DRAFT MIDDLE PARK PRONGHORN HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT PH-37

GAME MANAGEMENT UNITS 15, 18, 26, 27, 28, 37, 181, 231 and 371

Prepared by:
Bryan Lamont (Terrestrial Biologist)

Approved ……. by the Colorado Parks and Wildlife Commission

Colorado Parks and Wildlife
Hot Sulphur Springs Service Center
346 Grand County Road 362
Hot Sulphur Springs, CO 80451

EXECUTIVE SUMMARY

Middle Park Pronghorn Herd (DAU PH-37) GMUs: 15, 18, 26, 27, 28, 37, 181, 231 and 371
Post-hunt Population: Previous Objective: 630 pronghorn; Modeled estimate for 2019: 816 **Preferred Alternative: Increase and widen population objective 600-800**
Pre-hunt Sex Ratio (Bucks:100 Does): Previous Objective: 40. Pre-hunt observed (3-year average): 53 **Preferred Alternative: Create range around previous objective 35-45 Bucks:100 Does**

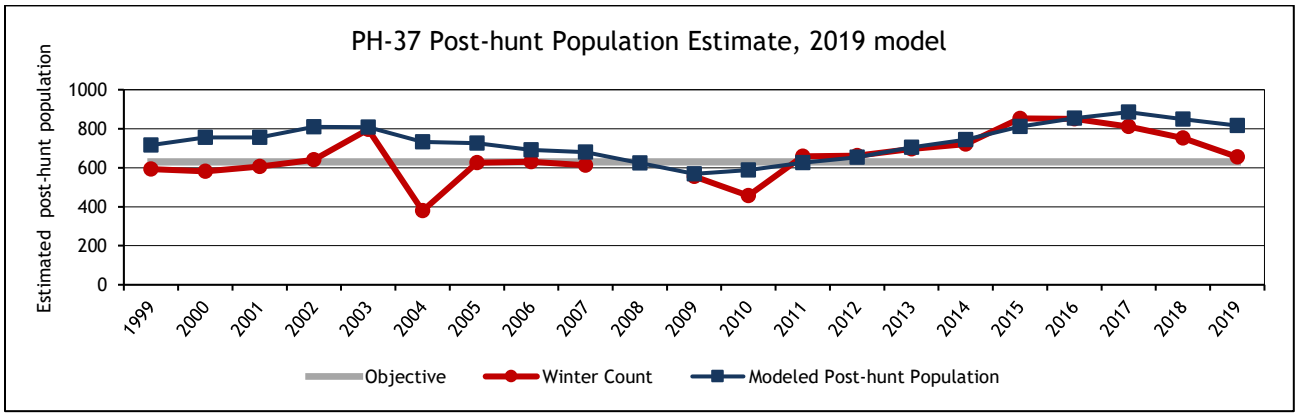


Figure 1. PH-37 Post-hunt modeled population estimate, objective and winter count 1999-2019.

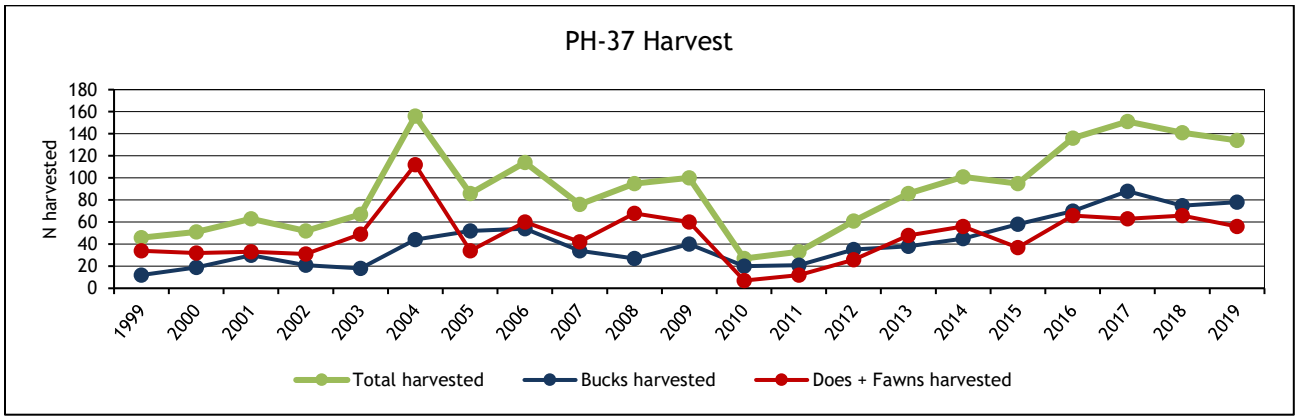


Figure 2. PH-37 total, buck and antlerless harvest 1999-2019.

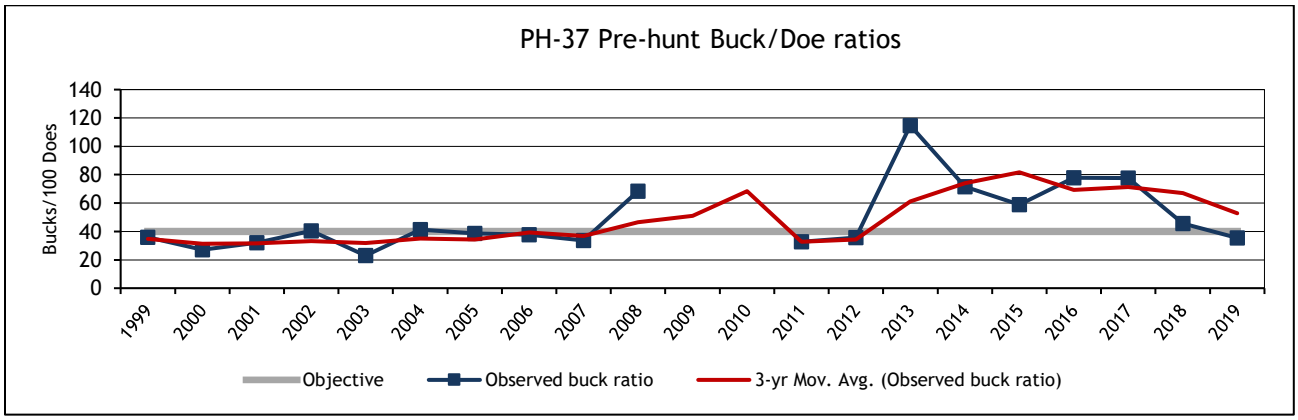


Figure 3. PH-37 observed pre-hunt sex ratio (bucks:100 does), and objective 1999-2019.

Background

The majority of pronghorn in the Middle Park Pronghorn Data Analysis Unit (DAU PH-37) are located in Grand County, however there are also small groups that are a part of the DAU in Eagle, Garfield, Jackson, Rio Blanco, Routt, and Summit Counties. The DAU is located in north-central Colorado, encompasses 3,298 square miles, and land ownership is 30% Private, 8% BLM, 53% USFS, 1% CPW, and 8% Other.

Although historical accounts indicate pronghorn in Middle Park were quite plentiful, by the 1920's pronghorn had been extirpated from the area. By the 1970's pronghorn naturally began to return to Middle Park and the current population estimate is 816 pronghorn. The most recent Herd Management Plan for the PH-37 DAU was completed in 1999 — at which time a population and sex ratio (bucks:100 does) objective of 630 and 40, respectively, were established.

Significant Issues

The proliferation of all forms of outdoor recreation on public lands, land development, fragmentation by roads and trails, and suppression of wildfires has the potential to affect habitat quality and quantity for the Middle Park pronghorn herd. Although Middle Park has not been impacted at the same rate as some other areas in CO, the concern remains high that if not kept in check, loss of quality habitat could eventually negatively affect this pronghorn herd. Vehicle traffic also continues to increase as the region's human population grows, and wildlife-vehicle collisions continue to be a concern.

In 2009, former Colorado Parks and Wildlife (CPW) researcher Tom Pojar documented a spring migration of pronghorn from Middle Park to the Toponas area. As a result, discussions began in 2015 about the possible inclusion of GMUs 15, 26, and 231 into the PH-37 DAU. Historically, the small group of pronghorn in these units had not been managed as a part of a particular DAU. After much internal discussion it was determined in 2015 that as a result of documented movements (primarily winter) of pronghorn into Middle Park from GMUs 15, 26, and 231 that it is appropriate to include these pronghorn as part of the Middle Park Pronghorn Herd (i.e., PH-37). This plan reflects and addresses this inclusion.

Management Objective Recommendations

CPW recommends a new population objective range of 600-800. This alternative will create a range rather than a single objective number (1999 DAU Plan Objective is 630 pronghorn), and the upper end of the range will include current population estimates while keeping a lower end that reflects carrying capacity on severe winters.

CPW recommends a new sex ratio objective of 35-45 bucks:100 does. This alternative will create a range rather than a single objective number (1999 DAU Plan Objective is 40 bucks:100 does). This approach allows for flexibility when fluctuations in the number of bucks occurs.

Strategies for Addressing Management Issues and Achieving Objectives

CPW will continue to work collaboratively with our partners in the federal land management agencies, private landowners, county governments, local municipalities and NGOs to protect and enhance the remaining pronghorn habitat. Important habitat conservation methods include habitat treatments, conservation easements or land acquisitions, maintaining landscape connectivity and movement corridors, and adhering to seasonal recreation closures on winter range areas.

To achieve the updated population and sex ratio objectives, CPW will continue to set licenses annually to provide sufficient buck and doe hunting opportunity for the public, and to use hunting as a management tool to keep pronghorn densities at a level that encourages herd productivity, discourages conflict with landowners, and decreases the potential for habitat degradation.

Table of Contents

List of Figures

List of Tables

INTRODUCTION AND PURPOSE

Herd Management Plans

Colorado Parks and Wildlife (CPW) manages wildlife for the use, benefit and enjoyment of the people of the state in accordance with the CPW's Strategic Plan and mandates from the Parks and Wildlife Commission and the 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, the CPW incorporates a "management by objective" approach (Figure 4). Big game populations are managed to achieve population and sex ratio objective ranges established for Data Analysis Units (DAUs).

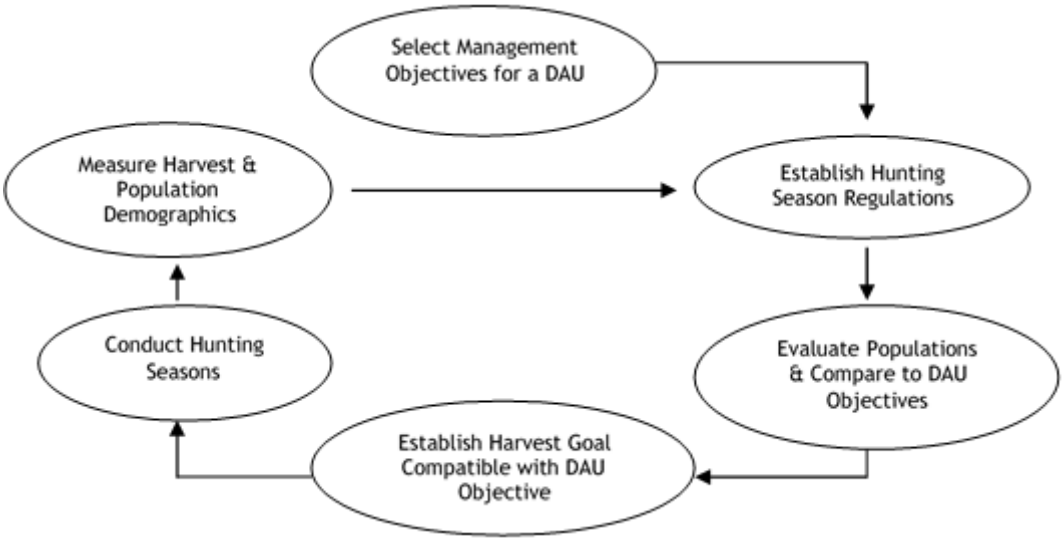


Figure 4. "Management by objectives" process used by CPW to manage big game populations on a DAU basis.

The purpose of a herd management plan is to provide a system or process which will integrate the plans and intentions of Colorado Parks and Wildlife with the concerns and ideas of land management agencies and interested publics in determining how a big game herd in a specific geographic area, i.e., the DAU, should be managed. In preparing a herd management plan, agency personnel attempt to balance the biological capabilities of the herd and its habitat with the public's demand for wildlife recreational opportunities. Our various publics and constituents, including the U.S Forest Service, the Bureau of Land Management, sports persons, guides and outfitters, private landowners, local chambers of commerce and the general public, are involved in the determination of DAU population and herd composition objectives and related issues. Public input is solicited and collected by way of questionnaires, public meetings and comments to the Parks and Wildlife Commission.

Most DAUs are the geographic areas that represent the year-around range of a big game herd, and delineates the seasonal ranges of a specific herd while keeping interchange with adjacent herds to a minimum. A DAU includes the area where the majority of the animals in a herd are born and raised as well as where they die either as a result of hunter harvest or natural causes. Each DAU usually is composed of several game management units (GMUs).

The primary decisions needed for an individual herd management plan include determining how many animals should exist in the DAU and what is the desired sex ratio (i.e.,

the number of males per 100 females) for that population of big game animals. These numbers are referred to as the population and sex ratio objectives, respectively. Secondarily, the strategies and techniques needed to reach the population size and sex ratio objectives also need to be selected. The selection of population and sex ratio objectives drive important decisions in the big game season setting process; namely, how many animals need to be harvested to maintain or move toward the objectives, and what types of hunting seasons are required to achieve the harvest objective.

DESCRIPTION OF DATA ANALYSIS UNIT

Location

Historically (1987-2016), the Middle Park Pronghorn DAU (PH-37) was solely located in Middle Park proper in north-central Colorado and only consisted of GMUs 18, 27, 28, 37, 181, and 371. Based on documented immigration and emigration of pronghorn from adjacent GMUs, in 2016, the DAU was informally expanded to include GMUs 15, 26, and 231 (Figure 5). This herd management plan reflects this addition of GMUs 15, 26, and 231, and upon the contingent approval of this plan these GMUs will be formally added to the PH-37 DAU. The expanded DAU is 3,298 square miles, and land ownership is 30% Private, 8% BLM, 53% USFS, <1% CPW, and 8% Other (Table 1, Figure 6).

The new DAU will include portions of Eagle, Garfield, Grand, Jackson, Rio Blanco, Routt and Summit Counties. It is bounded on the north by Routt County Roads (CR) 29, 132A, 25, 132 and 15, and the Continental Divide; the east by the Continental Divide; on the south by Interstate 70 east of Silverthorne to the Blue River and Cataract Creek; and on the west by the Gore Range, Eagles Nest Wilderness Divide, and the Williams Fork-Yampa River divide to Dunkley Pass, Rio Blanca CRs 8 &19 and Routt CR 55.

The DAU is drained by the upper Colorado River, the Fraser River, the Williams Fork River, Troublesome Creek, Muddy Creek, the Blue River, the Yampa River, Bear River, Middle Fork Derby Creek, East Fork Williams Fork River (Routt and Rio Blanco Counties), and Willow and Fish Creeks.

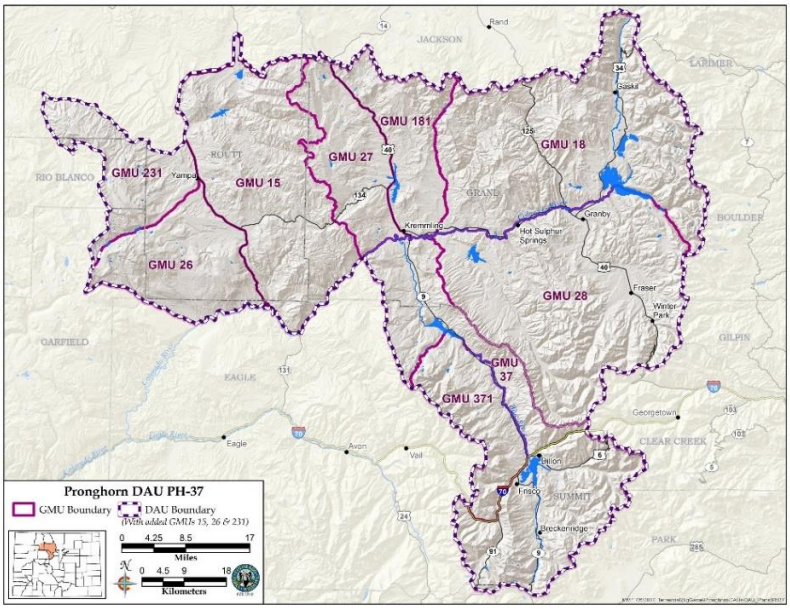


Figure 5. New DAU PH-37 location with the addition of GMUs 15, 26, and 231.

