

SOUTH PARK PRONGHORN HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT PH-30

Game Management Units 49, 50, 57, 58, 500, 501, 511, 581

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DAU PH-30 (South Park)

Executive Summary

GMUs: 49, 50, 57, 58, 500, 501, 511, 581

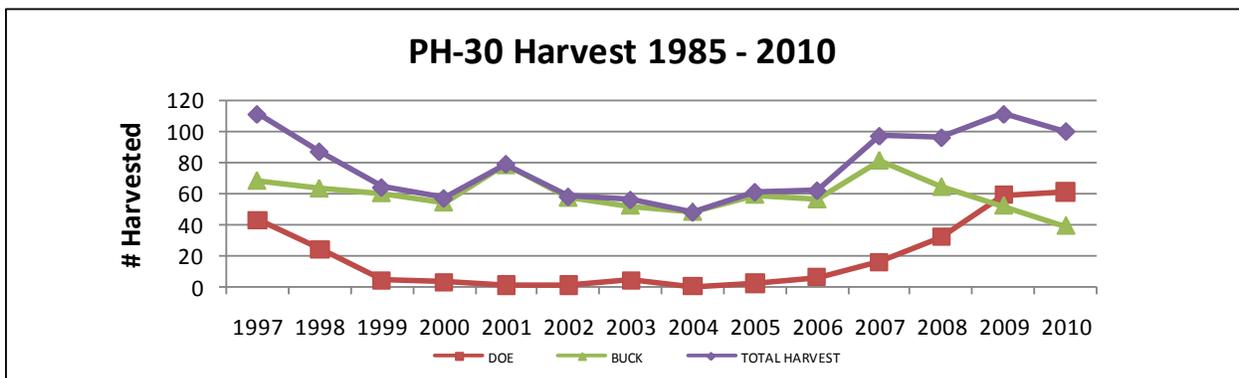
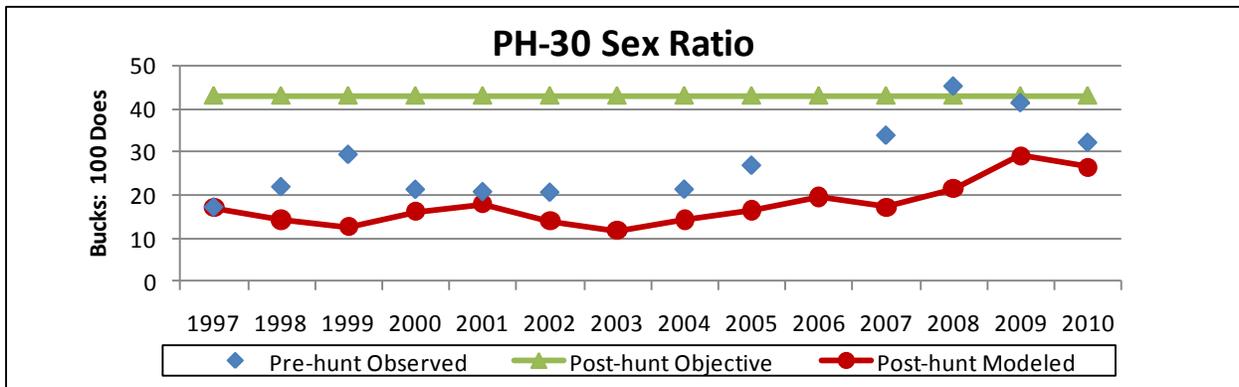
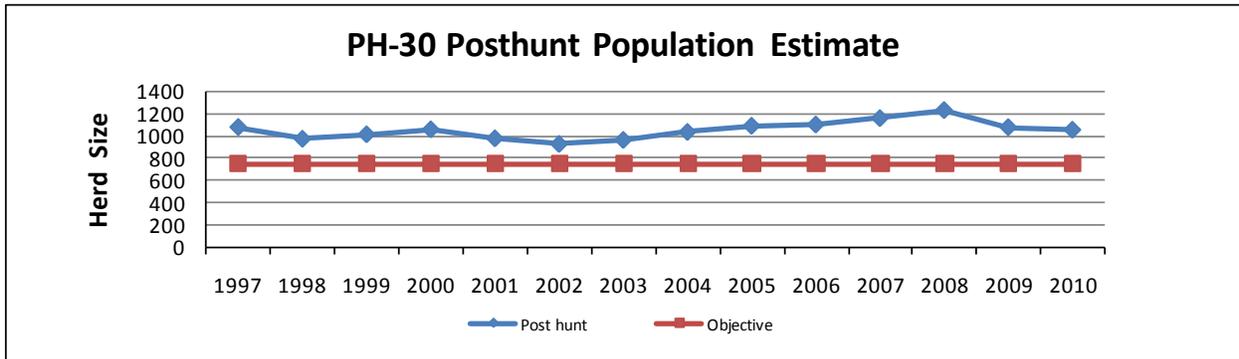
Land Ownership: Private 39%, USFS 39%, BLM 14%, State of Colorado 7%

Posthunt Population: Previous Objective 750 2010 Estimate 1,060

Current Objective 1,000 -1,200

Posthunt Sex Ratio: Previous Post-hunt Objective 43 2010 Pre-hunt Observed 34

Current Post-hunt Objective 30-35 2010 Post- hunt Modeled 27



Background

The South Park pronghorn herd (PH-30) has the distinction as being the highest elevation herd within the state of Colorado. This herd is likely at the extent of the pronghorn's habitat range, occupying a high elevation (9,000-10,000 feet) grassland steppe ecosystem. It is a relatively small herd that has maintained around 1,000 animals in recent years, but has seen numbers as low as 300 in the early 1970s. This herd experiences periodic low recruitment rates and it is not uncommon to see pre-hunt fawn:doe ratios fall below 20:100. Game damage issues in the past kept harvest high and the overall population well below 1,000 in the late 1980s and early 1990s. Extended periods of drought and severe winters appear to be limiting factors for this herd more recently.

