Northern San Luis Valley Pronghorn PH-14 Herd Management Plan Extension

Game Management Units 68, 79, 82, 681, 682, and 791

Revised By

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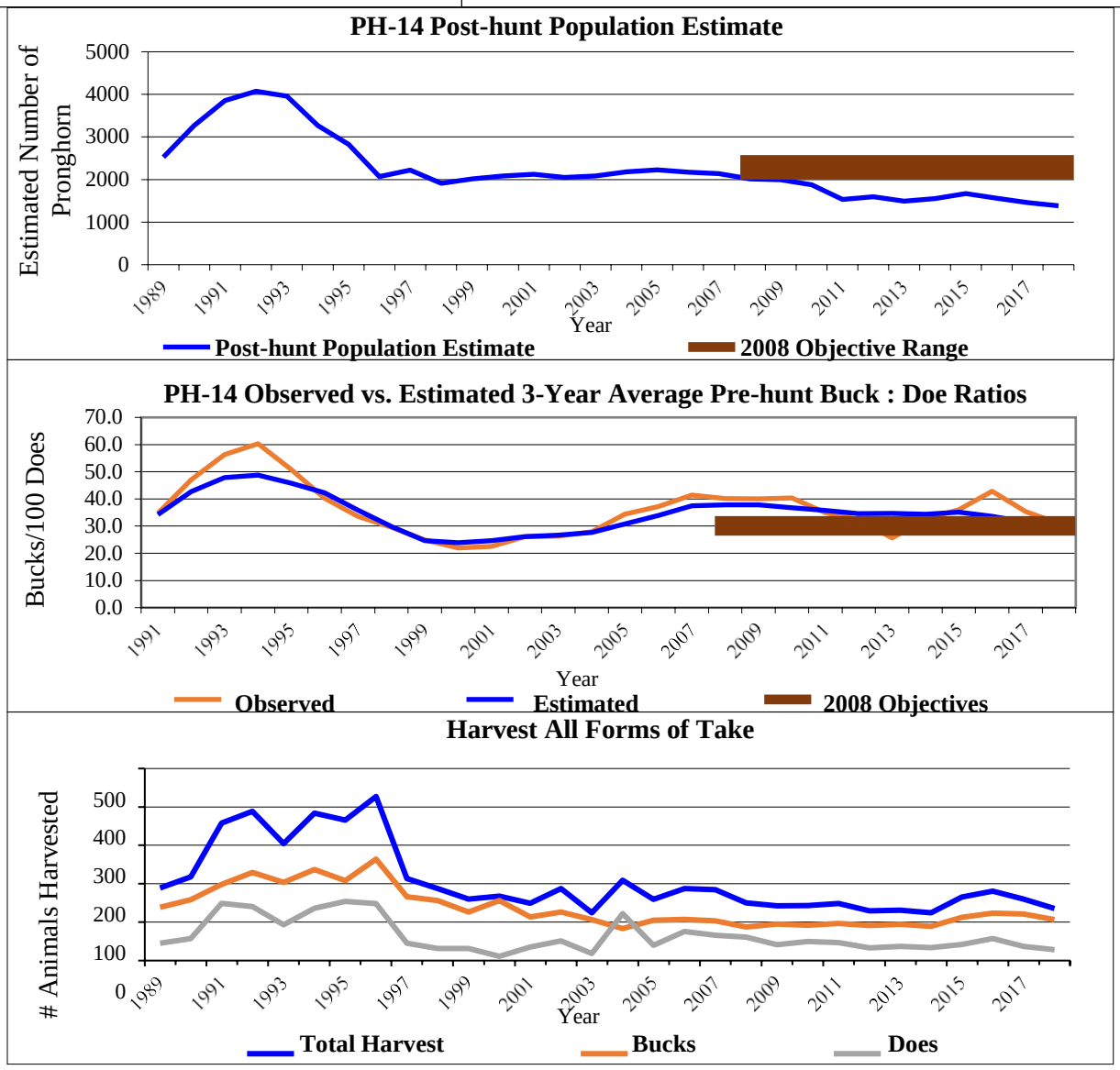
Northern San Luis Valley Pronghorn PH-14 HMP Extension Executive Summary

GMUs: 68, 79, 82, 681, 682, and 791.	**Land Ownership:** 12.5% BLM, 33.8% RGNF, 4.1% USFWS, 6.6% NPS, 0.1% BOR, 3.8% CO State and 36.3% Private.
Post-hunt Population (2018): 1,386 pronghorn.	**Pre-hunt Sex Ratio (Bucks to 100 Does):** 31 (Observed 3-yr. average).
2008-2018 (Previous Herd Plan Objectives):	2,000 to 2,500 pronghorn; 27-33 Bucks per 100 Does.
2019-2029 Preferred Herd Plan Objectives:	2,000 to 2,500 pronghorn; 27-33 Bucks per 100 Does.



Pronghorn herd PH-14 is in the northern section of the San Luis Valley. The DAU (geographical area) comprises Game Management Units (GMUs) 68, 79, 82, 681, 682, and 79. The pronghorn range (summer and winter) comprises approximately 1,517 square miles of this area. The DAU encompasses portions of Alamosa, Mineral, Rio Grande, and Saguache counties. CPW rarely locates pronghorn in the Mineral County portion. Public land makes up approximately 64% of the entire DAU, and approximately 36% of the area is privately owned.

The post-hunt population estimate reached its peak during the early 1990s at almost 4,100 animals. Since 1992, the population has declined to its current (2018) estimated population level of approximately 1,400animals. A sharp decline occurred in the mid-1990s. CPW believes the reduction occurred because of poor fawn recruitment and high female harvest. Drought conditions over many years may have contributed to the decrease in fawn recruitment. The pre-hunt observed fawn-to-doe

ratios have fluctuated since the mid-1990s. Moisture availability during the spring and summer months may have caused the fluctuations in fawn survival. CPW expects the population to remain relatively stable and possibly increase with the present harvest potential.

The three-year-average observed sex ratio peaked in the mid-1990s at approximately 60 bucks per 100 does. The sex ratio then dropped through to the early 2000s before making a recovery towards the end of the decade. Since the late 2000s, there has been variability in the average observed sex ratios. Over the last ten years, it has averaged approximately 35 bucks per 100 does. CPW recognized this was above the established objective range. Hence, CPW cautiously increased buck licenses to reduce the sex ratio slightly. The most recent three-year-average observed sex ratio of approximately 31 bucks per 100 does fell comfortably within the objective range. The current sex ratio objectives provide adequate hunting opportunity and a desirable mature buck population.

The ability to obtain a license for this DAU can influence harvest success, which is typical in many pronghorn units. Buck licenses are available on a limited basis but are in high demand. Public land doe licenses are extremely limited and are only available for GMU 82 and a portion of eastern GMU 681 (East of CR 46AA and between Saguache Creek and Kerber Creek). Despite that, CPW may provide doe depredation licenses may on private land. Since 1989, buck harvest has averaged approximately 136 animals. After implementing the 2008 objectives, buck harvest has averaged approximately 101 animals. The average doe harvest since 1989 is 64 animals. However, most doe damage or dispersal requests have occurred in GMUs 68 and 79. Harvest from damage and dispersal licenses comprises approximately a third of the doe harvest in the DAU. Since 2008, the average doe harvest has decreased to 42 animals. The overall combined-season (all methods of harvest) average success rate, since 2008, has been approximately 64%. The highest harvest success rate since 2008 has occurred during the rifle season (73%), and the lowest has been during the archery season (19%).

The two most significant factors limiting this population are the amount of annual precipitation and availability of water resources, particularly on winter habitat. Relatively high reproduction rates have occurred in areas with natural water retention and succulent forage, such as along San Luis Creek and irrigated alfalfa fields. The more arid regions have seen reduced fawn recruitment, especially during drought conditions; significant droughts occurred in 1996, 2002, 2013, and 2018. The availability of winter range continues to diminish, with increased development on private land and competition with domestic livestock.

Most game-damage issues in this population have been on agricultural land between Del Norte and Center in GMU 79 and the Villa Grove area of GMU 82. Some landowners have been intolerant of the presence of pronghorn on their fields. The number of pronghorn involved in landowner conflict issues is a small proportion of the overall population. Issuing doe damage or dispersal licenses to the affected landowner usually resolves the problems. In GMU 79 and 82, CPW has used doe damage and dispersal licenses to reduce pronghorn conflicts on private land.

Preferred Objectives:

Post-hunt Population

The preferred management objective for PH-14 is a **population of 2,000 to 2,500 pronghorn**, aiming to increase the population. Buck hunting opportunities would remain the same. CPW will remove public land and private-land-only (PLO) doe licenses in GMUs 82 and 681. Once the herd population estimate falls within the objective range, or if significant private land issues occur, CPW may reinstate these licenses. CPW will maintain the availability of doe PLO licenses in GMU 79 and provide these to landowners if needed.

Three-year Average Pre-hunt Sex Ratio

The preferred three-year average pre-hunt sex ratio is to maintain the current objective at **27-33 bucks per 100 does**. This range supports what CPW has recently observed during summer inventory flights. The objective range allows for a satisfactory hunting experience and the desired hunting opportunities.

