	post-hunt			2	4	4		10		24	28	9	2	45
2/14/2005	post-hunt		1	1	1	1		4		19	21	8		31
2/11/2006	post-hunt		7	2	1	1		11		13	21	2	2	28
1/8/2007	post-hunt		1	1	2	3		7		22	26	4		33
1/4/2008	post-hunt		2	2	2	1		7		27	30	2	2	38
1/9/2009	post-hunt		1	3		1		5		24	26	3	1	33
1/1/2010	post-hunt		7		2	3	1	13		42	52	11		66
6/20/2010-10/5/2010	pre-hunt			2		1		3		43	44	10		56
12/2/2011	post-hunt			2	3	10		15		28	38	7		50
1/11/2011	post-hunt		7	1	2	3		13		25	35	7		45
5/9/2012-9/202012	pre-hunt			1	1			2		67	67	22	18	109
8/3/2012	post-hunt		5	3	4	1		13		4	10	1		18
12/20/2013	post-hunt					3		3		11	14	4		18
1/18/2013	post-hunt		3	12	2	5		22		12	20	2		36

Figure 7. Total number of bighorn classified during surveys in S36, 1991-2012.

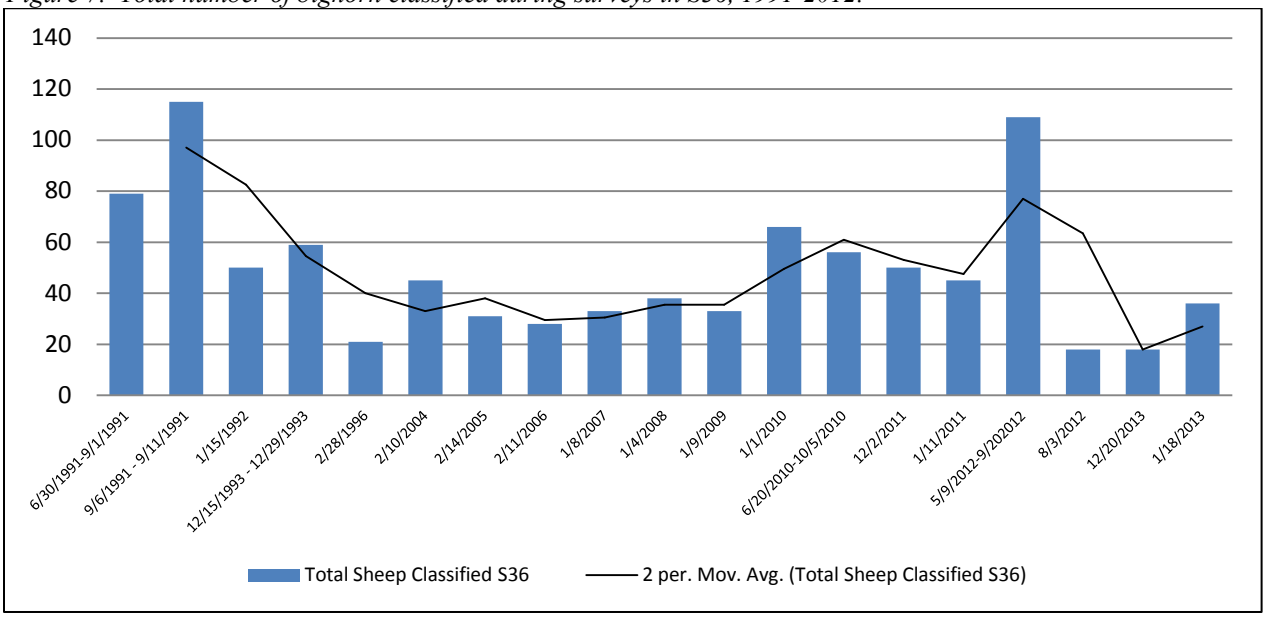
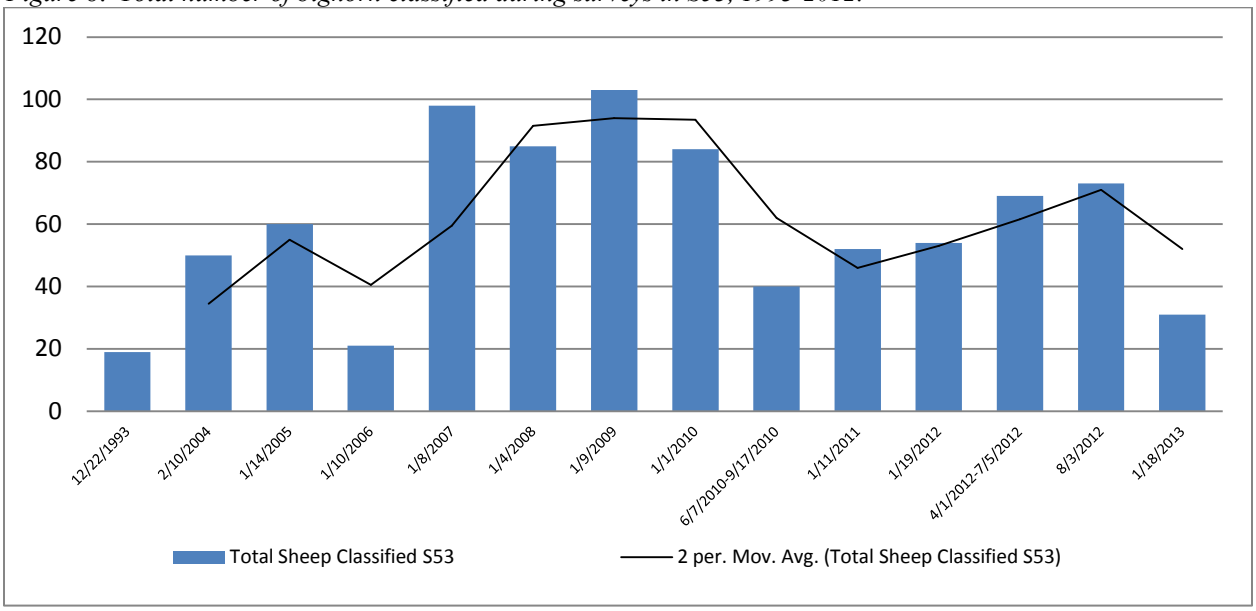


Table 6. Pre and post-hunt survey data (aerial & ground) for S-53, 1993-2012.

Date	Pre/Post-Hunt	<3/4	≥3/4	Yrlng Rams	2-Year Ram (~1/2)	Adult (5/8+)	Unclassified Rams	Total Rams	Yrling Ewews	Adult Ewes	Total Adults	Lambs	Unclass-ified	Total Sheep Classified
12/22/1993	post-hunt						9	9		6	6	4		19
2/10/2004	post-hunt		1	1	3	7		12		28	36	6	4	50
1/14/2005	post-hunt		3	1	5	4	4	17		35	42	6	2	60
1/10/2006	post-hunt		4		4	6		14		5	15	1	1	21
1/8/2007	post-hunt		1	5	2	2	6	16		56	59	26		98
1/4/2008	post-hunt			7	5	3		15		49	52	18	3	85
1/9/2009	post-hunt		8	2	1	4		15		65	77	23		103
1/1/2010	post-hunt		8	4	3	6		21		56	70	7		84
6/7/2010-9/17/2010	pre-hunt		8	1	4	3		16		18	29	6		40
1/11/2011	post-hunt		3	2		1		6		35	39	11		52
1/19/2012	post-hunt		8	6	3	1		18		30	39	6		54
4/1/2012-7/5/2012	pre-hunt			1	3	29		33		21	50	15		69
8/3/2012	pre-hunt		9	9	4	2		24		33	44	16		73
1/18/2013	post-hunt		3	10	3	2		18		10	15	3		31

Figure 8. Total number of bighorn classified during surveys in S53, 1993-2012.



Hunting and Harvest History

S-22 Records indicate that the first formal hunting season for bighorn rams in S-22 took place in 1954 with 15 ram licenses issued and no sheep harvested (Bear and Jones 1973). That season was nine days long and opened the second week of September. Licenses were not issued ever year thereafter, with five licenses issued in 1956, and six licenses issued in 1959. Apparently no bighorn sheep were harvested during the 1950's. In 1956, either-sex licenses were issued for the first time, however no other ewe licenses have subsequently been issued in S-22.

Hunting seasons became more liberal in the 1960's with anywhere from five to ten licenses issued and season lengths that varied from 16 to 37 days. 16 rams were harvested during the 1960's seasons. The late 1970's and early 1980's appear to have been the "hay days" of sheep hunting in S-22 (Appendix B). As many as 30 ram licenses were issued annually (1980-1985) with an all-time high ram harvest of 29 animals in 1980. During this time, the sheep season structure included an early and a late season, with licenses divided equally between hunts. A total of 118 rams were harvested in this unit during the 1980's. For comparison, only 26 rams were harvested in S-22 from 2000 to 2012. Beginning in the late 1980's, license allocation and harvest began to decline and by 1991 only two ram licenses were issued. Since that time, between one and six licenses have been issued and despite the stagnant or declining population, the unit has never been closed to hunting. From 2008 through 2012, 16 ram licenses have been issued with 11 rams harvested. The five-year hunter success rate is approximately 75%, which is similar to the three and ten-year average success rates of 83% and 81% respectively. The five-year average number of growth rings on harvested rams in the unit is eight, indicating that hunters continue to encounter mature rams in the population. The most recent three-year average number of rings from harvested rams is seven. Hunter success rates remain high, but anecdotal reports suggest that hunters are working harder to find rams in the unit than they were five years ago. Hunters have also started to search for and harvest what are in fact S-36 rams in the southeast corner of S-22. These rams will no longer be available to S-22 hunters once the unit boundary is changed, which will have some influence on the age and size of rams harvested in future years. Two ram licenses were issued for the 2013 season.

S-36 Bighorn sheep have been harvested from S-36 since the 1800s at unregulated rates (Wallace 1940, Bear and Jones 1973). The first known hunting season began in 1990 and continued through 1993 (Appendix B). Two rifle ram licenses were issued annually during this time, with an average success rate of 50%. A total of five rams were harvested from the unit prior to its closing. The hunting season was closed after 1993 due to a disease outbreak and all-age die off. No legal hunting has occurred in S-36 since.

S-52 Records indicate that no formal hunting season has ever occurred in this GMU. As mentioned previously, wildlife managers were poised to open a hunting season in the unit in the late 1980's, but unfortunately the season never came to fruition as a result of the catastrophic die-off that occurred between 1989 and 1990.

S-53 While bighorns were heavily hunted during the 1800s (Wallace 1940, Bear and Jones 1973), the first formal hunting season in S-53 occurred in 1999. One ram rifle license was issued through 2007. This hunt had a 100% success rate during that time. In 2008 and 2009, the number of ram rifle licenses was increased to two. Both years had 100% success. In 2010, ewe harvest began in S-53 along with several other bighorn GMUs in southwest Colorado (i.e., S-15, S-16, S-21, S-33 and S-28). Several factors prompted issuing hunting licenses for ewes: 1) Based on population size and trend, managers determined that the herd could withstand low levels of harvest (<5% of total post-hunt population > 1 year old or <12% of pre hunt ewe population, George *et al.* 2009). Two ewe licenses were predicted to result in a ≤ 3% adult ewe removal rate, which was and still is within recommended harvest guidelines. 2) Managers were interested in beginning to address population density and herd size, in part due to overlap with domestic sheep allotments. By adding a conservative amount of ewe hunting, CPW also increased hunter opportunity for bighorns while maintaining the level of ram hunt quality. Of five ewes harvested, two have come from the same drainage. Locations of ewe and ram harvest will continued to be monitored to protect subgroups from overharvest. Since 2010, two ram and two ewe rifle licenses were allocated annually. The three year average annual harvest was one ram and two ewes. Three-year average success rate for ewes was 83%, and for rams it was 50%.

History of Translocations

Bighorn sheep are native to most of the region encompassed by DAU RBS-22. A substantial amount of seemingly suitable, yet unoccupied habitat is present in RBS-22 to this day. Population augmentation has been a widely and successfully used management tool throughout the western United States, particularly with respect to native big game animals. Because of the susceptibility of wild bighorn sheep to introduced respiratory disease pathogens and ectoparasites, transplants have been used extensively with the goal of restoring or augmenting populations that have experienced historic or recent declines. A substantial number of transplants have occurred in RBS-22 (Table 7). The only sub-herd that has not directly received a population augmentation is S-22; however, transplanted animals have found their way into that unit through association with native animals.

Transplant efforts in S-52 in the late 1970's were part of a formal management investigation intended to evaluate "the short-term responses of bighorn sheep following transplanting into suitable ranges adjacent to areas presently occupied by bighorn sheep" (Bear 1979). At the time, wildlife managers were evaluating the efficacy of various transplant protocols that included age of animals transplanted, use of holding pens at release sites, source herd considerations, and use of radio telemetry equipment for post-release monitoring. Later transplants in S-52 were intended to restore the lower Cebolla sub-herd following its near extirpation in 1989-90. Animals transplanted into S-52 typically have been released on what is now the Phil Mason SWA. As mentioned previously, following release, some of these transplants were documented in the La Garita Wilderness (i.e., Baldy Chato and Stewart Creek), and outside of Creede on one occasion (Bear 1979).

Because the S-36 and S-53 sub-herds were thought to be extirpated in the 1950s, Bellows Creek and Bristol Head were identified as desirable transplant recipient sites (Bear and Jones 1973). A transplant of 25-35 bighorns to S-53, specifically Bristol Head and Seepage Creek, was proposed by Wildlife Conservation Officer Glen Hinshaw in the late 1970s. The objective was to establish a herd of 125 bighorns in the area. A 1978 Environmental Assessment Report found no significant effect from the proposal. Issues and concerns evaluated included domestic sheep grazing, competition with elk, and recreational use, particularly snowmobiles (Wiggins *et al.* 1978). Although the proposed transplant had approval from USDA Forest Service and was listed as a priority for the Colorado Division of Wildlife, the transplant did not occur until 1983, and consisted of 19 S-21 bighorns from Cow Creek near Ouray (Table 7). Additional bighorns were brought to Bristol Head in 1984 from Almont (north of Gunnison). In 1987, Glen Hinshaw proposed another bighorn transplant to S-53. His initial plan was to put 25-40 bighorns in Box Canyon east of Rio Grande Reservoir. However, he decided that Road Canyon and Long Canyon were more central to the historic bighorn herd home range. The USDA Forest Service found no significant effect from the proposed transplant (USDA Forest Service 1988). In 1991, 19 bighorn sheep from Almont were released near Forest Service Road 520 at the base of Road Canyon and Long Canyon.

While past S-53 transplants were well-documented, scarce written documentation was found on the S-36 transplants that occurred in 1985 and 1988. Both of these transplants involved moving 20 bighorn sheep to Blue Creek southeast of Creede. The 1985 transplant was from Cottonwood Creek in the North Collegiates, a frequently-used source population for bighorn transplants in Colorado (George *et al.* 2009). The 1988 transplant came from Almont, another common source herd in the 80's and 90's. The origin of transplanted sheep is often discussed both in terms of population genetics and disease history. Six different bighorn population were sources for RBS-22 transplants, and overall, records indicate that 150 bighorn sheep have been transplanted into this DAU. The majority of animals were released into S-36 and S-53 (Table 7).

Table 7. Historic bighorn sheep translocations to and from RBS-22.

GMU	Date	Source	Release Site	Rams	Ewes	Yrlngs	Lambs	Total
S-52	02/1976	Trickle Mt	Cebolla SWA	2	6		1	9
S-52	3/31/1977	Trickle Mt	Cebolla SWA		7		2	9
S-53	3/9/1983	Cow Creek / Ouray	Bristol Head	3	11		5	19
S-53	1/11/1984	Almont	Bristol Head	5	11		4	20
S-36	3/6/1985	Collegiates North	Blue Creek	2	10		8	20
S-52*	3/06/1986	Cebolla SWA	Almont	1				1
S-52*	3/13/1987	Cebolla SWA	Gunnison Gorge	2	12		9	23
S-52*	3/13/1987	Cebolla SWA	Pole Ck Mt	1	1			2
S-36	1/1/1988	Almont	Blue Creek	2	9		9	20
S-52	1/06/1988	Almont	Cebolla SWA	1				1
S-53	1/17/1991	Almont	Road/Long Canyons	2	9	1	7	19
S-52	2/07/2002	Georgetown	Cebolla SWA	3	17		7	27
S-52	2/21/2002	Almont	Cebolla SWA	1	4		1	6

**Shaded rows were transplants out of the DAU*

Current Herd Management, Issues, and Strategies

Current Population Status

In 2009, the former Colorado Wildlife Commission adopted the Colorado Bighorn Sheep Management Plan for 2009-2019 (George *et al.* 2009). The plan established a "Tier" system intended to give management priority to the largest native bighorn populations throughout the state. Tier 1, or "primary" herds are native, large (≥100 animals for 90% of the years since 1986), and have received few if any supplemental releases. Tier 2 herds, or "secondary" herds are medium to large (≥75 animals for 80% of the years since 1986 or since becoming fully established), and are comprised of one or more interconnected herds that are native or have resulted from translocations. Tier 2 herds may represent indigenous or introduced bighorn sheep populations (and combinations thereof) that have less genetic diversity and more limited ranges that may or may not be able to persist in sizable numbers in the face of various adversities. The statewide plan indicates that Tier 2 herds should be given priority for inventory, habitat protection and improvement, and research over populations that are not considered primary core populations. RBS-22 encompasses native bighorn habitat, where native bighorn sheep still reside. However, because of the number of transplants that have occurred over time, the unit technically meets the criteria for Tier 2 designation. Managers continue to consider this DAU a regional priority for several reasons: 1) the S-22 sub-herd is native, was historically one of the most prolific sheep herds in the state, and has never specifically been the focus of transplant efforts. Transplanted animals have made their way into the GMU through association with native sheep, but the core S-22 herd has remained relatively "pure." And 2) records indicate that bighorn sheep were native to the other three GMU's in this DAU, and transplants were the only viable method of reintroducing animals to their historic range following extirpation. Tier 1 herds should receive the highest priority from resource managers. However, it should be recognized that many Tier 2 herds are also worthy of a high level of investment and protection. There are an estimated *7,000* bighorn sheep in the state of Colorado; the current population estimate for RBS-22 is approximately *250* animals (Figure 9).

Future Inventory and Monitoring

Portions of RBS-22 are remote and are comprised of rugged terrain, making it challenging to coordinate comprehensive ground surveys. Aerial surveys conducted using a helicopter are not without bias, however they provide a much more effective and efficient way of searching for bighorn within this unit. Helicopter time is expensive, therefore these types of surveys have not been conducted every year. This results in data sets that are broken up by non-surveyed years, thereby inhibiting the ability of biologists to construct reasonable population models. Another difficulty faced by biologists is that some herds winter at high elevations that may not be helicopter accessible during post-season deer and elk classification flights. This prevents biologists from obtaining winter lamb:ewe ratios which are perhaps the most important metric of population performance for wild sheep. More precise population estimates have been achieved in several Colorado bighorn herds by initiating mark-resight studies; however those types of projects are costly, and rely on the ability to capture and mark a predetermined sample of animals from the target population. In the absence of more rigorous management studies, biologists will continue to generate population estimates using the most current and least biased information available to them. Specific future management objectives shall include:

- ***Attempt annually to conduct post-season/winter population surveys, preferentially during the month of December***
    - Winter lamb:ewe ratios are indicative of population health and recruitment potential; populations plagued by disease issues often will have chronically low winter lamb:ewe ratios. In these herds, summer lamb:ewe ratios are typically higher, but they are not a true metric of annual lamb survival and potential recruitment
    - For future hunt management in RBS-22, assessment of winter lamb:ewe ratios across the DAU will be paramount for adaptively managing harvest and evaluating population trends
    - In accordance with the statewide management plan, RBS-22 should be surveyed at least every other year. Aerial surveys are the preferred method for monitoring in this DAU

- ***Continue to conduct late summer helicopter surveys if funding allows.*** The principal reason for maintaining these surveys in RBS-22 is to allow biologists to evaluate wild sheep distribution in relation to domestic sheep grazing allotments. They also allow biologists to document important seasonal habitats, and refine minimum population estimates

- ***If the management objective is for a stable-increasing population, managers should expect to classify between 125-175 animals during late summer aerial surveys across the DAU.*** This assumes that flight conditions are favorable, and areas where bighorn are known to concentrate are systematically searched. The average number of bighorns observed during recent surveys across the DAU is approximately 150 (SE ± 24). Therefore, observing 125-175 bighorns during late summer aerial surveys should generally reflect a stable bighorn population. If < 125 bighorns are classified in RBS-22, managers should be prepared to thoroughly investigate the cause(s) of the deficit and adapt management accordingly. Summer surveys may not occur on an annual basis, and are dependent on funding therefore this metric may be assessed infrequently.