Significant Issues

Game damage has been a concern historically, but there have been few complaints in recent years. Based on public input gathered through meetings and a survey, the public is generally satisfied with current management although there is a desire for a slight increase in population and a buck to doe ratio above 25:100.

Recent years have seen an increase in archery hunter numbers and the proportion of buck harvest going to archery hunters. In 2009 and 2010, 35% and 37% of the buck harvest was attributed to archery hunters. Archery hunting licenses in South Park units have been unlimited and could be purchased over-the-counter; however it has required 6-8 preference points to draw limited rifle buck licenses. In November 2010, the Colorado Parks & Wildlife Commission (CPW) approved the recommendation to remove game management units (GMUs) 49, 50, 57, 58, 500, 501, and 581 from the statewide archery hunt and create limited archery hunts starting in the 2011-2012 hunting season.

Management Alternatives

Three alternative population objectives and four sex ratio objectives are being considered for PH-30.

Population Objective Alternatives:

Population Alternative 1: 700 – 900 (~25% reduction from current estimate)

This alternative contains the current objective of 750.

Population Alternative 2: 1000 – 1200 (contains current estimate)

With average weather conditions, game damage concerns should be minimal and the habitat should be adequate to support this population level.

Population Alternative 3: 1250 – 1400 (~25% increase from current estimate)

It is questionable as to whether this population size could be maintained at this level. A pronghorn herd at this size would also be more susceptible to a large population decline in the event of a severe winter or drought and more likely to cause game damage conflicts.

Herd Composition- Post-hunt Sex Ratio Objective Alternatives

Composition Alternative 1: 25 –30 bucks:100 does (current composition status)

This alternative would be consistent with current modeled ratios but represents a decrease from the current objective.

Composition Alternative 2: 30 –35 bucks:100 does

This alternative strikes a balance between hunter opportunity and buck quality, in regards to horn size and maturity. Past herd performance indicates this objective is achievable.

Composition Alternative 3: 35 – 40 bucks:100 does

This alternative represents an increase from the current composition status, although still a decrease from the current objective and may be a difficult to obtain due to periodic low fawn recruitment.

Composition Alternative 4: 40 – 45 bucks:100 does (contains previous objective)

Historically this population has never been able to achieve the current objective of 43:100 and past herd performance indicates this objective may not be obtainable.

Preferred Alternatives

Population Alternative #2: 1,000 – 1,200

Composition Alternative #2: 30 – 35 bucks:100 does

Considering public comment and past population performance, it is recommended to maintain the population at the current level. The recommended composition alternative is slightly above the current post-hunt sex ratio, however, trends in the modeled and observed ratios indicates 30-35 bucks:100 does is achievable. Public comment supported increasing the sex ratio above the current level and the recommended alternative strikes an achievable balance between hunter opportunity and quality buck hunting.

This plan was approved by the Colorado Parks and Wildlife Commission on April 12, 2012.

SOUTH PARK PRONGHORN HERD MANAGEMENT PLAN

Data Analysis Unit PH-30
Game Management Units 49, 50, 57, 58, 500, 501, 511, 581

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INTRODUCTION AND PURPOSE

The Colorado Parks & Wildlife (CPW) manages wildlife for the use, benefit and enjoyment of the people of the state in accordance with the 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 uses a "management by objective" approach (Figure 1). Big game populations are managed to achieve population objective ranges and sex ratio ranges established for data analysis units (DAUs).

COLORADO'S BIG GAME MANAGEMENT BY OBJECTIVE PROCESS

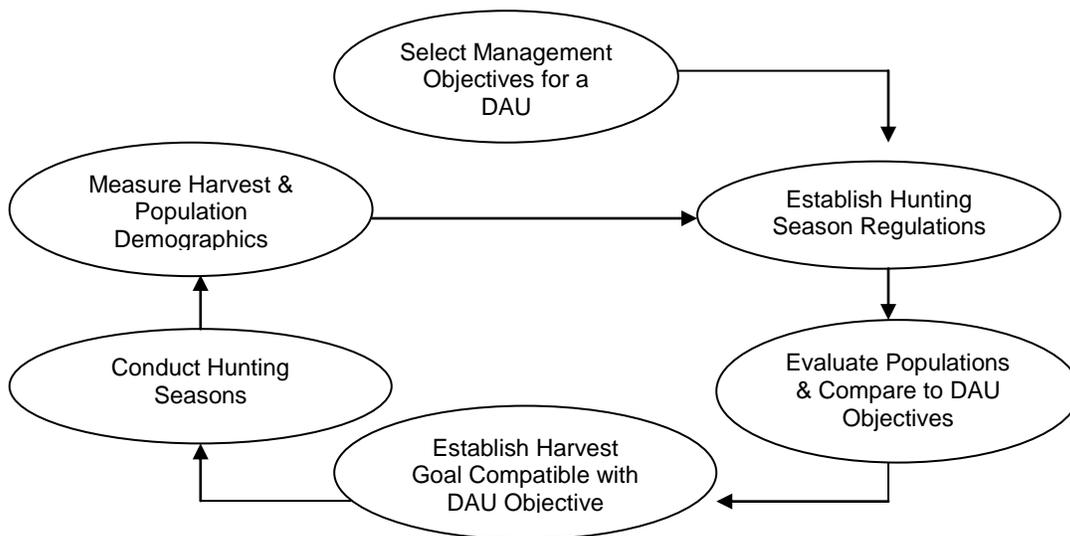


Figure 1. Management by objectives process used by the CDOW to manage big game populations on a DAU basis.

The purpose of a DAU plan is to provide a system or process which will integrate the plans and intentions of the CPW with the concerns and ideas of land management agencies and interested publics in determining how a big game herd in a specific geographic area, DAU, should be managed. In preparing a DAU 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 (BLM), 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 Wildlife Commission.

A Data Analysis Unit or DAU is the geographic area that represents 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), but in some cases only one GMU makes up a DAU.