Strategies for Achieving the Preferred Objectives:

Post-hunt Population – To manage towards the preferred pronghorn population objective, buck licenses will remain the same. Eliminating all public land and private land (GMU 82 and 681) doe licenses should allow for population growth. However, control of private land depredation issues will remain in place. CPW will consider doe harvest opportunities once the population estimate is within the objective range, or there is a deterioration in habitat.

Pre-hunt Sex Ratio – Maintaining buck license numbers will allow buck-hunting opportunities to remain the same. Harvest from these licenses should sustain the desired adult buck population at acceptable levels and maintain stakeholder satisfaction.

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Herd Management Plans and Wildlife Management by Objectives

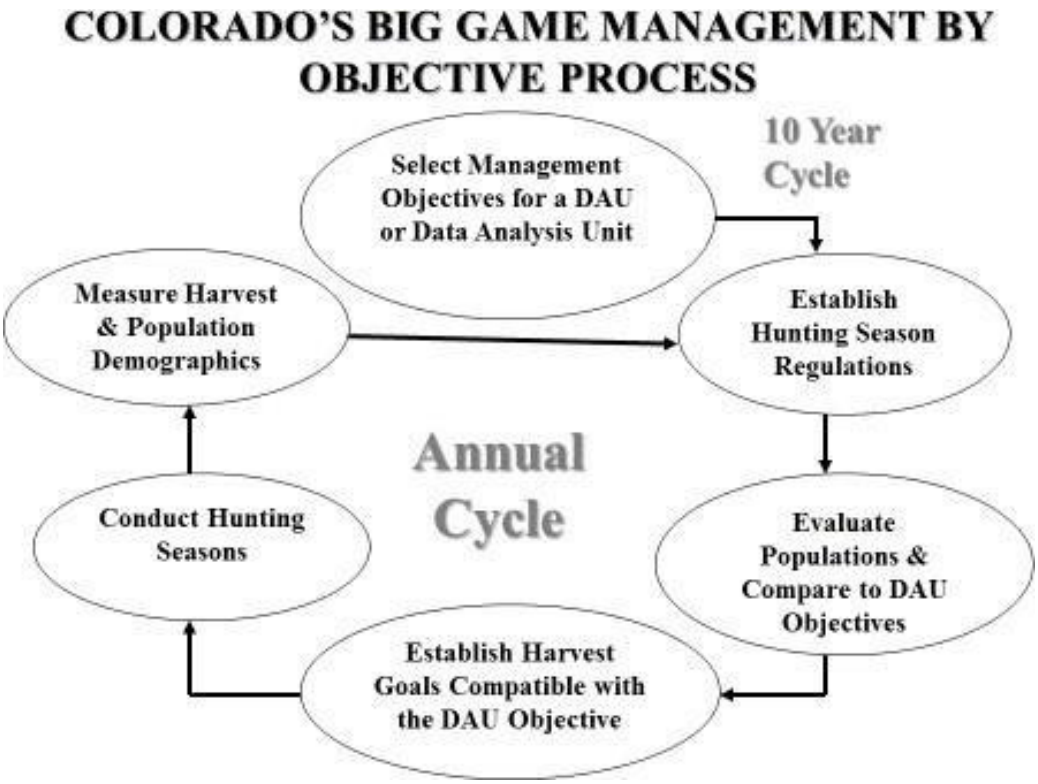

Figure 1. Management by the objective process used by Colorado Parks and Wildlife to manage big game populations on a DAU basis.

Colorado Parks and Wildlife (CPW) writes Herd Management Plans (HMPs) for big game populations in specific geographical areas represented as Data Analysis Units (DAUs). The DAU comprises an aggregation of one or more Game Management Units (GMUs). It also represents the year-round distribution of a specific big game herd. CPW manages big game populations using a "management by objective" approach. This management style is the guiding direction to a cycle of data collection, data analysis, and the resulting decision-making processes (Figure 1). HMPs support and accomplish the management objectives of the long-range (10-year) plan within the specific DAU. A significant outcome is the availability of hunting seasons for big game harvest opportunities.

CPW designed the HMP process to use big game harvest as a tool to achieve the identified objectives. The method incorporates a combination of public desires, habitat capabilities, and herd biological capabilities into the final management strategy. The general public, hunters, commissioners, federal land management agencies, private landowners, and agricultural interests are all involved in the formulation of the HMP objectives. Biologists from CPW use input from all stakeholders to contemplate the preferred objectives. The agency regional and state review sessions discuss and analyze the HMPs. Finally, they go through the Colorado Parks and Wildlife Commission (PWC) approval process.

CPW manages individual herds to meet the specific HMP objectives. Biologists compile data and transfer it into population models to derive a population estimate. The parameters used in the models include harvest data calculated from hunter surveys, sex and age composition collected from aerial flight inventories, and mortality factors. Mortality factors comprise roadkill reports, wounding-loss estimates, and deaths from winter-severity received during field observations. After this, biologists compare the computed population estimate to the herd objectives. CPW then establishes the number of hunting licenses to manage the population towards the objectives.

Description of the Data Analysis Unit (DAU) PH-14

Location

The DAU for the Northern San Luis Valley pronghorn herd is in south-central Colorado, on the north side of the San Luis Valley (SLV). It comprises GMUs 68, 79, 82, 681, 682, and 791 (Figure 2). The continental divide bounds the DAU on the northern and northwestern side, the Sangre de Cristo Mountains on the eastern side, and highway 160 and the Costilla-Alamosa County line on the southern side. PH-14 is approximately 3,225 square miles in size, of which the pronghorn range (summer and winter) comprises approximately 1,517 square miles (or 47%). It encompasses portions of Alamosa, Mineral, Rio Grande, and Saguache counties. Rarely has anyone found pronghorn in the Mineral County portion of the DAU. The primary drainages in the area are the Carnero Creek, Rio Grande River, Russel Creek, Saguache Creek, and San Luis Creek.

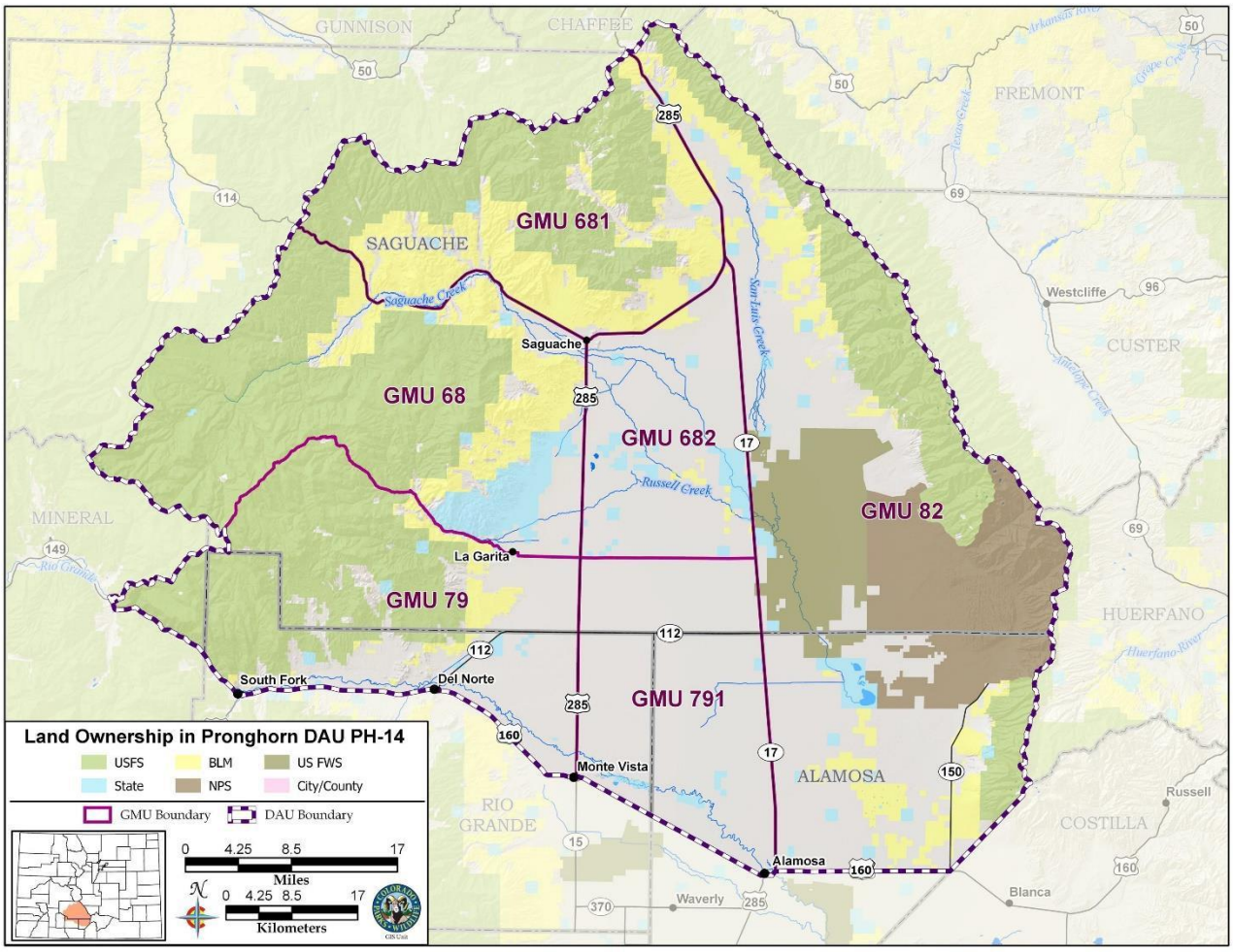

Figure 2. Geographical boundaries with landownership for DAU PH-14 (GMUs 68, 79, 82, 681, 682, and 791) in southwestern Colorado.