Table 1. Land Ownership by Game Management Units in DAU PH-37.

GMU	USFS		PRIVATE		BLM		CPW		OTHER		TOTAL
	mi²	%	mi²	%	mi²	%	mi²	%	mi²	%	mi²
15	253	51	165	33	51	10	13	3	10	3	492
18	339	53	79	12	70	11	2	0.3	156	24	645
26	71	30	122	51	45	19	0.05	0.02	2	<1	240
27	68	35	90	46	10	5	0.07	0.03	29	14	197
28	397	60	196	30	44	7	4	0.56	23	2	663
37	344	65	142	27	27	5	2	0.42	12	3	528
181	31	17	114	63	16	9	0	0.0	20	11	182
231	109	61	64	36	3	2	0	0.0	2	1	178
371	146	85	25	14	0	0	0.03	0.02	2	<1	173
DAU PH-37 Total	1759	53	997	30	266	8	21	0.65	256	8	3298

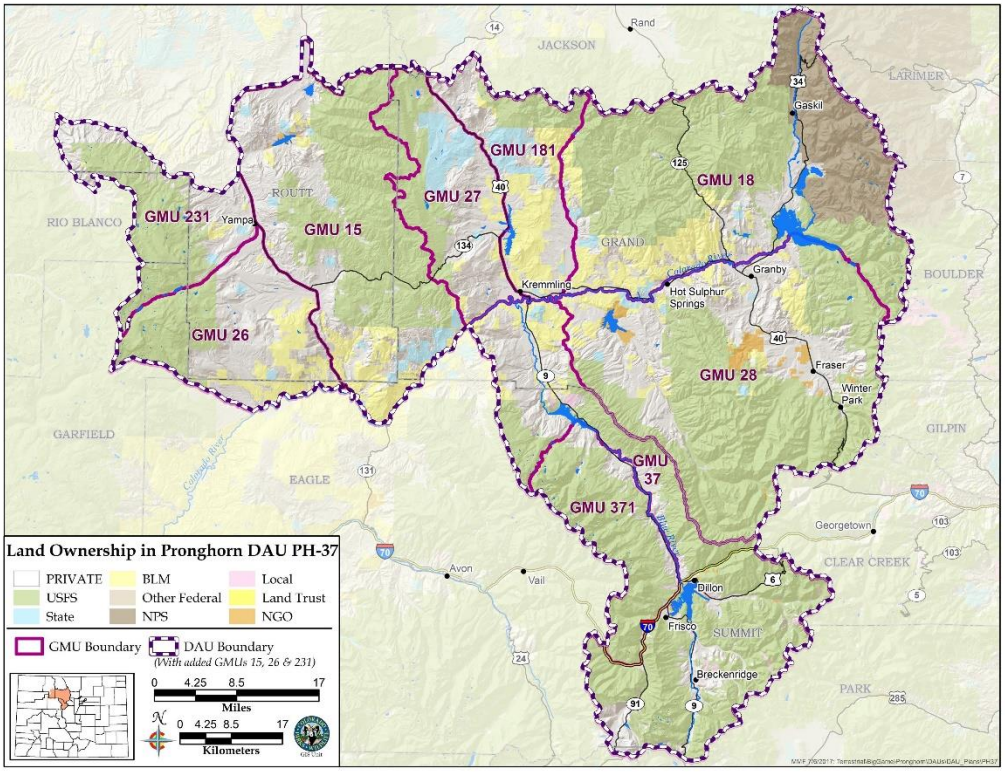


Figure 6. Land ownership for DAU PH-37.

Physiography

Topography

Middle Park is a large basin surrounded on all sides by high mountain ranges. The Gore Range and Continental Divide both have peaks exceeding 13,000 feet in elevation. Middle Park is unique as an inter-mountain park in two respects – it does not have the level interior characteristic of other large mountain parks in Colorado, such as North Park and South Park, and it lies west of the Continental Divide. The main natural surface drainage for the area is the Colorado River that funnels through the Gore Canyon, downstream from Kremmling. The valley floor at Kremmling is 7,300 feet in elevation. Once snow accumulation forces big game animals down to the valley floor in the winter, they become

constrained to this area and are unable to migrate out of the valley. GMUs 15, 26 and 231 provide summer and winter habitat that is comprised of small mountain parks, mountains (lower elevations than the higher Middle Park proper peaks), and river drainages.

Climate

The climate in Middle Park and GMUs 15, 26, and 231 varies greatly depending on location and elevation. In general, the climate is cold and the majority of annual precipitation falls as snow. Drought years occur with some regularity. When there is no wind during the winter, cold air becomes trapped by the surrounding mountains, causing extreme temperature inversions. During the middle of winter, nighttime low temperatures in the -20º F range are to be expected, and can drop much further. Kremmling has recorded temperatures as low as -64º F. The growing season is extremely short and variable. Snow showers may even strike in the summer at higher elevations. Lower elevations may have daytime temperatures reaching into the 90º F range; however, valleys become significantly cooler than uplands during the night as colder air settles.

Local topography also affects the amount and type of moisture. Kremmling lies in the "rain shadow" of the Gore Range and only averages about 11 inches of moisture per year; whereas Grand Lake and Fraser, where prevailing winds push clouds up against the Continental Divide, average precipitation is approximately 20 inches. Areas along the Continental Divide may experience thunderstorms almost daily during the summer. Most of the moisture that falls in the area comes during the period of October to late April. Snow blankets the area during the winter and accumulations of 30" are typical at the 9,000-10,000 foot level. At high elevations, upwards of 20 feet of snow can fall over the course of winter. Big game animals move to lower elevations as snow accumulates, seeking out south facing or wind-blown slopes. In the valleys, sunny winter days and/or windy conditions cause snow to disappear on some slopes.

Vegetation

Vegetation in the DAU can be categorized into five broad types – cropland, wetland/riparian, rangeland, forestland and alpine (Figure 7). Pronghorn do not generally make use of forestland, wetland/riparian areas or the alpine. They prefer open habitats of rangelands and occasionally use croplands. It is in these areas that they can make best use of their keen eyesight and tremendous bursts of speed to avoid danger.

Rangelands consist of sagebrush steppe, mountain shrub and grassland communities. These plant communities occur at lower elevations and have been modified by agriculture or are increasingly being disturbed by intensive human use associated with recreation and development. The sagebrush type is by far the most common rangeland in the DAU at elevations up to 9,000 feet. Sagebrush is found on drier non-agricultural areas on the valley floors and the lower hills. Mountain shrub consisting of big sagebrush mixed with serviceberry, chokecherry and antelope bitterbrush, is found on better soils at lower elevations. This plant community is not widely represented in Middle Park but provides important wildlife food and cover. Both sagebrush steppe and mountain shrub provide grass and forb understories, making them suitable for livestock grazing. Bluebunch wheatgrass is prominent in these vegetative types under good range conditions. Native grasslands are found in two different settings. Mountain meadows consisting of grasses, forbs and some shrubs, occur at higher elevations in association with lodgepole, aspen and spruce-fir forest types. Low elevation grasslands occur

on windswept sites with poorly developed soils that cannot support sagebrush. Croplands consist of irrigated hay meadows and terraces that have been re-seeded to more desirable forage plants. Most of the hay ground is "native hay," consisting of timothy and smooth broome, with some sedges and rushes. Some hay meadows have been seeded to alfalfa.

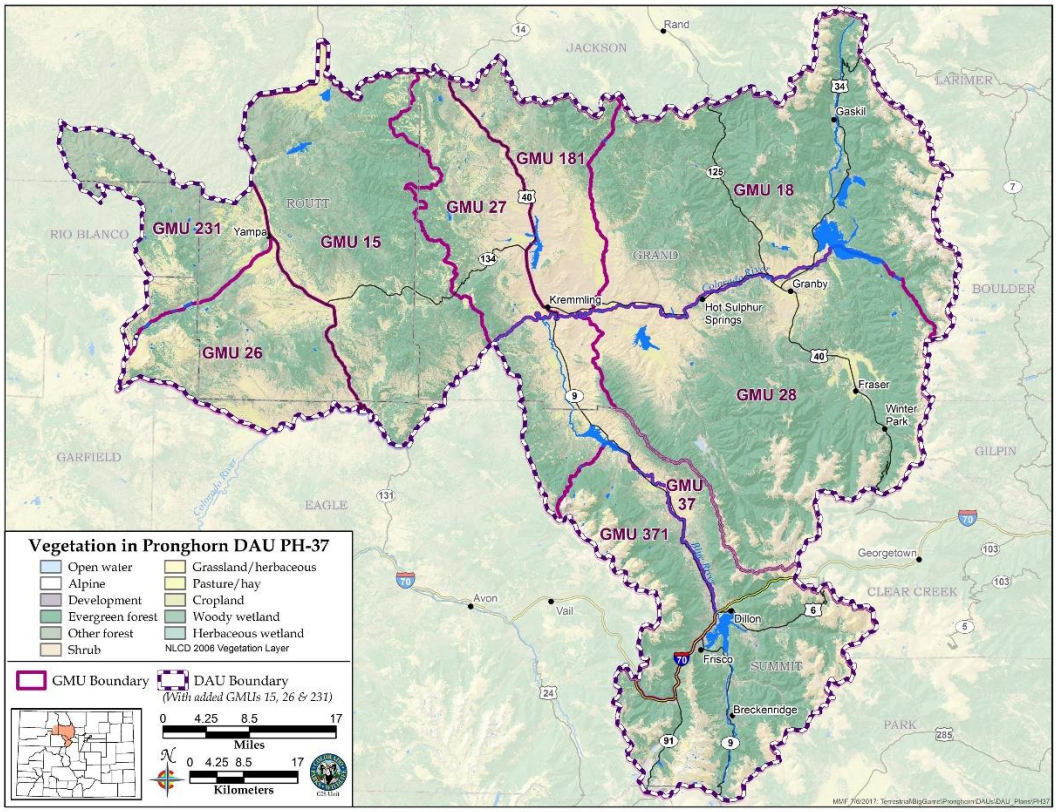


Figure 7. Vegetation types for DAU PH-37.

Land Use

Industry

The main industries in this part of the state are recreation, ranching, mining and construction. Highly developed mountain communities occur in the areas surrounding Winter Park, Granby, and Dillon/Silverthorne. The Kremmling Resource Area of the BLM administers most of the federal lands inhabited by pronghorn within the DAU. Recreation, livestock grazing and wildlife production are the predominant uses of BLM lands, with timber harvest occurring in areas where there are suitable forest products. BLM is also responsible for other activities such as right-of-way administration, mineral production, watershed protection and cultural resource protection.

Recreation

Grand County is a popular destination for summer recreationists, with numerous campgrounds, dude ranches and other resorts. In 2019, Rocky Mountain National Park received more than 4.67 million visitors. Reservoirs built to divert water to East Slope metropolitan areas provide good fishing, along with opportunities for recreational boating.

Rafting companies offer trips down the Colorado River, and local rivers also provide opportunities for kayaking. Cross-country skiing and snowmobiling are both popular wintertime activities.

Hunters can harvest deer, elk, moose, bear, pronghorn, bighorn sheep, mountain goat, mountain lion, dusky grouse and sage grouse in Middle Park. Fishing opportunities are provided in several Gold Medal streams, large reservoirs and numerous high lakes. Hunters and anglers make substantial contributions to local economies. People who take trips to observe and photograph wildlife also contribute financially while buying gas, groceries and other supplies, substantially impacting both destination areas and retailers along travel routes.

Agriculture

Besides providing recreational opportunity, undeveloped lands in the DAU are also used to raise livestock. Most livestock operations are cow-calf enterprises. Most livestock are pastured on USFS or BLM allotments during summer months. Private lands are used for hay production and winter/spring pasture.

Habitat Resource

Habitat Distribution

Pronghorn have very specific habitat requirements that restrict their overall range mainly to the large, open, rolling hills of sagebrush and native rangelands. Pronghorn in the DAU primarily winter in the southern portion of GMUs 27 and 181 on BLM and private lands. During spring and summer animals range widely throughout the remaining GMUs. Some animals migrate as far as Fraser, North Park and Toponas to spend the summer.

Although the PH-37 consists of a total of 3,298 square miles, pronghorn inhabit only about 18% of the DAU (598 square miles). Winter range consists of about 2% of the total DAU (58 square miles), and about 10% of the habitat that pronghorn inhabit. The BLM and private lands are responsible for about 80 and 408 square miles, respectively, of pronghorn habitat in PH-37. Portions of the Junction Butte and Kemp-Breeze State Wildlife Areas, along with various state land board parcels, provide about 53 square miles of habitat for pronghorn. Portions (49 square miles) of USFS lands are characterized as pronghorn habitat, but use by pronghorn on these lands is limited (Figure 8).

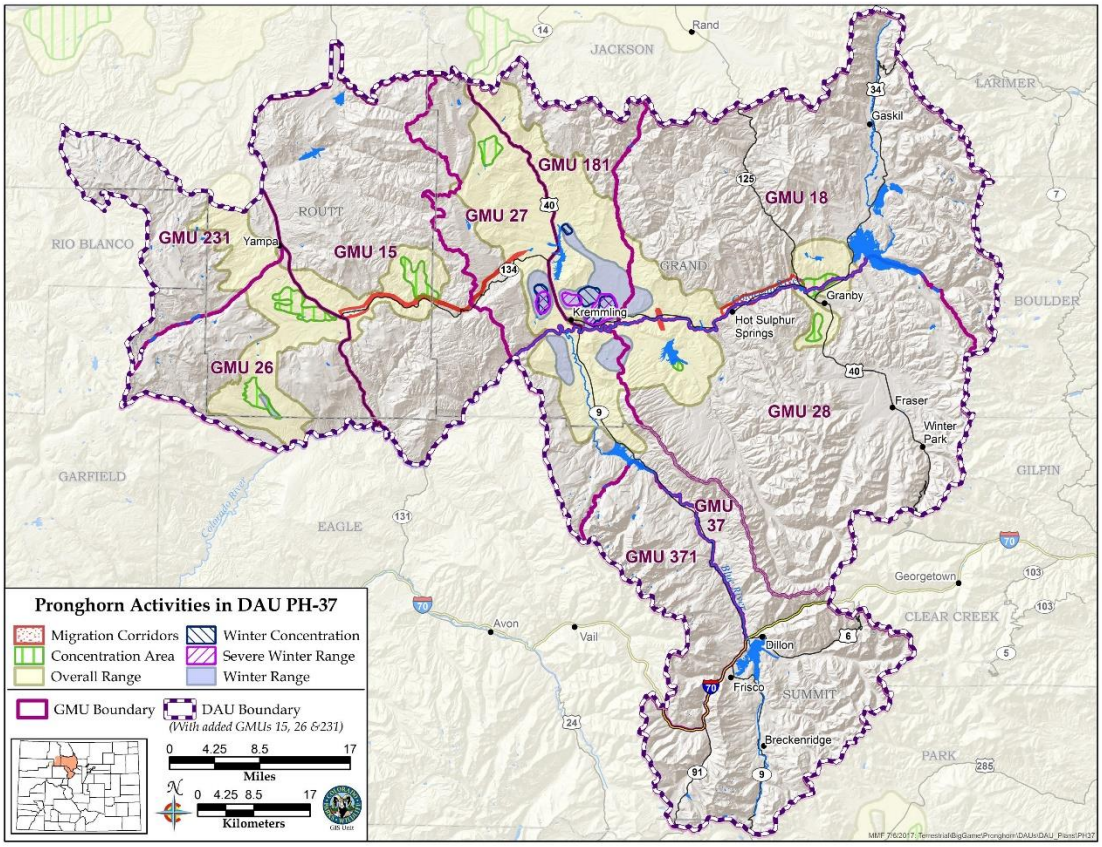


Figure 8. PH-37 overall range, seasonal ranges, concentration areas and migration corridors.