The primary decisions needed for an individual DAU plan are how many animals should exist in the DAU and what is the desired sex ratio for the population of big game animals e.g., the number of males per 100 females. These numbers are referred to as the DAU population and herd composition objectives, respectively. Secondly, the strategies and techniques needed to reach the population size and herd composition 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 DAU

Location

The South Park pronghorn DAU encompasses an area of 3,895 square miles in central Colorado and includes game management units 49, 50, 57, 58, 500, 501, 511, and 581 (Figure 2). This DAU crosses regional boundaries within the Northeast and Southeast Regions. Originally consisting of GMUs 50, 57, 58, and 581, several other GMUs have been added throughout the years to incorporate all annual pronghorn movement and potential habitat. The DAU is bounded on the north by the Continental Divide and the North Fork of the South Platte River, on the west by the Arkansas River and Tennessee Creek, and on the south by US 50. The eastern boundary of the DAU is bounded by the South Platte River, I-25, Colorado Road 67, and Phantom Canyon Road. The northern third of this DAU is in the South Platte River valley while the southern two thirds are in the Arkansas River drainage. Elevations range from 13,822 feet at Mt. Silverheels to 5,322 feet at Canon City. However, the majority of the pronghorn utilize the geographic area known as South Park, a 900 square mile mountain basin averaging 9,100 feet in elevation. PH-30 includes all of Park County and portions of Fremont, Douglas, Jefferson, the eastern edges of Chaffee and Lake, and the western edge of El Paso Counties.

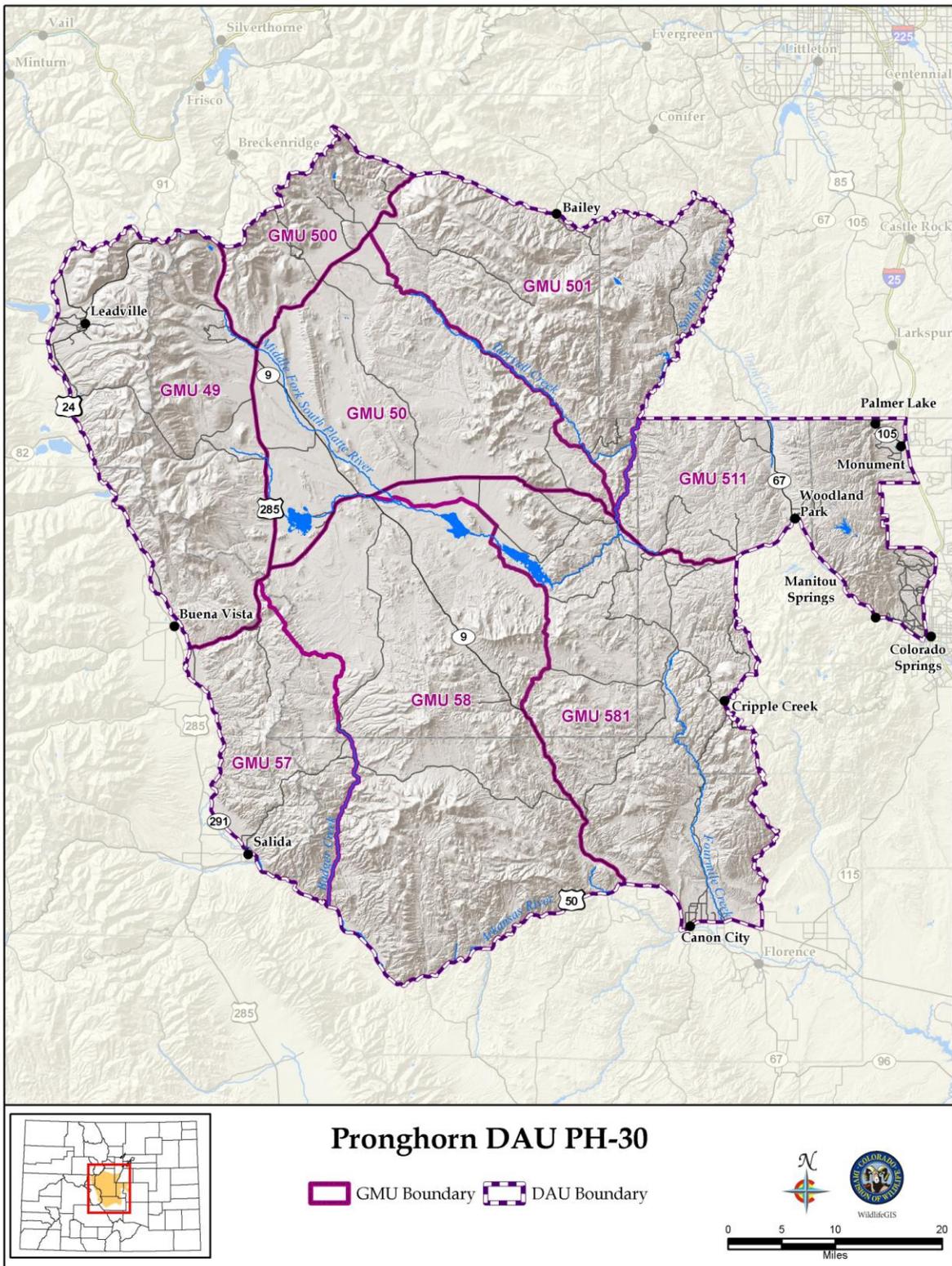


Figure 2. PH-30 Geography and GMU Boundaries

Climate

As with all of mountainous Colorado, the climate varies significantly with season, elevation and aspect. Elevations below 7,500 feet are typically warm in the summer and the south slopes generally remain snow free during most of the winter. Elevations between 7,500 and 9,500 feet have somewhat cooler and wetter summers with persistent snow cover on north aspects during the winter. South-facing slopes normally remain open or have minimal snow cover throughout the winter. Above 9,500 feet elevation the climate is much cooler and wetter during the summers and north slopes are snow covered all winter except for windswept ridges above timberline. The South Park basin is generally an arid climate with cool summers and very cold winters.