Landownership, Climate, and Vegetation

The entire unit has an elevation ranging from approximately 7,500 ft. on the valley floor to over 14,000 ft. in the Sangre de Cristo Mountains. Public land makes up approximately 64% of the DAU, and approximately 36% of the area within the DAU is privately owned (Figure 2, Table 1).

At the lower elevations, grassland, shrub, and agriculture are predominant. As the elevation increases, precipitation levels become higher, and the vegetation changes to oakbrush, pinyon-juniper, and ponderosa pine. After that, Douglas fir and white fir combined with extensive stands of aspen groves flourish. Engelmann spruce, lodgepole pine, and subalpine fir become predominant between 9,500 and 12,500 feet in elevation. Alpine tundra prevails above 12,500 feet in elevation.

	Overall Range	Winter Range	Winter Concentration Areas	Severe Winter Range	DAU PH-14 Area
Overall DAU	**47.0%**	**33.3%**	**6.5%**	**4.4%**	**100.0%**
BLM	**9.9%**	**7.2%**	**1.1%**	**1.1%**	**12.5%**
RGNF	**5.1%**	**1.8%**	**0.2%**	**0.1%**	**33.8%**
Colorado State	**2.9%**	**2.1%**	**0.2%**	**0.2%**	**3.8%**
Private	**20.5%**	**14.5%**	**3.2%**	**3.0%**	**36.3%**
Bureau of Reclamation	**0.1%**	**0.1%**	**0.0%**	**0.0%**	**0.1%**
Land Trust	**1.9%**	**1.5%**	**0.4%**	**0.0%**	**2.7%**
Fish and Wildlife Services	**3.9%**	**3.7%**	**0.6%**	**0.0%**	**4.1%**
National Park Service	**2.7%**	**2.4%**	**0.8%**	**0.0%**	**6.6%**

Table 1. Land ownership overall, in the winter range, the winter concentration areas, and the severe winter range for pronghorn herd PH-14.

PH-14 has a highland or mountain climate, with cool summers and cold winters. Heavy snowfalls can occur, especially at higher elevations. A portion of the DAU is in the rain shadow of the San Juan Mountains. Total precipitation at the higher elevations of the La Garita and Sangre de Cristo mountains can vary annually between 20 and 30 inches. This precipitation comes mostly in the form of winter snow. The foothills receive 10-12 inches, while the valley floor gets 6-8 inches annually; the valley is considered a high desert environment.

Habitat Resources

Major limiting factors for the PH-14 herd are the amount of annual precipitation and water resources. These limiting factors can affect the quantity and quality of forage. The availability of quality forage is essential in the winter range and production areas (Figure 3).

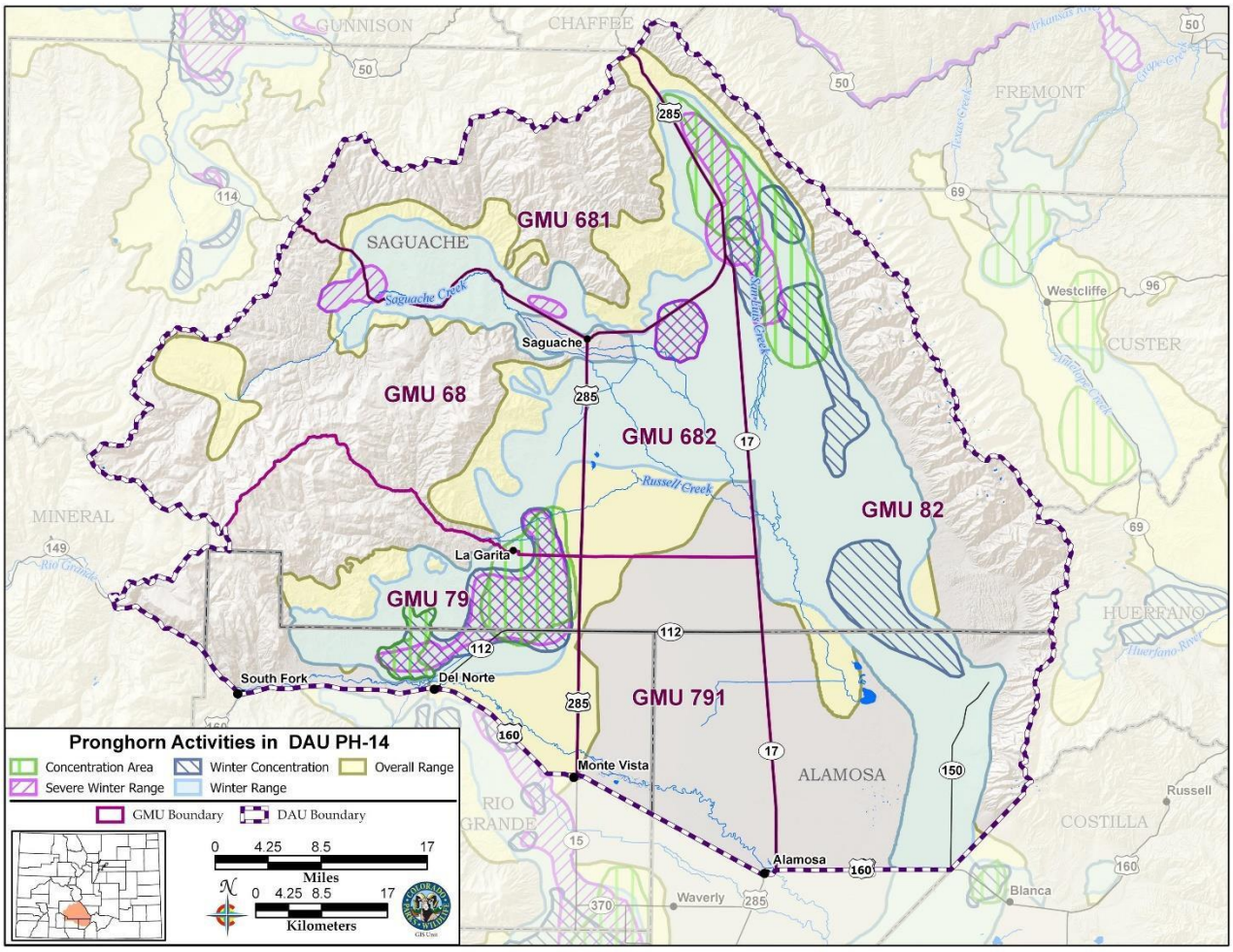

Figure 3. Winter range, severe winter range, and winter concentration areas for PH-14. (For definitions: https://cpw.state.co.us/learn/Maps/CPW-Public-GIS-Species-Activities-Definitions.pdf#search=winter%20range%20definition).

Pronghorn Range and Movement

Pronghorn are usually located below 9,500 feet in this DAU. The majority of pronghorn are in the grassland or shrub habitat. Several pronghorn can also be found in openings of the ponderosa pine, pinyon-juniper, or oak brush vegetation types. In GMU 68, an increasing number of pronghorn are located at higher elevations, such as in Saguache Park. The highest concentration of pronghorn in the DAU occurs along San Luis Creek, near Villa Grove. Many drainages in the area provide significant water resources throughout the year, and dominant native vegetation provides quality forage availability.

Pronghorn usually move to the south and west-facing slopes during the fall and winter migration. The time and distance moved change depending on winter severity, particularly snow depth. The movement to summer range is general dispersal throughout the overall range. This movement takes place during the spring, summer, and fall months.

Herd Management History

Pronghorn had been exploited by the early 1900s, like much of Colorado's big game animals, because of market hunting and individual settlers needing food (Warren 1910). In 1907, Cary (1911) gathered pronghorn numbers and distribution data from the San Luis Valley. Most of the herd, which Carey (1911) estimated conservatively at 50 to 75 animals, was located between Crestone and Fort Garland.

Several translocations of pronghorn to the DAU occurred in the early 1960s, having been indigenous to the area (appendix A). During the early 1980s, CPW trapped and moved approximately 1000 pronghorn to or from the DAU (appendix B).

CPW started limiting all pronghorn licenses in the late 1990s. Archery licenses became limited in 1999 and went from either sex licenses to buck-only licenses. The limitation was because of poor fawn recruitment observed in the years leading up to that period. In 2007, muzzleloader licenses went from being statewide-limited licenses to limited licenses valid only for GMUs in the San Luis Valley. In the same year, CPW eliminated muzzleloader doe licenses in this DAU.