- ***An expected range for the number of bighorn classified during winter (ie.post-season) survey flights needs to be developed for the DAU.*** Winter flights are preferential for deriving lamb:ewe ratios and minimum population estimates. Many surveys in this DAU have occurred during the summer and early fall, therefore the efficacy of winter surveys has not been proven. Bighorns wintering at lower elevations are opportunistically inventoried during deer and elk classification flights, but survey effort has varied and rarely have focused sheep flights been conducted during winter. Winter flights will also help document important winter ranges across the DAU. If funding is limited, winter surveys should receive priority.

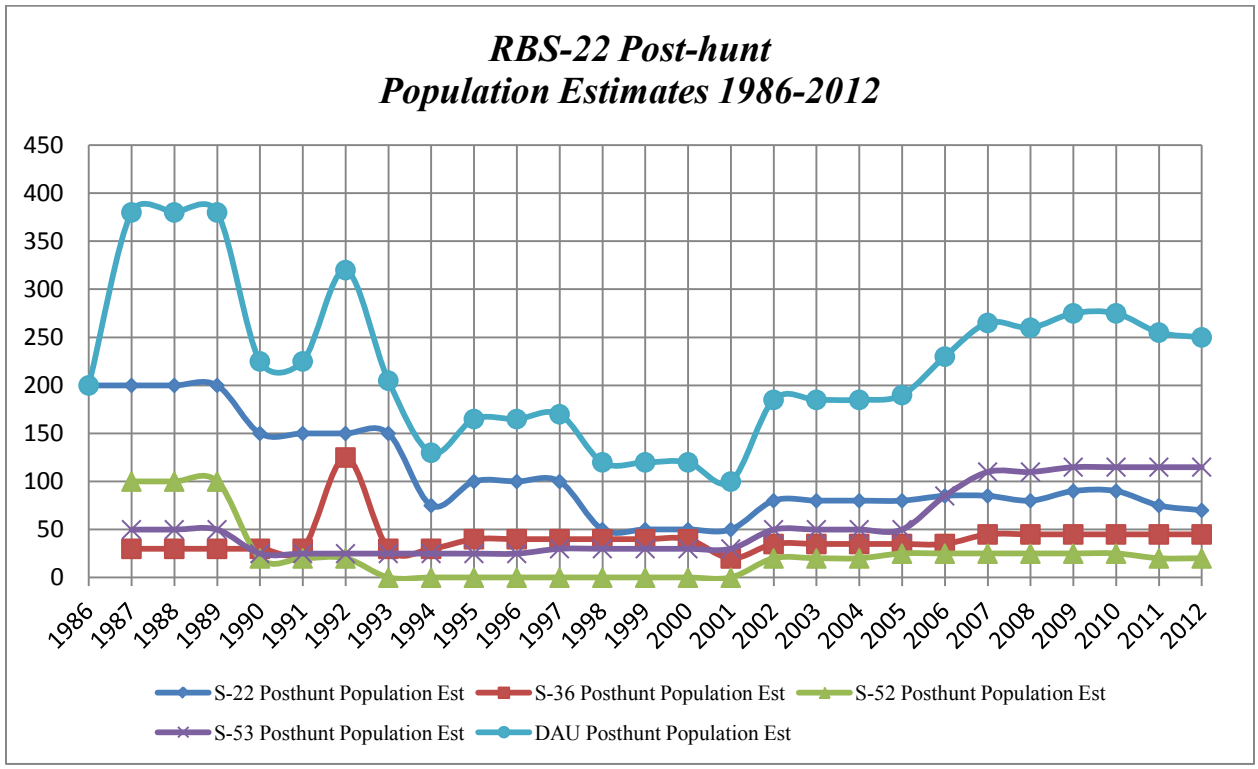


Figure 9. RBS-22 Population Estimates 1986-2012.

Current Harvest Objectives and Management

Hunting licenses have traditionally been issued conservatively for two reasons; one is to maintain a quality hunting experience for hunters that draw licenses. In 2013, *14,129* hunters applied for *238* bighorn sheep licenses in Colorado. Hunters often wait for more than 10 years to draw licenses and the expectation is that a high quality hunting experience will be provided. More licenses may contribute to hunter crowding and diminish the experience,

particularly if sheep tend to concentrate in one or two small geographic areas. The second reason for conservative license allocation is the threat of stochastic events outside of the influence of management. Pneumonia epidemics, in particular, have led to large-scale population declines which are typically followed by lengthy periods of low lamb recruitment. The frequency, intensity, and duration of any future disease events essentially will dictate hunting opportunities for bighorn sheep in RBS-22.

All sheep licenses in Colorado are issued through a limited drawing system, and an applicant must acquire three preference points before they are eligible to be included in license drawings. Rams harvested in Colorado are required to have horns that are ≥ ½ curl, and ewes are required to have horns ≥ 5 inches. All sheep hunters are required to submit a mandatory check form following their hunt that includes details specific to their hunting experience and the number, locations, and composition of sheep observed. Successful hunters must personally present their animal for inspection within five days of harvest so that horn measurements can be collected and a permanent plug embedded in ram horns. Successful ram hunters are required to wait five years post-harvest before they are eligible to begin applying for a license again. In 2013, a total of four ram licenses and two ewe licenses were issued in units S-22 and S-53 (Table 8). GMU's S-36 & S-52 do not currently have a hunting season, however a ram season is being considered for S-36. In 2010, ewe licenses were added for the first time in management history in S-53. Ewe licenses are not currently issued in GMU S-22 based on persistently poor lamb survival and recruitment.

Table 8. 2013 Hunting license allocation in RBS-22.

GMU	***Ram, Resident***	***Ram, Non-Resident***	***Ewe, Resident***	***Ewe, Non-Resident***
S-22	*2*			
S-36	*Not hunted*			
S-52	*Not hunted*			
S-53	*2*		*2*	
DAU Total	***4***		***2***	

Ewe Hunting

Increasing densities of bighorn create unique management concerns, specifically with regard to disease and the potential for increased susceptibility to disease and disease transmission. Bighorns, particularly ewe groups, are often slow to pioneer into vacant habitat, and therefore tend to congregate in the same places year after year (George *et al.* 2009). As a population grows, densities increase in these traditional use areas, which may potentially lead to localized habitat degradation, reduced animal body condition and vigor, and subsequent increased vulnerability to disease. Wild sheep studies conducted on Ram Mountain in Alberta, Canada, offer some valuable insight into the role density plays in bighorn population dynamics. Results from these studies indicated that lamb mass and winter survival decreased as population density increased (Portier *et al*. 1998), that yearling female survival was negatively affected by density, and that age at first reproduction was also negatively correlated with population size (Jorgenson *et al*. 1997). In 2009, CPW biologist Andy Holland wrote an issue paper to establish ewe hunting in the San Juans. In it he wrote: "…establishing conservative ewe harvest may reduce intraspecific competition, increase juvenile survival, lower age at first reproduction, provide hunter opportunity, increase hunter attained herd information, encourage use of new habitats/dispersal, and possibly reduce the risk and severity of disease outbreaks."

Recommendations for ewe harvest are presented in the Colorado Bighorn Sheep Management Plan (George *et al.* 2009). These recommendations should provide managers with the general framework for establishing ewe hunting seasons across the state (Table 9). 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 (i.e., high winter lamb:ewe ratios and adult survival) are capable of sustaining relatively high levels of annual female harvest (Table 10). Because of the potential for hunter crowding, and the variability of annual winter lamb:ewe ratios, it is unlikely that the maximum harvest potential would ever be realized in RBS-22. Managers will consider additional ewe hunting opportunity and strategies in the future if the population remains stable or increases over time. 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.

Ewe harvest may be used as a tool for maintaining a desired population density, and potentially, distribution management in RBS-22. It should be recognized that not all sub-herds are performing equally well in this DAU. GMU focused ewe hunting opportunity will be evaluated on an annual basis and will be based on a three-year population trend. More specifically, winter lamb:ewe ratios should approach or exceed 30:100 for at least a three-year period before ewe hunting is considered sustainable. This strategy relies entirely on frequent and representative population surveys across the DAU. Furthermore, because of the overlap with several active domestic sheep grazing allotments, hunting season structure and pressure must be thoughtfully applied and adapted where necessary. The potential for contact between wild and domestic sheep exists in RBS-22, and managers must design hunting seasons and unit boundaries that do not increase this potential. Management actions instituted by CPW, federal land management agencies, and livestock producers should maintain effective separation between wild and domestic sheep.

Table 9. 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*

Table 10. Hypothetical RBS-22 ewe harvest rates at varying population trends and winter lamb:ewe ratios; uses a population estimate of 250 as a baseline; relies more on population trend rather than a specific population objective.

Population Trend	***Winter Lambs:100Ewes*** **No data**	***Winter Lambs:100Ewes*** **≥ 40:100**	***Winter Lambs:100Ewes*** **20-39:100**	***Winter Lambs:100Ewes*** **< 20:100**
	Harvest of Ewes ≥ 1 year old			
Declining	*No ewe harvest*			
Stable	*No ewe harvest*	*13-25 ewes*	*≤ 13 ewes*	*No ewe harvest*
Stable-Increasing	*No ewe harvest*	*13-25 ewes*	*≤ 13 ewes*	*No ewe harvest*
Increasing	*No ewe harvest*	*≥ 25 ewes*		

Ram Hunting

Several strategies are outlined in Colorado's bighorn sheep management plan with regard to ram harvest (George *et al.* 2009). Ram harvest rates of 2-5% of the post-hunt population and/or 4-10% of the total post-hunt ram numbers are recommended, as long as winter lamb:ewe ratios exceed 20:100. Similar to ewe hunting, ram licenses will be driven by winter lamb:ewe ratios, and hunter satisfaction. Using a 2012 post-hunt population estimate of 250, and assuming a winter lamb:ewe ratio greater than 20:100 (preferably higher) across the DAU, RBS-22 could hypothetically sustain a harvest of between 5 and 13 rams. Assuming a hunter success rate of 75%, achieving a harvest of 13 rams would necessitate issuing 17 licenses. That would equate to nearly a 325% increase from current license allocation. A theoretical allocation of 17 ram licenses and upwards of 25 ewe licenses would likely lead to reduced hunt quality and hunter satisfaction. Nonetheless, managers will consider increasing licenses in the future based on population performance and the management objectives outlined in this plan. Managers intend to allow for limited ram hunting in S-22 and S-53 as long as population performance allows. Limited ram hunting is currently being considered in S-36, and may be established by regulation for the 2014 season. Ram hunting will focus on providing a quality hunting experience, and to a lesser extent population management. In this DAU, ram hunting will not be used to manage for a specified male:female ratio; however biologists will manage ram hunting in accordance with the average age of rams harvested and hunter success alternatives selected during this planning process.

Brunot Treaty

A portion of RBS-22 falls within the boundary of the Brunot Treaty Area (*Brunot Area*) (Figure 10). The Brunot Area results from the 1874 Brunot Agreement between the United States government and the bands of Ute Indians that were residing in Colorado at the time. Today descendants of these bands include the Southern Ute and Ute Mountain Ute Tribes. The area encompassed by the Brunot Treaty was removed from the tribes' reservation lands in 1874 after the discovery of gold in the San Juan Mountains, which facilitated mining and settlement in the region by US citizens. Although no longer reservation land, Article II of the agreement states that "the United States shall permit the Ute Indians to hunt upon said lands so long as the game lasts and the Indians are at peace with the white people." The Southern Ute Tribe (SUIT) began to exercise their treaty rights in 2009, and the Ute Mountain Ute Tribe plans to begin exercising its rights in 2013. Any hunting of bighorn sheep by tribal members falls outside the jurisdiction of CPW management and management plans. However, since the SUIT began exercising its treaty rights they have worked collaboratively with CPW to ensure that bighorn populations falling within the Brunot Treaty area are not over-harvested or otherwise impacted. The SUIT issued one either-sex license to a tribal member in 2009, then increased allocation to two licenses from 2010-present. Concern about overharvesting certain accessible groups of bighorn led to the Tribe voluntarily creating two separate sheep units within the Brunot Area. From 2011 to the present, one of the bighorn licenses was valid in their Northern Unit and the other valid in their Southern Unit. One seven year old, 5/8 curl ram was harvested from S-53 in 2011; all other harvest has occurred in other DAUs. Under the Brunot Agreement there remains the potential for additional annual harvest by Tribal members in RBS-22. Brunot license allocation has historically been calculated as a percentage of the total bighorn licenses issued within the treaty area. Thus, as licenses increase in GMUs within the treaty area, Brunot licenses will increase correspondingly. Bighorn harvest by Tribal hunters and where those animals are taken is expected to have some influence on general public license allocation and management over time.

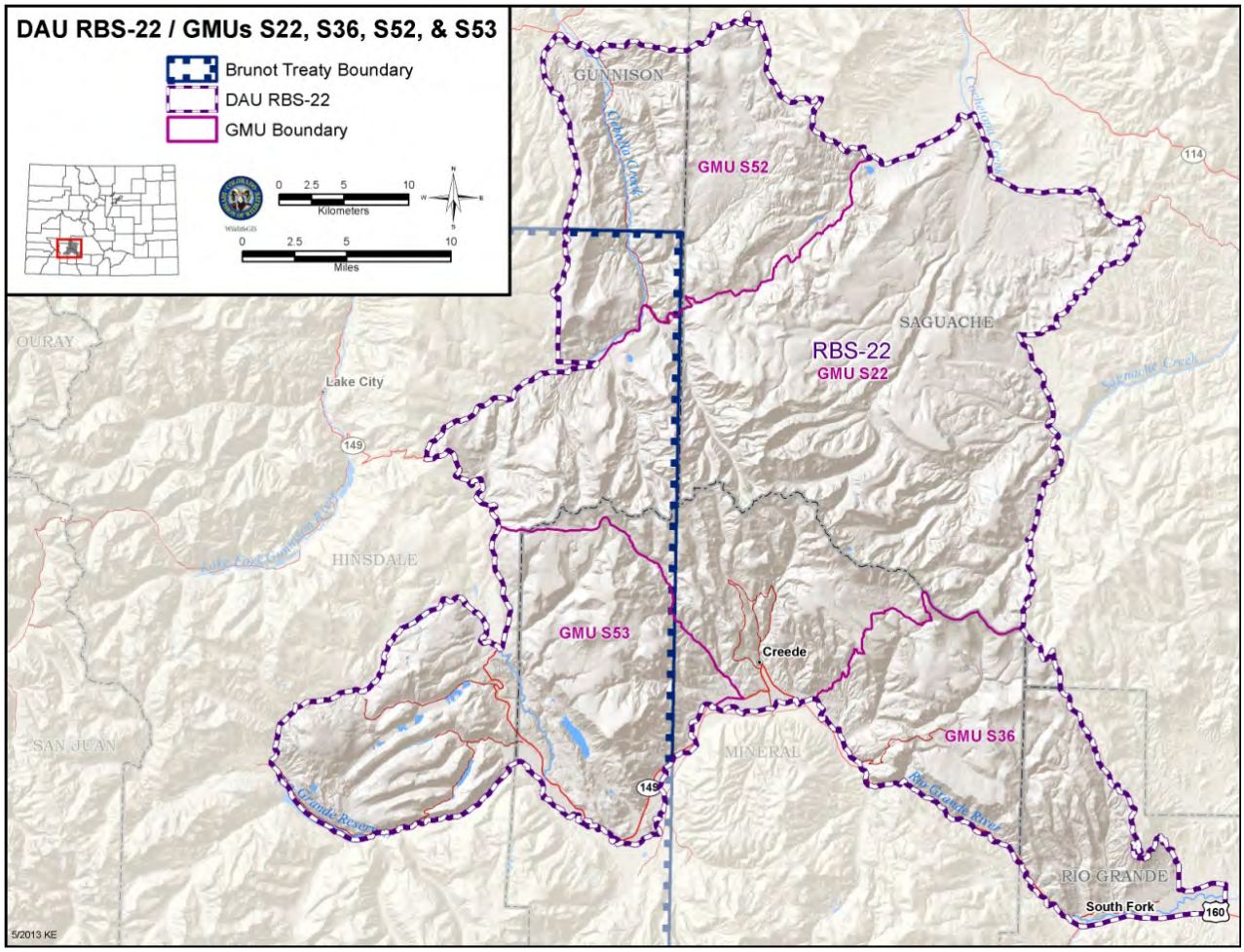


Figure 10. RBS-22 with Brunot Area boundary shown.

Management Issues and Strategies

Herd Interactions

Because of the ruggedness of this DAU, it is difficult to observe sheep on a regular basis. Outside of aerial surveys, managers must make considerable efforts to access bighorns in the unit, and even then, may observe only a small sub-sample of animals during any given day. This is particularly true during the snow-free months when sheep are scattered across summer ranges. Some groups become highly visible during the winter months, particularly in S-36 and S-52; however, winter observations paint an incomplete picture of overall range and habitat use throughout the year. As funding becomes available, additional work needs to be done to develop a more robust understanding of habitat use and timing of use across the DAU. Integrating VHF or satellite/GPS collars into herd monitoring would be highly beneficial for wildlife and land managers. Lower-cost alternatives such as ear-tagging, or otherwise marking sheep also may prove useful for future monitoring.

Official documentation of interaction(s) between S-22, S-36, S-52, & S-53 sheep has not occurred in recent years, but historic records and observations would suggest that interactions are likely occurring to some degree (Bear and Jones 1973, Bear 1979, Beecham *et al.* 2007). Because there is suitable, connected habitat between all four GMU's in this DAU, there is a high potential for movement and interactions between sub-herds. Logically, this potential increases if and when sub-herds increase and the probability of range expansion grows. This is a key consideration for wild sheep management, and it is crucial to understand that what happens in one sub-herd is likely to affect the others. Furthermore, it is important to reiterate that RBS-22 is surrounded by other bighorn sheep units, including S15, S16, S-33, & S-55. The potential for immigration and emigration of wild sheep among these herds will

increase as populations grow. Unfortunately, there is no simple method for monitoring those movements. Managers must use their best professional judgment when making land use decisions that could affect bighorn across this region.

Disease & Domestic Sheep

Bighorn sheep are unique among Colorado's big game species with respect to the influence that infectious disease has on population performance and species abundance. The susceptibility of bighorn sheep to pathogens originally introduced by domestic livestock is regarded as the primary factor limiting bighorn sheep populations in Colorado. Respiratory disease is by far the most important health problem in contemporary bighorn populations. In addition to initial all-age die-offs, pneumonia epidemics in bighorn sheep can lead to long-term reductions in lamb survival and recruitment resulting in stagnant or declining populations over many years (George *et al*. 2009). Interaction between bighorn sheep and domestic sheep is a significant management issue for bighorn populations in Colorado and elsewhere, and is comprehensively discussed in scientific literature (WAFWA 2012, Wehausen *et al*. 2011, Lawrence *et al.* 2010, George *et al*. 2009, Schommer and Woolever 2008, Beecham *et al*. 2007). The primary concern is transmission of novel respiratory pathogens from domestic sheep to bighorns and the concomitant deleterious acute and long-term effects on bighorn populations (George *et al*. 2009). Native North American wild sheep species are quite susceptible to pasteurellosis, the generic term for disease (often respiratory) caused by bacteria in the family *Pasteurellaceae* (Miller 2001). Some strains of these bacteria carried by domestic sheep (and probably domestic goats, and perhaps cattle) are particularly pathogenic in bighorns (reviewed by Miller 2001, US Department of Agriculture [USDA] 2006, George *et al*. 2008a). Recent study has also examined the role that *Mycoplasma* bacteria, particulary *M. ovipneumoniae* plays in fatal pneumonia of bighorn sheep. Some of this research concludes that *M. ovipneumoniae* may not in of itself result in fatal pneumonia in bighorn sheep; however, it may predispose them to respiratory infection (Dassanayake *et al*. 2010). CPW recognizes that not all disease outbreaks and reduced recruitment in bighorn sheep can be attributed to contact with domestic sheep.