Winter temperatures range from average daily lows of -3 degrees Fahrenheit at Hartsel to 9 degrees at Grant and Cheesman Reservoir in January. Summer temperatures vary from average daily highs of 75 at Hartsel and Grant to 84 degrees at Cheesman Reservoir and Pine in July and August.

Annual precipitation is highly variable from site to site and ranges from ten inches per year in portions of South Park to over twenty-five inches at the highest elevations. Snowfall accounts for the majority of the precipitation in the DAU with thunderstorms adding significant localized moisture in the summer. The bottom of South Park generally receives much less moisture than the surrounding mountains because of the rain-shadow effect from the Mosquito Mountains. Summer thunderstorms created by thermals over the park generally travel to the east before releasing significant precipitation.

Vegetation and Habitat Use

Habitat within the DAU varies widely from short grass prairie to alpine tundra. Mountain slopes are dominated by mixed-conifer forests and aspen (*Populus tremuloides*) stands. Ponderosa pine (*Pinus ponderosa*), douglas-fir (*Pseudotsuga menziesii*), pinyon pine (*Pinus edulis*), juniper (*Juniperus* spp.), limber pine (*Pinus flexilis*), white fir (*Abies concolor*), blue spruce (*Picea pungens*), bristlecone pine (*Pinus aristata*), lodgepole pine (*Pinus contorta*), englemann spruce (*Picea englemannii*), and subalpine fir (*Abies lasiocarpa*) can all be found throughout the DAU depending on elevation. However, pronghorn habitat is confined to the South Park basin which is primarily a grass-dominated steppe ecosystem (Figure 3). Common species found within the grassland communities include blue grama grass (*Chondrosium gracilis*), sedges (*Carex* spp.), fringed sage (*Artemisia frigida*), Arizona fescue (*Festuca arizonica*), and mountain muhly (*Muhlenbergia montana*). The Park basin also features some of the largest expanses of montane wetlands in the western United States. Large salt flats and marshes occur throughout the Park.

The South Park pronghorn herd is unique, in that unlike other antelope herds in Colorado, this herd will regularly use areas with aspen, ponderosa, or piñon-juniper forest cover. Sightings of pronghorn have even occurred above timberline. The majority of pronghorn habitat is contained within GMUs 50 and 58 along with 581 to a lesser extent. Winter ranges tend to be towards the eastern and southern edges of the Park.