Post-hunt Population Size

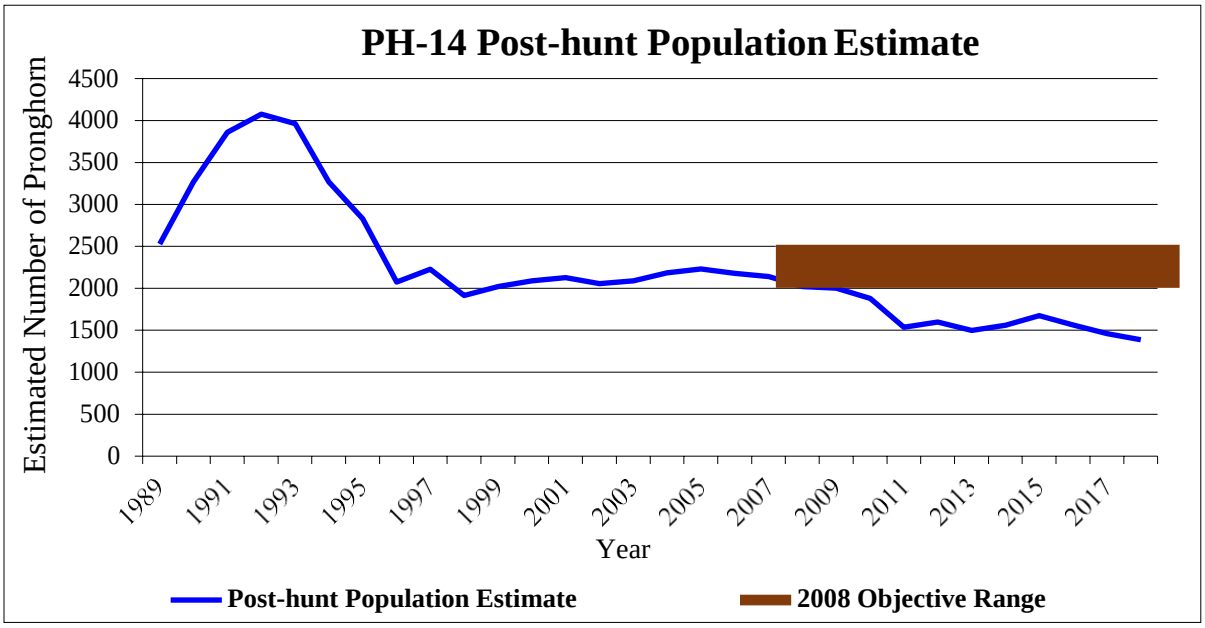

Figure 4. PH-14 post-hunt population estimate from 1989 to 2018.

CPW uses a computer modeling process to estimate the size of the pronghorn populations in each DAU. The computer modeling programs used by biologists have transformed since the early 1970s. The most recent change occurred in 2006 with CPW embracing a spreadsheet instrument. Modeled post-hunt population estimates are generated by solving for the best fit between observed vs. predicted pre-hunt sex ratio data. Observed pre-hunt sex ratio samples vary annually. The variance is due to weather or existing drought conditions, animal distribution, or limitations on flight time. Variation makes alignment between observed and predicted values difficult because the models work to align the sex

ratios over time. CPW biologists calculate the observed three-year average sex ratio to balance any variation. Biologists then compare the observed three-year average to the preferred objective range for management actions and hunting license allocation.

In 2008, CPW set the population objective at 2,000-2,500 animals (Figure 4). The intent was to maintain the population at that level. Since then, the estimated post-hunt population has averaged approximately 1,650 pronghorn. This estimate is below the 2008 objective range. The estimated post-hunt population size for PH-14 reached its peak, above 4,000 animals, in the early 1990s (Figure 4). Since that time, the population model depicts a decline to the current (2018) estimated population size of approximately 1,400 animals. The average estimated population size throughout the 1990s was 2,950 animals (Table 2), which has decreased since then. A sharp decline occurred in the mid-1990s. Drought conditions combined with high female harvest are the likely cause. A severe drought in 2002 may have exacerbated the decline further, with poor fawn recruitment observed.

Management Herd	1990s	2000s	2010 - 2018	2008 Post-hunt Population Management Objective
	Population Average	Population Average	Population Average	
Pronghorn - Northern San Luis Valley PH-14	2,950	2,110	1,570	2,000 - 2,500

Table 2. Population Averages for the 1990s, 2000s, and 2010 to 2018. Estimates are based on the population model.

Pre-hunt herd Composition

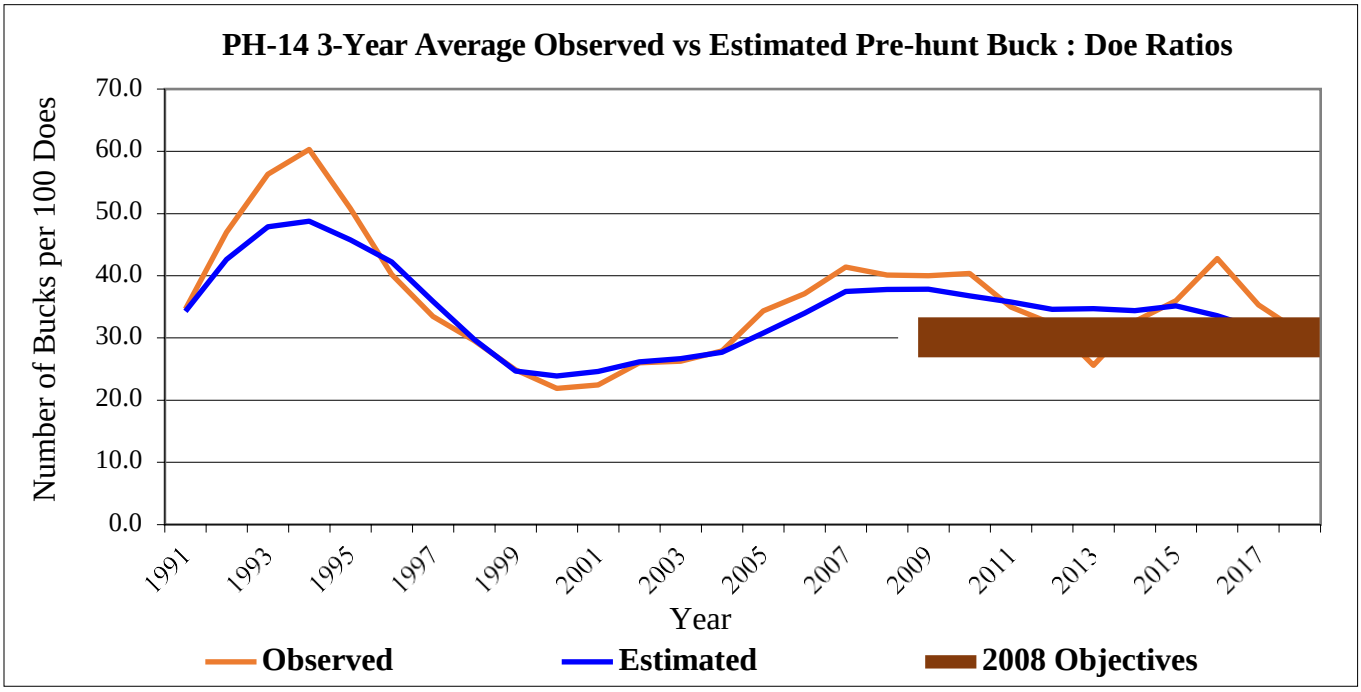

Figure 5. PH-14 Three-year average observed vs. estimated pre-hunt sex ratios from 1991 to 2018.

CPW uses aerial classification surveys to gather observed pre-hunt herd composition data. These surveys usually take place at the end of July (summer), using a fixed-wing aircraft. The classification flights do not result in a population census, but an observed sample large enough (10-25%) to establish the age and sex ratios throughout the DAU. Management objectives are based on the post-hunt population, and the three-year-average observed sex ratios. The mechanisms to determine the herd status relevant to the preferred objectives are consistent throughout the life of the HMP.

The three-year-average observed sex ratios for this herd peaked in the mid-1990s at approximately 60 bucks per 100 does (Figure 5). It then dropped into the early 2000s before making a recovery towards the end of the decade. Since the late 2000s, there has been variability in the observed sex ratios. It has averaged approximately 35 bucks per 100 does over the last ten years, which was above the established objective range. Hence, CPW cautiously increased buck licenses to reduce the sex ratio slightly. The most recent three-year-average observed sex ratio of approximately 31 bucks per 100 does fell comfortably in the established objective range. The current sex ratio objectives provide adequate hunting opportunity and a desirable mature buck population.