Habitat Capability and Condition

In general, pronghorn winter range is limited in the PH-37 DAU. While there are some relatively large contiguous blocks of suitable winter habitat, some of these areas are in poor condition due to senescence and succession of plant communities. In contrast to winter range, summer range habitat is vast and provides higher quality forage.

Starting in the 1950's, habitat treatments have occurred within Middle Park (i.e., ~500 treatments) on lower elevation public lands that consist primarily of Sagebrush Steppe habitat. A variety of treatment types (e.g., fertilization, brush beating, Spike, Dixie Harrow, thinning, seeding, burning, pinyon-juniper thinning, etc.) have occurred to address different objectives (e.g., improve winter range for big game, improve brood rearing habitat for sage grouse, increase forage for livestock, etc.) for a variety of species (e.g., sage grouse, elk, deer, pronghorn, livestock, etc.). In addition, some land conversion (e.g., conversion of lands to agriculture, housing, etc.) have also occurred during this same period on private lands.

There have been numerous fertilization projects over the last 60 years in Middle Park on pronghorn ranges. In the fall of 2019, a fertilization treatment occurred (Junction Butte and Sulphur Gulch) and a subsequent treatment is planned for the fall of 2020 (Rock Creek and Wolford Mountain). These habitat treatments will benefit all of the previously mentioned species in core pronghorn winter range. These fertilizations are intended to improve the quantity and quality of forage during the most critical times of the year for pronghorn.

Public Lands

The USFS has a limited number of active grazing allotments within DAU PH-37, although pronghorn use on USFS lands is limited. The period of utilization is variable, but primarily occurs from late June through September. Classes of livestock using these allotments include cattle and horses.

In Middle Park proper, the BLM currently has 79 active allotments in the DAU and 6 inactive allotments. The active allotments provide 107,157 AUMs of forage for livestock, with use occurring primarily in the spring and fall, although some use occurs in summer and winter. The class of livestock using these allotments is almost exclusively cattle and horses.

Wildlife/livestock Conflict Areas - Public Lands

Land use agencies were asked for input on areas where there may be conflicts between livestock and big game. Conflicts might be where wildlife had forced a change or delay in period of use on an allotment, or where forage utilization by wildlife had caused a reduction in AUMs of forage available for livestock. The Sulphur Ranger District, Parks Ranger District and the Kremmling Resource Area of the BLM have not identified any allotments where pronghorn are causing conflicts with livestock.

Wildlife/livestock Conflict Areas - Private Lands

Conflicts caused by pronghorn on private lands are minor when compared to those caused by elk. However, in one instance in the Sulphur Gulch area a landowner's pivot was fenced due to conflicts with pronghorn. Identification of specific areas where conflicts do occur, and resolution of any conflicts, will be best handled by the Middle Park Habitat Partnership Committee.

HERD MANAGEMENT HISTORY

Overview of Procedures to Estimate Population Size

Estimating population size of wild animals over large geographic areas is a difficult and inexact exercise. In several research projects, attempts have been made to accurately count all the known number of animals in large fenced areas. All of these efforts have failed to consistently count all of the animals. In most cases fewer than 65% of the animals can be observed and counted. CPW conducts aerial classification surveys of pronghorn herds nearly every year in August (some years ground surveys are conducted in lieu of helicopter surveys). Contrary to a common misperception, these surveys (often misnamed "counts") are not a census of the population and are at best a very coarse index of population trend. Instead, the primary purpose of these aerial surveys is to obtain pre-hunt age and sex ratios.

CPW then incorporates the observed pre-hunt sex and age ratios, along with hunter harvest, estimated survival rates of adults and juveniles, and wounding loss rates into population models developed by White and Lubow (2002). These population modeling methods represent CPW's current best estimate of population sizes. As better information becomes available, such as new estimates of age-specific or sex-specific survival rates,

wounding loss, sex ratio at birth, density estimates, or new statistical modeling techniques, better population estimates may be derived in the future.

History

In the late 1800's pronghorn were quite plentiful in the Middle Park area. By the1920's pronghorn had been extirpated from Middle Park, and remained totally absent from the area for more than 50 years. By the 1970's pronghorn had started to reappear in the area and were living in Middle Park year-round by the winter of 1983-84. This "pioneering" population probably originated from North Park via the Muddy Pass Divide.

Managers in Middle Park are fortunate to have some of the best inventory data on pronghorn in DAU PH-37 of any wild ungulate herd in Colorado. CPW initiated a research study on the Middle Park herd in December 1986 that involved ear-tagging and neck-banding animals for identification, along with the installation of nine radio-transmitters to facilitate tracking. New radio transmitters were installed in subsequent years and these, coupled with bi-weekly tracking, allowed researchers to keep close tabs on animal movements for over ten years. During the winters, when most of the herd would form into large groups within a 25-30 square mile area near Kremmling, radio-collars helped pinpoint distribution of sub-herds for managers and allowed teams of observers to go out and conduct a near total count of animals in the open habitat. At times, more than 10% of the population was “radioed,” which minimized chances of groups escaping detection. These ground counts were compared to projected winter population sizes computed from life tables that incorporated observed natural mortality rates, recruitment rates and harvest mortality, as well as to spreadsheet models.

The Middle Park Habitat Partnership Program (HPP) Committee paid to have 20 solar-powered ear transmitters installed on pronghorn by a helicopter net capture crew in December 1998. These enabled managers to continue mid-winter counts with a high degree of accuracy. However, once transmitters were lost due to mortalities, expired batteries, or for other reasons, it became much more difficult to conduct accurate counts. More personnel were needed and a “spotter” aircraft was required to provide a quality count. Fortunately, through these research efforts good data on survival rates was collected on the Middle Park herd which improved the accuracy of computer models.

One of the main objectives of the pronghorn research project in Middle Park was to arrive at an estimate of the biological carrying capacity. The carrying capacity of an environment is the maximum population size of a species that can be sustained given the resources available (Appendix B). By monitoring the declining fawn to doe ratios (an index of productivity) of the Middle Park pronghorn herd as the herd increased in size, researcher Tom Pojar was able to estimate the “K-value,” or maximum herd size that the habitat can support. As the population grew, there was a dramatic drop in the annual rate of increase. In the late 1980’s, the population averaged over 41% annual growth. Following 1993, the growth rate declined every year, and was below 10% by 1997. With each additional year of data, the estimate of “K-value” crept upward and it appeared that the herd would eventually level off on its own around 800 animals. However, this figure was for the currently occupied range at that time; if the herd expanded its range south of the Colorado River and west into GMUs 15, 26, and 231, it was likely this additional habitat would support several hundred more animals.

Comparing population densities between pronghorn in Middle Park and animals in North Park (Jackson County), where pronghorn had done well through the years, also provided insight into the carrying capacity of DAU PH-37. Vegetation and climate were very similar between the two areas. Approximately 800 square miles of habitat was available for pronghorn in North Park. Line transect and quadrat estimates indicated the pronghorn population in North Park consisted of about 1,900 animals. In Middle Park, there was some 300 square miles of sagebrush habitat north of the Colorado River (GMUs 18, 27 & 181). If the pronghorn density in North Park was around 2.4 animals per square mile, then the Middle Park herd could be estimated around 720 animals for a population that would provide good hunting opportunity. It should be noted that this calculation did not include potential pronghorn habitat south of the Colorado River, or GMUs 15, 26, and 231.

Post-hunt Population Size

To estimate the population size for the PH-37 herd, each August managers inventory (e.g., ground or helicopter) a sample of bucks (adults and yearlings), does and fawns from the herd, which allows age and sex ratios to be established. Following the hunting season, these ratios are used in conjunction with harvest statistics in the population modeling process to generate an annual population estimate. In addition to the August inventory, managers also conduct a coordinated count during the winter when animals are congregated and highly visible on winter range. This count is used as a second measure of population, and a way to assess the modeled population estimate.

The 2018 and 2019 model estimates and winter counts are showing a slight downward trend in the population (Figure 9). In recent years, a downward trend has also been seen in the observed age and sex ratios, so it makes sense to see this slight downward trend in the overall population.

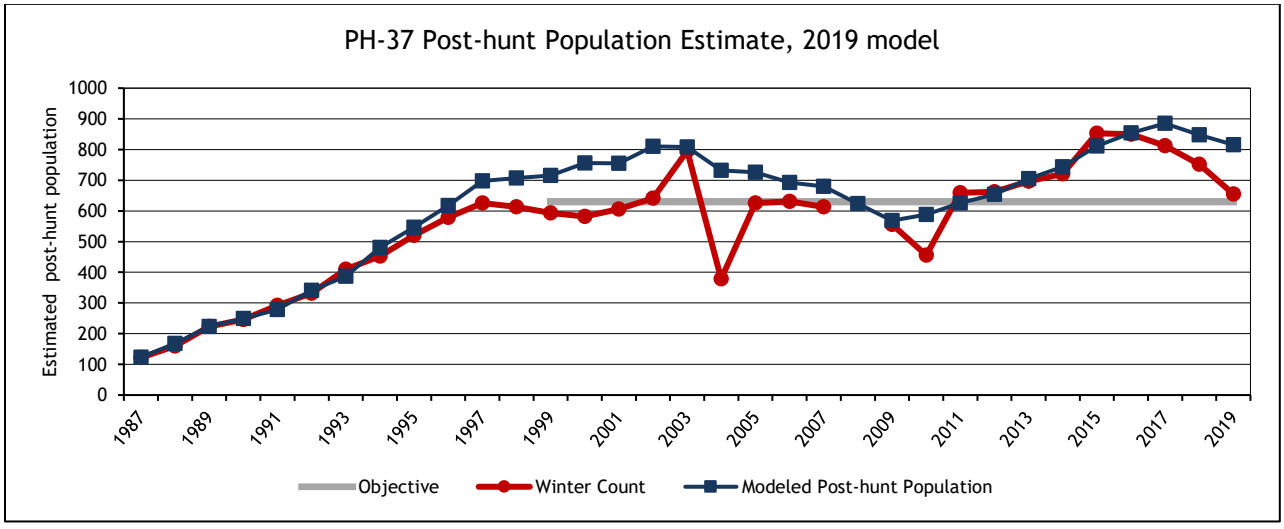


Figure 9. PH-37 observed post-hunt population estimate and objective from 1987-2019.

Pre-Hunt Herd Composition
Age Ratio

As would be expected, as this pronghorn population initially pioneered into Middle Park, productivity was very high and then slowly decreased as the population has gotten closer to its biological carrying capacity. In 2018 and 2019, a decrease was observed in the fawn:doe ratio relative to the previous 5 years (Figure 10). The most recent observed 3-year average (2017-2019) was 49 fawns:100 does.

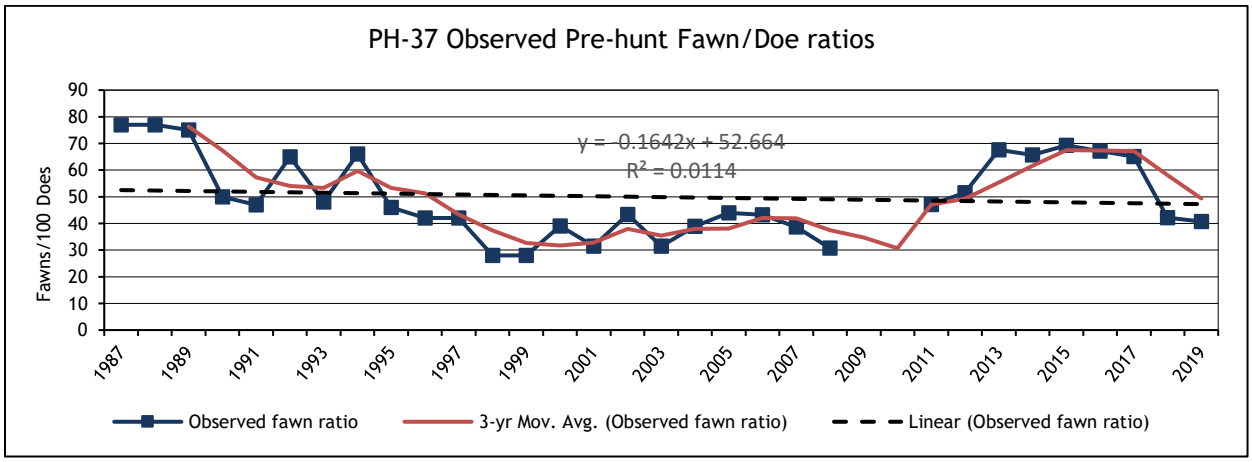


Figure 10. PH-37 observed pre-hunt age ratio (fawns:100 does) 1987-2019.

Sex Ratio

Each year as license quotas are established, managers attempt to provide a certain number of buck licenses that will align the observed sex (buck) ratio (i.e., from inventory) with the sex ratio objective. For example, if the observed ratio is well above the sex ratio objective, then licenses may be increased relative to the previous year's license quota, or if the observed ratio is below the objective, then buck licenses may be reduced relative to the previous year's license quota. Similar to the recent observed age ratio, the recent observed sex ratio has trended downward (Figure 11). The most recent observed 3-year average (2017-2019) was 53 buck:100 does.

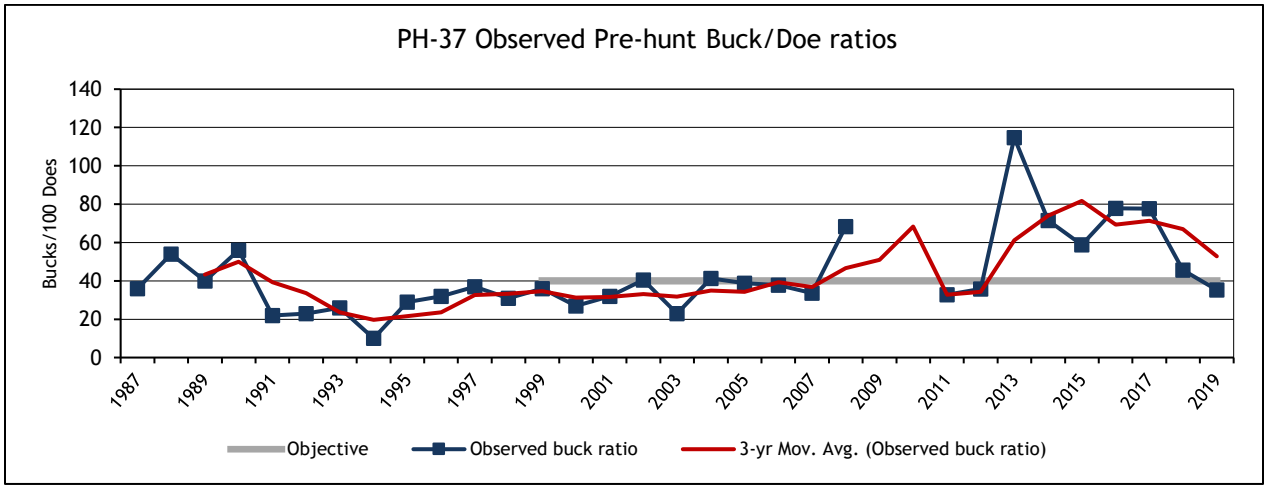


Figure 11. PH-37 observed pre-hunt sex ratio and objective 1987-2019.