Population declines documented historically in RBS-22 have been attributed to respiratory disease. In 1989-1990, the S-52 sub-herd suffered an all age-class die-off that nearly extirpated the population. Though poorly documented, it was believed that this die-off may have extended into the S-22 population as well. In a memo dated April 23, 1990, former wildlife biologist Don Masden summarized a helicopter survey for bighorn in S-52 & S-22. Managers were aware that a die-off was occurring, and Masden attempted to evaluate the extent of mortality. In the memo he stated "This brings the total of known dead animals in the area (*S-52*) to at least 8 rams and one ewe." He went on to state "At this time, it is hard to say whether or not any die-off of rams has occurred in unit S-22. However, because of the movement of sheep between S-22 and 52, and particularly of rams, I would say that it is highly possible that some die-off has also occurred in at least the northern part of S-22." Apparently a hunting season was slated in S-52 for the fall of 1990; however, Masden recommended that the season be curtailed based on the extent of the die-off. Leslie Spicer's report (1999) also referenced this die-off, and speculated on cause: "During the summer of 1989 a domestic sheep owner was allowed a one day permit to move his herd through a portion of the Rock Creek herd's home range. The following winter the Rock Creek herd suffered a die-off. It is possible that there was contact between these domestic sheep and the bighorns causing the Rock Creek die-off. However, there is no documentation to support direct contact between the domestic sheep and the bighorn sheep." The S-52 population never recovered following this die-off, and despite transplant efforts in 2002, the herd still appears plagued by disease issues and is declining.

An epizootic occurred in S-36 four years after the S-52 occurrence. In 1993, substantial bighorn mortality was observed in S-36 due to *Pasteurella hemolytica* induced pneumonia. During this initial die-off, wildlife managers documented the deaths of 24 rams, 22 ewes, and 10 lambs. Division of Wildlife managers later discovered that three months before the outbreak, bighorn rams and domestic sheep were seen intermingling by a herder on Pool Table Mountain. A second, all-age class mortality event occurred in the early 2000's, which was followed by depressed lamb recruitment. Several distinct mortality events are not uncommon during the most severe respiratory disease epizootics (George *et al.* 2009). Presently S-36 appears to be slowly recovering from the disease onset nearly 20 years ago (Ghormley 2010), although lamb:ewe ratios remain below optimal levels for population growth. Occasional sightings of coughing bighorns are still reported in the unit (Gomez 2010). Coughing alone is not a conclusive indicator of respiratory disease, although persistent coughing suggests that respiratory pathogens persist within the herd. Continued monitoring and additional biological sampling are needed to more thoroughly evaluate S-36 herd health.

Domestic sheep grazing has been a historical land use in RBS-22 that continues today. There are several active sheep allotments within this DAU that are grazed on an annual basis. Active allotments occur on both the Rio Grande and Gunnison Ranger Districts, and on BLM lands within the DAU. Noteworthy allotments, in terms of their active status & proximity and/or overlap with wild sheep include the Miner's, Snow Mesa, and Table allotments. The Cold Springs allotment, on the Gunnison Ranger District, is also worthy of mention based on its proximity to occupied bighorn habitat. Multiple vacant allotments also occur within the DAU (Appendix A). The potential for contact between wild and domestic sheep exists within this DAU; therefore, on-going and future management actions should focus on maintaining effective separation between the species (WAFWA 2012). Pioneering and foraying bighorn sheep, particularly rams (George *et al.* 2009), are most likely to co-mingle with domestic livestock. Conversely, stray domestic sheep are also likely to associate with wild sheep groups if they are separated from their primary band. Sheep are highly gregarious by nature and are likely to interact with other sheep, wild or domestic, as they encounter one another.

In 2007, Rocky Mountain bighorn sheep were designated a "Sensitive Species" by the US Forest Service. A sensitive species is defined as (www.fs.fed.us/biology/resources/pubs/tes/ss_sum_by_region_31Oct2005_fs.pdf):

Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by:

- *Significant current or predicted downward trends in population numbers or density*
- *Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution*

- *Objectives for sensitive species include:*
  - *Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions*
  - *Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands*

The decision to designate bighorn as sensitive is commendable and hopefully will elevate their status during future planning. Subsequent to the sensitive species designation, comprehensive planning documents such as the *Final Supplement to the Forest Plan Biological Evaluation and Conservation Assessment for Rocky Mountain Bighorn Sheep on the Rio Grande National Forest* (Ghormley 2010) were drafted to help determine if the current Forest Plan was compatible with bighorn sheep conservation objectives. This particular Supplement states that "…maintaining and improving the health of bighorn populations depends on preventing respiratory disease epidemics and that preventing potential contact with domestic sheep and goats is particularly important to the success of these efforts." With the ultimate goal of maintaining effective separation between wild and domestic sheep, the Supplement provides a set of conservation recommendations that should be "incorporated into rangeland management planning at the Forest and project-level to further the commitment to the long-term persistence and viability of Rocky Mountain bighorn sheep across the Rio Grande National Forest and the San Luis Valley Public Lands Center." Furthermore, the Supplement states, "It is recommended that this guidance be communicated as standard operating procedures and conservation recommendations from the Forest Supervisor/Center Manager to all ranger districts and field offices with a goal of providing as much consistency as possible between the Forest Service and BLM when addressing the issues involved with maintaining effective separation between domestic and bighorn sheep" (Ghormley 2010). As a result of this analysis, consistent, collaborative management direction is now in place across the Rio Grande National Forest and San Luis Valley Public Lands Center. "The issue of potential contact and disease transmission between domestic and bighorn sheep is currently being addressed through risk analysis and adaptive management procedures being implemented at the project level" (Ghormley 2010). This process and outcomes provides an excellent model for future bighorn sheep conservation efforts where domestic sheep grazing allotments and wild sheep ranges overlap.

Rocky Mountain bighorn sheep currently receive no special status on lands managed by the BLM, however managers are not without guidance relative to bighorn sheep and domestic sheep grazing. An existing USDI Bureau of Land Management Instruction Memorandum 98-140 (1998) provides specific guidelines for managing domestic sheep and goats in wild sheep habitat. The desire for "progressive native wild sheep management" is referenced in this IM, which is admirable. In the memo, guideline number four mentions the development of "buffer strips" between wild and domestic sheep that could range up to 13.5 kilometers (9 miles). This guideline is specific to "renewing new domestic sheep or goat grazing permit applications or proposed conversions of cattle permits to sheep or goat permits in areas with established native wild sheep populations." This language is quite different than USDI Bureau of Land Management Instruction Memorandum 92-264 (1992) that stated, "Buffer strips surrounding bighorn sheep habitat should be encouraged, except where topographic features or other barriers prevent physical contact between bighorn and domestic sheep. Buffer strips could range up to 13.5 kilometers (9 miles), depending upon local conditions and management options." The reason for the revision in the 1998 IM is unclear, however the concept of buffer zones may be further evaluated in DAU's like RBS-22, where domestic/wild sheep ranges overlap. Buffers up to nine miles have been reported in the literature; however, buffers of that magnitude have rarely been instituted by federal agencies. CPW respectfully suggests that Rocky Mountain bighorn sheep receive thorough consideration during land use planning, as well as receive comprehensive inclusion in future Forest and Resource Management Plan amendments and revisions, and grazing permit renewals.

The following Management Goal is established in Colorado's statewide management plan (George *et al*. 2009):

- ***CPW will strive to prevent introductions of infectious or parasitic diseases from domestic livestock that could adversely impact bighorn population performance and viability. The CPW will work cooperatively with the USFS and BLM and private landowners to minimize the potential for bighorn sheep to contact domestic livestock whenever practicable***

To this end, Colorado Parks and Wildlife advocates strict adherence to recommendations like those presented in the Western Association of Fish and Wildlife Agencies (WAFWA), *Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat* (2012) and U.S. Animal Health Association's, *Recommendations on best management practices for domestic sheep grazing on public land ranges shared with bighorn sheep* (2009). These types of recommendations and Best Management Practices (BMP's) are only effective if consistently implemented and rigorously enforced. WAFWA managers emphasize the goal of "***effective separation***," which they define as "spatial or temporal separation between wild sheep and domestic sheep or goats to minimize the potential for association and the probability of transmission of diseases between species." Furthermore, the WAFWA guidelines go on to state that "effective separation should be a primary management goal of state, provincial, territorial and federal agencies responsible for the conservation of wild sheep, based on evidence that domestic sheep or goats can transfer pathogens to wild sheep." Literature (reviewed by Wehausen *et al*. 2011) and experimental evidence (Lawrence *et al*. 2010) support the goal that domestic sheep or goats should not concurrently occupy areas where conservation of wild sheep is a clearly stated management goal. Managing for effective separation is sometimes challenging, as it is difficult to account for every contingency that may arise "on the mountain" when developing annual operating plans, or when working through permit renewals. In the early fall of 2011, for example, CPW managers observed domestic sheep bands and associated salt grounds along the Continental Divide between the heads of Mineral and Oso Creeks. Subsequent field reconnaissance and discussion with the herder indicated that bighorns had been using domestic sheep salt grounds and that interaction with domestics had occurred. Based on the high fidelity of bighorns to this area, it was likely not the first time that contact had occurred between wild and domestic sheep in the area. The following year, the permittees modified their grazing regime based on collaboration with the USFS and CPW in an effort to create a greater degree of separation with bighorn sheep. This situation highlights the importance of monitoring, communication, and adaptive management inherent to bighorn sheep conservation.

Domestic sheep grazing is a significant management issue in RBS-22. In 2009, the former Colorado Division of Wildlife (CDOW) was a signatory to a Memorandum of Understanding (MOU) for Management of Domestic Sheep and Bighorn Sheep (Appendix F). The MOU was crafted over an 18 month period by the US Forest Service, Bureau of Land Management, CDOW, Colorado Department of Agriculture, and the Colorado Woolgrowers Association. The purpose of the MOU "is to provide general guidance for cooperation in reducing contact between domestic and bighorn sheep in order to minimize potential interspecies disease transmission and to ensure healthy bighorn sheep populations while sustaining an economically viable domestic sheep industry in Colorado." CPW remains interested

in continued collaboration with area sheep producers and federal agency staff that works towards the mutually beneficial purpose described in the MOU.

CPW's statewide management plan includes additional goals and strategies related to bighorn sheep-domestic livestock disease interactions (George *et al.* 2009):

- ***GOAL: Prevent introductions of infectious or parasitic diseases from domestic livestock that could adversely impact bighorn population performance and viability***

    - Strategy: Conduct research and surveillance to identify key pathogens of domestic sheep and other livestock species that can be managed to prevent epidemics

    - Strategy: Develop, evaluate, and use appropriate tools, management practices, and policies (e.g., species and herd segregation, education, vaccines, therapeutics, habitat management, harvest and dispersal) to prevent pathogen introductions and/or protect bighorn from select pathogens that may be introduced via interactions with domestic ruminants

Specific future management actions in RBS-22 may include:

- ***At their request, actively assist USFS and BLM managers with Forest Plan revisions and Resource Management Plans; ensure that wild sheep are comprehensively considered***

- ***At their request, continue to actively assist USFS and BLM managers with Grazing Permit Renewals and Risk Assessments in areas where bighorn sheep range overlaps or is adjacent to active domestic sheep grazing allotments***

    - Risk assessment processes should rely on quantitative and qualitative information. The potential for biased assessments increases when comprehensive data is lacking. Stakeholders should recognize that not everything is currently known about each wild sheep population, and agree to make logical inferences when necessary. Risk assessments should be made synchronously between agencies and between Field and District Offices to ensure that comprehensive analysis takes place. Livestock producers are integral to these processes

    - Risk assessments should be revisited frequently to ensure management is adapted if and when necessary

    - The NEPA process for the ***Snow Mesa/Table/Miners Creek*** domestic sheep allotments are slated to begin in 2013-14. CPW looks forward to collaboration with the USFS & permittees to ensure that effective separation between domestic and wild sheep is established and maintained in perpetuity. These allotments and associated trailing routes represent a nexus between the bighorn sheep sub-herds in this DAU and play a key role in future management (Appendix E)

- ***Obtain biological samples from wild sheep within this DAU to establish baseline disease profiles***

- ***Investigate the potential for radio collar monitoring (GPS preferable) of wild sheep for evaluation of spatial and temporal overlap with domestic sheep allotments in the DAU; seek funding sources to support those efforts***

- ***Jointly develop more comprehensive "Response Plans" with federal agencies for promptly addressing any instances of wild sheep / domestic sheep contact. In 2011, the BLM state office in Idaho sent direction to all field offices for development of "Separation Response Plans" (USDI Bureau of Land Management Instruction Memorandum ID-2011-004, 2011) that are intended to "establish the process, protocols, and timelines to quickly address short-term or emergency management actions in response to imminent or likely contact between bighorn sheep, domestic sheep and goats." Several sample response plans/protocols are also included in the WAFWA (2012) recommendations. Perhaps this can be done***

concurrently with future permit renewal processes. Response plans should include permitee incentives for vigilance and timely reporting of bighorn/domestic interactions, and/or bighorns in proximity to domestic sheep bands so that CPW can respond and take appropriate actions to prevent contact, or to prevent bighorns from interacting with other wild sheep following contact with domestics

- ***The use of domestic sheep or goats as pack animals by hunters, anglers, and other recreational or commercial users that travel in identified wild sheep habitat should be prohibited. Where legislation or regulations are not already in place, an effective outreach and public education program should be implemented, to inform potential users of the risks associated with that activity and recommend that individuals not use domestic sheep or goats as pack animals in occupied wild sheep***

- ***In order to maintain effective separation between wild sheep and domestic animals (sheep, goats, cattle, llamas, etc.), 4-H or other "hobby" livestock might warrant future consideration in land-use planning by individual Counties. At a County's discretion, land use regulations could be enacted, or educational materials made available for home owners or potential home owners that live or plan on moving into bighorn sheep habitat. For example, a County could encourage double fencing as an exclusionary measure to help minimize the potential for contact between wild sheep and domestic livestock near a residence. CPW would certainly be willing to assist in the development of any future land use regulations pertinent to bighorn sheep***

Furthermore,

- ***CPW recognizes that the VACANT domestic sheep allotments in RBS-22 may provide some level of flexibility to land management agencies for adjusting and adapting grazing management across the landscape***

    - In some instances, VACANT allotments may provide land managers and permittees with grazing alternatives that reduce the potential risk of contact between wild and domestic sheep in currently active allotments. We recognize that VACANT allotments may also contribute to the overall management of vegetation within a permit area. However, CPW *does not* support restocking domestic sheep in VACANT allotments if it will increase the potential for contact with bighorn

    - Land management agencies should consider closing VACANT allotments through standard NEPA processes, when it is collaboratively decided, in accordance with the existing MOU, that future restocking of these allotments would not be compatible with bighorn sheep conservation

- ***No proposals will be developed for translocating bighorn sheep into RBS-22 where active domestic sheep grazing is occurring***

- ***CPW will promptly respond to reports of bighorn sheep mingling with domestic sheep. Wild sheep that have made contact with domestic sheep will be destroyed in compliance with CPW policies and administrative directives***

Recreation

Burgeoning recreational use in this unit is of concern. Recreation is a driving economic force in local communities and occurs throughout the year. These communities continue to grow and demand for recreational opportunities and natural resources is also growing. Quality wildlife habitat includes food, water, shelter, space, *and* connectivity. Large blocks of contiguous habitat are most likely to promote the long-term viability of a species. Habitat becomes fragmented as land use changes break the landscape into smaller more distinct "patches." These patches may not provide fundamental habitat requirements resulting in a diminished carrying capacity for the species across the landscape. Wildlife living within fragmented habitat is more vulnerable to stochastic population declines stemming from disease, increased rates of predation, or habitat loss or modifications. Fragmentation often leads to diminished immigration and emigration rates that are vital for promoting genetic diversity, range expansion, and recolonization in the event of localized extirpation. Most wildlife managers agree, with support from the scientific literature that recreation has the potential to impact wildlife distribution and abundance (Moser and Pillmore 1956, Joslin and

Youmans 1999, Valdez and Krausman 1999, Taylor and Knight 2003, Keller and Bender 2007, Naylor *et al*. 2008, Goldstein *et al.* 2010). The "zone of influence" of recreational activities for wildlife may extend for some distance beyond the actual activity and will vary depending on habitat composition, topography, and a species' tolerance of human disturbance. Discussions relative to the impacts of recreation on wildlife have been on-going for decades. In a bighorn sheep study report from the 1940's, focused on the neighboring "Pole Mountain" bighorn herd, the author writes: "*Now that the district is becoming built up with dude ranches and tourists are attracted in larger numbers, some tourists are going up on the mountain to see the sheep. There is no thought of harm to the sheep in this hunting and tourist activity, but it does tend to scatter the sheep to ranges which are less suitable for them and where they are not so well protected"* (Wallace 1940).

Bighorn sheep inhabit open country and are particularly vulnerable to disturbance from recreation. For example, sheep will often flee at the sight of humans on a distant ridge, even when they are a considerable distance away (Holl and Bleich 1983). Ewes with young lambs are particularly flighty and every effort should be made to document and protect lambing and nursery areas from excessive disturbance. Animal density has been discussed in a previous section; human activity, including recreation, may perpetuate high densities of bighorn in areas where they seek refuge from disturbance. Several specific recreational activities and geographic areas are of concern to wildlife managers in this unit. San Luis Peak is one example. San Luis is 14,014 feet in elevation, drawing the attention of recreationists interesting in climbing peaks over 14,000 feet. Hikers access the peak from several areas, but the Stewart Creek trail likely receives the most concentrated use. Old time residents of the Gunnison Valley have sometimes described San Luis Peak as an "ant-hill," when explaining the level of bighorn sheep use that used to occur there (ie. many bighorns could be seen on San Luis Peak on any given day). Bighorn still may be found on San Luis Peak, but it is typically few animals, low on the west side where hiker pressure is less. Other nearby areas such as Organ Mountain, and Stewart Creek proper are historically important bighorn habitats; Organ Mountain continues to be one of the most noteworthy lambing and nursery areas in S-22. Some of the more popular and accessible "Fourteeners" in Colorado experience hundreds of hikers per day. Land managers should recognize and evaluate the impacts to wildlife from that type of intensive use. Growing use of the Colorado Trail through the La Garita Mountains is also of concern to wildlife managers. Anecdotal reports over time suggest that big game use in general is declining in the headwaters of drainages throughout the La Garitas. Some folks attribute these declines to increasing levels of use of the Colorado Trail. Big game animals, including bighorn sheep, rely on access to the highest quality forage throughout the growing season. During the spring and summer, these animals follow the "green-line" to higher elevations in step with plant phenology in order to capitalize on the most highly digestible and nutritious forage possible. Subalpine and alpine vegetation is integral for building winter fat reserves for migratory big game. Limiting access to these habitats, through displacement by human recreation or other land uses, will be detrimental to big game populations over time.

Of course winter range is also crucial for bighorn sheep across Colorado. Winter wildlife needs should be carefully considered during all land-use and recreational planning. Disturbance from recreation is typically unnecessary and additive during the winter months when bighorn are already on a downward starvation curve. Some bighorn populations have no choice but to temporarily habituate to human activities during the winter; however, activities such as snowmobiling, dog walking (*ie. dogs off-leash harassing wildlife*), and heli-skiing all have significant potential to disturb and displace wintering sheep (Graham 1980, MacArthur *et al*. 1982, Etchberger *et al*. 1989). An incidence of snowmobilers encountering wintering rams in the La Garita high country was reported in recent years. Bighorns wintering at high elevations are typically confined to strips of windblown ridgeline where forage is exposed. They will sometimes spend an entire winter in areas that are only a handful of acres in size. Disturbing sheep in these areas results in unnecessary energy expenditure and should be avoided and/or regulated.

At lower elevations, along roads and highways, bighorns are vulnerable to vehicles collisions due to increasing traffic. Summer and fall recreational traffic may be substantial in this DAU. Annually, several bighorn mortalities occur in S-36 and S-53 as a result of vehicle collisions. Bighorns often are attracted to roads because of the concentrated salt in runoff or from de-icer that accumulates along road shoulders. These animals will also cross roads to access water resources, such as the Rio Grande River, and bighorns are commonly observed near Highway 149 in both S-36 and S-53. Signs have been posted and diversionary methods have been implemented with varying amounts of success. Keeping bighorn sheep away from roadways is difficult, however, risk of vehicle collisions may be minimized through public education and collaboration with the Colorado Department of Transportation and local counties. The cumulative effect of road kill on this population is likely insignificant based on the total number

of bighorns in the DAU (George *et al.* 2009). Whenever possible, however, additive mortality factors should be monitored and mitigated for, including road-kill "hot-spots."

Recreation has the potential to limit the overall range of bighorn and discourage use of suitable habitats that are dominated by human activities. CPW biologists look forward to working with federal agencies, Non-Governmental Organization's (NGO's), and local jurisdictions in the future to ensure that recreational activities are not detrimental to bighorn sheep in RBS-22.