Harvest

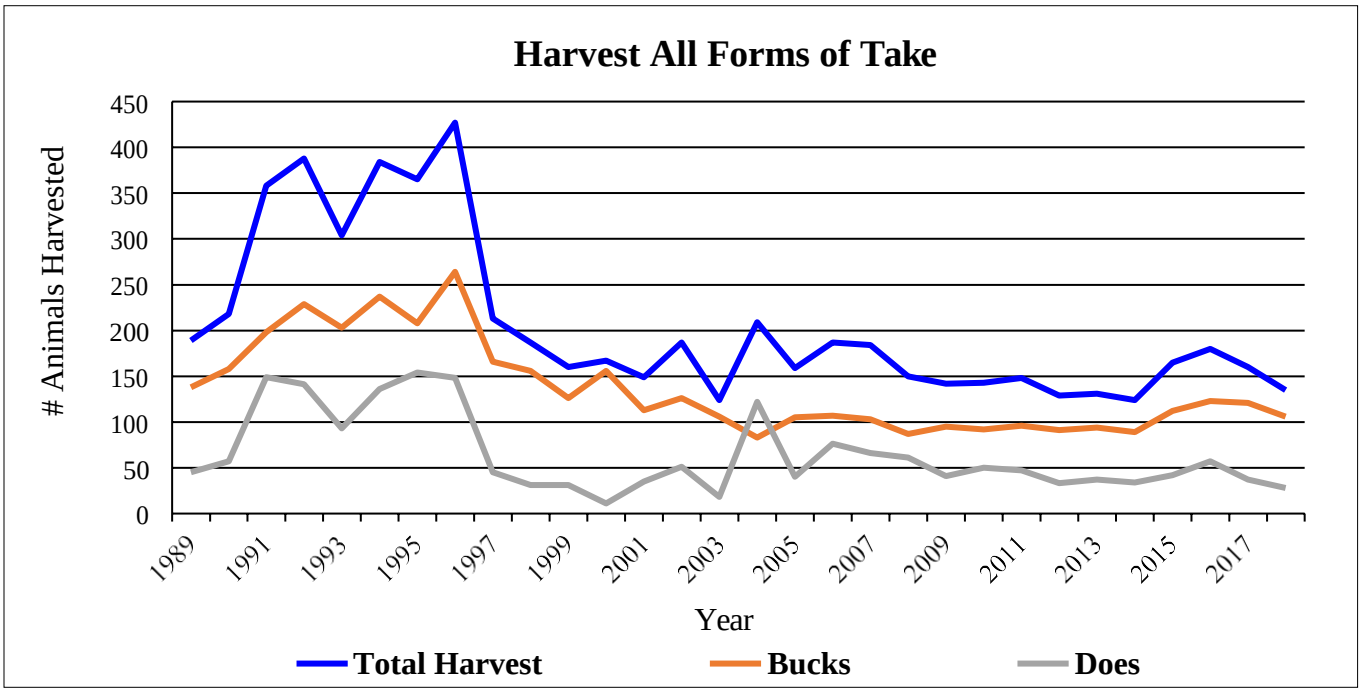

Figure 6. PH-14 Total harvest, buck harvest, and antlerless harvest from 1989 to 2018.

Pronghorn harvest depends on the availability of limited licenses. Rifle success rates in this DAU are relatively high in comparison with other ungulate species. The open habitat in which pronghorn usually occur result in the higher success rates. The open habitat makes it easier for hunters to pursue their quarry. Nevertheless, hunters take the opportunity seriously because of the difficulty in drawing a pronghorn license. Thus, variability in harvest is usually a reflection of changes in licenses more than changes in the population size.

Buck harvest has averaged 136 animals since 1989. The maximum buck harvest of 264 animals occurred in 1996, and a minimum of 83 animals in 2004. Since 2008, the average buck harvest has been 101 animals with a high of 123 in 2016 and a low of 87 in 2008. Alternatively, doe harvest has averaged 64 animals since 1989, with a maximum harvest of 154 animals in 1995 and a minimum of 11 in 2000. Since 2008, the average doe harvest has decreased to 42 animals, with significantly fewer depredation issues. Over that period, the maximum doe harvest was 61 animals in 2008 and a minimum of 28 animals in 2018. The majority of doe harvest occurred in GMU 82; however, additional dispersal doe harvest occurred in GMU 68 and 79. Game damage or dispersal harvest has comprised approximately a third of all doe harvest in the DAU.

The combined hunting season success rates from 2008 to 2018 have averaged approximately 64%. However, the harvest success rates are significantly skewed between the archery and rifle seasons. The average archery success since 2008 is approximately 19%, with a low of 4% in 2012 and a high of 34% in 2011. In comparison, the rifle season's success has averaged approximately 73%, with a low of 52% in 2012 and a high of 91% in 2015.

Current Herd Management Status

Summary of Current Conditions

The current post-hunt population estimate (approximately 1,400 animals) is below the objective range. Yet, the population trend has been relatively stable since 2011 (Figure 4). Since implementing the 2008 objectives, the pronghorn groups, in the Villa Grove vicinity in the northeastern section of the DAU, have had relatively successful fawn recruitment rates. CPW currently issues doe licenses on public and private land in GMU 82 and GMU 681 (East of CR 46AA and between Saguache creek and Kerber creek). These licenses are to alleviate any potential game damage issues. Observed fawn-to-doe ratios fluctuate annually. CPW believes that differences in annual precipitation levels and timing may cause these fluctuations to occur. Management has little control over this. Variables, such as weather, forage quality, forage availability, water resources, predation, or disease, may have higher impacts on reproduction and fawn recruitment than management actions.

The three-year-average observed sex ratio has been on a downward trend over the last few years, after having been above the currently established objective range. The most recent sex ratio of approximately 31 bucks per 100 does fell comfortably in the objective range. CPW set these objectives to provide desirable buck hunting experiences and to sustain a relatively mature buck population. Pronghorn typically reach their maximum, mature, horn-size at three years of age, unlike deer and elk. Pronghorn do not continue to increase their horn growth much past that age (O'Gara and Yoakum 2004). Horn growth appears to be more related to the genetic background and annual nutritional status than it does to the age of the animals (Mitchell and Maher 2001). Thus, limiting licenses to increase buck maturity may not be beneficial. Increasing the mature buck population may generate higher license limitations on a herd that is already limited. Alternatively, reduced sex ratios may provide improved hunter opportunity, especially in areas with high hunting demand.

Current Management Concerns

The DAU experienced severe droughts during the late 1990s and early 2000s. Quality forage became limited because of the lack of moisture, and pronghorn responded with some of the lowest annually observed fawn-to-doe-ratios. The low ratios may have caused the populations to remain at lower numbers. CPW established the previous population and herd composition objectives in 2008. At that time, biologists intended to maintain the herd within the objective range. CPW cannot clearly explain the reduction that occurred in the post-hunt population estimate from 2008 to 2011. CPW believes that drought conditions played a significant role. Attempts to maintain and increase the size of this herd have been a continued effort. The effort will remain throughout this HMPs' 10-year lifespan. In response, CPW reduced pronghorn hunting licenses. The exception to this were areas around Villa Grove and San Luis Creek, in which pronghorn groups remained relatively stable during that period. Smaller areas that had available water resources and quality forage experienced moderately successful reproduction.

Reducing licenses may cause a decrease in the ability of hunters to obtain a license. Nevertheless, the demand for these licenses continues to increase. The increase in demand consequently increases the number of preference points required to draw a license. Currently, for residents of Colorado, it requires 15 preference points for a rifle buck-license in GMU 68 and 681W, 17 points for the same license in GMU 79, and 7 points in GMU 82 or 681E.

Another potential problem in this DAU is pronghorn on agricultural land and the accompanying depredation concerns. Depredation issues have subsided considerably over recent years. CPW provides game damage and dispersal licenses to private landowners to address any significant problems. CPW also offers Private-Land-Only (PLO) antlerless licenses in GMU 79. However, harvest from these licenses would be contrary to the goal of increasing the population. Limited access to private land by general hunters is a significant factor in decreasing the ability to harvest pronghorn that remain on private property. Localized problems result from pronghorn distribution, which does not affect the entire DAU. Most private landowners who experience pronghorn issues accept the use of various management tools that CPW offers. Future concerns will be dealt with on an individual basis. During the severe drought years, pronghorn had moved from public lands to irrigated agricultural fields. Many of these pronghorn became resident groups, particularly affecting areas in GMUs 79 and 82. The movement to private land has been a distribution predicament more than an overpopulation problem.

Pronghorn distribution is poor, with a large portion of the population along the San Luis Creek. Other areas of concentrated groups are in GMU 79 and Saguache Park (GMU 68). Habitat improvement and enhancement of these areas would help considerably in supporting more animals. These efforts would be beneficial to the viability of the entire herd. Saguache Park is a high elevation area in which winter conditions and snow-loads could limit the survival of pronghorn in the area. A severe winter in this area could have detrimental effects on animals that remain. CPW has no knowledge of the migratory movement tracks to and from the park. Movement timing and migration routes may depend on the severity of winter conditions.

The development of private lands is a growing problem in the DAU. Potential impacts to pronghorn populations from further development include, a) loss of limited habitat, b) redistribution of animals from historic winter range, and c) migration and movement barriers created by increasing road and fence establishment. Given the agricultural-based economy in the San Luis Valley, development occurs slowly, mostly focused around current municipalities. The development of private land that occurs within the winter, fawning, or production range has the potential of being a problem in the DAU. The threat from low-density residential development depends on the amount and distribution of private land, and the area used for crop and cattle ranching. Johnson et al. (2016) analyzed a 40-year relational and correlative study. The study looked at land-use changes from 1970 to 2010 and the impacts on deer populations. Although this analysis was conducted for deer, having different habitat and distribution requirements, the results may have pronghorn management implications. In PH-14, the proportion of "undeveloped" private land (0 houses) has decreased from 50% to 10%. Most of the reduction occurred after 1990. Alternatively, the development of rural private land (83 acres/house) has almost doubled since 1970. The vast majority of this development occurred between 2000 (approximately 502,500 acres) and 2010 (approximately 632,600 acres). In addition, a significant increase in ex-urban development (4-83 acres/house) occurred from 1970 to 2010. Ex-urban development more than tripled from approximately 9,460 acres to approximately 31,920 acres. Similarly, developmental sprawl has

affected the summer range. Ex-urban development on the summer range has also more than tripled from approximately 7,460 acres (1970) to 22,910 acres (2010).