Hunting Licenses and Harvest Statistics
Licenses allocation

When the current PH-37 DAU plan was established in 1999 only 60 licenses were available to hunters. By 2004, licenses had increased significantly to 325. Due to the severe winter of 2007-2008 and concerns of high winter mortality, licenses were drastically reduced to 56 licenses in 2010. High fawn production in years following this weather event, and winter counts returning to the 2006 level, allowed managers to slowly increase license numbers back to 2007 levels by 2013 for bucks and 2015 for does. In 2019, 220 buck licenses and 285 doe licenses were available as limited licenses (Figure 12).

Since 2015, GMUs 15, 26, and 231 have been included in PH-37 management decisions. Starting in 2004, game damage doe licenses were available in portions of GMUs 15, 26, and 231. Between 2004 and 2017, 241 doe game damage licenses were issued. Starting in 2018, 10 buck and 15 doe limited licenses became available, and the same numbers of each were issued in 2019. In addition to game damage and limited licenses, either-sex over-the-counter (OTC) archery licenses have been available in these GMUs since 2011.

Due to this population being over objective and low hunter success as a result of many pronghorn in PH-37 being pushed onto private lands, in 2018 private land only (PLO) licenses were implemented to try to distribute pronghorn off private lands to public lands where more hunters can access them during the hunting season. In 2018, 30 buck and doe PLO licenses, and in 2019, 50 buck and doe PLO licenses were offered. This strategy will be monitored for effectiveness to assess if hunter harvest and success rates increase.

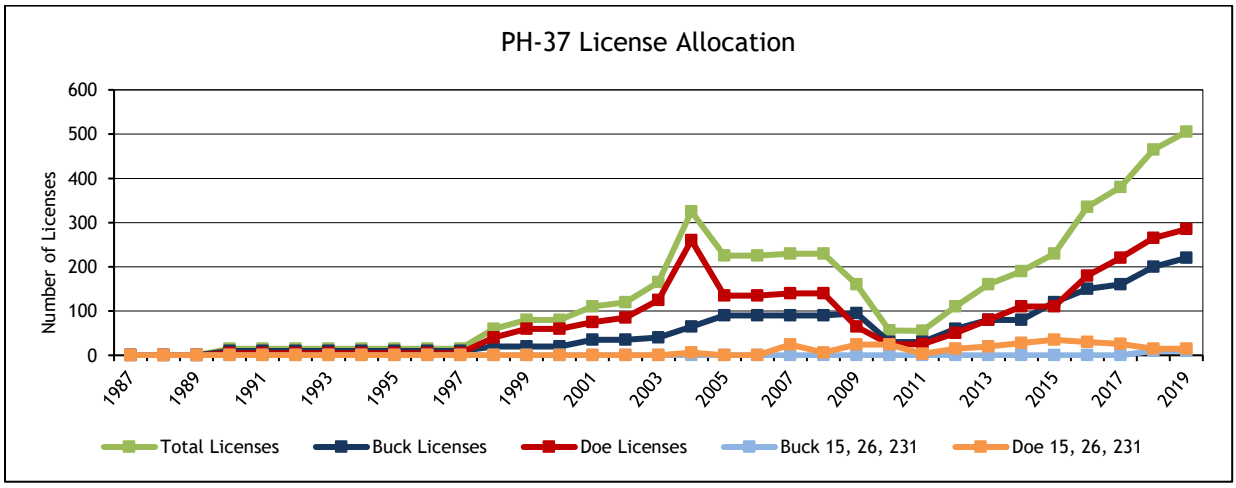


Figure 12. PH-37 licenses allocated from 1987-2019.

Harvest and Success Rates

When the current PH-37 DAU Plan was established in 1999 hunters harvested 46 pronghorn. Harvest peaked at 156 pronghorn in 2004 and then declined until 2010. From 2011-2017, harvest increased steadily to 2004 levels, but in 2018 and 2019, harvest declined slightly. In 2019, hunters harvested 78 bucks and 56 does. In the fall of 2018, in GMU 27 a wildfire occurred at upper elevations. Although the fire did not directly affect pronghorn habitat, the majority of the GMU that would typically provide pronghorn hunting was closed and this may have affected harvest.

License success rates, defined as the percent of pronghorn harvested per license, have ranged from 30% to 95% for buck licenses and from 20% to 92% for doe licenses (1999-2019; Figure 14). For buck licenses, overall license success from 1999-2019 was 68% and the running three-year average (2017-2019) was 43%. For does, license success for the same time periods are lower, 55% and 24%, respectively.

Since 2011, license success has experienced a downward trend. During this same time period license allocation has steadily increased, and harvest increased and then in the last three years has plateaued. License allocation increased to address an over-objective population. Although this strategy did work to return harvest to previous highs (i.e., in the 2000's), this saturation of licenses (i.e., buck licenses currently are three times as high and doe licenses twice as high as in the 2000's) decreased license success rates. As more hunters are in the field putting pressure on pronghorn, many pronghorn will seek refuge on private lands making it difficult for public land hunters to be successful. Starting in 2018, private land only licenses were issued to attempt to address this issue. Unfortunately, success with this strategy depends on private landowners providing access. Often landowners are hesitant to provide access because they are focused on harvesting mature bucks and do not want hunters to push pronghorn herds off their property, or they simply do not allow access to hunters. This cycle makes it extremely difficult for managers to reach harvest and population objectives.

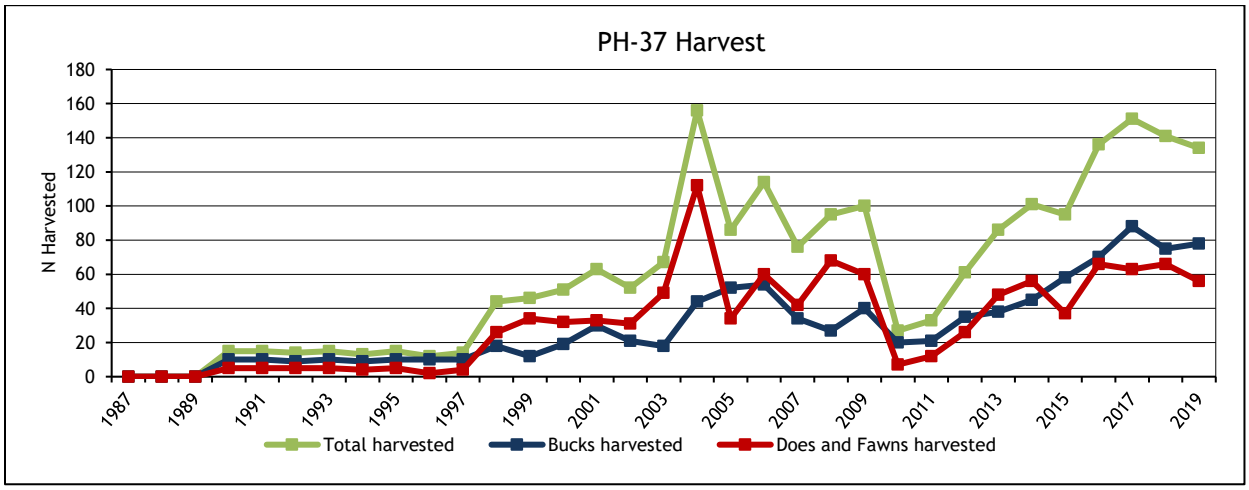


Figure 13. PH-37 buck, antlerless (does and fawns), and total harvest from 1987-2019.

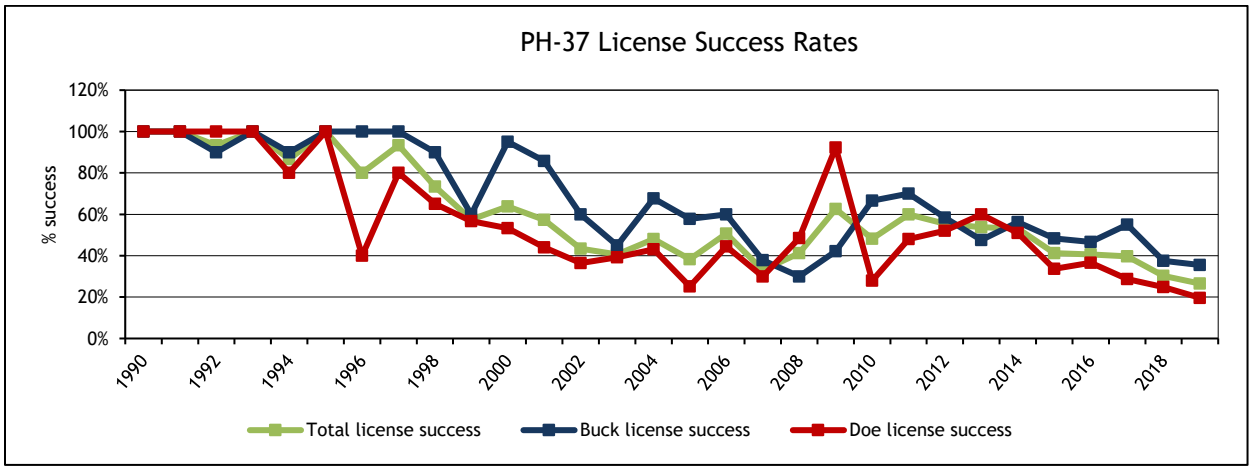


Figure 14. PH-37 license success rates for 1990-2019.

Demand and Preference Points Required

With PH-37 offering relatively few licenses, many of these limited licenses (in particular buck licenses) are highly sought after. In 2019, all buck and rifle doe licenses sold out as first choice, although only buck rifle licenses required preference points (i.e., 3 points). The remainder (i.e., doe archery, muzzleloader and PLO) of licenses were available as leftovers. GMUs 15, 26, and 231 offer OTC archery licenses and a limited number of buck and doe rifle licenses. In 2019, these rifle buck licenses required 1 preference point and sold out as first choice, and rifle doe licenses sold out as second choice.

CURRENT MANAGEMENT STATUS

1999 PH-37 Plan Objectives

Population Objective = 630
Sex ratio Objective = 40 bucks:100 does

Current Management Strategies

The PH-37 DAU is managed through limited licenses for both antlered and antlerless harvest for all manners of take, with the exception of GMUs 15, 26, and 231 offering either-sex over–the–counter archery. Archery, muzzleloader, rifle and PLO licenses are available for the PH-37 DAU. Private land licenses provide hunting opportunity on private lands, and are intended to help to disperse pronghorn onto public lands. Although the PH-37 herd has been slightly above the population objective during the majority of the life of the 1999 DAU Plan (1999-2019), the observed sex ratio has fluctuated above and below the objective and the most recent 2-year average is at the objective of 40 bucks:100 does. For a relatively small pronghorn herd, PH-37 offers an excellent opportunity to hunt pronghorn. Continued efforts will be made to address the "private land refuge effect" (i.e., pronghorn seeking refuge on private lands during the hunting season — limiting public land hunters to access pronghorn.).

Current Management Issues

1. ***Limited Winter Range***

   Winter snow forces pronghorn from typical summer ranges throughout the DAU to winter range above the Colorado and Blue Rivers, and Muddy Creek. This movement concentrates pronghorn to elevations of 7,000-8,500 feet on very limited winter range. During light to normal winters, the winter mortality rates probably do not exceed 15-20% of the total pronghorn herd. However, during severe winters the pronghorn can be concentrated in the valley floors on very limited south-facing or wind-swept slopes. Competition for food is acute and this results in high winter mortality, especially for fawns and bucks. Winter range is considered the most limiting factor for pronghorn in this DAU.

2. ***Unfavorable Range Conditions***

   Although much of pronghorn habitat across the western US is in fair to poor condition, Middle Park habitat tends to be in better shape due to the considerable moisture it receives in the winter. However, suppression of large-scale wildfire has resulted in plant successional movement towards later seral stage or climax

communities. Browse plants are generally mature to over-mature and often decadent. Browse seedlings and young plants are sparse and in some areas, the grass and forb understory is sparse and lacks diversity. Many of the mixed mountain shrublands also are over-mature, less productive, and can be unavailable for winter browse use. CPW, BLM, USFS, and private landowners continue to make efforts to conduct habitat improvement projects, such as prescribed burns, fertilization treatments, and pinyon-juniper thinning/removal.

3. ***Loss of Habitat due to Land Development***

Over the past 50-60 years, residential and commercial developments have resulted in a rapid loss of big game habitat. This trend is expected to continue over the next 10 years.

4. ***Indirect Loss of Habitat due to Fragmentation and Human Activities***

The proliferation of all forms of outdoor recreation on public lands has continued since the 1999 DAU Plan was created. Human activity in the form of recreation has been widely shown to have negative impacts on wildlife species (reviewed in Larson et al. 2016). Pronghorn react to the presence and activity of humans either by fleeing or by being vigilant, both of which detract from the animal's ability to feed and rest. These disturbances on the scale of individual encounters between an animal and a human recreationist may seem minor in isolation, but when translated to the lifetime of the animal or even to the scale of the whole pronghorn population, the cumulative effects of year-round disturbance will lead to lower recruitment of fawns, higher mortality, and overall decline in population size over time. Disturbance from human activity can make what would otherwise be suitable habitat from a forage standpoint into poor quality habitat from a behavioral standpoint.

New or expanded trail systems for both motorized and mechanized recreation have been established on both pronghorn winter and summer ranges. Dispersed recreation occurs on public lands elsewhere throughout the DAU. Camping, hiking, ATV/UTV riding, horseback riding, biking, snowmobiling, backcountry skiing, and dog walking are among the many recreational uses of public lands.

Seasonal closures on both BLM and USFS lands help to reduce human activity on some areas of pronghorn winter range and transitional range during critical times of the year. CPW has also instituted a spring closure on shed-antler hunting on public lands. Seasonal closures and similar restrictions are only as effective as they are complied with, enforced, and socially accepted. With limited agency staff to patrol and enforce these regulations, it is admittedly difficult to ensure compliance with these closures. It is important for recreationists to be aware of their potential impacts on wildlife, to follow the seasonal closure dates, and to encourage their peers to do so as well.

5. ***Road kills***

Traffic has continued to increase over the past decade as the region's human population has grown, and wildlife-vehicle collisions continue to be a concern. Highways 9 and 40 bisect winter range and are the primary routes for visitors and residents traveling from I-70 to Steamboat Springs. Starting in 2015, wildlife exclusion fencing and overpass/underpass structures were installed along a section of Hwy 9 to

reduce wildlife-vehicle collisions. However, other portions of Hwy 9 and Hwy 40 continue to result in pronghorn mortalities.

6. ***Access and Refuges***

The majority of summer range habitat in the PH-37 DAU is comprised of either private lands or BLM. Due to a limited number of pronghorn on public lands, as the hunting season begins many public land hunting groups are forced to pursue the same small groups of pronghorn. When this occurs, many of these groups of pronghorn will seek refuge on private lands making it difficult for public land hunters to access them. This situation creates crowding issues for public land hunters because they are constrained to similar areas where they are able to find pronghorn. Often, access onto private lands is very limited making it difficult for the average public land hunter to be successful. Crowding issues on private lands are rarely reported as landowners have the ability to control the number of hunters they allow at any one time.

7. ***Game Damage***

Game damage and conflicts with landowners in GMUs 18, 27, 28, 37, and 181 are limited/non-existent. Due to the low population level of the PH-37 herd and an adequate mix of public and private lands, pronghorn have a sufficient amount of natural habitat (i.e., sagebrush) that precludes over-use of private agricultural lands. In rare instances where problems have existed, either fencing or hazing strategies have been implemented to reduce conflict.

In contrast, conflicts with landowners in GMUs 15, 26, and 231 began to be evident in 2004. Prior to 2018, no limited rifle licenses were offered in these units and population management was primarily addressed by issuing doe game damage licenses. Starting in 2018, limited buck and doe licenses began to be offered to help address conflict while providing additional hunting opportunity to the public. It may continue to be necessary to offer game damage licenses to private landowners if the limited rifle licenses do not address conflict issues.