Mountain Goat / Bighorn Interactions

Mountain goats were first introduced into Colorado in 1948 with the intent of establishing populations that would support controlled hunting (Hibbs 1966). However, no specific goat transplants have occurred in RBS-22. Mountain goats provide unique wildlife viewing and hunting opportunities, and have proven to be extremely effective at pioneering into new areas. Issues related to sympatric bighorn and mountain goat populations are comprehensively discussed in the Colorado Bighorn Sheep Management Plan (George *et al.* 2009). Of chief management concern is the potential for resource competition within a given habitat once mountain goat populations become established, thereby reducing bighorn population vigor. The statewide plan is clear on mountain goat management in bighorn habitat: "The DOW will strive to manage mountain goat populations and distribution via the DAU planning process to limit their expansion into Tier 1 and Tier 2 bighorn sheep DAU's." Furthermore, CPW Commission Regulation #230 grants the director of Parks and Wildlife the authority to issue special licenses to hunters in order to harvest mountain goats found outside of an established mountain goat unit. Using this tool, managers may remove pioneering mountain goats preemptively, and before any significant population establishment has occurred.

Managers do not feel that mountain goats are a significant issue in RBS-22 at this time. However, goats have been observed in the DAU for many years at very low density. Mostly single goats have been observed that have appeared to be billies, but on one occasion three unclassified animals were observed in a group. Mountain goats have been observed in various places including San Luis Peak, Baldy Alto, Canyon Diablo, Stewart Peak, Machin Lake, and Nutras Creek. The most recent observation of a mountain goat in the DAU was during a bighorn survey in 2006 on the northwest side of San Luis Peak.

Predation

Most predators common to the southern Rocky Mountains are present across RBS-22 bighorn ranges, including mountain lions, golden eagles, red foxes, coyotes, and bobcats. The effect(s) of predation are largely unknown, but appear to be non-significant at this time. A number of transplanted animals in S-52 were killed by mountain lions following their introduction, which is not surprising when animals are moved into a novel environment where healthy predator populations occur. Several mountain lion kills in S-36 and S-53 have been reported to DWM Brent Woodward in recent years. These kills have tended to be at lower elevations where lions may exploit thicker vegetative cover and broken terrain. Several of these kills have been old, decrepit rams with extremely worn teeth. Rams will commonly sacrifice escape terrain and visibility for accessible, higher quality forage. Mountain lions are opportunistic hunters and will take advantage of any prey species that they encounter. Lions in this DAU have a wide variety of prey species available to them including mule deer, elk, moose, and many species of small mammals and birds, reducing the potential for specialization on wild sheep. Impacts, if any, from predation will continue to be assessed and managed in accordance with the statewide management plan, which states: "CPW will strive to prevent predation from severely impacting or extirpating introduced or established bighorn populations, but also will allow natural predation on unhealthy individuals to aid bighorn population in recovering from epidemics" (George *et al.* 2009). Disease and habitat capability are much more likely to be influencing population dynamics within this bighorn population.

Illegal Take

There is no recent evidence that illegal take of bighorn sheep in RBS-22 is a major issue. Some of these sheep are highly visible and accessible during certain times of year, and the potential for poaching exists. Illegal take of any bighorn sheep in Colorado is a serious crime with substantial penalties, and any instances of illegal take of bighorn will be investigated and prosecuted within the fullest extent of the law. Witnesses to poaching or suspicious activity are encouraged to contact Operation Game Thief or their local CPW officer. The general public can help protect this bighorn sheep population by reporting suspect activities.

Public Involvement

This planning process spanned nearly eight months, from April through November of 2013. In April, CPW managers held a preliminary scoping meeting with USFS personnel in Creede to identify and discuss significant management issues in the DAU. A draft management plan with a suite of potential alternatives was crafted over the next several months which was made available to the public on June 10th, 2013. At that time the draft DAU plan was posted on CPW's website, with notification occurring on-line and in local media. Synchronously, an on-line survey was made available to anyone interested in bighorn sheep management in the DAU. Various constituent groups, including local Boards of County Commissioners, outfitters, federal agencies, and woolgrowers were sent individualized letters explaining the process and soliciting input on the draft plan. In addition, nearly 300 postcards were sent to first-choice applicants for hunting licenses in S-22 & S-53 informing them of the process and soliciting their input. Beginning on June 10th, an approximate 30-day public comment period was provided that closed on July 9th, 2013. Several requests were made to extend the comment period, which were granted. CPW had planned to hold a public meeting on June 27th in Creede, however that meeting was cancelled as a result of the West Fork Complex wildfire, and the more pressing concerns of local communities. During the 30-day public comment period, no requests were received for face-to-face meetings with CPW staff.

At the close of the 30-day comment period, CPW had received two written comment letters; one from the Colorado Woolgrowers Association and one from the Rocky Mountain Bighorn Society (Appendix G). In addition to the written comments, 68 individuals participated in the on-line survey. Of the 68 respondents, 93% were Colorado residents, with 10% residing in RBS-22. With regard to bighorn sheep hunting, 45% responded that they had hunted bighorn sheep, while 75% had applied for a sheep hunting licenses in Colorado. 88% of respondents indicated that wild bighorn sheep were "Very Important" to them. No one selected the alternative where bighorn sheep were "Unimportant." When asked what the "main factor limiting the number of bighorn sheep in Colorado" was, 65% of survey respondents indicated that disease was the main factor. Furthermore, 84% of respondents "Strongly Agreed" or "Somewhat Agreed" that bighorn sheep contributed substantially to local economies in Gunnison, Hinsdale, Mineral, Saguache, and Rio Grande Counties. One of the key objectives of the survey was to gauge public desire relative to population management of bighorn sheep in RBS-22. The majority, 55%, of respondents indicated that they preferred to see CPW manage RBS-22 for an increasing population and distribution, while 42% favored a stable population and distribution. Only 2% of respondents preferred to see CPW manage for a decreasing population and distribution. All of the survey questions and associated responses are available in Appendix H. Respondents written comments are also included at the end of Appendix H.

Managers thoroughly and thoughtfully reviewed all written comments and survey information that was received during the June-July comment period. Subsequently, a final draft DAU plan was developed that was posted on the Colorado Parks and Wildlife website for reference. This final draft plan included a set of preferred alternatives that were introduced to the PWC at their September meeting in Montrose. During that meeting, the PWC had the opportunity to ask questions and provide comments relative to the plan. They also provided an opportunity for public comment following the DAU plan presentation. The final RBS-22 plan was approved by the PWC on November 15, 2013 at their meeting in Lamar.

Ample opportunity for public involvement and discussion occurred during this planning process, which continued until the plan was approved by the Colorado Parks and Wildlife Commission in November of 2013. Two primary issues were discussed during the process: wild and domestic sheep issues and future management implications, and bighorn sheep hunting opportunity. CPW recognizes that on-going collaboration with various stakeholders is paramount, and respects the diverse viewpoints represented during this process. All of the comments received were incorporated into deciding the final management objectives. We selected management objectives that aligned with views expressed by the majority of stakeholders. As the primary wildlife management agency in the state, CPW is tasked with promoting wild sheep conservation across Colorado and in RBS-22. Bighorn sheep conservation is the emphasis of this management plan.

MANAGEMENT ALTERNATIVES

Bighorn sheep management in Colorado is complex and is, in our opinion, significantly different from other ungulate management. This document attempts to describe some of that complexity while providing specific recommendations for supporting and enhancing management in RBS-22. A traditional DAU plan includes management alternatives that revolve around a desired post-hunt male:female ratio and population objective. Managers feel that those types of objectives are not appropriate for RBS-22, based partly on the lack of unit specific data accumulated for all of the GMU's, and historic data sets that may be highly biased; but more importantly, because of the stochastic influence of disease on population performance. RBS-22 objective alternatives were somewhat non-traditional; however, it was critical that they be quantifiable and realistic for future monitoring. Bighorn sheep management is important to a wide array of constituents and involving the public is integral to the DAU planning process. Therefore, the following alternatives were presented that focused on harvest management, and population trend.

Harvest management

Ram and ewe hunting will continue in RBS-22 game management units as long as population performance allows. Each GMU will be evaluated individually in terms of hunting potential and sustainability, as well as how harvest management fits into the overall DAU objectives. A fundamental question for aspiring hunters is how much hunting *opportunity* is desired versus the desire for a high *quality* hunting experience and animal (most applicable to ram hunters) harvested. Maximizing the level of sheep hunting opportunity in this DAU could potentially lead to increased hunter crowding which could contribute to a concurrent decrease in the quality of an individual hunter's experience, and potentially a decrease in the quality of rams harvested. Ram quality would decline based on reduced age and size of animals harvested as hunter selectivity removed older aged rams over time. For the past ten years, the average age of rams harvested in the DAU was eight. Terms like "crowding," "experience," and "quality" are highly subjective; however they are factors that must be considered when discussing bighorn management alternatives. The number of years a hunter waits to draw a license and the fact that sheep distribution is sometimes limited within a GMU make these factors important considerations when selecting a management objective. It should also be acknowledged that managers have the flexibility to address some of these issues through season dates, sub-unit designations, and hunter education/outreach efforts. Ewe hunting is an important management tool and where available is providing an outstanding hunting opportunity in this DAU. Ewe hunting will occur as long as population performance allows and will be regulated within the sideboards outlined in the statewide management plan.

During planning, CPW presented two sets of alternatives related to harvest management; both focused on ram hunting:

Ram Age at Harvest **Average age of harvested rams is measured using a three-year average*:

1) **Maintain an average age of 5-6 years for rams harvested across the DAU**. In the short-term, this alternative may potentially increase hunting opportunity; however, it would likely increase crowding, diminish the experience, and reduce the average size of rams harvested

2) **Maintain an average age of 7-8 years for rams harvested across the DAU.** This alternative would essentially maintain the current harvest regime in the DAU for the foreseeable future. Moderate ram license increases may be possible for some of the GMU's in the unit, which would be based on individual sub-herd vital rates. This alternative should continue to provide a quality experience, moderate levels of crowding, and diverse age-classes of rams

3) **Maintain an average age of 9-10 years for rams harvested across the DAU.** This alternative might necessitate a decrease in the number of licenses available in the DAU. This alternative would provide the highest quality experience and the least crowded conditions in the field

It is also important to managers that sheep hunter success rates are high. It must be pointed out, however, that with a relatively small number of licenses allocated on an annual basis, average hunter success rate is prone to change substantially based on one or more unsuccessful hunters. Consistently low success rates are of concern, but are not necessarily the result of animal availability; rather, they may be the result of increased animal wariness concurrent with increased hunting pressure, or the realities of how challenging these hunts may be. At this time it is unknown

how modifying license allocation will impact success rates. The average success rate in RBS-22 since 1999 was 76%. Annual success rate will need to be evaluated synchronously with the age of harvested rams.

Ram Hunter Success Rate **Average hunter success rate is measured using a three-year average*:

1) **Maintain an average hunter success rate of 50-65%.** This alternative would likely provide maximum flexibility for license allocation and maximizes the potential for future license increases

2) **Maintain an average hunter success rate of 65-80%.** This alternative would essentially maintain the status quo. Some increases to license allocation may be possible. This success rate range is above the three-year statewide average of 62%

3) **Maintain an average hunter success rate greater than 80%.** This alternative would not inhibit the ability to make minor modifications to license numbers, but provides the least flexibility for adjusting allocation. Achieving this objective might entail a reduction in license allocation

Population Trend and Distribution

The current population estimate in RBS-22 is 250 animals. Over the last five years, the population trend for the DAU has generally been stable to decreasing. Managers recognize that the S-22 & 52 sub-herds have not been performing as well as the S-36 & 53 sub-herds, and will continue to evaluate not only the DAU status, but also the individual status of each sub-herd. There is clearly an abundance of suitable habitat in this DAU, both summer and winter, and documentation of a much larger bighorn population historically. There were several management alternatives for this herd, however the effectiveness of any future management is constrained by disease issues and how those issues impact annual lamb recruitment and/or adult survival. Recent observed lamb:ewe ratios, particularly in northern RBS-22, suggest that disease has been negatively impacting lamb survival for several years. There is no "silver bullet" to address these issues; however, managers will use every tool at their disposal to promote future bighorn conservation and population viability in this DAU. Several concepts/issues are discussed below relative to population management:

"Expected population": The expected population is not a population objective that is actively managed toward using female harvest; rather, it is the number of wild sheep that should be expected to reside within the DAU under different management regimes. It is based on aerial survey information, agency and public reports, and hunter sightings. In the absence of more rigorous population estimates, all available information should corroborate an "expected population" of animals. Managers working towards an expected population recognize that post-hunt population estimates are mostly qualitative, and lack a measure of precision. They are subject to change on an annual basis depending on: 1) whether or not comprehensive surveys are conducted and 2) the number of animals that are actually classified during those surveys. Based on the best available information, the post-hunt 2012 population estimate in RBS-22 is approximately 250 animals.

Contact with domestic sheep: When considering population objectives, one must consider the issues relative to the active domestic sheep grazing allotments in this DAU. These allotments, particularly the Table/Miners/Snow Mesa complex, are quite relevant to local bighorn management based on their overlap with and proximity to occupied wild sheep habitat. Increasing this bighorn population will logically increase the risk of contact with domestic sheep; although there is evidence that contact is occurring or has occurred at the current population level of 250. In this DAU, the issue is not necessarily one of bighorn population size, it is related more to where these allotments are situated within native sheep habitat. While every contact between bighorn and domestics may not result in disease transmission, there is always the inherent and well documented risk of pathogenic respiratory disease transmission between the species through intermingling (Wehausen *et al.* 2011, Lawrence *et al.* 2010). One contact has the potential to affect the RBS-22 population for decades. Future NEPA analysis of these allotments will be useful for discussing and collaborating on these issues. Domestic sheep grazing in this DAU must be a consideration during all bighorn sheep management planning, with the ultimate goal of establishing effective separation between species.

In terms of population trend and distribution, the following alternatives were presented:

1) ***Manage for a stable population and stable distribution within the DAU***. This alternative will:

    - Assume an expected population in RBS-22 of between **225 and 275** animals

- Encourage managers to respond with targeted hunting licenses, non-lethal harassment, or managed culling if individual or small groups of bighorn expand their range into novel areas, particularly those areas where the risk of contact with domestic sheep is considered too high

- Assume that the risk of contact with domestic sheep is maintained at the current level

- Maintain at least the current level of hunting opportunity; future increases to license allocation would be possible depending on population performance

- Assume that current watchable wildlife opportunities will be maintained

2) ***Manage for an increasing population and increasing distribution within the DAU.*** This alternative will:

- Allow the RBS-22 population to increase and expand their range. Rate of population increase will be dependent on annual lamb recruitment and is generally outside of direct management control

- Assume an expected population of **> 275** animals. In the late 1980's and early 1990's when several of these sub-populations experienced catastrophic die-offs, the RBS-22 population was approaching 400 animals. Population density has been discussed in this plan, and is an important consideration in bighorn sheep management. The exact mechanism(s) leading to these die-offs are unknown, however managers are acutely aware of the role density plays in epizootics. There is little concern at this time relative to bighorn density in this DAU, and there is no specific reason(s) to believe that 400 animals is this DAU's carrying capacity. However, if or when this population significantly increases, managers will initiate more rigorous annual assessment that includes the following considerations:

    - If the population reaches or exceeds 350 animals, managers will allocate additional resources towards the population in terms of monitoring, agency collaboration, and harvest management

    - Habitat utilization and density will be carefully evaluated to determine whether densities may be exceeding a sustainable level

    - Proximity to domestic sheep and risk of contact with domestic sheep will continue to be evaluated regardless of population size

    - On-going harvest management will be comprehensively evaluated in terms of ram & ewe harvest rates, hunter distribution, GMU license allocation, Sub-unit designation within GMU's, and hunting season structure

    - ***The herd will not be capped at 350 animals; 350 is simply the tentative threshold at which management will be methodically re-evaluated***

- Assume that the risk of contact with domestic sheep will increase as the population increases; however, if individuals or small groups of bighorn are documented associating with domestic sheep or in areas where the risk of contact with domestic sheep is considered too high, in compliance with CPW policy, managers may respond with targeted hunting licenses, non-lethal harassment, or managed culling to ensure separation between species.

- Not require significant changes to current license allocation, but may accommodate future license increases if and when the population increases

- Assume that watchable wildlife opportunities will be increased

3) ***Manage for a decreasing population and decreasing distribution within the DAU***. This alternative will:

- Reduce the current population in RBS-22 through hunter harvest and/or trap/transplant

- Assume an expected population in RBS-22 of **< 225** animals
- Attempt to prevent and discourage range expansion of individual or small groups of dispersing bighorn through lethal or non-lethal alternatives, particularly in those areas where the risk of contact with domestic sheep is considered too high
- Assume that the risk of contact with domestic sheep will decrease as the population decreases
- Possibly require license increases depending on annual herd performance and growth rates; Temporarily would provide maximum hunting opportunity
- Assume that watchable wildlife opportunities will be decreased

Final RBS-22 Management Objectives

Based on the biological analysis and public involvement that occurred during this DAU planning process, managers selected the following objectives for future RBS-22 bighorn sheep management:

Maintain a 3-year average age of 7-8 for hunter harvested rams. This alternative will essentially maintain the current harvest regime in the DAU for the foreseeable future. Moderate ram license increases may be possible for some of the GMU's in the unit, which would be based on individual sub-herd vital rates. This alternative should continue to provide a quality experience, moderate levels of crowding, and diverse age-classes of rams

Maintain a 3-year average hunter success rate of 65-80%. This alternative will essentially maintain the status quo. Some increases to license allocation may be possible. This success rate range is above the three-year statewide average of 62%

Manage for an Increasing Population and Increasing Distribution within the DAU. This alternative will:

- Allow the RBS-22 population to increase and expand their range. Rate of population increase will be dependent on annual lamb recruitment and is generally outside of direct management control.
- Assume an expected population of **> 275** animals. In the late 1980's and early 1990's when several of these sub-populations experienced catastrophic die-offs, the RBS-22 population was approaching 400 animals. Population density is discussed in this plan, and is an important consideration in bighorn sheep management. The exact mechanism(s) leading to historic die-offs are unknown, however managers are acutely aware of the role density plays in epizootics. There is little concern at this time relative to bighorn density in this DAU, and there is no specific reason(s) to believe that 400 animals is this DAU's carrying capacity. However, if or when this population significantly increases, managers will initiate more rigorous annual assessment that includes the following considerations:
    - If the population reaches or exceeds 350 animals, managers will allocate additional resources towards the population in terms of monitoring, agency collaboration, and harvest management
    - Habitat utilization and density will be carefully evaluated to determine whether densities may be exceeding a sustainable level
    - Proximity to domestic sheep and risk of contact with domestic sheep will continue to be evaluated regardless of population size
    - On-going harvest management will be comprehensively evaluated in terms of ram & ewe harvest rates, hunter distribution, GMU license allocation, Sub-unit designation within GMU's, and hunting season structure
    - ***The herd will not be capped at 350 animals; 350 is simply the tentative threshold at which management will be methodically re-evaluated***

- Assume that the risk of contact with domestic sheep will increase as the population increases; however, if individuals or small groups of bighorn are documented associating with domestic sheep or in areas where the risk of contact with domestic sheep is considered too high, in compliance with CPW policy, managers may respond with targeted hunting licenses, non-lethal harassment, or managed culling to ensure separation between species.
- Not require significant changes to current license allocation, but may accommodate future license increases if and when the population increases.
- Assume that watchable wildlife opportunities will be increased.

These proposed management alternatives will:

- *Strive to increase the current population trend and productivity of this population over the next 10 years; will be dependent on annual level of lamb recruitment*
- *Maintain current hunter success rates and accommodate for harvest of older age class rams; may allow for minor increase in ram license allocation*
- *Maintains current ewe hunting opportunity; future ewe hunting will be dependent on annual level of lamb recruitment*
- *Maintain a quality hunting experience, and low hunter crowding*
- *Strive to minimize the potential risk of contact with domestic sheep regardless of population size*
- *Potentially increase watchable wildlife opportunities*

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APPENDIX A

USDA Forest Service Rio Grande Forest Divide Ranger District allotment information April 2013.