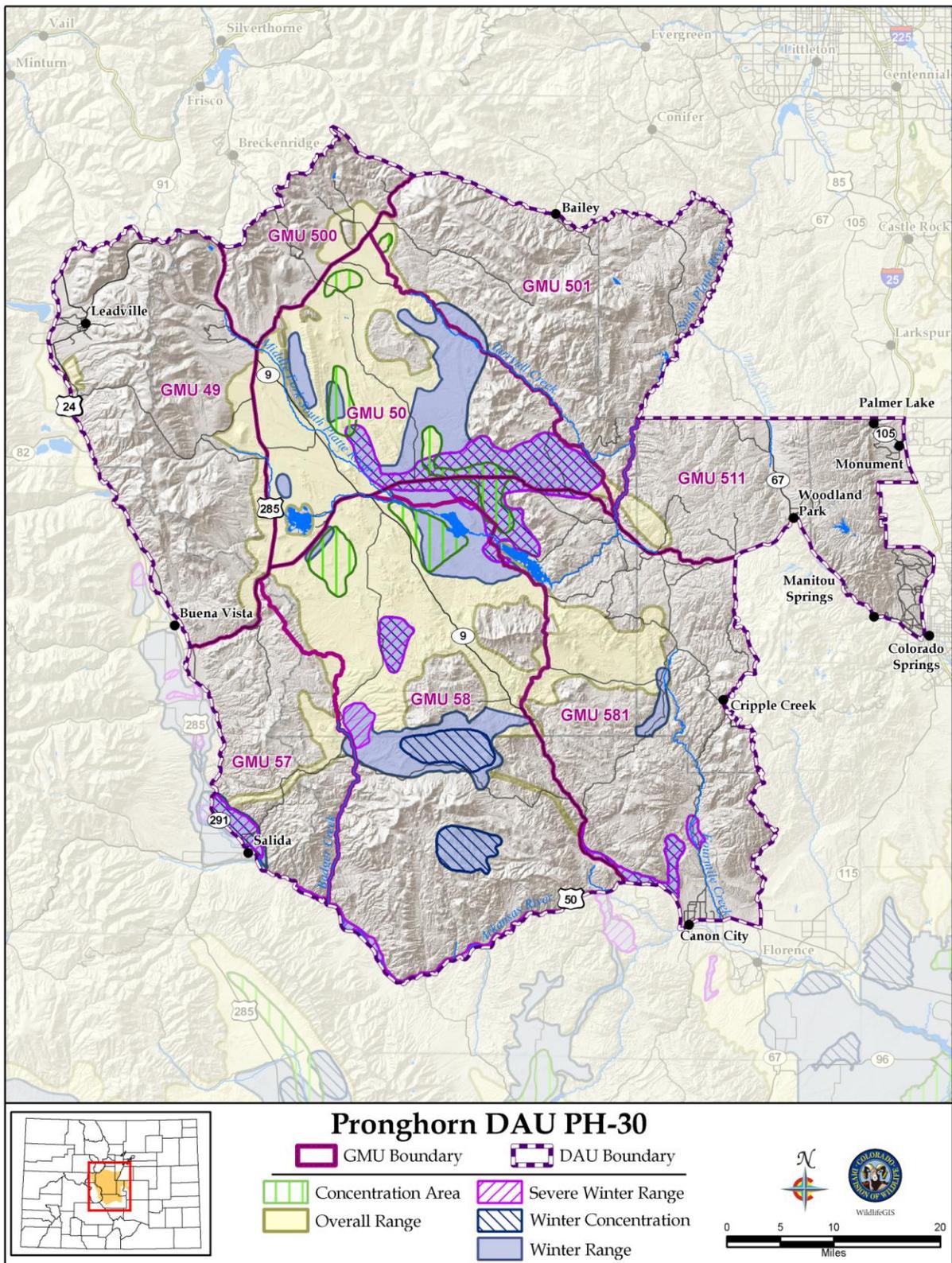


Figure 3. PH-30 Pronghorn Habitat

Land Ownership and Use

At just under 2.5 million acres, approximately 53% of this DAU is public land administered by the U.S. Forest Service or BLM (Figure 4). There is also a considerable amount of State owned lands including several State Wildlife Areas operated by the CPW. State Wildlife Areas within PH-30 total just over 39,000 acres of which 29,000 acres are considered within the overall pronghorn range. However, the majority of the overall pronghorn range is in private ownership (62%). Cattle ranching and residential development are the major land uses in the privately owned portion of the DAU. Although most of the South Park DAU consists of rangeland, there is some farming, but it is primarily limited by climate and topography. The primary crops produced are hay and alfalfa. Tourism and outdoor recreation, including fishing and hunting, are major components of the local economy.

Land use in the DAU has changed significantly in the last 25 years. The majority of water rights used to irrigate hay fields that provided winter feed for the local livestock producers have been sold to downstream municipalities along the Front Range. Land on the ranches those water rights supported was then often sold for subdivision. As residential use expanded through Jefferson County and into Park County, critical habitat types for elk, deer, and pronghorn were impacted because those areas are more desirable for residential development than the open bottom of the park or the heavily forested hillsides.

Multiple uses of the public lands in the DAU include heavy recreational use of both National Forest and BLM lands throughout the year. Recreational activities include hiking, camping, horseback riding, mountain biking, off-highway vehicle and snowmobile riding, wildlife watching, hunting, and fishing. Additionally, most of the public lands have seasonal grazing allotments. There is only a small amount of logging, primarily for disease control or salvage timber sales of beetle killed trees or for habitat improvement for wildlife. Mining has been a significant historic use of public and private lands, but has decreased to a very low level of activity at the current time.

Non subdivided private lands are generally in agricultural production, either by livestock grazing or hay production, however, there has been a steady and accelerating rate of conversion from agricultural status to subdivision for residential development. Pronghorn antelope habitat is particularly vulnerable to this change in land use especially if wildlife impeding fences are constructed within subdivisions.

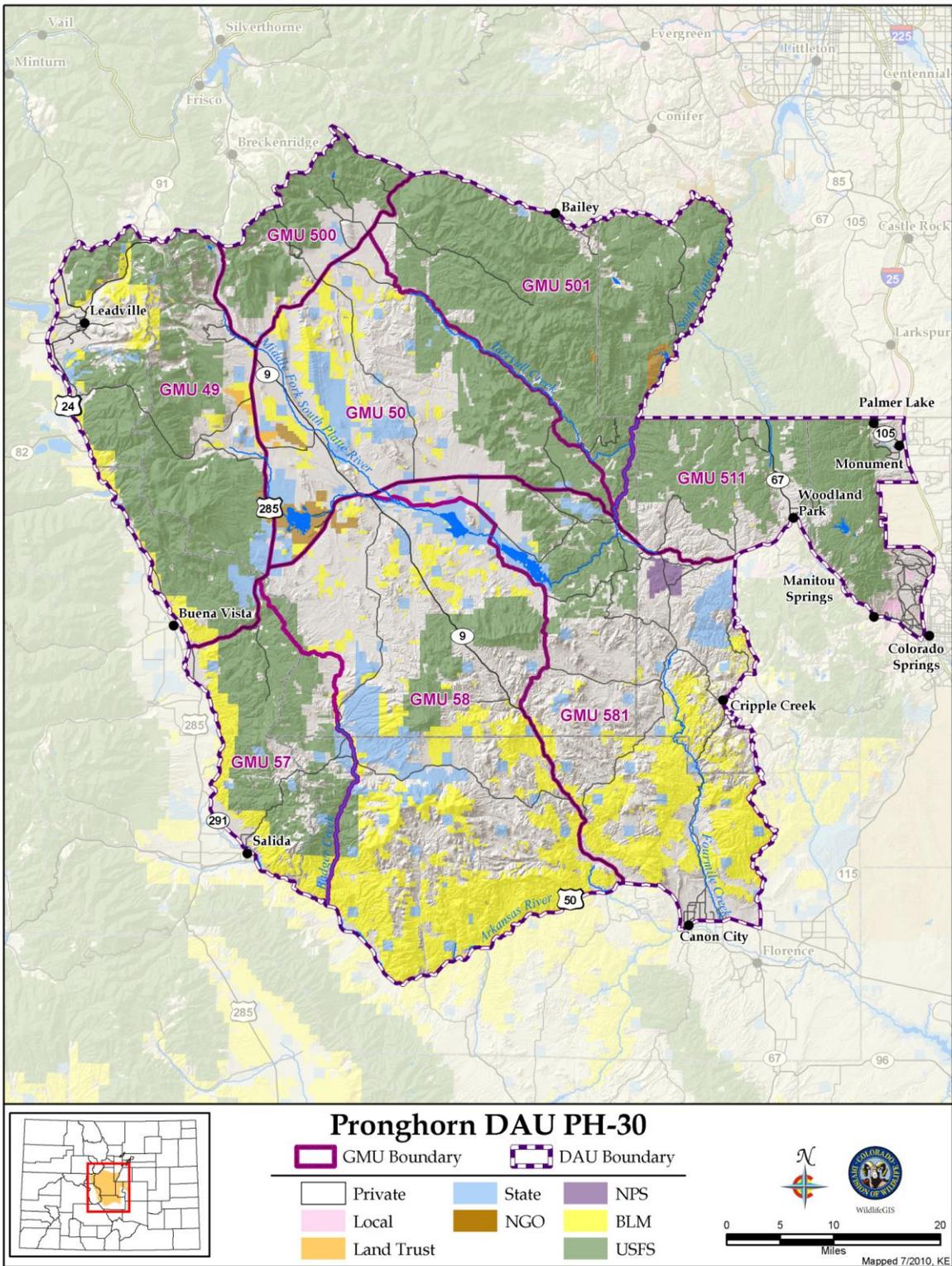


Figure 4. PH-30 Landownership.