Oil, gas, geothermal, and solar energy development and their potential impact on wildlife are a concern throughout western states. Exploration of energy development continues in the San Luis Valley (SLV). To date, no cost-effective gas, oil, or geothermal extraction techniques are available to justify commercial expansion. The threat of oil and gas development to pronghorn populations in the DAU remains low at present. Proposals for solar power development also continues in the SLV. Many segments of private land, in the DAU, have already been approved for solar panel development or expansion. These developments have not had any detrimental effects on pronghorn nor other wildlife. If the expansion of solar energy development, or oil and gas extraction, becomes lucrative, their impact could affect the pronghorn range and population viability into the future. CPW bases this information on the existence of energy development and expansion in other parts of the state.

Public Involvement

CPW provided an initial draft document online to the public for a 30-day review period. CPW also sent the draft to the RGNF, the BLM, the local HPP committee, and local county commissioners, for commentary and feedback. The draft was to allow all constituents, including non-consumptive recreationists, hunters, landowners, and local business owners, to take part in the public process.

Management Strategies

The primary purpose of the Herd Management Plan is to determine the long-term (10-year) post-hunt population and pre-hunt sex ratio objectives. The objectives are a basis for setting hunting licenses and as a management reference. Management actions can usually manipulate sex ratios, whereas age ratios are likely a result of environmental or biological factors.

The basis for harvest-based population management is to increase female harvest when a population exceeds the objective range, decrease female harvest when a population is below the objective range, and maintain female harvest when a population is within the objective range. The preferred population objective range depends on the modeled population estimate at the time of the HMP revision. Modeling estimates can change over time based on additional data or improved modeling efforts.

When updating HMPs, population objectives may need to be adjusted to fit more accurately with updated model estimates. A range is given for the objectives to allow flexibility in management. The bases for management flexibility are uncontrolled impacts on the population. These impacts could be extreme weather events, droughts, severe winters, disease outbreaks, or forest fires.

The investment effort needed for habitat improvement would likely be lower with lower population objectives. As the population increases, the investment required may be more significant. Habitat management practices vary in labor intensity, costs, and life expectancy of the project. CPW proposes management practices such as prescribed fires, fertilization, seeding, water-retention facility implementation, fencing, timber management, travel management, or range management. Game damage problems would likely decrease under a lower population objective or with public-land habitat improvements.

Private-land conflict issues may escalate if the pronghorn population size increases or if the habitat deteriorates. Higher population levels may benefit hunter harvest success. In addition, increased numbers of pronghorn may help satisfy hunter demand and increase fiscal benefits to state and local economies.

Private land game damage issues are usually correlated with winter severity and pronghorn distribution. Increased pronghorn numbers can occupy healthy landscapes, but only when their distribution minimizes conflict. Increasing water retention efforts could enable pronghorn to withstand many years of lowered precipitation levels. Working with partner agencies in habitat improvement and enhancement projects may help maintain healthy, viable pronghorn populations. An increased population also has the potential of increased highway collisions and conflicts on private agricultural lands. CPW will work cooperatively with CDOT to reduce animals involved in vehicle collisions as much as possible. A reduction in animal-vehicle collisions could be achieved by increasing signage and deploying other traffic warning mechanisms. CPW will also retain various tools to address potential game damage issues.

Post-hunt Population Objective

CPW proposes no change in management for the PH-14 pronghorn herd. The intent is to maintain management in attempting to increase the population and sustaining it within +/- 10% of the objective range. That would support a post-hunt population objective of **2,000 to 2,500 animals**. This objective range allows the best balance for managing the herd for recreational opportunities and minimizing agricultural conflicts. All public and private land doe licenses in GMU 82 and GMU 681 (east of CR 46AA and between Saguache Creek and Kerber Creek) would be removed. Once the population estimate stabilizes within the objective range, CPW may conservatively implement public-land doe licenses. The implementation of these licenses depends on the population status and productivity of the herd at that time. If necessary, CPW will continue providing damage and dispersal licenses to address private land conflicts. Encouragement of additional habitat improvement and water retention efforts continues on public land, particularly in areas of low pronghorn densities. Any improvements may promote distribution away from private property and sustain a viable pronghorn population on public land.

Herd Composition – (Three-year-average observed number of bucks per 100 doe ratio)

All input results propose no changes to the sex ratio objective range for this pronghorn herd. Thus, the preferred three-year-average sex ratio objectives remain at **27 to 33 bucks per 100 does**. The management would be to achieve and maintain the herd composition within this range. This objective creates the best balance between the hunting experience and the opportunity of harvesting a desired pronghorn buck in the DAU.

Public Input and Preferred Objectives

The CPW biologist provided a draft version of the HMP to the public for a 30-day review period. The biologist analyzed all public responses to the draft document for the correct determination of the preferred objectives. CPW also examined response letters received from the RGNF, the BLM, and the HPP committees. Many local CPW employees heard directly from numerous hunters and private landowners. Furthermore, biologists evaluated biological herd capabilities, land tolerance levels, and other factors mentioned previously.

For PH-14, the **Preferred Population objective is 2,000 to 2,500**, and the **Preferred Three-year-average Sex Ratio objective is 27 to 33 bucks per 100 does.** Management towards these objectives will take place for the next ten years under current conditions. If the objectives become socially or biologically unacceptable in an earlier timeframe, CPW will re-examine theses accordingly.

CPW attempted to solicit as much public feedback and comments as possible, with the resources available. After combining the feedback from the public and partner agencies on the draft document, the overwhelming consensus is to increase the pronghorn population. The increase is in agreement with maintaining the preferred objective at 2,000 to 2,500 pronghorn.

CPW is grateful to the Rio Grande National Forest (RGNF) for offering feedback on the draft document. The RGNF has indicated that they support the current population objective range (2,000 to 2,500 pronghorn). The RGNF has also acknowledged that they do not expect any significant conflicts with an expansion in herd numbers to the preferred objective range. They recognize that range conditions should be a focus for habitat improvements and water retention efforts. Habitat carrying capacity should continue to increase with further implementation and accomplishment of these actions. The RGNF does not believe that cattle compete significantly with pronghorn for resources; however, with domestic sheep, it is to a minimal extent. The RGNF also agrees with maintaining management towards the preferred objective range (27 to 33 bucks per 100 does). The preferred objective range is consistent with observations in the past. It would provide an equal opportunity between the recreational experience and harvesting a mature buck.

CPW is also grateful to the Bureau of Land Management (BLM), who manages a significant portion of the pronghorn range. After the draft document review period, the BLM has indicated that range condition assessments are underway to identify areas of concern. They have acknowledged that any habitat improvements should support more pronghorn. Thus, they have cautiously supported the preferred population objective range (2,000 to 2,500 pronghorn). The BLM suggests collaborative habitat improvement monitoring between CPW and the BLM would be beneficial in improving quality

forage and limit land health impacts. These management actions would likely alleviate any adverse effects with an increase in the pronghorn population. Collaborative monitoring of the habitat may also help determine more accurate carrying capacity levels going forward.

The San Luis Valley Habitat Partnership Program (HPP) committee addressed the draft document on October 17, 2019, and the Mount Blanca HPP committee discussed the draft document on October 22, 2019. Both of the HPP committees gave their support for the preferred population objective (2,000 to 2,500 pronghorn). The San Luis Valley HPP committee suggested that increasing the northern pronghorn population would not increase conflicts on private land significantly. The San Luis Valley HPP committee also feels that there is adequate habitat to achieve the preferred population objective. Both committees acknowledge that CPW has additional resources in place if conflicts should arise. Maintaining management for the preferred population objective would likely maintain hunter demand and satisfaction. Both of the HPP committees supported the preferred sex ratio objectives (27 to 33 buck per 100 does).

All public responses to the draft document were in agreement with increasing the population. They supported the preferred objective range of 2,000 to 2,500 pronghorn. All respondents were also in support of maintaining management towards the preferred sex ratio objective range (27 to 33 buck per 100 does). This range would maintain hunter opportunity and satisfaction.

Thus, for PH-14, the **Preferred Population objective is 2,000 to 2,500** pronghorn, and the **Preferred Sex Ratio objective is 27 to 33 bucks per 100 does**. CPW staff re-evaluates management towards the accepted objectives annually. Management towards these objectives will take place for the next ten years under current conditions unless they become socially or biologically unacceptable. If so, CPW will address the objectives in an earlier timeframe.