ALLOTMENT and STATUS	**HISTORIC STOCKING** **Ewe/lambs**	**SEASON**	**LAST GRAZED**	**OTHER**	**LONG TERM RECOMMENDATIONS with a future NEPA decision**
Bristol S&G – (vacant)	1000	7/11-9/15	1993 or 1997	Historically grazed with Snow Mesa/Table allotments	Recommend closure
Halfmoon/Monument S&G (vacant)	1000	7/11-9/30	1986	Historically grazed with Wason and Pooltable	Recommend closure or change in class of livestock (ie cattle)
Ouray S&G(vacant)	1000		1988 or 1992 *2012	Historically grazed with Miners and Snow Mesa and/or Table. *Crystal Lakes basin used for 10 days in 2012	Adjust allotment boundaries and use portions to offset boundary adjustments on Miners.
Pooltable S&G **(No longer a sheep allotment)**	1000	7/11-9/15	1992	Combined into the Blue Park C&H allotment and Halfmoon/Monument S&G.	2009 NEPA changed class of livestock to cattle; and modified the boundary.
San Luis S&G(vacant)			1964	Creede Municipal watershed	Recommend closure
Wason S&G(vacant)	1000	7/11-9/30	1989; 1993?	Historically grazed with Pooltable and Halfmoon/Monument	Recommend closure or change in class of livestock (ie cattle)
West Willow S&G(vacant)	1000	7/11-9/15	1985 temporary		Recommend closure
Mesa S&G (Active)	1200	8/18-9/14	2012	Jan Klecker's; grazed with Boot Mountain S&G	2009 NEPA decision;
Miners S&G Snow Mesa S&G Table S&G (Active)	1000 (2 permit holders)	7/11-9/15	2012	These allotments are used together in a logical rotation. Head of Oso Cr toward the divide was not grazed in 2012 to mitigate BHS concerns.	Modify boundaries as needed and implement adaptive management.
Alder C&H(Active)	107	6/21-9/8	2012		No change
Bear C&H(Active)	97	6/21-9/30	2012		No change
Blue Park C&H(Active)	250	7/1-9/30	2012		No change
Crooked Creek C&H (Active)	275	6/16-9/30	2012		No change

ALLOTMENT and STATUS	HISTORIC STOCKING Ewe/lambs	SEASON	LAST GRAZED	OTHER	LONG TERM RECOMMENDATIONS with a future NEPA decision
Park C&H(Active)	1,126	6/10-10/10	2012		No change
Saguache Park C&H (*Saguache District) (Active)	1000	6/1-10/5	2012		*Saguache Ranger District administration
Shallow C&H	114	6/21-9/30	1999	Sheep trail on McKenzie Stock driveway to access Table/Snow Mesa S&G allotments	Anticipated decision to designate as a forage reserve for cattle

APPENDIX B

RBS-22 License allocations and harvest 1954-2013.

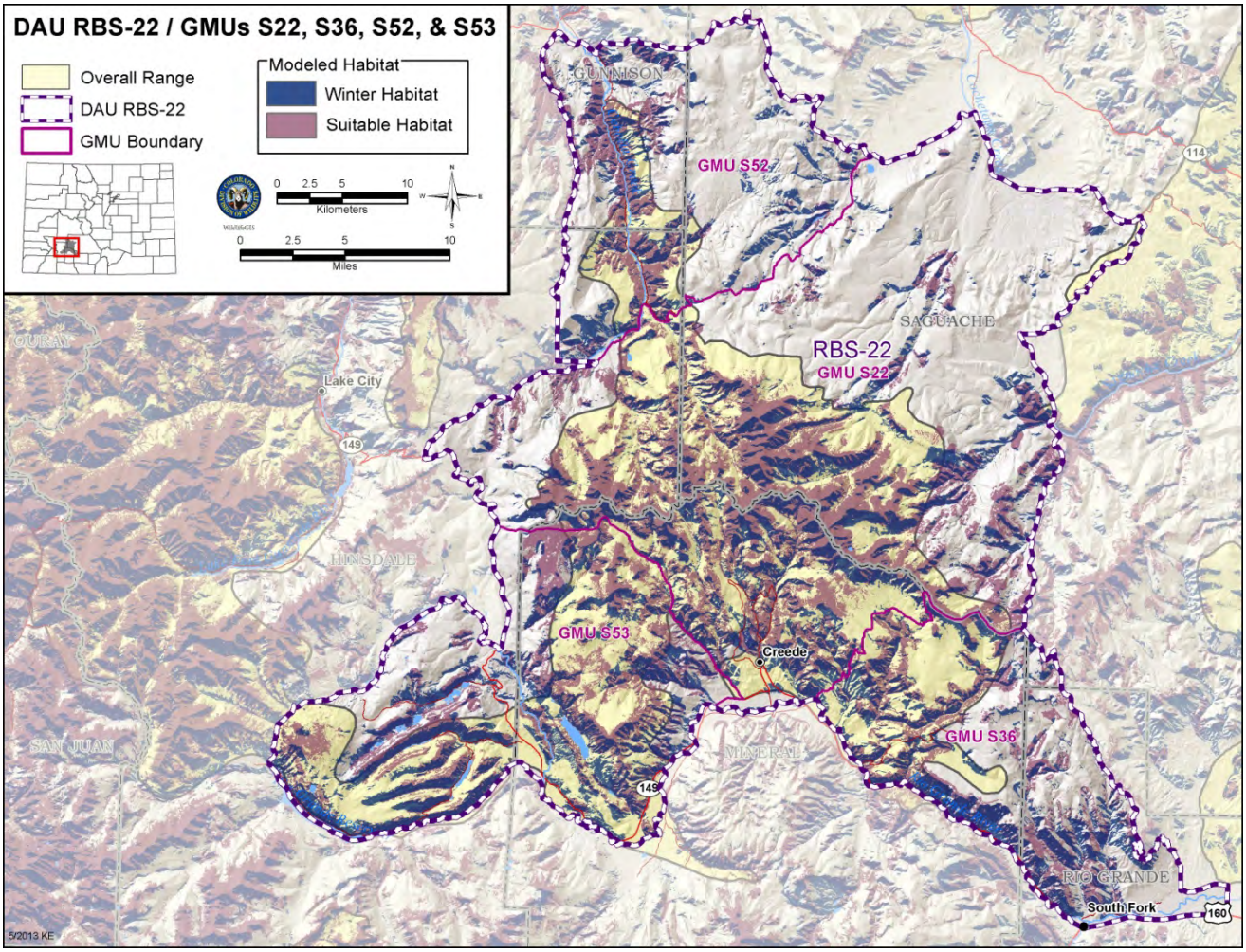
Year	S-22 Total Licenses	S-22 Ram Harvest	S-36 Total Licenses	S-36 Ram Harvest	S-36 Ewe Harvest	S-53 Total Licenses	S-53 Ram Harvest	S-53 Ewe Harvest
1954	15	0						
1955	season closed	-						
1956	5	0						
1957	season closed	-						
1958	season closed	-						
1959	6	0						
1960	10	5						
1961	6	1						
1962	8	0						
1963	10	4						
1964	10	3						
1965	10	0						
1966	5	0						
1967	6	0						
1968	6	2						
1969	6	1						
1970	6	3						
1971-1974	no data available	-						
1975	8	2						
1976	10	5						
1977	8	5						
1978	10	7						
1979	31	15						
1980	30	29						
1981	30	14						
1982	30	13						
1983	30	14						
1984	30	11						
1985	30	11						
1986	20	3						
1987	12	2						
1988	20	12						
1989	10	9						

Year	S-22 Total Licenses	S-22 Ram Harvest	S-36 Total Licenses	S-36 Ram Harvest	S-36 Ewe Harvest	S-53 Total Licenses	S-53 Ram Harvest	S-53 Ewe Harvest
1990	*10*	*2*	*2*	*1*				
1991	*2*	*2*	*2*	*2*				
1992	*6*	*5*	*2*	*1*				
1993	*6*	*2*	*2**	*1*				
1994	*4*	*2*						
1995	*2*	*1*						
1996	*2*	*1*						
1997	*1*	*0*						
1998	*1*	*0*						
1999	*1*	*0*				*1*	*1*	
2000	*1*	*0*				*1*	*1*	
2001	*1*	*0*				*1*	*1*	
2002	*2*	*1*				*1*	*1*	
2003	*3*	*3*				*1*	*1*	
2004	*3*	*3*				*1*	*1*	
2005	*3*	*3*				*1*	*1*	
2006	*3*	*2*				*1*	*1*	
2007	*3*	*3*				*1*	*1*	
2008	*4*	*1*				*2*	*2*	
2009	*3*	*3*				*2*	*2*	
2010	*3*	*2*				*4*	*0*	*2*
2011	*3*	*3*				*4*	*1*	*1*
2012	*2*	*2*				*4*	*2*	*2*
2013	*2*					*4*		
TOTALS	*489*	*212*	*6*	*5*	*0*	*29*	*16*	*5*

* Last hunting licenses issued in S-36. Hunting season closed following disease outbreak.

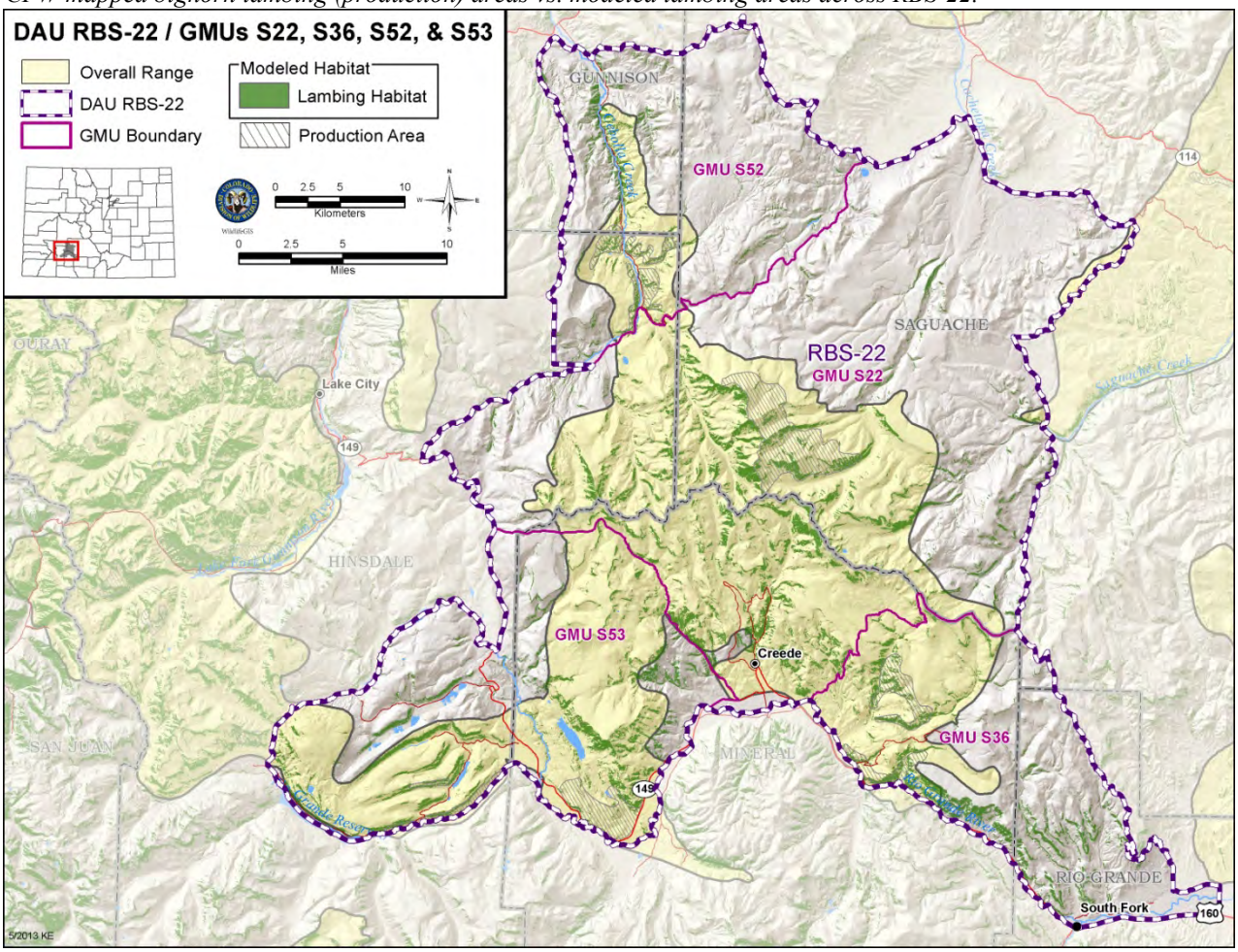
APPENDIX C

Modeled winter habitat within modeled suitable habitat for Rocky Mountain bighorn sheep in RBS-22.



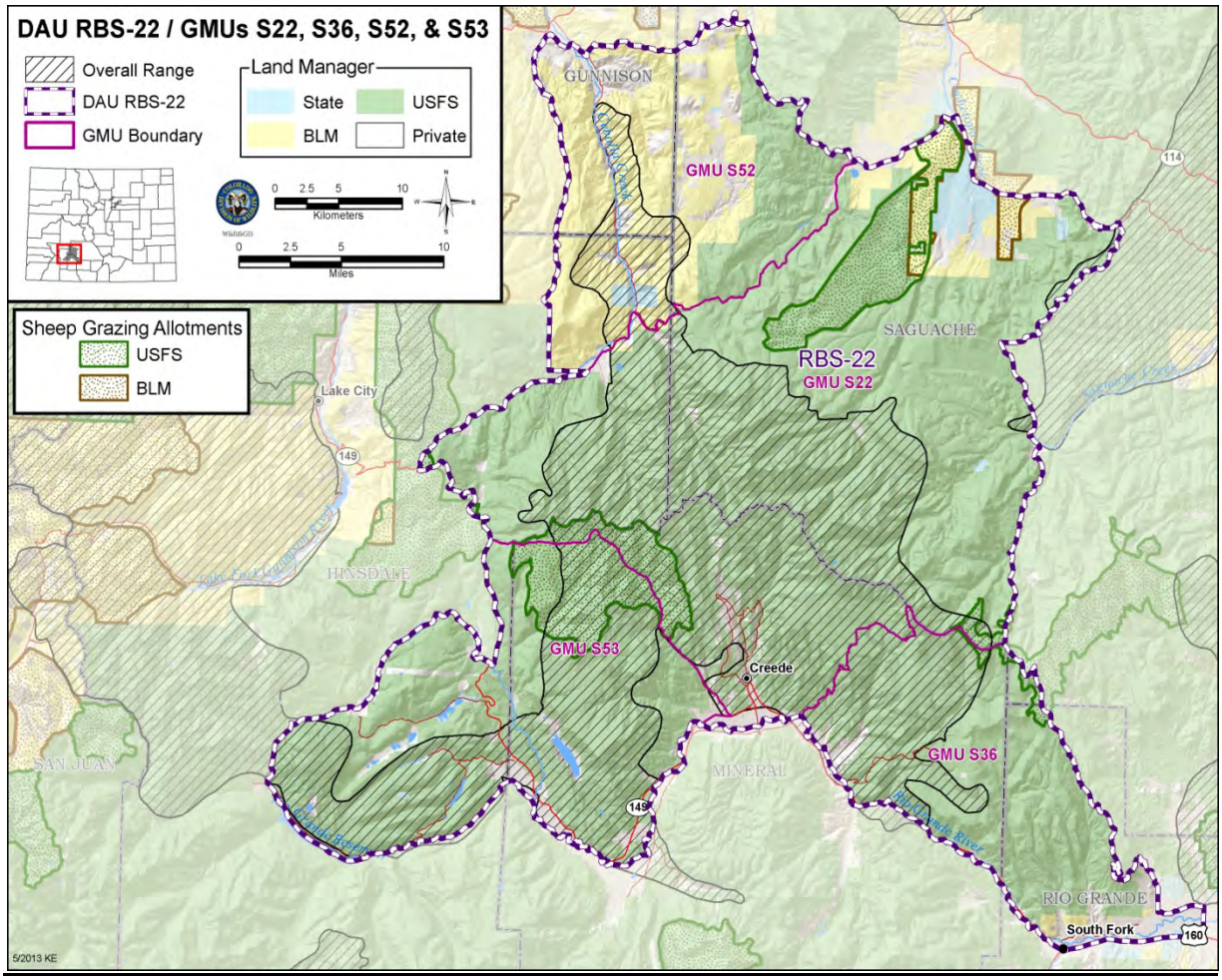
APPENDIX D

CPW mapped bighorn lambing (production) areas vs. modeled lambing areas across RBS-22.



APPENDIX E

Domestic sheep grazing allotments managed by the USDA Forest Service and Bureau of Land Management in RBS-22.



APPENDIX F

Forest Service Agreement No. 09-MU-11020000-006
Bureau of Land Management Agreement No. BLM-MOU-CO-482

MEMORANDUM OF UNDERSTANDING FOR MANAGEMENT OF DOMESTIC SHEEP AND BIGHORN SHEEP

I. *TO MINIMIZE POTENTIAL INTERSPECIES DISEASE TRANSMISSION*

The purpose of this Memorandum of Understanding (MOU) is to provide general guidance for cooperation in reducing contact between domestic and bighorn sheep in order to minimize potential interspecies disease transmission and to ensure healthy bighorn sheep populations while sustaining an economically viable domestic sheep industry in Colorado.

II. STATEMENT OF MUTUAL BENEFITS AND INTEREST:

The interested parties of this MOU include the USDA Forest Service (USFS) Rocky Mountain Region, USDI Bureau of Land Management Colorado State Office (BLM), Colorado Department of Agriculture (CDOA), Colorado Woolgrowers Association (CWGA), and the Colorado Division of Wildlife (CDOW). The aforementioned parties have a mutual desire to prevent or minimize to the extent feasible direct contact between domestic sheep and bighorn sheep by developing and implementing mutually agreeable guidelines. By adhering to these guidelines, all parties should mutually benefit by maintaining healthy bighorn sheep populations while maintaining a viable domestic sheep industry as a result of reduced conflicts.

III. AUTHORITY

a. The Act of October 21, 1976, Public Law 94-579, Federal Land Policy and Management Act (FLPMA); Section 302.

IV. ALL PARTIES AGREE THAT;

a. Contact between bighorn sheep and domestic sheep sometimes occurs under rangeland conditions.
b. Contact between domestic sheep and bighorn sheep increases the probability of respiratory disease outbreaks in bighorn sheep.
c. Not all disease outbreaks and reduced recruitment in bighorn sheep can be attributed to contact with domestic sheep.
d. Gregarious behavior of bighorn sheep and domestic sheep, as well as dispersal, migratory, and exploratory behaviors of bighorn sheep traveling between populations, increases the potential for contact.
e. Several species of bacteria in the family *Pasteurellaceae*, other bacteria, virus and other agents can occur in apparently healthy free-ranging bighorn sheep and in apparently healthy domestic sheep.
f. Bighorn sheep translocated to vacant or occupied bighorn ranges and domestic sheep moved onto grazing allotments should be in apparent good health, and where feasible herd health evaluations should be made for both species prior to release or turn-out to

help reduce the potential for introducing new pathogens or pathogen strains into established bighorn sheep herds.

g. All parties will act to familiarize the public with the potential risks regarding disease transmission between bighorn sheep and domestic sheep.
h. The goal is to minimize contact by decreasing the opportunities for domestic/bighorn sheep interaction; while still recognizing that some vacant sheep allotments are important to the domestic sheep industry as forage reserves or for other economic or management reasons.

V. CDOW AND CWGA AGREE TO THE FOLLOWING:

a. CDOW and CWGA agree that closure of active domestic sheep allotments on public lands will not be recommended based solely on the potential for interaction between domestic and bighorn sheep. However, they recognize that the USFS and BLM will continue to follow existing regulation and direction regarding closure or modification of active domestic sheep allotments to resolve documented resource conflicts.
b. The CDOW and CWGA may jointly or individually recommend vacant domestic sheep allotments for closure, modification, forage reserve status, activation, or management options at any time, including via standard USFS/BLM NEPA processes. The CDOW and CWGA understand that the USFS/BLM will follow current regulation and direction for closure, modification, activation, and management of vacant domestic sheep allotments to include consideration of recommendations from parties to this MOU.
c. Individual bighorn sheep, or small groups of bighorn sheep (<5) that through dispersal or other movements come in contact with domestic sheep will be promptly removed by the CDOW using means determined appropriate by CDOW. Permittees and herders will be encouraged to operate in a manner that reduces opportunities for contact between bighorn sheep and their flocks and to notify CDOW as soon as possible if bighorn sheep appear with domestic sheep.
d. Domestic sheep that stray into occupied bighorn sheep habitat or are not gathered and removed as specified by the allotment management plan pose a risk of interaction and will be removed by the owner as soon as possible or as otherwise specified by the land management agency. If stray domestic sheep are not claimed and reasonable attempts to locate their owner fail, then CDOW may seek remedies under existing statutory authority in cases where contact with bighorn sheep may occur.
e. CDOW will inform land management agencies and domestic sheep industry representatives of proposals for transplants of bighorn sheep and will afford an opportunity for comment on translocation proposals prior to animals being released. Bighorn translocation proposals will include disease transmission risk and habitat evaluations consistent with existing CDOW guidelines and directives. In general, transplants will not occur in proximity (e.g., probable travel distance of dispersing bighorn sheep) to occupied domestic sheep allotments unless physical barriers to movement or other mitigating circumstances exist. Furthermore, CDOW assumes the risk of potential respiratory disease transmission from domestic sheep operations that are within proximity (probable travel distance of dispersing bighorn sheep) of the transplant location.

f. Domestic sheep, when moved to grazing allotments in areas of potential contact with bighorn sheep, will be in apparent good health as determined by accepted best management practices for range sheep production.
g. Bighorn sheep, when moved for translocation, will be in apparent good health as determined by accepted best management practices for bighorn sheep management.