HERD MANAGEMENT HISTORY

Population size

During the mid-1960s, this pronghorn herd peaked to over 1,000 animals. However, during the severe winter of 1968-1969 the herd dropped to less than 300 due to winter mortality and emigration out of South Park. Mortality rates were high due to the deep and crusted snow and to avoid the severe winter conditions many pronghorn traveled through Ute Pass to Colorado Springs while others moved through Current Creek Pass to the east side of Canon City. Due to low population numbers, pronghorn were brought into South Park from eastern Colorado where there was an abundance of animals on private lands in January of 1981. A total of 56 pronghorn (22 males and 34 females) were trapped 9 miles east of Karval and released in Park County near the small town of Como. Unfortunately, not all pronghorn were released as 12 died (8 females and 4 males) during transit. With fifteen years of tightly restricted hunting the herd recovered slowly to an estimated size of just under 800 animals by 1985. During the mid to late 1980s increased harvest and removal of 106 pronghorn by trapping reduced the herd to approximately 600. The pronghorn were trapped out of the Shaw's Park area in 1986 to address game damage concerns and the majority of them went out of state to Texas and New Mexico. Since the early 1990s the population has rebounded and remained relatively steady at around 1,000 animals (Figure 5).

Since 1988, PH-30 has had a post-hunt population objective of 750 animals. At that time, this objective was suitable for current habitat conditions and allowed for a slight increase in population. Potential game damage conflicts were still a concern at the time, so there was no desire to allow the population to increase. The herd was further managed to limit the number of pronghorn wintering in Fremont County east of Colorado Highway 9 by directing harvest at that portion of the herd to address game damage conflicts.

In most winters South Park stays open enough to support the entire herd as winds expose the basin from accumulating snow. During severe winters, portions of the herd have migrated to the Twelvemile Park and Shaw's Park areas west of Canon City, where the winters are mild. Pronghorn have historically migrated to these areas intermittently in response to severe weather and traditionally returned to South Park in the spring. However, during the winter of 1968-1969 several hundred pronghorn moved east of Canon City and did not return to South Park. Almost 20 years later, South Park experienced another severe winter that affected pronghorn movement in 1986-1987. During this time over 500 pronghorn had moved down to Shaw's Park and the CPW had to address concerns regarding game damage by conducting dispersal hunts. In comparison, the winter of 1987-1988 was mild in South Park and fewer than 250 antelope wintered in Shaw's Park.

More recently in 2007-2008 South Park, along with other areas in the state, experienced another severe winter. Pronghorn were observed migrating along Highway 50 towards Canon City to avoid the deep snow. There was even an incident where 18 pronghorn were killed when they were struck by a truck as the herd crossed the highway. As a result of the severe winter another dispersal hunt was conducted in 2007 in Shaw's Park to prevent game damage conflicts.

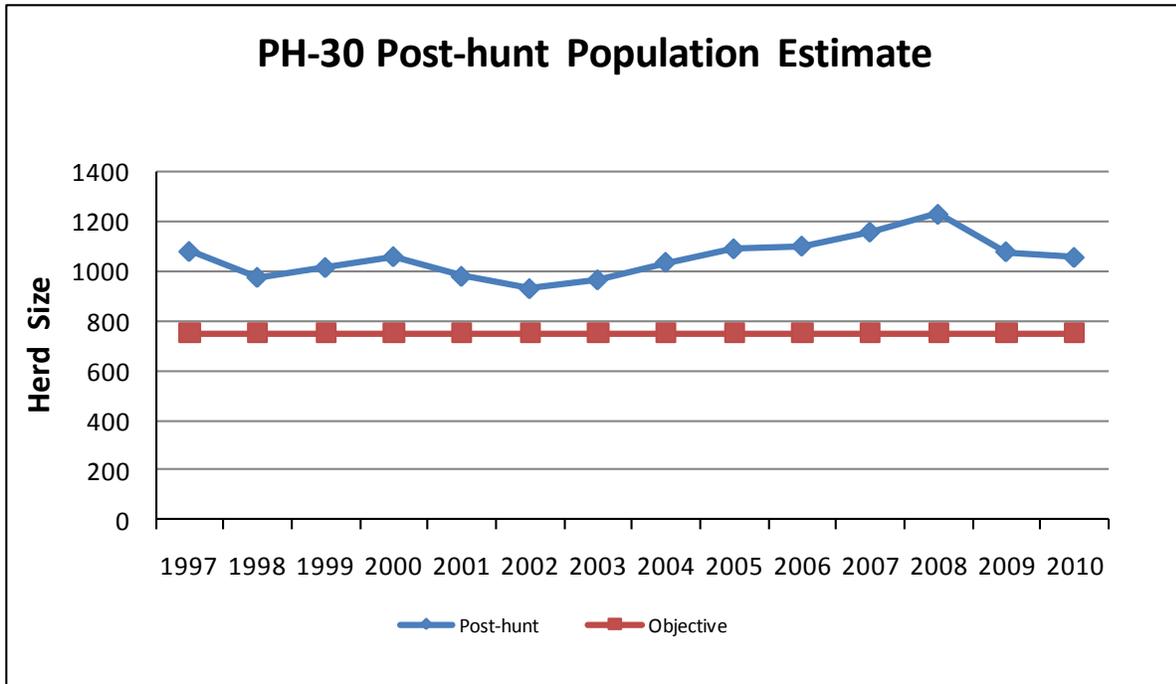


Figure 5. PH-30 Post-hunt Population Estimate

Herd Composition

Herd composition data has been collected via aerial surveys using a fixed-wing aircraft in August. Pre-hunt composition data is desirable since at this time there is a naturally high association between the sexes as the breeding season approaches. Even then there is the potential for sex ratios to be biased low as males tend to stay a short distance from the herd and sometimes are not detected when they are alone or in small bachelor groups. South Park is also unique from a habitat perspective as pronghorn tend to use the edges of forested areas making detection challenging. Historically line transects at one-mile line intervals have been flown to achieve a minimum trend count along with composition data. However, in 2008 2 mile-line transects were flown due to time constraints and flight budgets. In 2010, 2 mile-line transects were flown as well, due to weather and other time constraints.