8. ***Disease***

Disease is not thought to be a factor regulating pronghorn populations in PH-37. Unlike deer, elk, and moose, pronghorn are not known to be affected by chronic wasting disease (CWD). Other diseases affecting pronghorn include bluetongue and epizootic hemorrhagic disease (Lance and Pojar 1984; O'Gara 2004); however, instances of these diseases affecting the Middle Park pronghorn population have not been seen.

Public Input Process

In June 2016, we contacted 545 hunters who had applied for PH-37 licenses during the 2011-2015 hunting seasons, and 424 landowners from Grand, Routt and Summit Counties. We mailed postcards to these individuals requesting that they complete an online survey on PH-37 pronghorn management. We received responses from 100 hunters and 100 landowners (18% and 24% response rate, respectively). It is important to note that not every survey participant answered every question. Complete survey results are available in Appendix A.

Key highlights of the hunter survey results:

- 78% of respondents (n=42) had a pronghorn license in PH-37 between 2011-2015; 94% that responded (n=33) had acquired that license through the limited draw process.
- 72% of respondents harvested a pronghorn.
- 46% of hunters felt the quality of pronghorn hunting was either excellent (10%) or good (36%), while 54% felt it was fair (42%) to poor (11%) .
- When asked relative to the current number of pronghorn how they would like to see the number of pronghorn change, of the 54 hunters that responded, 43% would like to see a slight (25%) increase, 24% would like to see the number of pronghorn increase greatly (50%), and 13% would like to see a minimal (10%) increase.
- When asked what changes hunters would like to see to buck licenses, of the 52 respondents, 52% want to maintain the current number, 23% decrease,17% had no opinion, and 8% increase.

Key highlights of the landowner survey:

- 50% of landowners (n=26) had a pronghorn license in PH-37 between 2011-2015.
- 52% of landowners felt the quality of pronghorn hunting was either excellent (8%) or good (44%), while 28% felt it was fair (24%) to poor (4%); 20% did not know.(n=25)
- 85% of landowners (n=13) did harvest a pronghorn in the PH-37 DAU.
- The majority of landowners (70%) that responded had property in Grand County.
- From 2011-2015, only 18% of landowners (n=45) allowed hunters to hunt on their property, and the majority of those hunters were family and friends.
- 95% of landowners (n=45) indicated they have not had any problems with hunters on their property in the last 5 years.
- 85% of landowners (n=45) indicated that pronghorn had not caused any damage to their property in the last five years, and those that did indicate damage (n=7), the majority (72%) characterized the damage as light.
- When asked relative to the current number of pronghorn how they would like to see the number of pronghorn change, of the 45 landowners that responded, 36% would like to see a slight (25%) increase, 22% would like to see a minimal (10%) increase, and 18% would like to see the number of pronghorn increase greatly (50%).
- When asked what changes landowners would like to see to buck licenses, of the 45 respondents, 42% want to maintain the current number, 24% had no opinion, 18% increase, and 16% decrease.
- When landowners were asked how they would like to see hunter numbers change, of the 45 respondents, 35% indicated to stay the same, 27% decrease, 23% had no opinion, and 15% increase.

To gather additional input from all stakeholders who have an interest in PH-37 pronghorn management, the draft plan was available for review during a 30-day comment period. During this 30-day comment period, CPW made a survey available for the public to ensure interested parties attitudes continue to be in line with the 2016 survey results. Only one individual participated in the survey and their comment can be found at the end of Appendix A. We also solicited input from county commissioners, federal land management agencies, and Habitat Partnership Program committees. Comments from these stakeholders can be found in Appendices C-E.

MANAGEMENT ALTERNATIVES and PREFERRED OBJECTIVES

Alternatives for Population Objective

The population objective sets the targeted overall number of pronghorn, regardless of sex or age class. CPW manages population size generally by adjusting the number of doe licenses because longer-term trends in population size are largely driven by doe survival rates; however, the amount of buck harvest can still contribute to changes in population size on a shorter timescale.

The current (post-hunt 2019) PH-37 population estimate is 816 pronghorn and the current population objective is 630 pronghorn. The alternatives being considered are all a range rather than a single numerical objective, and the midpoints (targets) of the ranges would be at or above the current population objective. The ranges within each alternative allow for some annual variation in the estimated population size due to factors such as weather patterns influencing pronghorn survival rates and statistical population modeling methods being inexact (see Overview of Procedures to Estimate Population Size section above).

Table 2. Proposed alternatives for PH-37 population objective range.

Proposed Alternatives for Population Objective	
Alternative 1:	560-690 (status quo, but with a range)
Alternative 2 (preferred):	**600-800 (below carrying capacity)**
Alternative 3:	950-1,150 (at/above carrying capacity)
1999 DAU plan population objective	630
Post-hunt 2019 population estimate	816

Alternative 1: 560-690:

Maintains a population objective target of 630 (status quo), but would create a range of +/- 10% around that target. This objective has been in place since 1999. Under this alternative, the population would be managed well below the habitat carrying capacity. The herd's productivity and survival rates should be higher than under the other two alternatives, and likewise, its resilience to severe weather events, predation, and other sources of mortality. Doe and buck licenses would be maintained at higher quotas due to the herd's higher productivity. Trying to reach this objective would lead to a continued decline in license success rates.

Alternative 2: 600-800 (Preferred):

Increases the population objective target by 11%, and creates a range of +/- 14% around that target. This alternative best reflects the current population and the fluctuations in population size that occur because of habitat constraints during the winter. This range should help to limit conflicts with landowners and increase hunter success rates.

Alternative 3: 950-1,150:

Increases the objective target to ~ 25% above 2016 population estimate of ~850, and creates a range of +/- 10% around that target. This alternative is a result of responses from hunter and landowner surveys, where the higher percentage of both landowners and hunters indicated they would like to see a slight increase of 25% to the existing population. This range is more than likely at or above carrying capacity.

Alternatives for Sex Ratio Objective

The sex ratio objective determines the target number of bucks per 100 does. This metric is an index of the relative quality of bucks in the herd. CPW manages for the sex ratio by adjusting the number of buck licenses issued.

The recent pre-hunt 3-year average sex ratio in PH-37 is 53 bucks per 100 does (2-year average is 40), which is above the 1999 Plan's objective of 40 bucks per 100 does. The alternatives under consideration would be to either decrease, maintain, or increase the sex ratio target and then create an objective range around each.

Table 3. Proposed alternatives for PH-37 sex ratio objective.

Proposed Sex Ratio Objective Alternatives	
Alternative 1 (Decrease)	25-35
Alternative 2 (preferred)	**35-45**
Alternative 3 (Increase)	45-55
1999 DAU plan sex ratio objective	40
Pre-hunt 3-year (2017-2019) average sex ratio	53

Alternative 1: 25-35 bucks:100 does:

Under this alternative, the herd would be managed for a fairly low sex ratio. Buck license quotas would be increased to manage the sex ratio downward from the current observed ratio. The advantages of this alternative would be that buck licenses would be easier to draw and there would be more hunting opportunity; there would be relatively fewer bucks to compete with does and fawns for forage, so we may see an increase in herd productivity and in the fawn ratio. The disadvantages would be that hunter crowding could become an issue, and that there would be relatively fewer mature bucks available for harvest in the herd.

Alternative 2: 35-45 bucks:100 does (Preferred):

This alternative would maintain the current sex ratio objective target that was established in the 1999 PH-37 Plan, but establishes a range around that target. This range is a moderate ratio at which the herd is still managed primarily for ample buck hunting opportunity. The maturity of available bucks would be about the same as is currently. Buck license quotas would likely remain similar to levels seen recently. The advantages and disadvantages of Alternative 2 would be intermediate to those of Alternatives 1 and 3. Hunters and landowners that responded to the 2016 survey preferred this management approach for bucks.

Alternative 3: 45-55 bucks:100 does:

This alternative would manage the herd for a higher sex ratio range. The advantages of Alternative 3 would be that there may be relatively more mature bucks in the herd. The disadvantages are that it would be more difficult to draw a buck license, and the population growth rate may decline as bucks compete with does and fawns for forage.

Preferred Alternatives and Objectives

The CPW staff-recommended population objective range is 600-800 pronghorn (Alternative 2). This range is likely below the DAU's current habitat carrying capacity and allows CPW to allocate an adequate and relatively stable number of pronghorn licenses from year to year.

The CPW staff-recommended sex ratio objective range is 35-45 bucks:100 does (Alternative 2). This objective has been satisfactory to the majority of surveyed PH-37 hunters and landowners, and maintains a moderate sex ratio that provides ample buck hunting opportunity.

STRATEGIES TO ADDRESS ISSUES AND MANAGEMENT CONCERNS

Few of the issues and management concerns identified in this management plan are wholly within CPW's regulatory purview. Addressing many of the issues and management concerns requires close coordination with other federal, state, and local governmental entities and other organizations. CPW will continue to work collaboratively with our partners in the federal land management agencies, private landowners, county governments, local municipalities and NGOs to protect and enhance pronghorn habitat. Important habitat conservation methods include habitat treatments, conservation easements or land acquisitions, maintaining landscape connectivity and movement corridors, and adhering to seasonal recreation closures on winter range areas.

STRATEGIES TO ACHIEVE HERD MANAGEMENT OBJECTIVES

To achieve the updated population objective and to maintain the current sex ratio objective, CPW will continue to set licenses annually to provide sufficient buck and doe hunting opportunity for the public and to use hunting as a management tool to keep pronghorn densities at moderate levels to encourage herd productivity. CPW will also continue to provide a tolerable number of private land only licenses to help disperse pronghorn onto public lands — that will provide additional opportunities to public land hunters and ideally help increase success rates.

ACKNOWLEDGEMENTS

Thanks to Michelle Flenner (GIS specialist, CPW) for conducting spatial analyses and preparing the maps for this document.

LITERATURE CITED

Bartmann, R.M., G.C. White, L.H. Carpenter. 1992. Compensatory mortality in a Colorado mule deer population. Wildlife Monographs No. 121. 39 pp.

Bishop, C.J., G.C. White, D.J. Freddy, B.E. Watkins, and T.R. Stephenson. 2009. Effect of enhanced nutrition on mule deer population rate of change. Wildlife Monographs No. 172. 28 pp.

Lance, W. R. and T. M. Pojar. 1984. Diseases and parasites of pronghorn: a review. Colorado Division of Wildlife Special Report #57. 14 pp.

O'Gara, B. W. 2004. Diseases and Parasites. Pp. 229-336 *in* O'Gara, B. W., and J. D. Yoakum, editors. Pronghorn Ecology and Management. The University Press of Colorado, Boulder.

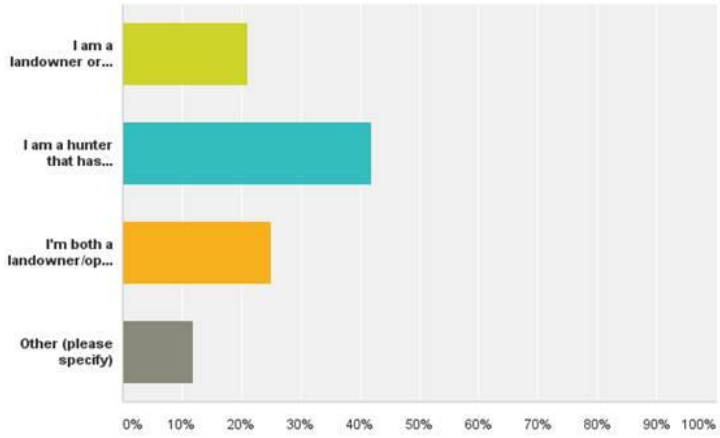
Southwick Associates. 2018. The 2017 Economic Contributions of Outdoor Recreation in Colorado: A regional and county-level analysis. 40 pp.

White, G. C., and B. C. Lubow. 2002. Fitting population models to multiple sources of observed data. Journal of Wildlife Management 66:300-309.

APPENDICES
Appendix A: PH-37 2016 Hunter and Landowner Survey Results

Q1: Which of the following statements best characterizes your interest in GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371? (Please choose one)

Answered: 100 Skipped: 0



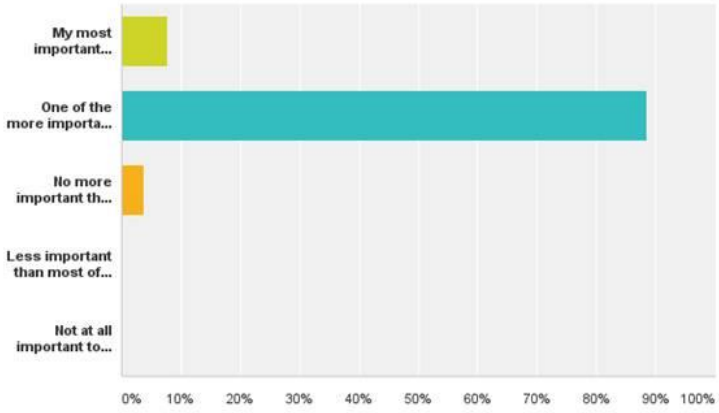
Powered by SurveyMonkey

Landowner Responses

Powered by SurveyMonkey

Q2: How important to you is hunting compared to your other recreational activities? (Please choose one)

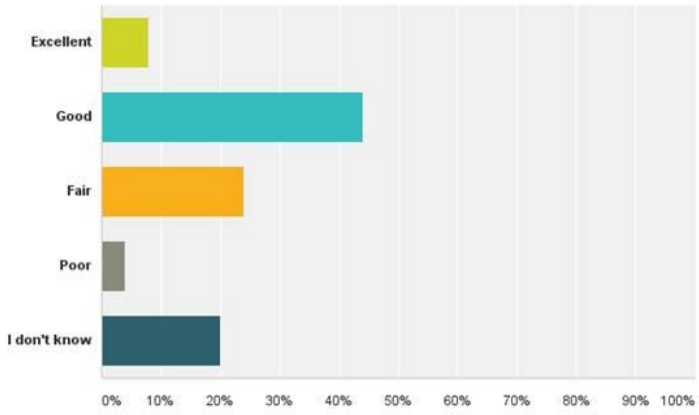
Answered: 26 Skipped: 74



Powered by SurveyMonkey

Q3: Overall, how would you rate the quality of pronghorn hunting in GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371) ? (Please choose one)

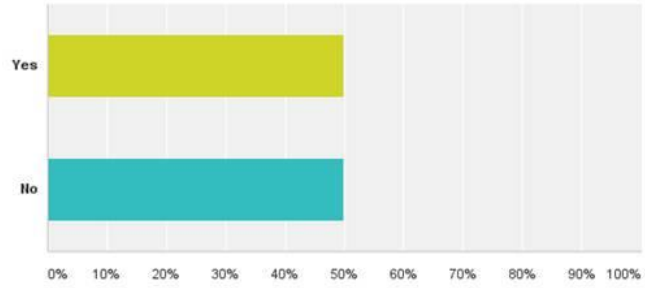
Answered: 25 Skipped: 75



Powered by SurveyMonkey

Q4: Did you have a pronghorn license for GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371 between 2011 and 2015?