VI. IT IS MUTUALLY AGREED AND UNDERSTOOD BY ALL PARTIES:

1. FREEDOM OF INFORMATION ACT (FOIA). Any information furnished to the Forest Service and Bureau of Land Management under this instrument is subject to the Freedom of Information Act (5 U.S.C. 552).

2. PARTICIPATION IN SIMILAR ACTIVITIES. This instrument in no way restricts the Forest Service, Bureau of Land Management or the Cooperator(s) from participating in similar activities with other public or private agencies, organizations, and individuals.

3. COMMENCEMENT/EXPIRATION/TERMINATION. This MOU takes effect upon the signature of all parties and shall remain in effect for five years from the date of execution. This MOU may be extended or amended upon written request of any of the parties and the subsequent written concurrence of the other(s). Any party may terminate this MOU with a 60-day written notice to the other(s).

4. RESPONSIBILITIES OF PARTIES. The Forest Service, Bureau of Land Management and all other parties and their respective agencies and office will handle their own activities and utilize their own resources, including the expenditure of their own funds, in pursuing these objectives. Each party will carry out its separate activities in a coordinated and mutually beneficial manner.

5. NON-FUND OBLIGATING DOCUMENT. Nothing in this MOU shall obligate the Forest Service, Bureau of Land Management, Colorado Division of Wildlife, Colorado Department of Agriculture, or Colorado Woolgrowers Association to obligate or transfer any funds. Specific work projects or activities that involve the transfer of funds, services, or property among the various agencies and offices of the Forest Service, Bureau of Land Management, Colorado Division of Wildlife, Colorado Department of Agriculture, and Colorado Woolgrowers Association will require execution of separate agreements and be contingent upon the availability of appropriated funds. Such activities must be independently authorized by appropriate statutory authority. This MOU does not provide such authority. Negotiation, execution, and administration of each such agreement must comply with all applicable statutes and regulations.

6. ESTABLISHMENT OF RESPONSIBILITY. This MOU is not intended to, and does not create, any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by a party against the United States, its agencies, its officers, or any person.

7. Conflicts between the participants concerning procedures under this MOU which cannot be resolved at the operational level will be referred to successively higher levels, as necessary, for resolution.

8. AUTHORIZED REPRESENTATIVES. By signature below, the cooperator certifies that the individuals listed in this document as representatives of the cooperator are authorized to act in their respective areas for matters related to this agreement.

THE PARTIES HERETO have executed this instrument.

APPROVED:

This MOU is between the USDA Forest Service, Rocky Mountain Region, USDI Bureau of Land Management Colorado State Office, Colorado Division of Wildlife (DOW), Colorado Department of Agriculture, and the Colorado Woolgrowers Association.

Randall Karstetter (FOR) ANTONIO L. DIXON — March 2, 2009
USDA Forest Service (USFS) **Date**
Rocky Mountain Region

[signature] — 3/23/09
USDI Bureau of Land Management (BLM) **Date**
Colorado State Office

Thomas E. Remington — 2/11/09
Colorado Division of Wildlife (CDOW) **Date**

[signature] — 3-30-09
Colorado Department of Agriculture (CDOA) **Date**

[signature] — 3/26/09
Colorado Woolgrowers Association (CWGA) **Date**

The authority and format of this instrument has been reviewed and approved for signature.

Monica Cordova — 3/2/09
Monica Cordova DATE
Forest Service G&A Specialist

APPENDIX G

Rocky Mountain Bighorn Society
P.O Box 8320
Denver, CO 80201-8320
(720) 201-3791

July 9, 2013

Brandon Diamond
Terrestrial Wildlife Biologist
Colorado Parks and Wildlife
300 West New York Ave.
Gunnison, CO 81230

Dear Mr. Diamond:

The Rocky Mountain Bighorn Society (RMBS) welcomes the opportunity to comment on the draft management plan for Rocky Mountain bighorn sheep DAU RBS-22 prepared by Colorado Parks and Wildlife (CPW) biologists. Our organization represents approximately 850 members, with a mission to promote and enhance the well being of Colorado's state animal, the Rocky Mountain bighorn sheep.

The RMBS prefers **Alternative 2 – Maintain an average age of 7-8 years for rams harvested across the DAU** under *Ram Age at Harvest* in the draft management plan. We prefer that hunters have the opportunity to harvest older age class rams given a reasonable effort. However, we point out that some hunters only wish to fill their license, and may not choose to pass up a young ram to search for a more mature ram. We hope that CPW staff will rely more heavily on herd inventory data, if available, when considering future hunter opportunity.

The RMBS prefers **Alternative 2 – Maintain an average hunter success rate of 65-80%** under *Ram Hunter Success Rate* in the draft management plan. We acknowledge that a bighorn sheep license is often a highly anticipated, once-in-a-lifetime opportunity for hunters, and we believe that herds should be managed so that reasonably prepared and motivated hunters have a high chance of success. However, we also realize that some successful applicants are not properly motivated, prepared or physically fit to have a reasonable chance of success, and that these hunters may negatively affect success rates. We urge CPW managers to consider these factors when determining future hunter opportunity, and to rely on herd inventories whenever possible when recommending license numbers.

The RMBS prefers **Alternative 2 – Manage for an increasing population and increasing distribution within the DAU** under *Population Trend and Distribution* in the draft management plan. We prefer that bighorn sheep are allowed to expand into historically occupied range and other suitable habitat. Historical population estimates from the last 25 years and habitat evaluations outlined in the draft management plan suggest that this DAU can support far more than the current 250 sheep. We recognize the potential for conflicts with domestic sheep producers and hope that CPW will work closely with federal land management agencies to reduce the chance of bighorn sheep interaction with domestic sheep.

The United States Forest Service (USFS) issued a new directive to Regional Foresters on August 19, 2011 requiring a comprehensive bighorn sheep viability analysis when making forest planning decisions requiring National Environmental Policy Act (NEPA) analysis. This directive states in part: "Where viability assessments indicate a high likelihood of disease transmission and a resulting risk to bighorn sheep population viability across the forest, the goal of spatial and/or temporal separation between domestic sheep/goats and bighorn sheep is the most prudent action we can use to manage risk of disease transmission."

It is incumbent upon CPW staff to ensure that USFS managers receive accurate and timely information about bighorn sheep herd growth and range expansion. This will enable forest managers to make appropriate management decisions that reduce the likelihood of future conflicts and disease transmission to bighorn sheep. It is also important that CPW continues to work with the USFS and Bureau of Land Management (BLM) to eliminate existing risks such as the active Snow Mesa/Table/Miners Creek and Cold Springs domestic sheep allotments in S-53 and S-22.

The RMBS agrees that radio collaring projects should be conducted in the DAU to help identify lambing areas, winter range, travel corridors and risk of contact with domestic sheep. Given the remoteness of a majority of this DAU, collars are one of the most effective ways to track movements of bighorn sheep. Domestic sheep producers should be given the opportunity work collaboratively with CPW, USFS and NGO's to help fund such studies. This collaboration is imperative to increase separation between domestic sheep and bighorn sheep, and therefore maintaining the viability of wild sheep populations.

The RMBS supports ewe harvest when CPW deems it necessary to meet management objectives and maintain herd health. However, if ram and ewe harvest guidelines are based on population estimates and winter lamb:ewe ratios, it is necessary for CPW to fly winter classification counts annually. Without annual surveys, it is possible that stochastic events which drastically reduce the population will go unnoticed, and overharvest will occur.

Ewe harvest is currently being used at the Game Management Unit (GMU) level within the DAU. However, the draft management plan recommended removal rates are based on DAU level guidelines. It may be important for the management plan to indicate that ewe harvest will be managed at the GMU level, based on herd performance in each GMU.

Colorado Parks and Wildlife has undertaken projects recently to remove stagnant sheep herds that are suffering from no lamb recruitment and are no longer viable populations. Preliminary data suggests that sheep herds subsequently transplanted into those newly vacant habitats are flourishing. Should the S-52 herd continue to struggle with no recruitment and population growth, CPW should consider removing the existing sheep and repopulating with sheep from another area. Such an undertaking should only occur after the risk of contact with domestic sheep has been mitigated within the GMU.

The existing MOU between the USFS, BLM, CPW and Colorado Wool Growers Association expires in 2014. This MOU hinders the ability of CPW biologists to advocate for native bighorn sheep populations in Colorado when land management agencies are making important decisions

regarding livestock grazing in bighorn sheep habitat. We urge CPW to not renew this MOU when it expires in 2014. As written, the MOU does not allow CPW to follow its Mission "*...to perpetuate the wildlife resources of the state, to provide a quality state parks system, and to provide enjoyable and sustainable outdoor recreation opportunities that educate and inspire current and future generations to serve as active stewards of Colorado's natural resources.*"

Thank you for giving RMBS the opportunity to comment on this draft management plan. Please do not hesitate to contact me if you have any questions or concerns about our comments. Also, please apprise us of future opportunities to comment on this plan or other bighorn sheep management issues in Colorado.

Sincerely,

Terry E. Meyers

Terry E. Meyers
President
Rocky Mountain Bighorn Society
meyers.terry@gmail.com
(970) 640-6892

Colorado Wool Growers Association
PO Box 292 ◦ Delta, CO 81416-0292 (970) 874-1433 ◦ (970) 874-4170 fax
cwgawool@aol.com ◦ coloradosheep.org

Colorado Parks & Wildlife
Attn: Brandon Diamond
300 West New York Avenue
Gunnison, CO 81230
Brandon.diamond@state.co.us

July 8, 2013

RE: Comments Pertaining to the Bighorn Sheep Management Plan
DAU RBS – 22 Central San Juans

The Colorado Wool Growers Association (CWGA) is adamantly opposed to any bighorn sheep herd expansion within Colorado. Our organization's position of not supporting expansion stems from two key issues: 1) anti-grazing groups are using the bighorn/domestic sheep conflict as a means to leverage sheep ranchers off of their grazing allotments; and 2) the U.S. Forest Service's (USFS) litigation driven, current policy using the presence or proximity of bighorn sheep to domestic sheep grazing allotments to eliminate domestic sheep grazing.

An immediate case in point, regarding the USFS policy to eliminate sheep grazing, is the recent Environmental Assessment of the Fisher/Ivy/Goose Lake Sheep Allotment which recommends vacating an active grazing allotment (see attached).

The reliance upon the *Western Association of Fish and Wildlife Agencies (WAFWA) Wild Sheep Working Group Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat* is problematic as it has a clear intent to eliminate domestic sheep grazing in favor of bighorn sheep, which is contrary to the MOU signed by the CPW and the CWGA. While there are other troubling comments in the management plan, the reference to the 9 mile buffer zone is also of great concern, knowing there is no scientific basis for this artificial reference point.

The Colorado Wool Growers Association is not opposed to bighorn sheep. Like other residents of Colorado we highly value these majestic animals. Unfortunately, the bighorn sheep are being used as a tool to leverage sheep producers off of their federal grazing allotments. Until such a time that better science, and balance and objectivity can be incorporated into the management of bighorn herds in Colorado, the CWGA regretfully objects to any additional herd expansion that jeopardizes the viability of our industry.

Respectfully, *Gary Visintainer* CWGA President

Colorado Wool Growers Association
PO Box 292 ◦ Delta, CO 81416-0292 (970) 874-1433 ◦ (970) 874-4170 fax
cwgawool@aol.com ◦ coloradosheep.org

District Ranger, Divide Ranger District
13308 West Highway 160
Del Norte, CO 81132
comments-rocky-mountain-rio-grande-divide@fs.fed.us
(719) 657-6035 fax

June 27, 2013

RE: Environmental Assessment for Comment (Fisher-Ivy/Goose Lake Sheep Allotment)

The Colorado Wool Growers Association (CWGA) appreciates the opportunity to provide comments on the Environmental Assessment (EA) for the Fisher-Ivy/Goose Lake Sheep Allotment. The CWGA supports Alternative 2 – Continued grazing with project design criteria in place to minimize potential contact between bighorn and domestic sheep and to protect other resources.

We oppose Alternative 1 – no authorized grazing, because the EA fails to accurately quantify the potential risk factors involved with continued grazing. We also oppose Alternative 1 because we believe this is an intermediate step (converting the active allotment to a vacant allotment) to permanently closing this viable grazing allotment.

The May 28th UFFS letter (File Code: 1950/2210) states, "Due to documented overlap between domestic and bighorn sheep occurring on the allotment, the potential risk of contact and subsequent disease transmission is high. Our proposed action is to not reauthorize domestic sheep grazing and maintain the allotment as vacant." Throughout the EA, the potential for disease transmission is classified as "great" although the EA fails to provide adequate justification for this.

The Forest Service chooses to highlight incidents of bighorn die-offs (no die-offs specific to this area) that may have occurred in conjunction with the presence of domestic sheep; while ignoring numerous occurrences of bighorn/domestic sheep contact that have not resulted in die-offs. Contact between domestic sheep and bighorn sheep does not automatically equate to disease transmission; nor does it support the opinion that contact "greatly" increases the potential for disease transmission. *The potential degree of risk of disease transmission under open range conditions is unknown.* Knowing that there are numerous occurrences of bighorn/domestic sheep contact that have not resulted in bighorn die-offs; it would appear that the degree of risk of disease transmission is somewhat less that "great" or "high."

The EA clearly acknowledges that it is managing the grazing allotment for the "worse-case scenario" yet there is no scientific or statistical basis upon which to quantify the possibility of the worse-case scenario

occurring. There is no baseline data that quantifies the number of bighorn/domestic sheep encounters that did or did not result in disease transfer.

Domestic sheep grazing has occurred on this allotment since 1927, and currently domestic sheep grazing meets the desired management criteria, except for the concern regarding contact with bighorn sheep. The EA references potential disease transmission but does not provide concrete data on actual disease transmission in this area. Furthermore, the Forest Service's recommendation to end domestic sheep grazing appears to be motivated by the desire to expand hunting opportunities for bighorn sheep.

Table 2.5 – 1 lists Project Design Criteria (PDC) identified to minimize contact between bighorn and domestic sheep. It appears Forest Service relies heavily upon the opinions listed in Table 2.5 – 1 – Project Design Criteria to reach its decision to support Alternative 1. However, the conclusions listed in this table seem to be of questionable value. Even when the probability of success of a specific PDC is rated a medium or moderate, FS staff still reach the conclusion that the risk of contact would remain high.

The Forest Service is currently involved in a lawsuit regarding questionable modeling design and analysis regarding bighorn and domestic sheep; and the recommended Alternative in this EA is primarily predicated on assumptions versus facts.

We request that the Forest Service more accurately analyze all factors involved in bighorn and domestic sheep encounters, and continue to authorize grazing on the Fisher-Ivy/Goose Lake Sheep Allotment.

Sincerely,

Gary Visintainer
President

Hinsdale County
311 North Henson Street
P.O. Box 277 • Lake City • CO 81235
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www.HinsdaleCountyColorado.us

Hinsdale County
COLORADO
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July 23, 2013

Brandon Diamond
Colorado Parks and Wildlife
300 West New York Ave.
Gunnison, CO 81230

Dear Mr. Diamond:

Thank you for the opportunity to respond to the Bighorn Sheep management plan proposed by Colorado Parks and Wildlife for the Data Analysis Unit RBS-22, Central San Juans, GMU's S-22, S-36, S-52 and S-53. We appreciate the extension of the initial comment period to accommodate the Papoose Fire in our county and the delay that the fire necessitated in our comments. Our comments refer specifically to S-22, S-52 and S-53 GMU's as these fall within Hinsdale County.

It is our understanding that the purpose of the plan is to determine the harvest rates and herd population objectives, and evaluate the potential influence of disease, recreation, development and other conditions on the Central San Juan Bighorn Sheep herd performance.

Referencing the Executive Summary, Hinsdale County makes the following comments:
As to the issues of Harvest Management, Hinsdale County advocates for alternative (3), Maintain an average age of 9-10 years for rams harvested across the DAU. For Population Trend and Distribution, Hinsdale County advocates for alternative (1), Manage for a stable population and stable distribution within the DAU.

Please see attached a more in-depth analysis of the plan. While this is not an exhaustive discussion of all aspects of the plan, it is a beginning as this plan develops. We appreciate you taking our comments under advisement as you further develop this plan.
Hinsdale County has a high level of interest regarding this plan and the impacts for our county.

Thank you again for the opportunity to comment on this draft plan.

Sincerely,

C F. Dozier

Hinsdale County Board of Commissioners
Cindy Dozier, Chair

cc Stephanie Steinhoff

Bighorn Sheep Comment Letter Attachment
July, 2013

DAU RBS-22 Central San Juans

- Comments in this attachment as well as the letter pertain to S-22, S-52, and S-53 GMU's as these fall within Hinsdale County

- **Executive Summary:** pages 4-5
- Management Alternatives: As this paragraph states, there is a lack of consistent, unit specific data from which to draw conclusions. Hinsdale County suggests further study before altering management alternatives. Part of any study should include additional data gathering regarding effectiveness of protocol for separation of domestic and bighorn sheep. What is currently being practiced appears to be working, so change should not be initiated without objective reasons.
- Harvest Management: Hinsdale County advocates for alternative (3), Maintain an average age of 9-10 years for rams harvested across the DAU. This alternative might help to mitigate the number of hunters so that the sheep are not moving around so much due to crowded hunting conditions.
- Population Trend and Distribution: Hinsdale County advocates for alternative (1), Manage for a stable population and stable distribution within the DAU. This alternative maintains the status quo which seems to be the most beneficial in this DAU. In the 1980's and early 1990's, when the population increased to nearly 400 animals, increased hunters caused the sheep to move in a way that may have proved detrimental to their welfare. Maintaining the status quo also keeps density at a level that is most healthy for the herd.

- **DAU Background and Issue Summary: pages 6-7**
- First paragraph: Despite stating that the data has been "inconsistently reported", "difficult to coordinate effective ground surveys", conclusions are drawn that seem to consistently go to the worst case scenario. ie. "population size is likely well below what it was historically", "loss of habitat resulting from human development and activity, competition for prime habitats with domestic livestock, and mortality resulting from disease(s) and parasites introduced by domestic livestock." The data is uncertain, habitat is "abundant and anecdotally in good condition" with parts unoccupied. Diseases previously attributed to domestic sheep have been confirmed to be indigenous to the bighorn. The tone of this Issue Summary seems decidedly negative towards domestic sheep without the scientific basis for such a conclusion. Have die-offs in herds without domestic sheep contact been studied?
- Second paragraph: What was the cause of the catastrophic die-off that occurred between 1989 and 1990? "Habitat in the DAU is abundant and anecdotally in good condition, although much of the suitable and modeled suitable habitat remains unoccupied. The unit contains large expanses of habitat that should be capable of supporting a considerably larger population of wild sheep.....winter range does not appear to be a limiting factor for this herd." When will the additional winter range inventory and assessment be done? Is there a possibility of bringing in more domestic sheep to utilize this large expanse of habitat?
- Third paragraph: Are there any examples, recently, of domestic/bighorn contact? How do you support the statement, "The susceptibility of bighorn sheep to pathogens originally introduced by domestic livestock is regarded as the primary factor limiting bighorn populations in Colorado"? Have you studied die-offs where there is no interaction with domestic sheep? This type of study is warranted before making inflammatory statements of this kind. Where does indigenous lungworm fit

into this equation? More study is needed, especially as the George Study is now nearly five years old.

- Fourth paragraph: Hinsdale County agrees strongly that on-going collaboration with various stakeholders in paramount in this DAU. Hinsdale County always appreciates public meetings held nearby and encourages multiple opportunities for public participation in this planning process.
- Hinsdale County is a Right to Farm and Ranch County and views these activities as a priority along with bighorn sheep conservation.
- Hinsdale County is highly interested in bighorn sheep management within its borders.