Since 1997 the observed pre-hunt buck:doe ratio has remained relatively steady between 20-25:100 and within the last few years the ratio has increased to around 35:100 (Figure 6). The modeled post-hunt buck:doe ratio has always been below the current objective of 43:100 which may be unrealistically high for this DAU. Buck hunting would have to be very limited to achieve this objective since historically recruitment in this population experiences periods of low fawn:doe ratios. It is not uncommon to have pre-hunt fawn:doe ratios below 20:100 resulting in a low number of bucks recruited. Also unlike elk and deer, a lower buck:doe ratio may still provide quality hunting opportunities since pronghorn typically achieve maximum horn growth at around 3 years of age.

Pre-hunt fawn:doe ratios fluctuate with 5 of the last 15 years observed at less than 20:100, but overall there has been an increasing trend since the drought in the early 2000s (Figure 7). Typically fawn:doe ratios in South Park are lower than other areas of the state and this is likely a

result of this herd occupying marginal habitat at the upper limits of its habitat range. In spite of this, pronghorn in South Park still manage to remain a relatively stable population and appear to primarily be affected by extreme weather events such as droughts and severe winters.

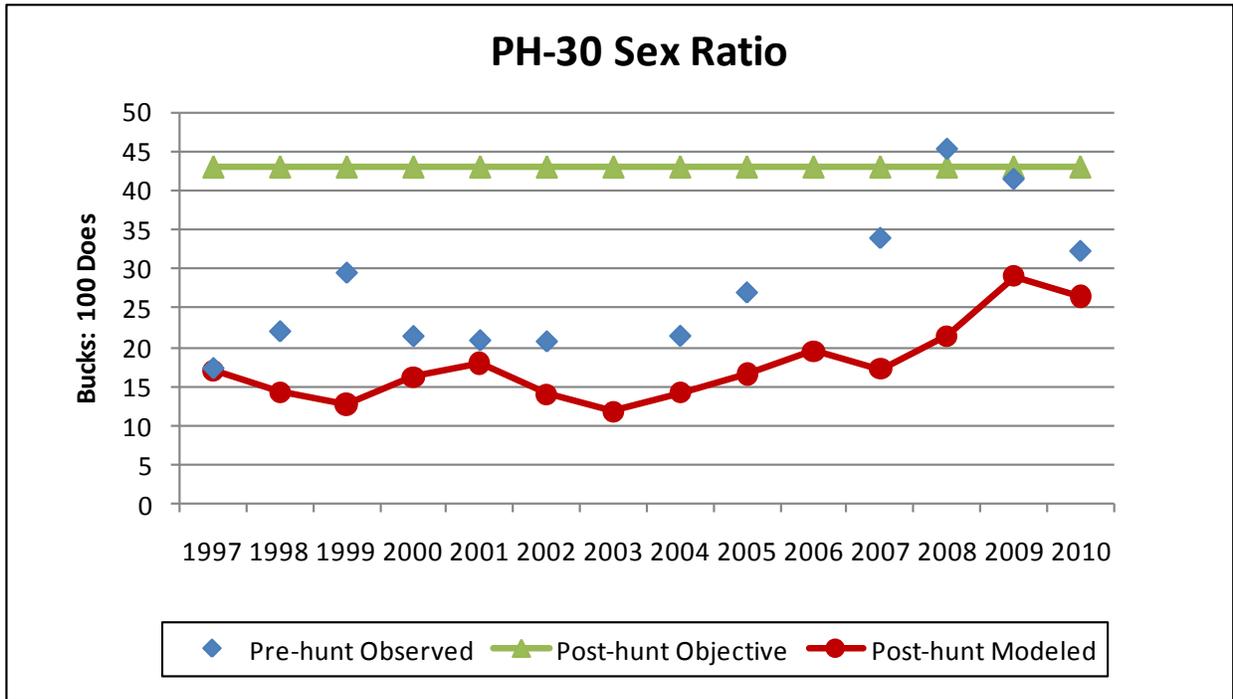


Figure 6. PH-30 Sex Ratio

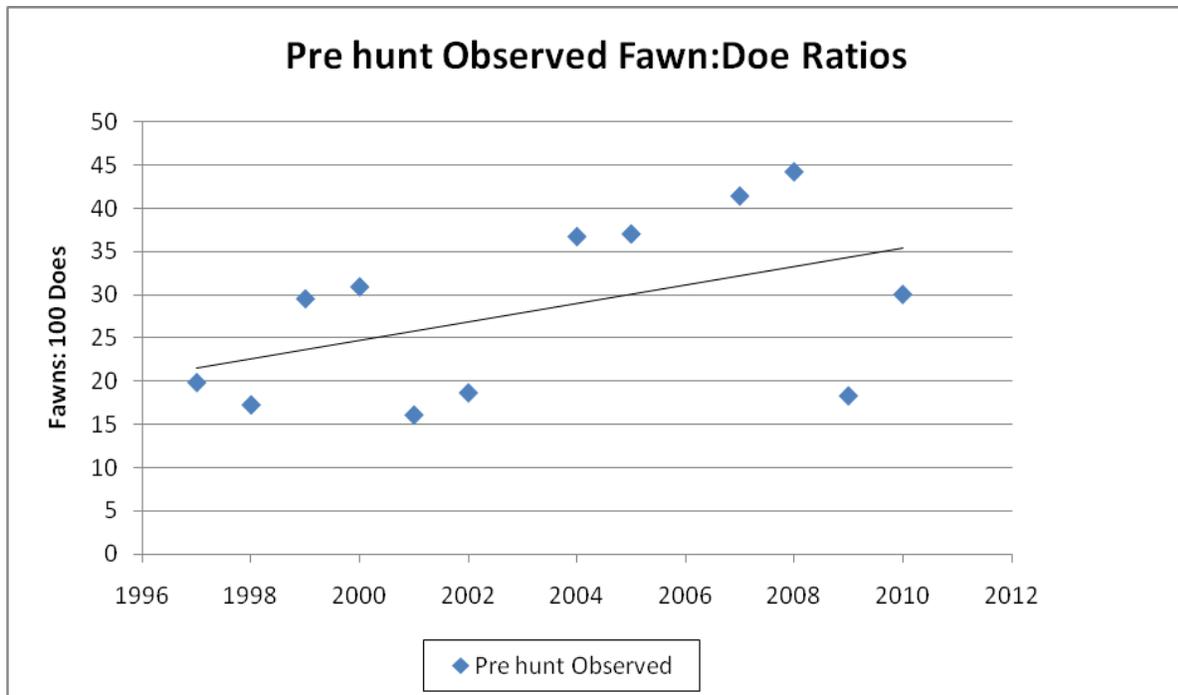


Figure 7. PH-30 Pre-hunt Age Ratio

Harvest and License numbers

Harvest has varied from a high of over 297 in 1967 to zero when the season was closed during 1971-1973 as a result of low population numbers. Harvest gradually increased from 1974 to 1987 when it peaked over 300. Most of this increase was in response to a growing population. However, the high harvest in 1986 and 1987 plus the removal of 106 animals in 1986 for translocation was designed