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Appendix A. Known Pronghorn Transplants into the DAU

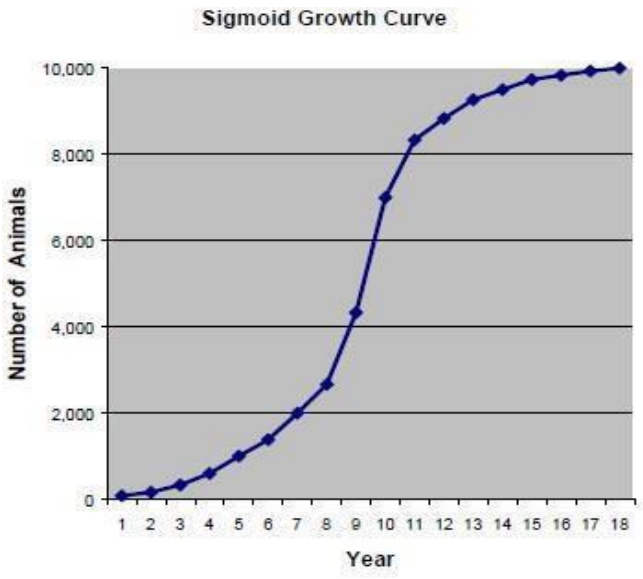
Date	Trap Site	Release Site	Males	Females	Fawns	Unknown	Total	Trap Method	Notes
3/10/1962	Wolf Ranch	Great Sand Dunes National Monument	6	13	7		26		
1963	Unknown	Natural Arch area				24	24		
1/7/1964	Chico Basin	Old Woman Creek	7			18	25		Unknown were does and fawns
12/1/1977	Maybell	Natural Arch	37	47	7		91		3 died
1/23/1981	Hugo	San Luis Valley	7		9		16		
02/9,10/83	5 miles east of Moffat	Tracy Canyon & Bidell Creek	15	30	5		50		
01/17-19/84	Crestone	Tracy Canyon	15	18	13		46	helicopter and trap	

Appendix B. Known Pronghorn Transplants from the DAU

Date	Trap Site	Release Site	Males	Females	Fawns	Unknown	Total	Trap Method	Notes
2/6/1980	9 miles NE Saguache	Poso Creek	4	34	13		51		
2/6/1980	9 miles NE Saguache	Ra Jadero Canyon	11	21	19		51		
11/22/1980	Villa Grove	unknown	20	40	22		82		4 mortalities not included in total number
02/09-10/83	5 miles east of Moffat	10 miles NE of Blanca	28	68	19		115		
02/9,10/83	5 miles east of Moffat	Tracy Canyon & Bidell Creek	15	30	5		50		
2/10/1983	5 miles east of Moffat	Upper Dome Lake	1	14	20		35		
02/10,12/83	5 miles east of Moffat	Dry Creek Basin	13	36	25		74		
2/12/1983	8 miles NE of Moffat	Jicarilla Tribe	17	23	19	3	62		
01/17-19/84	Crestone	Arizona	29	75	73	9	186	helicopter & trap	
01/17-19/84	Crestone	Jicarilla Tribe	41	86	22	27	176	helicopter & trap	
01/17-19/84	Crestone	Tracy Canyon	15	18	13		46	helicopter & trap	
2/6/1990	Rito Alto	Fort Garland	6	47	23		76		

Appendix C. Population Dynamics and Managing for Maximum Sustained Yield

Numerous studies of animal populations, including species such as mice, rabbits, and white-tailed deer, have shown that the populations grow in a mathematical relationship referred to as the "sigmoid growth curve" or "S" curve (right). There are three distinct phases to this cycle. The first phase occurs while the population level is still very low and is characterized by a slow growth rate and a high mortality rate. This occurs because the populations may have too few animals, and the loss of even a few of them to predation or accidents can significantly affect the population.



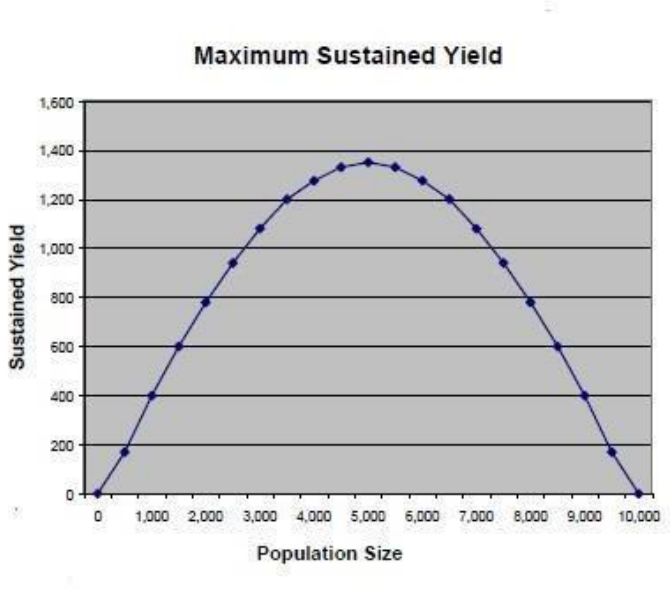
The second phase occurs when the population number is at a moderate level. This phase is characterized by a very high reproductive and survival rate. During this phase, food, cover, water, and space (habitat) is not a limiting factor. In addition, during this phase, animals such as white-tailed deer have been known to successfully breed at six months of age and produce a live fawn on their first birthday, and older does have been known to produce 3-4 fawns that are very robust and healthy. Survival rates of all the deer (bucks, does, and fawns) are at maximum rates during this phase.

The final or third phase occurs when the habitat becomes too crowded, or habitat conditions become less favorable. During this phase, the quantity and quality of food, water, cover, and space become scarce due to the competition with other members of the population. This phase is characterized by a decrease in reproduction and survival. In addition, during this phase, white-tailed deer fawns can no longer find enough food to grow to achieve a critical minimum weight that allows them to reproduce; adult does will usually only produce 1-3 fawns; and survival of all deer (bucks, does and fawns) will decrease. During severe winters, large die-offs can occur due to the crowding and lack of food. The first to die during these situations are fawns, then bucks followed by the adult do. The severe winters thus affect the future buck to doe ratios by favoring more does and fewer bucks in the population. Also, since the quality of a buck's antlers is somewhat dependent upon the quantity and quality of his diet, the antlers are stunted during this phase. If the population continues to grow, it will eventually reach a point called "K" or the maximum carrying capacity. At this point, the population reaches an "equilibrium" with the habitat. The number of births each year equals the number of deaths; therefore, to maintain the population at this level would not allow for any "huntable surplus." The animals in the population would be in relatively poor condition, and when a severe winter or other catastrophic event occurs, a large die-off is inevitable. A recent example of such a population die-off occurred in the relatively un-hunted Northern Yellowstone elk herd during the severe winter of 1988-89. This winter followed the forest fires of the summer of 1988 that raged in the National Park.

What does all this mean to the management of Colorado's big game herds? It means that if we attempt to manage for healthy big game herds, we should attempt to hold the populations at about the middle of

the "sigmoid growth curve." Biologists call this "MSY" or "maximum sustained yield." At this level, which is exactly half the maximum population size or "K", in this example it would be 5,000 animals, the population should provide the maximum production, survival and available surplus animals for hunter harvest. In addition, at this level, range condition should be good to excellent, and range trend should be stable. Game damage problems should not be significant, and economic return to the local and state economy should be at the maximum. This population level should produce a "win-win" situation to balance sportsmen and private landowner concerns. A graph of a hypothetical deer population showing sustained yield (harvest) potential vs. population size is shown (right). Notice that as the population increases from 0 to 5,000 deer, the harvest also increases.

However, when the population reaches 5,000 or "MSY", food, water, and cover become scarce, and the harvest potential decreases. Finally, when the population reaches the maximum carrying capacity or "K" (10,000 deer in this example), the harvest potential will be reduced to zero. Also, notice that it is possible to harvest exactly the same number of deer each year with 3,000 or 7,000 deer in the population. This phenomenon occurs since the population of 3,000 deer has a much higher survival and reproductive rate compared to the population of 7,000 deer. However, at the 3,000 deer level, there will be less game damage and resource degradation.



Actually, managing deer and elk populations for MSY on a DAU basis is difficult, if not impossible, due to the amount of detailed information required because of the complex and dynamic nature of the environment. In most cases, we would not desire true MSY management even if possible, because the number and quality of bulls and bucks are minimized. However, the concept of MSY is useful for understanding how reducing densities and pushing asymptomatic populations towards the inflection point can stimulate productivity and increase harvest yields. Knowing the exact point of MSY is not necessary if the goal is to conservatively reduce population size to increase yield. Long-term harvest data can be used to gauge the effectiveness of reduced population size on harvest yield.

Appendix D

Date: October 17, 2019

Colorado Parks and Wildlife
0722 S. Rd. 1E
Monte Vista, CO 81144

Thank you for the opportunity to review and comment on the Draft PH-14 and PH-16 San Luis Valley Northern and Southern Pronghorn Herd Management Plans.

It is our understanding that there are no proposed change in population objectives for either DAU. CPW's intent it to maintain the status quo in attempting to increase the populations (from the 2008 plans) and maintain those populations within +/- 10% of the objective range. CPW is proposing minor changes in doe license availability as a whole, in an attempt to increase both herds until the population estimates stabilize within the objective ranges.

That would be a post-hunt population objective of 2,000-2,500 animals in PH-14 (current estimate at 1,400) and 1,000-1,500 in PH-16 (current estimate at 900). These objectives allow for a good balance for managing this herd for recreational opportunity while minimizing agricultural conflicts.