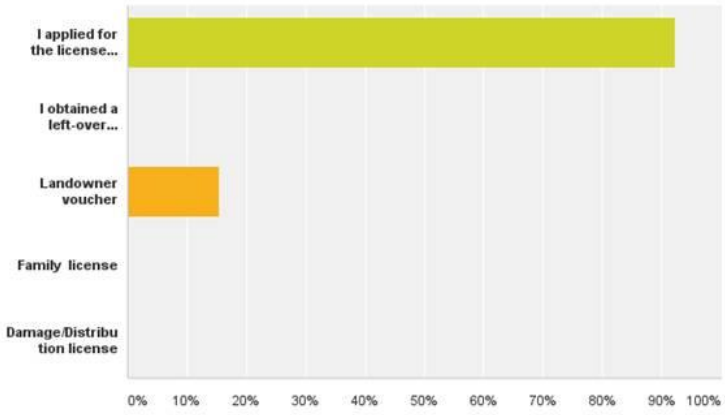
Answered: 26 Skipped: 74



Powered by SurveyMonkey

Q5: How did you acquire your pronghorn license(s)? (Check all that apply)

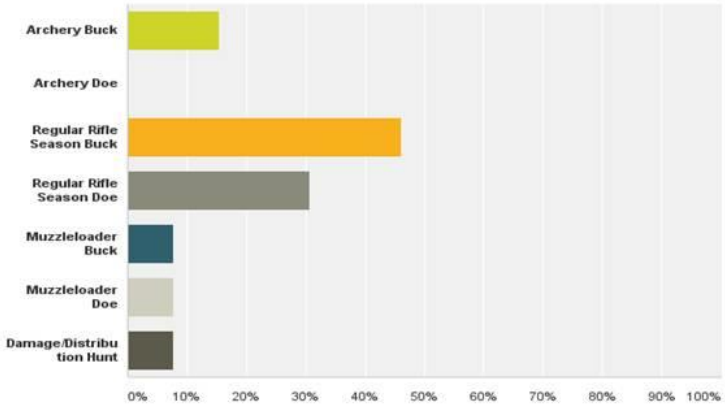
Answered: 13 Skipped: 87



Powered by SurveyMonkey

Q7: Which of the following seasons did you hunt pronghorn? (Please check all that apply)

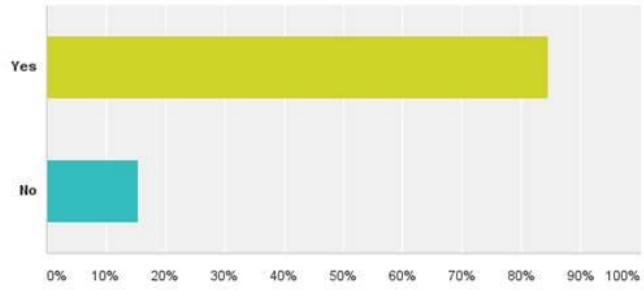
Answered: 13 Skipped: 87



Powered by SurveyMonkey

Q8: Did you harvest a pronghorn in one of these GMUs (15, 18, 26, 27, 28, 37, 181, 231, or 371) between 2011 and 2015?

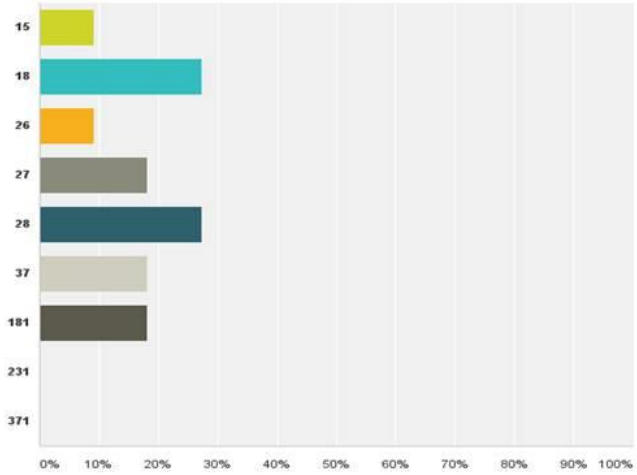
Answered: 13 Skipped: 87



Powered by SurveyMonkey

Q9: Which GMU(s) have you harvested a pronghorn in between 2011 and 2015? (Check all that apply)

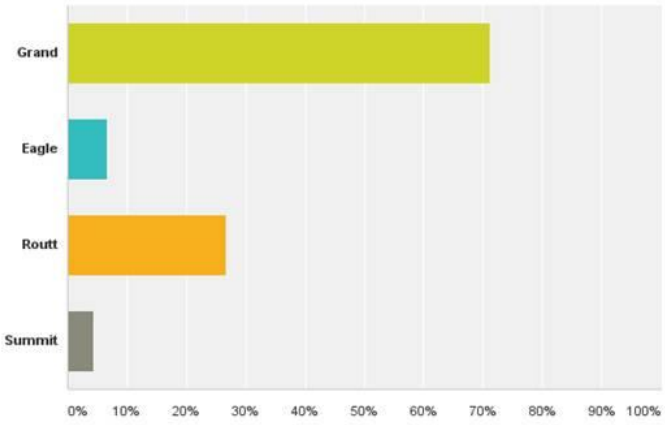
Answered: 11 Skipped: 89



Powered by SurveyMonkey

Q12: In which county(ies) is your property located? (Please check all that apply)

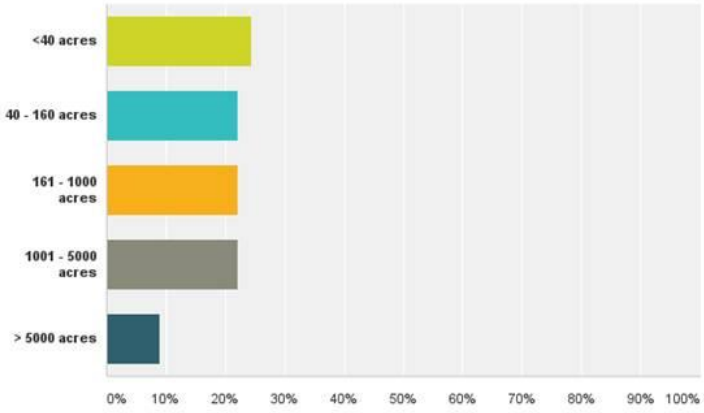
Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q13: How many acres of land do you own, lease or manage? (Please choose one)

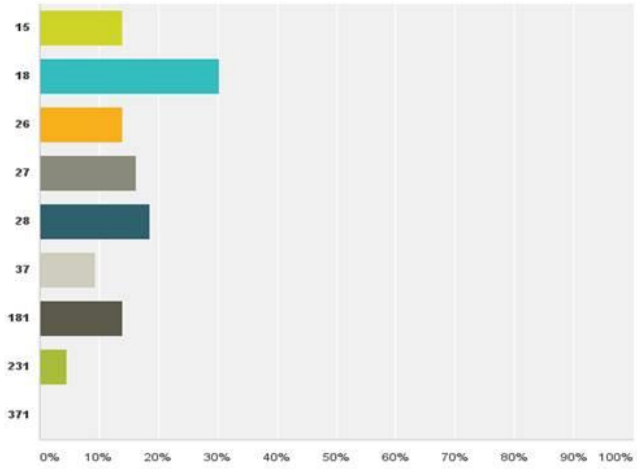
Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q14: Which GMU(s) do the property that you own, lease or manage lie? (Check all that apply)

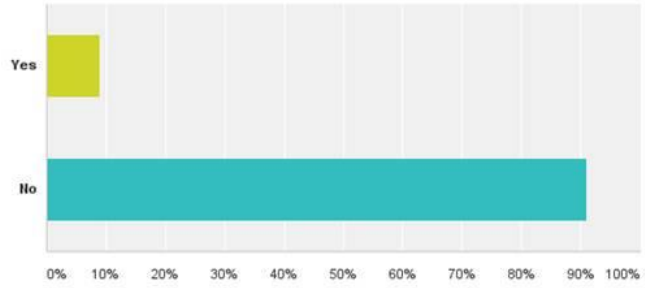
Answered: 43 Skipped: 57



Powered by SurveyMonkey

Q15: Do you lease your property to outfitters?

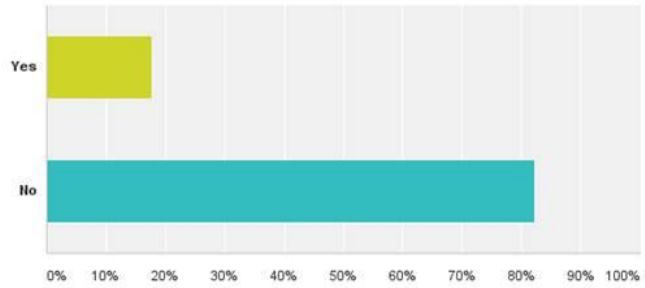
Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q16: From 2011-2015 did you allow anyone to hunt pronghorn on your property?

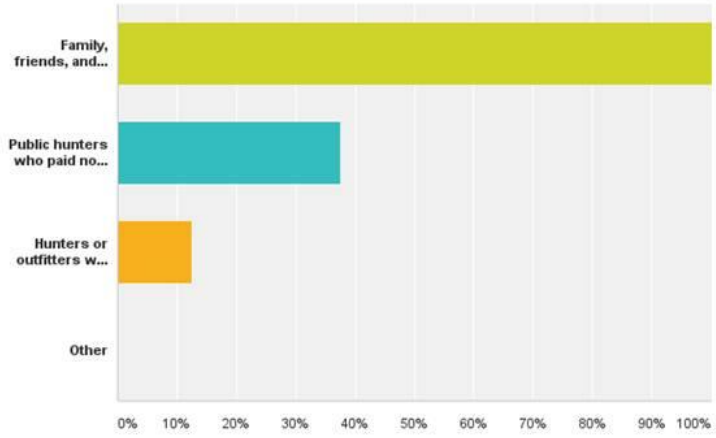
Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q17: Whom did you allow to hunt pronghorn on land you control in the last 5 years? (Please check all that apply)

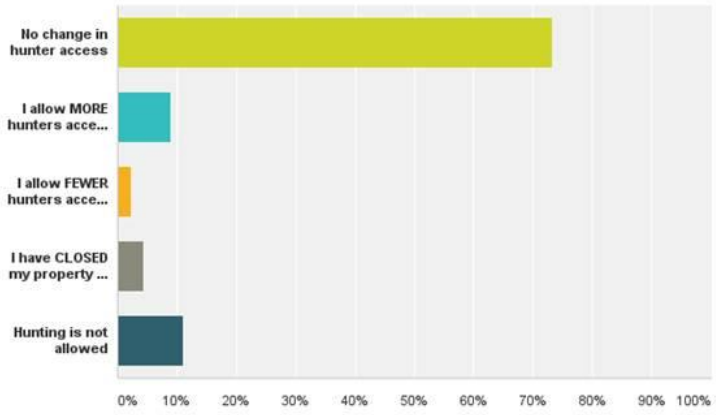
Answered: 8 Skipped: 92



Powered by SurveyMonkey

Q18: Have you changed hunter access to your property in the last 5 years? (Please choose one)

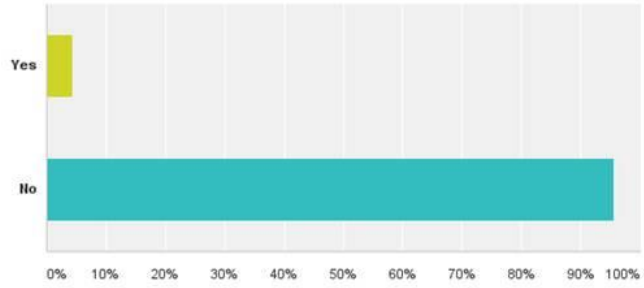
Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q19: Have you had problems with pronghorn hunters on your property in the last 5 years?

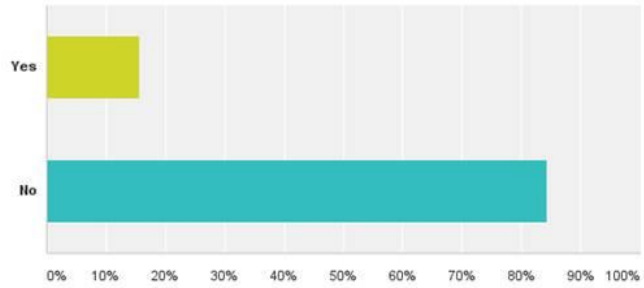
Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q22: Have pronghorn caused damage to your property in the last 5 years?

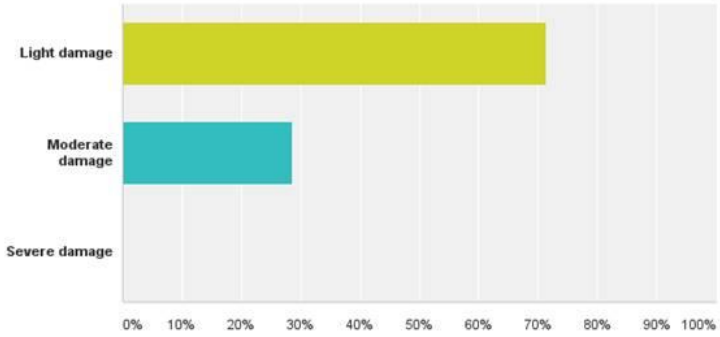
Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q23: Please rate the severity of damage done to your property by pronghorn.

Answered: 7 Skipped: 93



Powered by SurveyMonkey

Q23: Please rate the severity of damage done to your property by pronghorn.

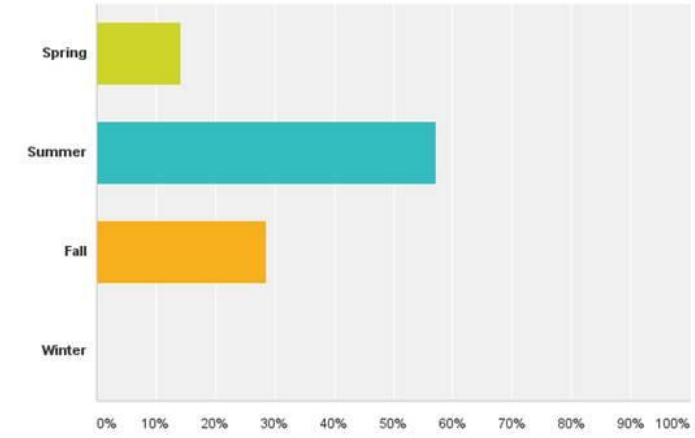
Answered: 7 Skipped: 93

Answer Choices	Responses	
Light damage	71.43%	5
Moderate damage	28.57%	2
Severe damage	0.00%	0
Total		7

Powered by SurveyMonkey

Q24: When does the majority of damage occur?

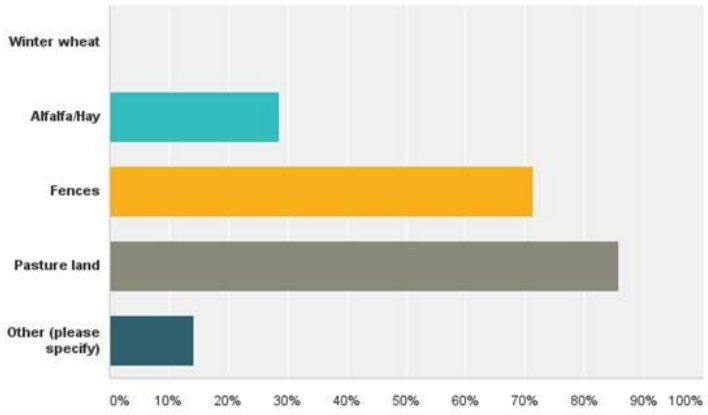
Answered: 7 Skipped: 93



Powered by SurveyMonkey

Q25: What type of crops/land did pronghorn cause damage to on your property? (Please check all that apply)

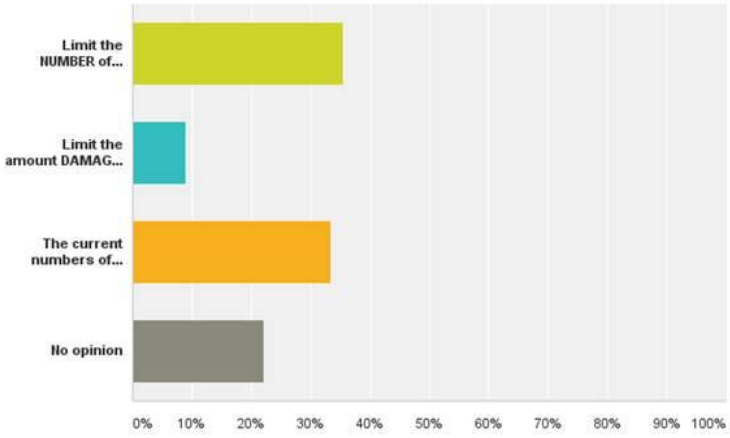
Answered: 7 Skipped: 93



Powered by SurveyMonkey

Q26: For the purposes of pronghorn management in the Game Management Unit(s) which include your property, what is your preference?

Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q26: For the purposes of pronghorn management in the Game Management Unit(s) which include your property, what is your preference?

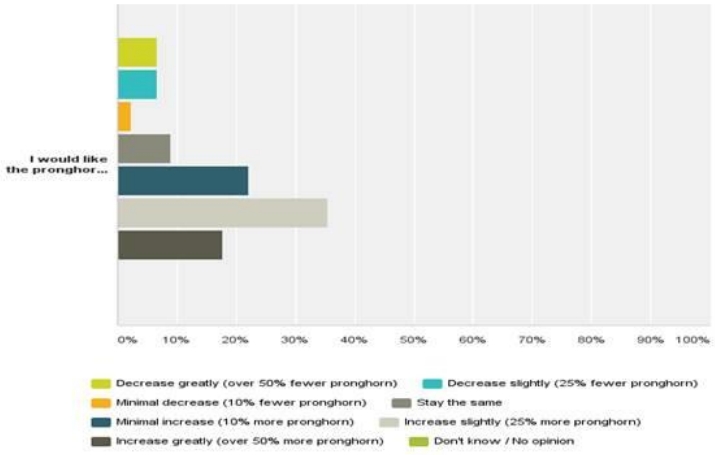
Answered: 45 Skipped: 55

Answer Choices	Responses	
Limit the NUMBER of pronghorn HUNTERS (more pronghorn, fewer hunters)	35.56%	16
Limit the amount DAMAGE to your property caused by PRONGHORN (fewer pronghorn, more hunters)	8.89%	4
The current numbers of hunters and pronghorn in the GMU(s) are acceptable	33.33%	15
No opinion	22.22%	10
Total		45

Powered by SurveyMonkey

Q27: For the 2017-2026 time period, relative to the current number, how would you like the number of pronghorn in Game Management Units (GMUs) which include your property(ies) to change from the previous years (2011-2015)? (Please choose one)

Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q27: For the 2017-2026 time period, relative to the current number, how would you like the number of pronghorn in Game Management Units (GMUs) which include your property(ies) to change from the previous years (2011-2015)? (Please choose one)

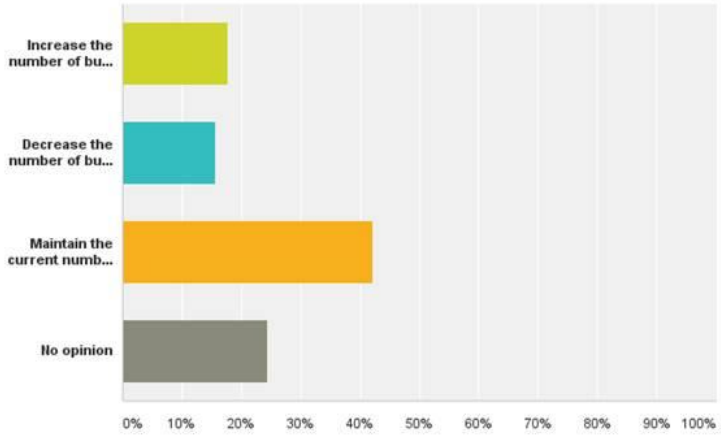
Answered: 45 Skipped: 55

	Decrease greatly (over 50% fewer pronghorn)	Decrease slightly (25% fewer pronghorn)	Minimal decrease (10% fewer pronghorn)	Stay the same	Minimal increase (10% more pronghorn)	Increase slightly (25% more pronghorn)	Increase greatly (over 50% more pronghorn)	Don't know / No opinion	Total
I would like the pronghorn herd size to:	6.67% 3	6.67% 3	2.22% 1	8.89% 4	22.22% 10	35.56% 16	17.78% 8	0.00% 0	45

Powered by SurveyMonkey

Q28: Which of the following general strategies should CPW use to guide decisions about how many buck pronghorn permits to issue in the Game Management Unit(s) which include your property? (Please choose one)

Answered: 45 Skipped: 55



Powered by SurveyMonkey

Q28: Which of the following general strategies should CPW use to guide decisions about how many buck pronghorn permits to issue in the Game Management Unit(s) which include your property? (Please choose one)

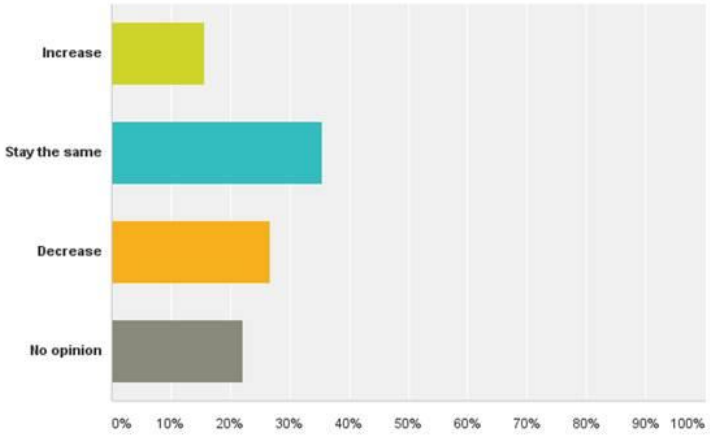
Answered: 45 Skipped: 55

Answer Choices	Responses	
Increase the number of buck pronghorn hunting permits (easier to draw a license, more hunters in the field)	17.78%	8
Decrease the number of buck pronghorn hunting permits (harder to draw a license, fewer hunters in the field)	15.56%	7
Maintain the current number of buck pronghorn hunting permits	42.22%	19
No opinion	24.44%	11
Total		**45**

Powered by SurveyMonkey

Q29: How would you like to see the number of pronghorn HUNTERS change in the Game Management Unit(s) which include your property? (Please choose one)

Answered: 45 Skipped: 55



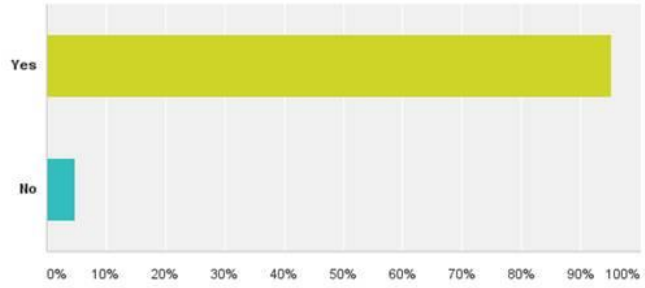
Powered by SurveyMonkey

HUNTER RESPONSES

Powered by SurveyMonkey

Q30: Are you a resident of Colorado?

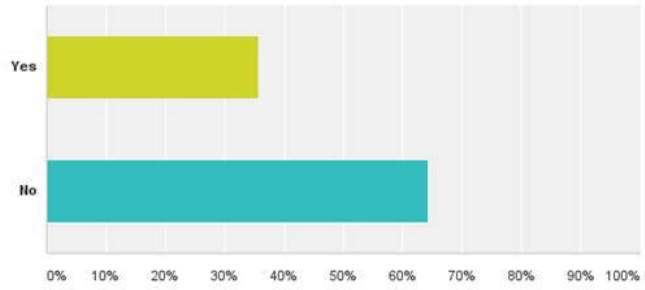
Answered: 42 Skipped: 58



Powered by SurveyMonkey

Q31: Do you live within GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371? See map of these GMU(s) below.

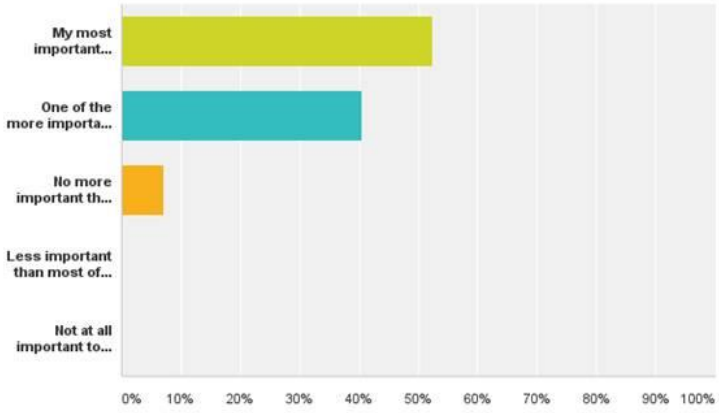
Answered: 42 Skipped: 58



Powered by SurveyMonkey

Q32: How important is hunting to you compared to your other recreational activities? (Please choose one)

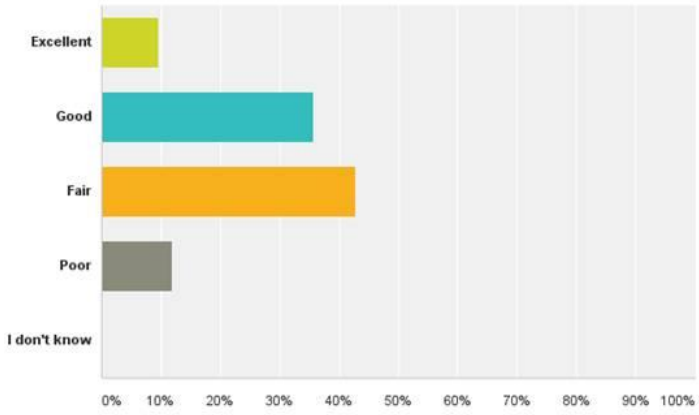
Answered: 42 Skipped: 58



Powered by SurveyMonkey

Q33: Overall, how would you rate the quality of pronghorn hunting in GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371? (Please choose one)

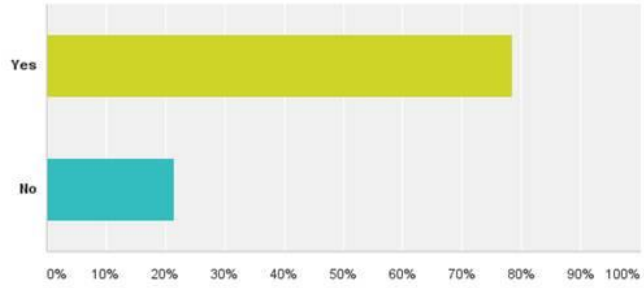
Answered: 42 Skipped: 58



Powered by SurveyMonkey

Q35: Did you have a pronghorn license to hunt in GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371 between 2011 and 2015?

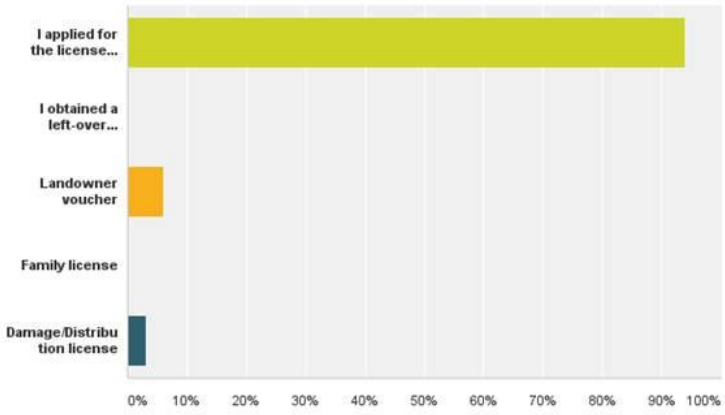
Answered: 42 Skipped: 58



Powered by SurveyMonkey

Q36: How did you acquire your pronghorn license(s)? (Please check all that apply)

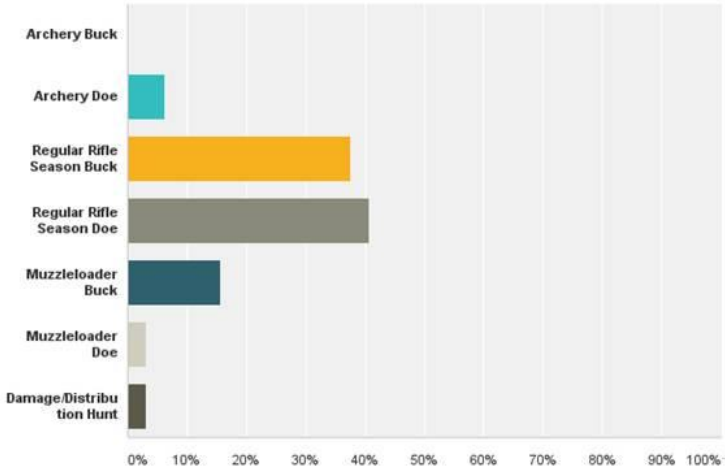
Answered: 33 Skipped: 67



Powered by SurveyMonkey

Q38: Which of the following seasons did you hunt pronghorn? (Please check all that apply)

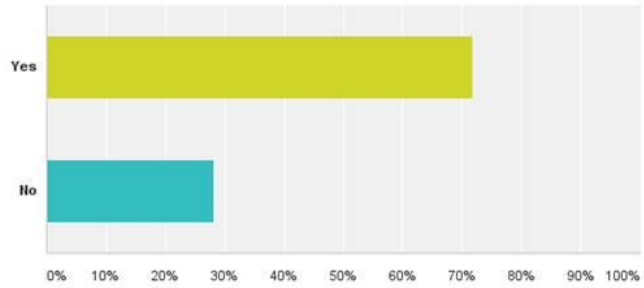
Answered: 32 Skipped: 68



Powered by S

Q39: Did you harvest a pronghorn in one of these GMUs (15, 18, 26, 27, 28, 37,181, 231 or 371) between 2011 and 2015?

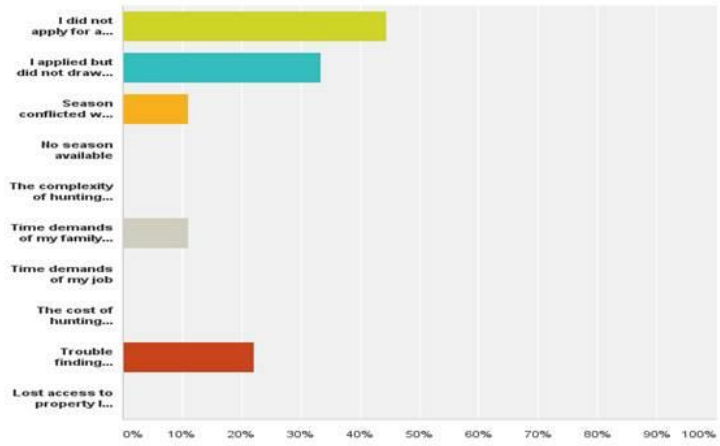
Answered: 32 Skipped: 68



Powered by SurveyMonkey

Q41: What were the reasons that you did NOT have a pronghorn license between 2011 and 2015 in GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371? (Please check all that apply)

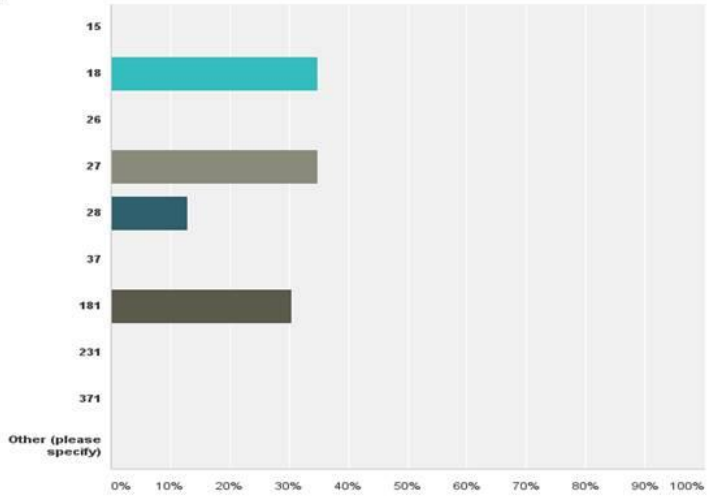
Answered: 9 Skipped: 91



Powered by SurveyMonkey

Q42: Which GMU(s) have you harvested pronghorn between 2011 and 2015? (Check all that apply)

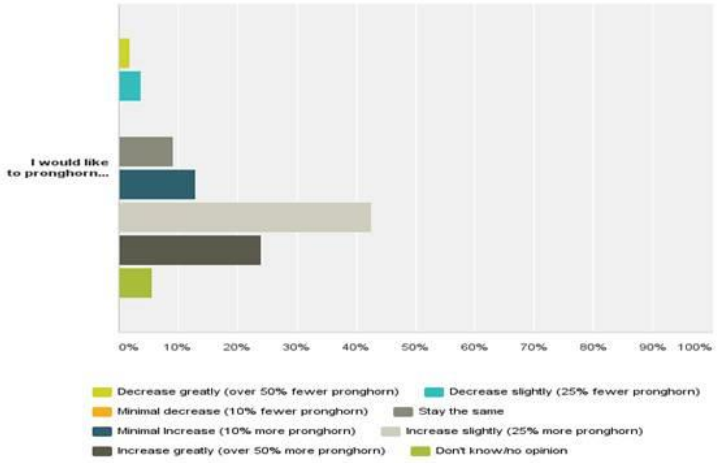
Answered: 23 Skipped: 77



Powered by SurveyMonkey

Q43: For the 2017-2026 time period, relative to the current number, how would you like to see the pronghorn herd change in GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371?