- **Current Land Uses: pages 11-12**
- Development--For Hinsdale County, the issue of year-round homeowners increasing dramatically is minimal. There is very little property available for development that is not already developed. It would be appropriate to separate out Hinsdale County regarding this issue.
- Livestock grazing--as a Right to Farm and Ranch County, Hinsdale County views grazing as a priority activity. We would favor keeping all allotments available for current and future use.
- Recreation--As a tourism-based community, Hinsdale would recommend extensive research prior to limiting recreational opportunities.

- **Historical Occurrence and Distribution: pages 12-13**
- S-22--"poorly documented" once again; conclusions drawn from inadequate data
- Does translocation increase likelihood of disease? Has this been studied?

- **Current Occurrence and Distribution: pages 13-16**
- S-22 Hinsdale County agrees that, in the future, if this population increases, it is likely that bighorn use would increase across the GMU within suitable habitats.
- S-53--Will there be studies of impact from the 2013 Papoose Fire to the BHS in this area?

- **Winter Range: pages 16-18**
- "Managers admittedly do not know where all of the winter range areas are within this DAU"...."If the density threshold from Ram Mountain is applied to RBS-22, it is evident that local winter ranges may be capable of supporting a much larger population of bighorn than what is currently present." Hinsdale County agrees that our current density is not problematic.
- Future management recommendations:
  We agree that local jurisdictions should actively participate in any decision-making process concerning BHS winter ranges across this DAU. The phrase "land-use planning" needs further definition before Hinsdale County can respond to this portion of the recommendation.
- Hinsdale County agrees that, "if funding and resources become available, a more comprehensive winter range carrying capacity analysis could be conducted throughout this DAU in coordination with the USFS, BLM, private landowners, and CPW" We would add that Hinsdale County should be included in this list.

- **Lambing: page 18**
- It should be noted that domestic sheep are not on the range during BHS lambing and, therefore, are not the cause of any disturbances.

- **Herd Management History: page 19**
- History of Population Inventory: "Historic population declines most likely".... mortality resulting from "disease(s) and parasites introduced by domestic livestock" --it should be noted that lungworm, once thought to be transmitted by domestic sheep to BHS has been determined to be indigenous to BHS. Have die-offs without domestic sheep contact ever been studied before blaming domestic sheep?

- **Current Herd Management, Issues and Strategies: pages 28-29**
- Specific future management objectives--Hinsdale County supports population surveys and assessments.

- **Disease and Domestic Sheep: pages 34-38**
- While it can be acknowledged that respiratory disease is the most important health problem in contemporary bighorn populations, Hinsdale County continues to advocate for continued research before drawing conclusions regarding disease in bighorn sheep. The lungworm once attributed to domestic sheep was found to be indigenous in the bighorn. Recent study of M.ovipneumoniae has shown that it may not, of itself, result in fatal pneumonia, but may predispose bighorn to respiratory infection. Who knows the future of research into disease and bighorn? It would be wise to draw conclusions only from conclusive data. Hinsdale County appreciates the statement, "CPW recognizes that not all disease outbreaks and reduced recruitment in bighorn sheep can be attributed to contact with domestic sheep." The Rock Creek herd may be an example of die-offs due to unknown causes since documentation is scarce. Until these die-offs are conclusively evaluated, they should not be attributed to one cause or another. The S-36 die-off "documentation" of intermingling by one herder is questionable science. Where is the documentation? This is an anecdotal observation with which caution should be exercised in drawing conclusions.
- While the "potential" for contact between wild and domestic sheep exists within this DAU, current management practices have been working well...this should be pointed out in this plan. The permittees have consistently implemented practices which support separation.
- Have translocations been thoroughly studied as a possible contributor to die-offs?
- For all herds in all areas, Hinsdale County advocates for continued monitoring and additional biological sampling, needed to more thoroughly evaluate herd health. Hinsdale County also asks that data be utilized and reported in the most objective way possible rather than adopting a general tone of negativity towards domestic sheep.

- **Recreation: page 38**
- Overall, it would be best not to draw conclusions on limited data.

- **Contact with domestic sheep: page 43**
- "Increasing this bighorn population will logically increase the risk of contact with domestic sheep; although there is evidence that contact is occurring or has occurred at the current population level of 250". Where is the support for this statement?

This concludes this attachment. Please remember that this is not an exhaustive discussion of all aspects of the plan, but rather a beginning as this plan develops.

APPENDIX H

Central San Juans Bighorn Sheep Management Plan

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

	Response Percent	Response Count
Yes	92.5%	62
No	7.5%	5
answered question		67
skipped question		1

2. Do you live in GMU S22, S36, S52 or S53? See the map below, which shows the boundaries of GMUs S22, S36, S52 and S53. (Please check one.)

	Response Percent	Response Count
Yes	10.3%	7
No	89.7%	61
answered question		68
skipped question		0

3. People are involved with wildlife in many ways. Which of the following statements best describes your current level of interest and involvement? (Please check one.)

	Response Percent	Response Count
I am interested in wildlife, BUT I don't do much that is specifically related to wildlife.	14.9%	10
I am interested in wildlife, AND I actively take part in wildlife-related activities.	**85.1%**	**57**
I am NOT very interested in wildlife AND I don't do much that is specifically related to wildlife.	0.0%	0
I am NOT very interested in wildlife, BUT for various reasons I am involved in wildlife-related activities.	0.0%	0
	answered question	**67**
	skipped question	**1**

4. The following are some ways that people interact with wildlife. Have you participated in these activities in the past 3 years? (Please check one for each item.)

	Yes	No	Rating Count
a. Learned about wildlife by reading or watching television	**89.6% (60)**	10.4% (7)	67
b. Spent time watching or photographing wildlife or birds	**94.0% (63)**	6.0% (4)	67
c. Hiked or walked in natural areas	**95.5% (64)**	4.5% (3)	67
d. Rode an ATV, Jeep or dirt bike in natural areas	**72.3% (47)**	27.7% (18)	65
e. Worked on a ranch or farm	**69.2% (45)**	30.8% (20)	65
f. Camped	**95.5% (64)**	4.5% (3)	67
g. Hunted any wildlife	**87.9% (58)**	12.1% (8)	66
h. Fished any fish species	**90.9% (60)**	9.1% (6)	66
i. Guided or outfitted individuals to hunt in Colorado	14.3% (9)	**85.7% (54)**	63
j. Participated in or commented on a CPW wildlife management plan or BLM, USFS or other federal land use plan	**51.5% (34)**	48.5% (32)	66
k. Participated in or commented on a county, city or other local land use plan	45.3% (29)	**54.7% (35)**	64
		answered question	**67**
		skipped question	**1**

5. Have you hunted bighorn sheep in the past?

	Response Percent	Response Count
Yes	44.8%	30
No	55.2%	37
answered question		67
skipped question		1

6. Have you applied for a bighorn sheep hunting license in Colorado?

	Response Percent	Response Count
Yes	74.6%	50
No	25.4%	17
answered question		67
skipped question		1

7. In relation to how you value other people, pets and livestock, how do you feel wild animals should be valued by society? (Please check one.)

	Response Percent	Response Count
Wild animals should be valued the same as people.	22.4%	15
Wild animals should be valued the same as pets.	9.0%	6
Wild animals should be valued the same as livestock.	55.2%	37
I am not sure.	13.4%	9
answered question		67
skipped question		1

8. Who do you believe owns wildlife in Colorado? (Please check one.)

	Response Percent	Response Count
Landowners on whose land the animals live	1.5%	1
The state government	10.4%	7
The federal government	0.0%	0
Wildlife are not owned by any individual or entity	**46.3%**	**31**
The people of the state and it's visitors	40.3%	27
I am not sure.	1.5%	1
	answered question	**67**
	skipped question	**1**

9. If you wanted to learn more about wildlife or wildlife-related issues in Colorado in the future, whom would you contact? (Please check all that apply.)

	Response Percent	Response Count
I would not contact any organization for assistance.	3.0%	2
U.S. Forest Service, U.S. Fish and Wildlife Service, NRCS, USDA, BLM or another federal agency	61.2%	41
Colorado Parks and Wildlife	**82.1%**	**55**
Colorado State University Extension Services	10.4%	7
A Colorado university or college	4.5%	3
Colorado Woolgrowers, Colorado Cattlemen's Association	1.5%	1
Wildlife conservation organizations (Rocky Mountain Elk Foundation, The Nature Conservancy, etc.)	55.2%	37
Local rod and gun club	6.0%	4
Local or municipal government	4.5%	3
Friends, family or neighbors	44.8%	30
Other (please specify)	7.5%	5
	answered question	**67**
	skipped question	**1**

10. How important are wild bighorn sheep to you?

	Response Percent	Response Count
Very Important	**87.9%**	**58**
Somewhat Important	12.1%	8
Neither Important, nor Unimportant	0.0%	0
Somewhat Unimportant	0.0%	0
Very Unimportant	0.0%	0
I am not sure.	0.0%	0
	answered question	**66**
	skipped question	**2**

11. How important is it to you that there are bighorn sheep in Colorado in the future?

	Response Percent	Response Count
Very Important	**100.0%**	**66**
Somewhat Important	0.0%	0
Neither Important, nor Unimportant	0.0%	0
Somewhat Unimportant	0.0%	0
Very Unimportant	0.0%	0
I am not sure.	0.0%	0
	answered question	**66**
	skipped question	**2**

12. To what extent do you agree with the statement below? (Please check one.) I believe that CPW is currently doing an adequate job of managing bighorn sheep in GMUs S22, S36, S52 and S53.

	Response Percent	Response Count
Strongly agree	10.6%	7
Somewhat agree	**54.5%**	**36**
Neither agree, nor disagree	19.7%	13
Somewhat disagree	3.0%	2
Strongly disagree	3.0%	2
I am not sure.	9.1%	6
	answered question	**66**
	skipped question	**2**

13. Overall, how would you rate state and federal actions to manage bighorn sheep in this area? (Please check one.)

	Response Percent	Response Count
Excellent	3.0%	2
Above Average	**33.3%**	**22**
Average	30.3%	20
Below Average	12.1%	8
Poor	4.5%	3
I am not sure.	16.7%	11
	answered question	**66**
	skipped question	**2**

14. To what extent do you agree with the statement below? (Please check one.) I believe that hunting, watching and other bighorn sheep-related forms of recreation contribute substantially to local economies within Gunnison, Hinsdale, Mineral, Saguache and Rio Grande counties.

	Response Percent	Response Count
Strongly Agree	**44.6%**	**29**
Somewhat Agree	38.5%	25
Neither Agree, nor Disagree	7.7%	5
Somewhat Disagree	1.5%	1
Strongly Disagree	1.5%	1
I am not sure.	6.2%	4
	answered question	**65**
	skipped question	**3**

15. Which of the following do you believe is the main factor limiting the number of bighorn sheep in Colorado? (Please check one.)

	Response Percent	Response Count
Disease	**64.6%**	**42**
Predation	4.6%	3
Hunting	0.0%	0
Loss of habitat/Land development	15.4%	10
I am not sure.	9.2%	6
Other (please specify)	6.2%	4
	answered question	**65**
	skipped question	**3**

16. How would you like to see the number of bighorn sheep change in this area over the next 10 years? (Please check one.)

	Response Percent	Response Count
Increase greatly	43.1%	28
Increase somewhat	47.7%	31
Stay the same	3.1%	2
Decrease somewhat	1.5%	1
Decrease greatly	0.0%	0
I am not sure.	4.6%	3
answered question		65
skipped question		3

17. The following are all considerations of state and federal agencies when deciding how to use and manage land in this area. Please tell us which of these you feel should be most important in future land use decisions. (Please type a number from 1 to 7 which indicates how important you feel each item should be, where 1 is the most important item and 7 is the least important.)

	Response Average	Response Total	Response Count
Bighorn sheep populations	2.22	144	65
Deer and elk populations	2.00	130	65
Non-motorized recreation (hiking, backpacking, skiing, etc.)	3.53	226	64
Motorized recreation (ATV riding, Off-road driving, etc.)	4.27	273	64
Livestock grazing	4.56	292	64
Mineral extraction and mining	4.92	310	63
Residential and commercial development	**5.76**	**363**	63
		answered question	**65**
		skipped question	**3**

18. Have you reviewed the draft bighorn sheep management plan for GMUs S22, S36, S52 and S53? (Please check one.)

	Response Percent	Response Count
Yes	54.0%	34
No	46.0%	29
answered question		63
skipped question		5

19. Which of the following alternatives would you prefer to guide CPW's decisions about the number and distribution of bighorn sheep in GMUs S22, S36, S52 and S53 in the next 10 years? (Please check one.)

	Response Percent	Response Count
Stable population and distribution: Maintain current number of sheep (225-275 sheep), which will allow for small increases in the number of hunting licenses available each year, stable opportunity to view wild sheep and may lower the risk of conflict with domestic sheep.	41.9%	26
Increasing population and distribution: Increase number to more than 275 sheep, which will allow for larger increases in the number of hunting licenses available each year, increased opportunities to view wild sheep, but may also increase the risk of conflict with domestic sheep as the wild sheep population increases.	**54.8%**	**34**
Decreasing population and distribution: Reduce number of sheep to less than 225 sheep through increased hunter harvest and trap/relocate programs, which would temporarily increase the number of hunting licenses available and may maintain current risk of conflict with domestic sheep, but reduce the opportunity to view wild sheep.	1.6%	1
I am not sure.	1.6%	1
	answered question	**62**
	skipped question	**6**

20. Please use the space below to write any additional comments or observations about bighorn sheep management that you would like to share.

	Response Count
	28
answered question	28
skipped question	40

Page 5, Q9. If you wanted to learn more about wildlife or wildlife-related issues in Colorado in the future, whom would you contact? (Please check all that apply.)		
1	Rocky Mountain Bighorn Society, Licensed outfitter	Jul 8, 2013 8:40 PM
2	Internet	Jun 25, 2013 12:07 PM
3	Dad	Jun 11, 2013 9:41 PM
4	internet search	Jun 10, 2013 10:48 AM
5	Private party websites	Jun 10, 2013 10:05 AM

Page 7, Q15. Which of the following do you believe is the main factor limiting the number of bighorn sheep in Colorado? (Please check one.)		
1	Too much government.	Jun 27, 2013 1:31 PM
2	human encroachment, carrying capacity, mother nature	Jun 26, 2013 2:14 PM
3	both disease and loss of habitat	Jun 25, 2013 9:11 AM
4	sheep are relitivety rare animal and only live in very speclized country and can never be as abundint as elk and deer	Jun 10, 2013 7:24 PM

Page 8, Q17. The following are all considerations of state and federal agencies when deciding how to use and manage land in this area. Please tell us which of these you feel should be most important in future land use decisions. (Please type a number from 1 to 7 which indicates how important you feel each it...

		Bighorn sheep populations
1	1	Jul 9, 2013 6:42 AM
2	1	Jul 8, 2013 8:44 PM
3	3	Jul 8, 2013 12:06 PM
4	1	Jul 8, 2013 11:17 AM
5	1	Jul 7, 2013 4:00 PM
6	2	Jul 5, 2013 10:39 PM
7	1	Jul 3, 2013 9:32 AM
8	2	Jul 2, 2013 11:08 AM
9	1	Jul 2, 2013 10:38 AM
10	1	Jun 28, 2013 12:36 PM
11	1	Jun 27, 2013 1:32 PM
12	1	Jun 27, 2013 11:36 AM
13	1	Jun 27, 2013 10:33 AM
14	6	Jun 27, 2013 6:44 AM
15	1	Jun 26, 2013 2:17 PM
16	1	Jun 26, 2013 7:54 AM
17	2	Jun 25, 2013 1:05 PM
18	2	Jun 25, 2013 12:34 PM
19	3	Jun 25, 2013 12:08 PM
20	2	Jun 25, 2013 10:23 AM
21	3	Jun 25, 2013 9:12 AM
22	1	Jun 22, 2013 8:21 PM
23	1	Jun 21, 2013 2:26 PM
24	7	Jun 20, 2013 2:14 PM
25	7	Jun 19, 2013 2:24 PM

Page 8, Q17. The following are all considerations of state and federal agencies when deciding how to use and manage land in this area. Please tell us which of these you feel should be most important in future land use decisions. (Please type a number from 1 to 7 which indicates how important you feel each it...		
26	1	Jun 19, 2013 11:27 AM
27	1	Jun 19, 2013 10:05 AM
28	1	Jun 19, 2013 9:11 AM
29	4	Jun 19, 2013 7:13 AM
30	5	Jun 19, 2013 6:21 AM
31	2	Jun 18, 2013 8:17 PM
32	2	Jun 18, 2013 1:29 PM
33	4	Jun 17, 2013 3:11 PM
34	2	Jun 17, 2013 1:55 PM
35	2	Jun 16, 2013 8:44 AM
36	2	Jun 12, 2013 8:31 AM
37	1	Jun 11, 2013 9:43 PM
38	1	Jun 11, 2013 9:39 PM
39	4	Jun 11, 2013 1:07 PM
40	1	Jun 11, 2013 12:58 PM
41	4	Jun 11, 2013 12:46 PM
42	1	Jun 11, 2013 5:34 AM
43	1	Jun 10, 2013 7:26 PM
44	1	Jun 10, 2013 6:51 PM
45	2	Jun 10, 2013 5:38 PM
46	2	Jun 10, 2013 2:56 PM
47	2	Jun 10, 2013 2:41 PM
48	4	Jun 10, 2013 1:51 PM
49	2	Jun 10, 2013 11:17 AM
50	1	Jun 10, 2013 10:50 AM
51	5	Jun 10, 2013 10:48 AM

Page 8, Q17. The following are all considerations of state and federal agencies when deciding how to use and manage land in this area. Please tell us which of these you feel should be most important in future land use decisions. (Please type a number from 1 to 7 which indicates how important you feel each it...		
52	1	Jun 10, 2013 10:46 AM
53	2	Jun 10, 2013 10:05 AM
54	1	Jun 10, 2013 9:56 AM
55	1	Jun 10, 2013 8:32 AM
56	2	Jun 10, 2013 8:24 AM
57	2	Jun 9, 2013 8:09 PM
58	2	Jun 9, 2013 1:14 PM
59	1	Jun 9, 2013 9:04 AM
60	2	Jun 9, 2013 8:55 AM
61	6	Jun 9, 2013 8:10 AM
62	2	Jun 7, 2013 4:17 PM
63	3	Jun 7, 2013 3:07 PM
64	1	Jun 7, 2013 1:07 PM
65	7	Jun 4, 2013 9:08 AM
	Deer and elk populations	
1	2	Jul 9, 2013 6:42 AM
2	2	Jul 8, 2013 8:44 PM
3	2	Jul 8, 2013 12:06 PM
4	2	Jul 8, 2013 11:17 AM
5	1	Jul 7, 2013 4:00 PM
6	1	Jul 5, 2013 10:39 PM
7	2	Jul 3, 2013 9:32 AM
8	1	Jul 2, 2013 11:08 AM
9	2	Jul 2, 2013 10:38 AM
10	2	Jun 28, 2013 12:36 PM
11	2	Jun 27, 2013 1:32 PM

Page 8, Q17. The following are all considerations of state and federal agencies when deciding how to use and manage land in this area. Please tell us which of these you feel should be most important in future land use decisions. (Please type a number from 1 to 7 which indicates how important you feel each it...		
12	2	Jun 27, 2013 11:36 AM
13	1	Jun 27, 2013 10:33 AM
14	5	Jun 27, 2013 6:44 AM
15	2	Jun 26, 2013 2:17 PM
16	1	Jun 26, 2013 7:54 AM
17	3	Jun 25, 2013 1:05 PM
18	1	Jun 25, 2013 12:34 PM
19	2	Jun 25, 2013 12:08 PM
20	1	Jun 25, 2013 10:23 AM
21	2	Jun 25, 2013 9:12 AM
22	1	Jun 22, 2013 8:21 PM
23	1	Jun 21, 2013 2:26 PM
24	6	Jun 20, 2013 2:14 PM
25	7	Jun 19, 2013 2:24 PM
26	2	Jun 19, 2013 11:27 AM
27	2	Jun 19, 2013 10:05 AM
28	2	Jun 19, 2013 9:11 AM
29	3	Jun 19, 2013 7:13 AM
30	3	Jun 19, 2013 6:21 AM
31	1	Jun 18, 2013 8:17 PM
32	1	Jun 18, 2013 1:29 PM
33	1	Jun 17, 2013 3:11 PM
34	1	Jun 17, 2013 1:55 PM
35	1	Jun 16, 2013 8:44 AM
36	1	Jun 12, 2013 8:31 AM
37	1	Jun 11, 2013 9:43 PM