Buck licenses for both units are limited and are in high demand. Licenses for does are limited with an average harvest of 42 since 2008 within PH-14 and approximately 10 in PH-16. Approximately 1/3 of the harvested does in PH-14 and all of the doe licenses within PH-16 are through damage and dispersal hunts on private property.

In an attempt to boost numbers to meet objectives within PH-14, all public private land doe licenses in GMU 82 and GMU 681 (east of CR 46AA and between Saguache Creek and Kerber Creek) would be removed which represented approximately 25 doe permits in 2019. The attempt would be to increase the herd until the population stabilizes within the objective range. At that time, conservative doe licenses may be implemented, depending on the population status and current productivity of the herd. There are currently no limited doe licenses available within PH-16 outside of PLO licenses. Damage and dispersal harvest will continue to be used if necessary on private lands.

There are no currently identified conflicts on the Rio Grande National Forest between current pronghorn numbers nor are any expected should the populations reach plan objective numbers. In general, pronghorn do not compete with cattle as they consume different vegetation for the most part. There are several domestic sheep allotments which overlap with the DAUs, however, competition for forage is minimal to non-existent.

The Rio Grande National Forest supports the proposed DAU plans for PH-14 and PH-16. The Forest agrees with the statements pointed out in the revised draft plans which include:

- These objective ranges would create the best balance between the hunting experience and the opportunity of being able to harvest a pronghorn. The present sex ratio objective ranges provides an acceptable hunting opportunity while also providing a desirable mature buck population.

- Sex ratio of 27 to 33 bucks per 100 does for both DAUs is favorable.

- Once and if the population estimate is within the population range or deterioration of habitat is observed, doe harvest opportunities will be considered.

- The main limiting factors is the amount of annual precipitation and available water sources.

- Variables such as weather conditions, forage quality and availability, water resource availability, predation and or disease may have a higher impact on reproduction than management actions.

Sincerely, On behalf of the Rio Grande NF

/s/ Dale Gomez Wildlife Biologist
DALE GOMEZ

Appendix E

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
San Luis Valley Field Office
1313 Highway 160 East
Monte Vista, CO 81144

In Reply Refer To:
October 16, 2019
File Code (COF03000-6805-SSM)

Dear Brent,
Thank you for the opportunity to comment on the draft Herd Management Plans for pronghorn in the San Luis Valley (PH-14 and PH-16). Because the BLM comprises large portions of the habitat for pronghorn in the San Luis Valley, particularly winter range, it is important to provide comments on the draft Plans. The San Luis Valley Field Office has a strong commitment to providing quality wildlife habitat, as one of our important "multiple uses", as per our Resource Management Plan (San Luis Resource Area Resource Management Plan, 1991). We agree with CPW's identification of annual precipitation and availability of water resources, particularly on winter range, as being the limiting factors for pronghorn across both PH-14 and PH-16. We also agree that overall availability of winter range decreases with increased development on private land and competition with domestic livestock. CPW's proposed plan to eliminate doe harvest to stabilize or slightly increase herd size, will likely result in a minor increase in stress on habitats already stressed by drought and livestock grazing. BLM assessments are underway to identify areas not meeting Colorado Land Health Standards and directing management changes or projects necessary to move conditions toward meeting Colorado Land Health Standards. These improvements should help support a larger herd size, but will take time to both implement and result in actual improvement on the ground. We support CPW's proposed harvest changes to stabilize or slightly increase herd size. In addition, because of the uncertainties regarding drought and private land development, we recommend CPW and BLM work together to monitor habitat conditions to ensure adequate quality habitat is available for proposed herd increases. Thank you for the opportunity to provide comment. If you have any questions, please feel free to contact me at 719-239-0494.

Sincerely,
/s/ Melissa K.S. Garcia

Melissa K.S. Garcia
Field Office Manager, San Luis Valley Field Office

October 24, 2019

Brent Frankland
Colorado Parks and Wildlife
0722 S. CO Rd 1 East
Monte Vista, CO 81144

RE: San Luis Valley Habitat Partnership Program Comments - DAU PH-14

Dear Brent:

One of the initial reasons for creating the Habitat Partnership Program was to provide local landowners and other interests an opportunity for input into big game management in their areas. The diverse makeup of local HPP committees (3 livestock growers, Forest Service, BLM, CPW and sportsmen representatives) provide a good cross section of local interests to review DAU proposals and respond accordingly for CPW consideration.

HPP has two purposes; to resolve big game wildlife (deer, elk, pronghorn, moose) conflicts with agricultural landowners and to assist CPW to meet game management objectives for those same species. From those perspectives, the San Luis Valley HPP committee has discussed your presentation, reviewed the draft alternatives, and offers these comments for consideration.

The San Luis Valley HPP committee is in agreement with the following comments pertaining to proposals for the populati on range and sex ratio objectives for the above DAU plan.

The San Luis Valley committee supports the draft alternative to keep the current population objective. We believe this alternative responsibly balances local range and habitat conditions with sportsmen desires and landowner concerns. We have not heard of any landowner concerns about the current population, and hunters would like to see an increase in the population. Any issues we have are more likely related to distribution of the herds in the area and not the overall population size. The current levels are below objective, so keeping the current objective will allow for some growth of the herd.

The San Luis Valley committee also discussed the proposed sex ratio alternative. We believe the current sex ratio objective is a good balance and provides ample hunting opportunity while also providing for a reasonable number of mature animals for those hunters who want to take a larger buck.

As stated above, HPP is also directed by statute to assist the Division to meet game management objectives. The San Luis Valley committee has worked with both public land managers and private landowners to improve the quality and quantity of the habitat in DAU PH-14. Adequate habitat is critical to meeting game management objectives and we remain committed to maintaining and improving habitat in this area.

Our committee is confident about CPW being able to achieve the proposed objectives for the following reasons:

- We have worked with numerous landowners who want to implement positive improvements for big game on their property.

- Federal land managing agencies place a high priority on habitat improvement and have worked successfully with our committee on valuable projects in the past and have expressed a desire to continue this.

- The San Luis Valley committee feels there is adequate habitat with adequate protections in place, such as seasonal closures and use restrictions, to achieve the desired objectives. While the committee has confidence in the plan's objectives over the next ten years, beyond that we are concerned residential growth and increased recreation demands could hinder future population objectives. However, we feel that we have the resources to address future conflicts and we will continue to work with private landowners and federal land managing agencies to enhance habitat and water resources in the area in order to help improve pronghorn dispersal.

Thank you for the presentation and the opportunity to provide these comments.

Sincerely,

Mick Davis, Chair
San Luis Valley HPP Committee

October 28, 2019

Brent Frankland
Colorado Parks and Wildlife
0722 S. CO Rd 1 East
Monte Vista, CO 81144

RE: Mount Blanca Habitat Partnership Program Comments - DAU PH-14

Dear Brent:

One of the initial reasons for creating the Habitat Partnership Program was to provide local landowners and other interests an opportunity for input into big game management in their areas. The diverse makeup of local HPP committees (3 livestock growers, Forest Service, BLM, CPW and sportsmen representatives) provide a good cross section of local interests to review DAU proposals and respond accordingly for CPW consideration.

HPP tias two purposes; to resolve big game wildlife (deer, elk, pronghorn, moose) conflicts with agricultural landowners and to assist CPW to meet game management objectives for those same species. From those perspectives, the Mount Blanca HPP committee has discussed your presentation, reviewed the draft alternatives, and offers these comments for consideration.

The Mount Blanca HPP committee is in agreement with the following comments pertaining to proposals for the population range and sex ratio objectives for the above DAU plan.

The Mount Blanca committee supports the draft alternative to keep the current population objective. We believe this lternative responsibly balances local range and habitat conditions with sportsmen desires and la ndowne r concerns. We have not heard of any landowner concerns about the current population, and hunters would like to see an increase in the population. Any issues we have are more likely related to distribution of the herds in the area and not the overall population size. The current levels are below objective, so keeping the current objective will allow for some growth of the herd.

The Mount Blanca committee also discussed the proposed sex ratio alternative. We believe the current sex ratio objective is a good balance and provides ample hunting opportunity while also providing for a reasonable number of mature animals for those hunters who want to take a larger buck.

As stated above, HPP is also directed by statute to assist the Division to meet game management objectives. The Mount Blanca committee has worked with both public land managers and private landowners to improve the quality and quantity of the habitat in DAU P-H-14. Adequate habitat is critical to meeting game management objectives and we remain committed to maintaining and improving habitat in this area.

Our committee is confident about CPW being able to achieve the proposed objectives for the following reasons:

- We have worked with numerous landowners who want to implement positive improvements for big game on their property.

- Federal land managing agencies place a high priority on habitat improvement and have worked successfully with our committee on valuable projects in the past and have expressed a desire to continue this.

- The Mount Blanca committee feels there is adequate habitat with adequate protections in place, such as seasonal closures and use restrictions, to achieve the desired objectives. While the committee has confidence in the plan's objectives over the next ten years, beyond that we are concerned residential growth and increased recreation demands could hinder future population objectives. However, we feel that we have the resources to address future conflicts and we will work with private landowners and federal land managing agencies to enhance habitat and water resources in the area in order to help improve pronghorn dispersal.

Thank you for the presentation and the opportunity to provide these comments.

Sincerely,

Mike Maldonado, Chair
Mount Blanca HPP Committee