Answered: 54 Skipped: 46



Powered by SurveyMonkey

Q43: For the 2017-2026 time period, relative to the current number, how would you like to see the pronghorn herd change in GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371?

Answered: 54 Skipped: 46

	Decrease greatly (over 50% fewer pronghorn)	Decrease slightly (25% fewer pronghorn)	Minimal decrease (10% fewer pronghorn)	Stay the same	Minimal Increase (10% more pronghorn)	Increase slightly (25% more pronghorn)	Increase greatly (over 50% more pronghorn)	Don't know/no opinion	Total
I would like to pronghorn population to:	**1.85%** 1	**3.70%** 2	**0.00%** 0	**9.26%** 5	**12.96%** 7	**42.59%** 23	**24.07%** 13	**5.56%** 3	54

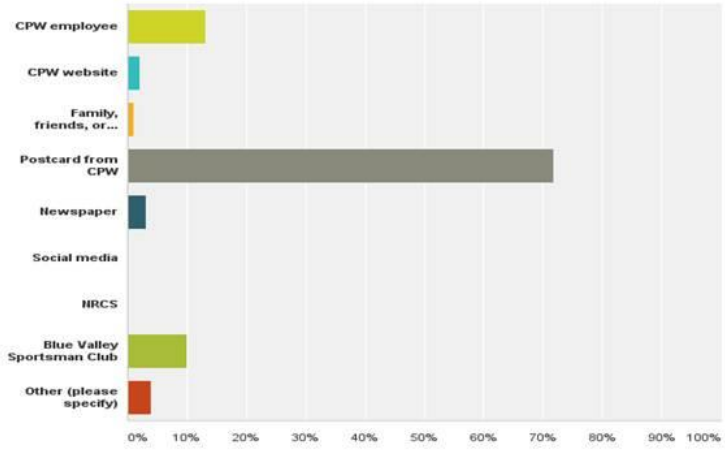
Q44: Which of the following approaches should guide the number of licenses allocated in GMUs 15, 18, 26, 27, 28, 37, 181, 231, or 371?

Answered: 52 Skipped: 48

Answer Choices	Responses	
Increase the number of buck hunting permits (easier to draw a license, more hunters in the field)	7.69%	4
Decrease the number of buck hunting permits (more PPs required to draw a license, more bucks in the population)	23.08%	12
Maintain the current number of buck hunting permits	51.92%	27
No opinion	17.31%	9
Total		52

Q45: How did you hear about this survey?

Answered: 99 Skipped: 1



Q45: How did you hear about this survey?

Answered: 99 Skipped: 1

Answer Choices	Responses	
CPW employee	13.13%	13
CPW website	2.02%	2
Family, friends, or neighbors	1.01%	1
Postcard from CPW	71.72%	71
Newspaper	3.03%	3
Social media	0.00%	0
NRCS	0.00%	0
Blue Valley Sportsman Club	10.10%	10
Other (please specify)	4.04%	4
Total Respondents: 99		

Powered by SurveyMonkey

Comment from 30-day HMP comment period:

Hunters are dangerous. They shoot at people and pets and have no regard for the pain they cause when they don't get a kill shot. Nonlethal herd management should be used, like birth control.

Appendix B: Population Dynamics, Maximum Sustained Yield, and Density Dependence

Numerous studies of animal populations, including such species as bacteria, mice, rabbits, and white-tailed deer have shown that the populations grow in a mathematical relationship referred to as the "sigmoid growth curve" (Figure 15). 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 population growth.

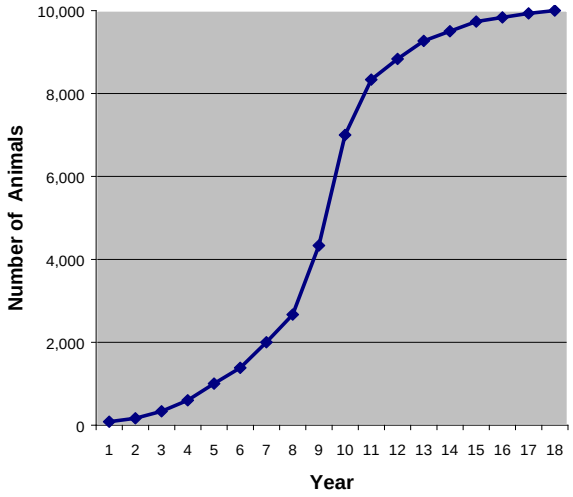


Figure 15. Sigmoid growth curve.

The second phase occurs when the population number is at a moderate level. This phase is characterized by high reproductive and survival rates. During this phase, food, cover, water and space are not a limiting factor.

During this phase, for example, animals' body condition is usually excellent, age of first reproduction may occur earlier, and litter sizes can be higher. Survival rates of all sex and age classes are also 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. These types of factors that increasingly limit productivity and survival at higher population densities are known as density-dependent effects. During this phase, for example, adult mule deer does may only produce one fawn rather than twins, and survival of all age-sex classes of deer (bucks, does and fawns) will decrease. During severe winters, large die-offs can occur due to crowding and lack of food. The first to die during these situations are fawns, then bucks, followed by adult does. Severe winters affect the future buck to doe ratios by favoring more does and fewer bucks in the population. Also, because the quality of a buck's antlers is somewhat dependent upon the quantity and quality of his diet, antler development is diminished. 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 equal 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 body condition, habitat condition would be degraded from over-use, and when a severe winter or other catastrophic event occurs, a large die-off is inevitable.

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 that are being limited by density-dependent effects, we should attempt to hold the populations more towards the middle of the "sigmoid growth curve." Biologists call this point of inflection of the sigmoid growth curve the point of "MSY" or "maximum sustained yield." In the example below, MSY, which is approximately half the maximum population size or "K", would be 5,000 animals. At this level, the population should provide the maximum production, survival, and available surplus animals for hunter harvest. Also, at this level, range habitat condition should be good to excellent and range trend should be stable to improving. Game damage problems should be lower and economic return to the local and state economy should be higher. 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 (Figure 16). Notice that as the population increases from 0 to 5,000 deer, the harvest also increases. However, as the population exceeds MSY (in this example, at 5,000 deer), food, water and cover becomes scarcer 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 because the population of 3,000 deer has a much higher survival and reproductive rate compared to the population of 7,000

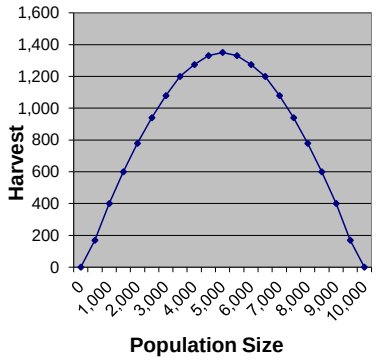


Figure 16. Maximum sustained yield (MSY) occurs at a moderate population size due to density-dependent population growth rate processes.

deer. However, at the 3,000 deer level, there will be less game damage and resource degradation but fewer watchable wildlife opportunities.

Actually managing deer populations for maximum sustained yield is difficult, if not impossible, due to the amount of detailed biological information about habitat and population size required. Additionally, carrying capacity is not static; the complex and dynamic nature of the environment cause carrying capacity to vary seasonally and annually. In most cases we would not desire true MSY management even if possible because of the potential for overharvest and the number of mature males is minimized because harvest reduces recruitment to older age classes. However, the concept of MSY is useful for understanding how reducing population densities and managing populations near the mid-point of the habitat's carrying capacity can stimulate herd productivity and increase harvest yields. Knowing the exact point of MSY is not necessary if the goal is to manage toward the mid-range of possible population size. Long-term harvest data can be used to gauge the effectiveness of reduced population size on harvest yield.

Research in several studies in Colorado has shown that density-dependent winter fawn survival is the mechanism that limits mule deer population size because winter forage is limiting (Bartmann et al. 1992, Bishop et al. 2009). Adult doe survival and reproduction remain high but winter fawn survival is lower at higher population sizes relative to what the winter habitat can support. The intuition to restrict, or even eliminate, female harvest in herds in which population recruitment is low and when populations are below DAU plan objectives may actually be counterproductive to management goals and objectives. As Bartmann et al. (1992) suggest, because of density-dependent processes, it would be counterproductive to reduce female harvest when juvenile survival is low. Instead, a moderate level of female harvest helps to maintain the population below habitat carrying capacity (ideally on the "left" or lower side of MSY) and should result in improved survival and recruitment of fawns. Increased fawn recruitment allows for more buck hunting opportunity and a more resilient population.

Thus, the key for DAU planning and management by objective is to set population objectives in line with what the limiting habitat attributes can support. A population objective range appropriately set should be below carrying capacity.

Appendix C: HPP Committee Comments

June 10, 2020

Bryan Lamont
Colorado Parks and Wildlife
346 Grand County Road 362
Hot Sulphur Springs, CO 80451

RE: Middle Park Habitat Partnership Program (MPHPP) Comments - Pronghorn HMP PH-37

Dear Bryan:

One of the initial reasons for creating the Habitat Partnership Program was to provide local landowners and other interests an opportunity to provide input into big game management in their areas. The diverse makeup of local HPP committees (3 livestock growers, a Forest Service, BLM, CPW and sportsperson representative) provide a good cross section of local interests to review HMP 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 MPHPP committee has discussed your presentation, reviewed the draft alternatives and offer these comments for consideration.

The MPHPP committee is in agreement with the following comments pertaining to proposals for the population range and sex ratio objectives for the above HMP plan.

The MPHPP committee supports the draft alternative 2, to increase the amount of animals within this DAU and within our committee area. The MPHPP committee does not believe this slight increase would create more conflicts and we also believe we have the resources necessary to address conflicts should they occur. Increasing the population objective will ultimately lead to more hunting licenses and sportsmen opportunities.

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

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

Sincerely,

Chuck Alexander, Co-Chair
Middle Park HPP Committee

Appendix D: Federal Agency Comments

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Kremmling Field Office
2103 East Park Avenue, PO Box 68
Kremmling, Colorado 80459

In Reply Refer To:
1610 (CON020) **P**

June 29, 2020

Colorado Parks and Wildlife
ATTN: Lyle Sidener, Area Wildlife Manager
346 Grand County Road 362
Hot Sulphur Springs CO, 80451

Dear Mr Sidener,

I am writing in support of Hot Sulphur Springs Colorado Parks and Wildlife recommended objectives for the Middle Park Pronghorn Management Plan, data analysis unit PH-37. No additional comments regarding scoping for the addition of GMUs 15, 26 and 231, and change of the population objective for PH-37.

My point of contact for this action is Tifany Rubalcaba, Wildlife Biologist, (970) 724-3013, or email at trubalcaba@blm.gov.

Sincerely,

William Mills
Field Manager

United States Department of Agriculture | Forest Service | Sulphur Ranger District
9 Ten Mile Drive, P.O. Box 10
Granby, CO 80446
Voice: (970) 887-4100, Fax: (970) 887-4111
Web: www.fs.fed.us/r2/arnf

File Code: 2610
Date: August 19, 2020

Jeromy Huntington
Area Wildlife Manager
Colorado Parks and Wildlife
PO Box 214
Hot Sulphur Springs, CO 80451

Dear Jeromy,

This letter is in response to Colorado Parks and Wildlife's (CPW) request for comments on the Draft Pronghorn Management Plans for the Middle Park Data Analysis Unit PH-37. From the information presented in the Draft PH-37 plan, it appears that only a small portion the Sulphur Ranger District overlaps with the Middle Park Pronghorn herd range. It appears that no winter range or concentration areas for the Middle Park herd overlaps National Forest System (NFS) lands on the Sulphur Ranger District.

We do not have any comments on the proposed changes to the population objectives and the GMU boundaries presented in the plan as occurrence on NFS lands is limited and would include only the edge of the delineated overall range. It is assumed that this herd and CPW management of it has little to no effect on NFS lands.

Thank you for the opportunity to comment on the Draft Pronghorn Management Plan for PH-37. If you have any question, please contact Aurelia DeNasha, South Zone Wildlife Biologist, at aurelia.e.denasha@usda.gov.

Sincerely,

SHOSHANA COOPER

Digitally signed by SHOSHANA COOPER
Date: 2020.08.19 15:50:14 -06'00'

SHOSHANA M. COOPER
District Ranger

CC: Kevin McLaughlin, Aurelia DeNasha

Appendix E: County Commissioners Comments

SUMMIT COUNTY
COLORADO

BOARD OF COUNTY COMMISSIONERS
970.453.3402 ph | 970.453.3535 f 208 East Lincoln Ave. | PO Box 68
www.SummitCountyCO.gov Breckenridge, CO 80424

July 24, 2020

Colorado Parks and Wildlife
Attention: Rachel Sralla, Acting Area Wildlife Manager
346 Grand County Road 362
Hot Sulphur Springs, CO 80451

Dear Ms. Sralla,

We are writing to express our support for the proposed herd management plans for deer and pronghorn in Middle Park.

CPW Biologist Bryan Lamont presented the D-9 deer management plan and the PH-37 pronghorn plan to us on June 9, 2020. We were very impressed by the solid science, data and research behind these proposals, and we support the preferred management objectives in both plans.

Thank you for including us in your outreach efforts.

Sincerely,

The Summit County Board of Commissioners

Karn Stiegelmeier
Commissioner

Thomas Davidson
Commissioner

Elisabeth Lawrence
Commissioner

GRAND COUNTY BOARD OF COMMISSIONERS

RICHARD D. CIMINO
District I, Fraser 80442
MERRIT S. LINKE
District II, Granby 80446
KRISTEN MANGUSO
District III, Kremmling 80459

E-Mail: grndcty1@co.grand.co.us
PHONE: 970/725-3100
Fax: 970/725-0565
KATHERINE MCINTIRE
County Manager
CHRISTOPHER LEAHY
County Attorney

July 21, 2020

Colorado Parks and Wildlife
c/o Bryan Lamont
P.O. Box 216
Hot Sulphur Springs, CO 80451

Delivered via electronic mail to: bryan.lamont@state.co.us

RE: Support of PH-37 Pronghorn Herd Management Plan

Dear Mr. Lamont,

The Grand County Board of County Commissioners wishes to express their support for the Middle Park Pronghorn Herd Management Plan for Unit PH-37. In addition, we support Colorado Parks and Wildlife (CPW) Strategic Plan and their effort to manage wildlife for the use, benefit and enjoyment of the people of the state and Grand County. We understand that Colorado's wildlife resources require careful and increasingly intensive management to accommodate the many and varied public demands and growing impacts from people. Therefore, we appreciate the work done and the time to share these findings.

With sincere appreciation and support,

Kristen Manguso	Merrit Linke	Richard Cimino
Commissioner Chair	Commissioner	Commissioner