Page 8, Q17. The following are all considerations of state and federal agencies when deciding how to use and manage land in this area. Please tell us which of these you feel should be most important in future land use decisions. (Please type a number from 1 to 7 which indicates how important you feel each it...		
38	1	Jun 11, 2013 9:39 PM
39	3	Jun 11, 2013 1:07 PM
40	2	Jun 11, 2013 12:58 PM
41	3	Jun 11, 2013 12:46 PM
42	1	Jun 11, 2013 5:34 AM
43	2	Jun 10, 2013 7:26 PM
44	2	Jun 10, 2013 6:51 PM
45	1	Jun 10, 2013 5:38 PM
46	1	Jun 10, 2013 2:56 PM
47	1	Jun 10, 2013 2:41 PM
48	1	Jun 10, 2013 1:51 PM
49	1	Jun 10, 2013 11:17 AM
50	1	Jun 10, 2013 10:50 AM
51	8	Jun 10, 2013 10:48 AM
52	2	Jun 10, 2013 10:46 AM
53	1	Jun 10, 2013 10:05 AM
54	2	Jun 10, 2013 9:56 AM
55	1	Jun 10, 2013 8:32 AM
56	1	Jun 10, 2013 8:24 AM
57	1	Jun 9, 2013 8:09 PM
58	1	Jun 9, 2013 1:14 PM
59	1	Jun 9, 2013 9:04 AM
60	1	Jun 9, 2013 8:55 AM
61	7	Jun 9, 2013 8:10 AM
62	1	Jun 7, 2013 4:17 PM
63	2	Jun 7, 2013 3:07 PM

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64	1	Jun 7, 2013 1:07 PM
65	7	Jun 4, 2013 9:08 AM
	Non-motorized recreation (hiking, backpacking, skiing, etc.)	
1	3	Jul 9, 2013 6:42 AM
2	3	Jul 8, 2013 8:44 PM
3	7	Jul 8, 2013 12:06 PM
4	3	Jul 8, 2013 11:17 AM
5	2	Jul 7, 2013 4:00 PM
6	3	Jul 5, 2013 10:39 PM
8	4	Jul 2, 2013 11:08 AM
9	3	Jul 2, 2013 10:38 AM
10	3	Jun 28, 2013 12:36 PM
11	3	Jun 27, 2013 1:32 PM
12	5	Jun 27, 2013 11:36 AM
13	1	Jun 27, 2013 10:33 AM
14	7	Jun 27, 2013 6:44 AM
15	6	Jun 26, 2013 2:17 PM
16	1	Jun 26, 2013 7:54 AM
17	1	Jun 25, 2013 1:05 PM
18	3	Jun 25, 2013 12:34 PM
19	1	Jun 25, 2013 12:08 PM
20	4	Jun 25, 2013 10:23 AM
21	3	Jun 25, 2013 9:12 AM
22	3	Jun 22, 2013 8:21 PM
23	2	Jun 21, 2013 2:26 PM
24	3	Jun 20, 2013 2:14 PM

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26	3	Jun 19, 2013 11:27 AM
27	3	Jun 19, 2013 10:05 AM
28	3	Jun 19, 2013 9:11 AM
29	7	Jun 19, 2013 7:13 AM
30	3	Jun 19, 2013 6:21 AM
31	3	Jun 18, 2013 8:17 PM
32	4	Jun 18, 2013 1:29 PM
33	3	Jun 17, 2013 3:11 PM
34	3	Jun 17, 2013 1:55 PM
35	4	Jun 16, 2013 8:44 AM
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38	4	Jun 11, 2013 9:39 PM
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41	2	Jun 11, 2013 12:46 PM
42	3	Jun 11, 2013 5:34 AM
43	7	Jun 10, 2013 7:26 PM
44	3	Jun 10, 2013 6:51 PM
45	4	Jun 10, 2013 5:38 PM
46	3	Jun 10, 2013 2:56 PM
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48	5	Jun 10, 2013 1:51 PM
49	4	Jun 10, 2013 11:17 AM
50	1	Jun 10, 2013 10:50 AM

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53	3	Jun 10, 2013 10:05 AM
54	3	Jun 10, 2013 9:56 AM
55	3	Jun 10, 2013 8:32 AM
56	6	Jun 10, 2013 8:24 AM
57	6	Jun 9, 2013 8:09 PM
58	3	Jun 9, 2013 1:14 PM
59	4	Jun 9, 2013 9:04 AM
60	3	Jun 9, 2013 8:55 AM
61	5	Jun 9, 2013 8:10 AM
62	4	Jun 7, 2013 4:17 PM
63	4	Jun 7, 2013 3:07 PM
64	1	Jun 7, 2013 1:07 PM
65	7	Jun 4, 2013 9:08 AM
	Motorized recreation (ATV riding, Off-road driving, etc.)	
1	4	Jul 9, 2013 6:42 AM
2	4	Jul 8, 2013 8:44 PM
3	6	Jul 8, 2013 12:06 PM
4	4	Jul 8, 2013 11:17 AM
5	2	Jul 7, 2013 4:00 PM
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59	7	Jun 9, 2013 9:04 AM
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65	7	Jun 4, 2013 9:08 AM
	Livestock grazing	
1	7	Jul 9, 2013 6:42 AM
2	7	Jul 8, 2013 8:44 PM
3	4	Jul 8, 2013 12:06 PM
4	5	Jul 8, 2013 11:17 AM
5	2	Jul 7, 2013 4:00 PM
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50	7	Jun 10, 2013 10:50 AM

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59	5	Jun 9, 2013 9:04 AM
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62	6	Jun 7, 2013 4:17 PM
63	1	Jun 7, 2013 3:07 PM
64	6	Jun 7, 2013 1:07 PM
65	7	Jun 4, 2013 9:08 AM
	Mineral extraction and mining	
1	5	Jul 9, 2013 6:42 AM
2	5	Jul 8, 2013 8:44 PM
3	1	Jul 8, 2013 12:06 PM
4	7	Jul 8, 2013 11:17 AM
5	3	Jul 7, 2013 4:00 PM
6	6	Jul 5, 2013 10:39 PM
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55	4	Jun 10, 2013 8:32 AM
56	5	Jun 10, 2013 8:24 AM
57	5	Jun 9, 2013 8:09 PM
58	4	Jun 9, 2013 1:14 PM
59	7	Jun 9, 2013 9:04 AM
60	6	Jun 9, 2013 8:55 AM
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62	5	Jun 7, 2013 4:17 PM
63	4	Jun 7, 2013 3:07 PM
64	6	Jun 7, 2013 1:07 PM

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65	7	Jun 4, 2013 9:08 AM
	Residential and commercial development	
1	6	Jul 9, 2013 6:42 AM
2	6	Jul 8, 2013 8:44 PM
3	5	Jul 8, 2013 12:06 PM
4	6	Jul 8, 2013 11:17 AM
5	7	Jul 7, 2013 4:00 PM
6	7	Jul 5, 2013 10:39 PM
8	7	Jul 2, 2013 11:08 AM
9	7	Jul 2, 2013 10:38 AM
10	7	Jun 28, 2013 12:36 PM
11	4	Jun 27, 2013 1:32 PM
12	6	Jun 27, 2013 11:36 AM
13	1	Jun 27, 2013 10:33 AM
14	4	Jun 27, 2013 6:44 AM
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27	6	Jun 19, 2013 10:05 AM
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48	7	Jun 10, 2013 1:51 PM
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52	7	Jun 10, 2013 10:46 AM

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59	5	Jun 9, 2013 9:04 AM
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61	4	Jun 9, 2013 8:10 AM
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63	7	Jun 7, 2013 3:07 PM
64	7	Jun 7, 2013 1:07 PM
65	7	Jun 4, 2013 9:08 AM

Page 11, Q20. Please use the space below to write any additional comments or observations about bighorn sheep management that you would like to share.

1	First: If possible expand and improve all winter range there is at present. Second: Divert human foot traffic from lambing areas. (Some people would do this if told or asked to do so.) Third: Buy out domestic sheep grazing allotments and close them to domestic sheep forever.Fourth: Keep all domestic livestock off winter ranges at all times.	Jul 9, 2013 6:50 AM
2	I think CPW does a good job generally speaking. I wish that other areas of the state would be more willing to accept public input like you are doing in your area. Thank you!	Jul 8, 2013 8:50 PM
3	From experiences in the field in the management plan area, I feel that Bighorn populations are overestimated by Colorado Wildlife. Their numbers appear to be reduced from previous years and are very difficult to see anymore in our experience. I feel that predation, habitat loss, hunting, and other consumptive land uses all have decimated the Bighorn populations in the management area. In general, policies of both Colorado and the BLM appear to me to be too consumptive and seem to favor hunting and grazing rather than sustainment of Bighorn populations and their habitat. In my opinion, increasing the Bighorn population and having a hands-off management approach by allowing natural predation instead of hunting and other means to control the population is the most responsible direction for management that ensures Bighorn remain in Colorado as they should.	Jul 5, 2013 10:52 PM
4	CPW needs to place more emphasis on managing bighorn sheep and other species in the state for the benefit of hunters and those who enjoy watchable wildlife opportunities. Too much focus is placed on appeasing ranching and agriculture interests, as is evident by the existing bighorn sheep/domestic sheep MOU between CPW, land management agencies and CWGA. The signing of this MOU by CPW is a slap in the face to the hunters and anglers that largely fund the agency and count on CPW to manage wildlife in a way that maintains healthy populations and provides both consumptive and non-consumptive opportunties to enjoy that wildlife. It is shameful that leadership within CPW has chosen to voluntarily strip its wildlife managers in the field of some authority to do what is best for bighorn sheep in Colorado. As long as politics continues to trump science-based wildlife management, bighorn sheep herds in Colorado will struggle with the effects of poor land management practices in bighorn sheep habitat. The CPW mission is "...to perpetuate the wildlife resources of the state, to provide a quality state parks system, and to provide enjoyable and sustainable outdoor recreation opportunities that educate and inspire current and future generations to serve as active stewards of Colorado's natural resources." There is no mention in that statement of maintaining a viable woolgrowing industry in the state, and it is high time that sportsmen and wildlife advocates in Colorado demand that CPW use every tool available in the toolbox to manage wildlife on public lands for the benefit of wildlife advocates in the state and throughout the country.	Jul 2, 2013 11:02 AM
5	Please do what can be done to reduce, or better yet, eliminate, domestic sheep and goat grazing in all areas where bighorns may interact with them. There are plenty of private and public-land pastures for sheep to graze in this country, and far too few for bighorns.	Jun 28, 2013 12:40 PM
6	Hunting is nasty. Keep government out of the management of bighorn sheep so	Jun 27, 2013 1:33 PM

Page 11, Q20. Please use the space below to write any additional comments or observations about bighorn sheep management that you would like to share.

	they stand a chance!	
7	Nice job. The Forest Service, BLM, and State land board need to get the domestic sheep out of there so that bighorn populations can thrive without the grim reaper standing at the doorstep.	Jun 27, 2013 6:47 AM
8	Sheep ranchers in this area display a sense of entitlement when it comes to exclusively dominated public land in the area where their herds are grazing and destroying wildlife habitat and streams. They are often accompanied by 'protector' dogs and there have been too many incidents of these dogs going after people and pets not harassing the livestock but merely on a hike or jog. These ranchers also fire weapons near other public land users to apparently send a message. I can see nothing good other than the historic precedence of these ranching activities and I can appreciate that, but not to to their hostile, exclusive use of our public land in a manner that threatens others, and certainly has totally messed up local streams. Please increase the wildlife population and don't allow these bullies to scare off other less harmful users of our public land. Thank you for your consideration.	Jun 26, 2013 8:01 AM
9	To elaborate on question 19 - I prefer to see CPW increase the population and distribution of sheep in this DAU to the extent possible given that adequate winter range capacity exists and that overlap with active domestic sheep allotments remains minimal. I also read the MOU between CPW, CDOA, BLM, USFS, and CWGA attached to the draft management plan with interest. It seems obvious that one of the most beneficial management practices is to control exposure of bighorns to domestic sheep. I believe there is potential for a collaborative effort (compromise) to vacate sheep allotments near occupied bighorn habitat in exchange for quality allotments elsewhere, or for sportsmen/conservation groups to buy out those allotments when they're available. Wool growers have families to feed, businesses to operate, and a way of life they wish to continue, and I expect we will find more workable solutions when they also concede that in some instances their business contributes to the decline of a wildlife resource in which nearly 5.2 million citizens of Colorado have a stake.	Jun 25, 2013 1:20 PM
10	Because of the limited water resource in the southwest, I believe that grazing should NOT be a "protected" activity or right. Wilderness needs to be protected.	Jun 25, 2013 1:07 PM
11	We have not allied for sheep permits because they are nearly impossible to obtain without the Max. preference points allowed...and then you are still in a group where the percentages are almost zero! Anything to help increase the herds in C O is welcome.	Jun 25, 2013 9:15 AM
12	I am Tim Pierce,I feel that only resadents should hunt these areas.I am also concerned with the so called point system,this is a joke on we the resadents of colo.If you say we need 15/20 points to hunt these areas,this to myself and others is a way to get more money for nothing but a waiting game,where you are putting my money in your pocket with intrest,while we wait for a maybe chance to hunt not only these ares but others as well.I do not have the price of some of the hunting tags that are for sale nor the points to try for these areas.I feel that we the resadents are not seeing the fairness of our states hunting laws,along with the issueing of tags on the so called 80/20 deal.Along with the so called leftover	Jun 22, 2013 9:22 PM

Page 11, Q20. Please use the space below to write any additional comments or observations about bighorn sheep management that you would like to share.

	draw where we put in for a tag and get nothing and still we are told there are no leftovers to be had while there are some tags returned too where hunters did not recive tags for other partys in there group or they cannot hunt for various reasons.These tags are not put back into the leftover draw and should be and only for the resadents as well.If you fell that the nonresadents bring alot of much needed money,just think how much more we the resadents put in every day,mounth,year,to the state and the revanue it brings in,200 times what others bring in,as is important as the revanues brought in by other means. The attitude of the resadent hunters against DOW and thepoorness of the issueing of the hunting tags and the point system is very bad you need to fix this today and start allowing the hunters to bring in ideas that should be put intothe regs.	
13	SHEEP GRAZING (DOMESTIC) SHOULD NOT BE ALLOWED IN WILDERNESS AREAS-	Jun 21, 2013 2:27 PM
14	I was privileged to hunt area 36 and harvested a very nice ram before the last big die off. Based on my experience the most significant limiting factor for wild sheep in the area is disease transmitted from domestic animals, in particular domestic sheep. While I realize politics are involved, to me the equation is very simple; there are many places where domestic sheep can be raised, but there are very few places where wild sheep can survive and thrive. I would like to see the domestic grazing allotments in the area reduced or eliminated, with adequate compensation to the holders of those allotments. If that is accomplished the wild sheep population may be able to expand further since there is both summer and winter range in the area which can be utilized not only by the wild sheep, but also the elk herds. I am sure that funding for that process can be secured from various of the wildlife organizations, such as RMBS, Wild Sheep Foundation, Rocky Mountain Elk Foundation, Safari Club, etc. As a member of many such organizations, I know that funding sources exist for such programs, and that they are willing to partner with state and federal agencies.	Jun 19, 2013 9:29 AM
15	I agree with the Tier 2 draft designation.	Jun 19, 2013 7:15 AM
16	According to your own review of the Rams Mountain herd management in Canada, managing for optimum carrying capacities, a die off occurred in that herd with low recruitment to that herd that has lasted for years now, and no domestic sheep near that herd. Respritory issues in that herd has not been ruled out.	Jun 19, 2013 6:28 AM
17	I do not agree with the Tier 1 designation for this DAU. There is too much evidence of historic and potentially ongoing disease events to make this a premier bighorn DAU	Jun 18, 2013 1:31 PM
18	PLEASE TRY TO INCREASE POPULATIONS ACROSS THE BOARD. PAY ATTENTION TO PREDATION BY ENCOURAGING MORE HUNTING OF PREDATORS. CONTINUE TO MONITOR DISEASE AND WHY IT TAKES HOLD. HUNTING TAG NUMBERS SHOULD BE ALMOST A NON FACTOR NOW IN POPULATION AS TAKING THE FEW THAT HUNTERS TAKE SHOULD NOT BE AFFECTING MUCH. IF ONE TAG HERE AND THERE AFFECTS NUMBERS I BELIEVE WE ARE FOCUSED ON THE WRONG PROBLEM. WE LOSE MORE TO CARS, PREDATION, WEATHER, AND DISEASE THAN THE HUNTERS TAGS.	Jun 17, 2013 3:24 PM

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19	The FS and BLM need to adequatley manage domestic sheep on public lands. They need to implement a buffer from wild sheep. Until they do we are at risk of loosing our wildife sheep.	Jun 17, 2013 1:58 PM
20	It's hard to believe that federal agencies continue to allow domestic sheep on top of bighorn sheep anywhere in the state. How does one agricultural producer's interest override the interest of the masses. The allotments up there are right in the middle of these bighorn herds. You will never be able to keep them apart and eliminate the risk of disease transmission as long as the domestics are allowed to graze up there. Find the permittee another allotment where there aren't bighorns. There used to be 30 ram licenses issued in S22, now we have 2. What does that tell you? Those are our public lands, and our bighorn sheep. Give them the consideration they deserve.	Jun 12, 2013 8:36 AM
21	Control disease by getting rid of domestic sheep grazing.	Jun 11, 2013 9:43 PM
22	Decrease domestic sheep grazing in DAU and in entire state.	Jun 11, 2013 9:40 PM
23	Decrease predators with lifting of method of take restrictions and add a bounty for coyote and fox. Also install more game fencing along roads, limit night speeds and require state/country to cut grass/weeds and brush back a min of 15' from the roads. This will help all wildlife.	Jun 10, 2013 11:26 AM
24	A very valuable resource. I feel they are over managed and limited. Need more feed back from hunters and outdoor people on sightings and counts to help validate new locations. A program of feedback is needed	Jun 10, 2013 10:57 AM
25	It took me 24 years to draw a sheep tag. Most people will never draw one because of the limited number of permits available. In 53, I would like to see the season moved back to late October or November. In 53 the season is September, and the sheep are in the thickest timber, worst cliffs and never come down. Where the rams spent that month, it was impossible to reach them without repelling equipment. After 24 years of waiting, I never got the oportunity for a shot. I hunted 22 days of the season. We saw the rams almost every day through spotting scopes from below, but physically could not get to where they were living.	Jun 10, 2013 8:32 AM
26	I base my answers on the state of the Alamosa Canyon herd/ S29 that I hunted 3 years ago. I assume all herds are being managed poorly based on that experience. There are very few sheep there and the local DOW reps (terrestrials man) are in denial. Whistling past the graveyard. Possibly they fear an ass chewing from higherups if the true state of the herd is revealed. I hired (and paid) one formal outfitter and three other informal outfitters, two of whom have formally guided bighorn hunts in the Alamosa canyon in the past. The 4th was a successful hunter in this area a few years ago. The only male bighorn the four of us could find in literally thousands of hours of searching, starting in early summer, was a lamb. Hunting should not be taking place in S29 and I wasted 13 years of points. Additionally, I am a veterinarian in Monte Vista and I have several clients that have residences within the Alamosa Canyon area. They report to me that they almost never see sheep anymore. One must go back 5 years plus before they recall frequently seeing sheep. Again, I have little knowledge of the sheep in the areas you reference but I base my answers on the	Jun 9, 2013 9:24 AM

Page 11, Q20. Please use the space below to write any additional comments or observations about bighorn sheep management that you would like to share.		
	assumption that the state herd is being managed as poorly as the Alamosa Canyon S29 herd. Best, Warren Deal	
27	The Bellows creek herd (AKA Blue Creek herd) seems to rise and fall in population due to diseases. Frequently there are years when quite a few large rams are in the area before there is a die off. I have personally seen as many as 6 shooter rams in one group on Pool Table road. I would like to see some hunting allowed here so that some of these rams could be harvested instead of waiting for them to die off. If predation is deemed to be a problem, let us start grinding down the mountain lion population which seems to be taking over this part of the State. I personally know of at least 2 mountain lion kills of deer within the Creede city limits, but don't personally know of any lion kills of Bighorns. My only observation of Coyote vs Bighorn was one case where a mature ram faced down a pair of coyotes who thought better of tackling him and fled the scene. The ram did not yield one inch of ground. This same pair would probably be able to take a lamb, however. Some placement of salt licks might reduce road kills, since Bighorns are frequently seen in the middle of the Highway during the winter licking salt. Thank you for the opportunity of putting in my two bits worth, and thanks for the work that you folks do. JB Alexander Creede	Jun 7, 2013 5:46 PM
28	I would like to see the weighted draw process change to make the draw more dependent on the number of preference points.	Jun 7, 2013 1:10 PM