to reduce the population in response to game damage complaints on wintering animals in the Shaw’s Park area. It was not uncommon for 150-300 pronghorn to concentrate on 200 acres of private rangeland resulting in perceived conflicts over forage with cattle. Total harvest remained below 100 until 1991 where it reached above 225 and then steadily declined for another 10 years (Figure 8). Since 2000, total harvest has remained relatively stable with a gradual increase the past 3 years. In 1999 doe licenses were removed from PH-30 due to low fawn:doe ratios and were not reinstated until 2007 after recruitment increased. Within the last 3 years, buck harvest has decreased while doe harvest has increased (Figure 9). In the last 10 years the average annual buck harvest has been around 60.

Historically archery harvest has been unlimited within the South Park DAU and until recent years has remained at a nominal level. Trends in buck harvest by method have changed within the last 3 years and during the 2009–10 and 2010–11 hunting seasons, archery harvest accounted for 35% and 37% of the bucks harvested, respectively (Figure 10). During the 2009–10 hunting season, archery and muzzleloader harvest combined resulted in a total of 26 bucks harvested, which was equal to the number harvested by rifle hunters. Traditionally archery and muzzleloading seasons are designed to provide more hunter opportunity and usually have a minimum impact on management objectives. However, in PH-30 archery harvest was having a significant impact on management objectives, so in November 2010 the Colorado Parks &

Wildlife Commission approved removing GMUs 49, 50, 57, 58, 500, 501, and 581 from the statewide archery hunt code and created limited archery units for the 2011-2012 hunting season.

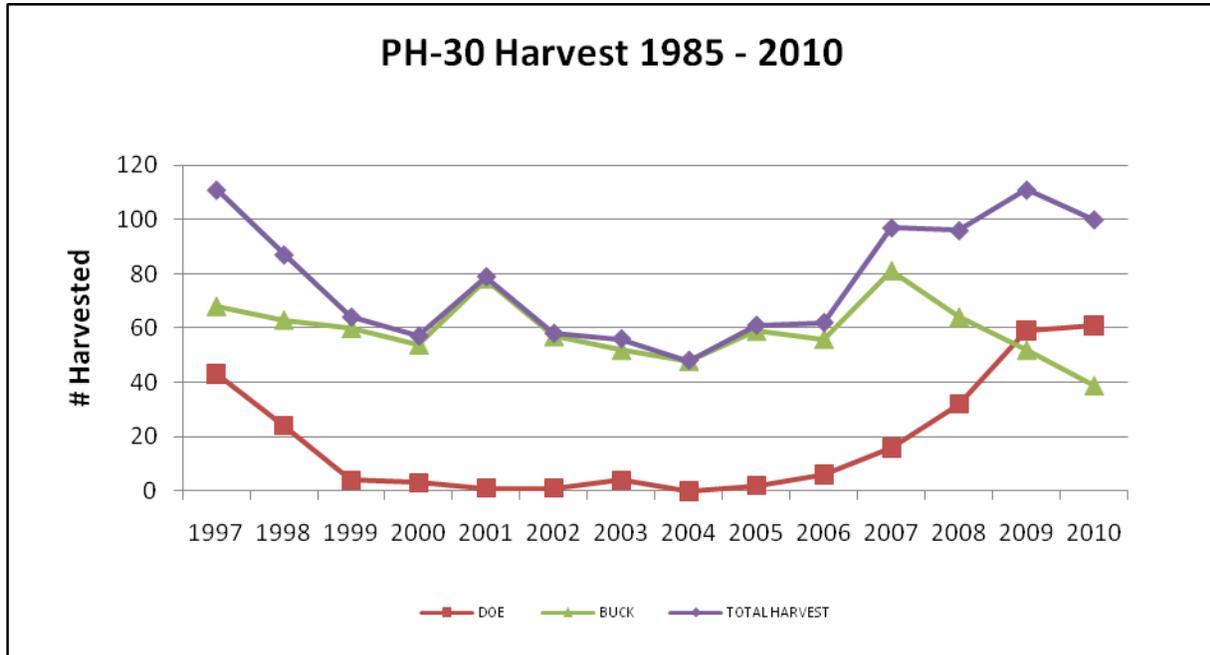


Figure 8. PH-30 Harvest

YEAR	RIFLE		ARCHERY	MUZZLELOADER		TOTAL
	Buck Limited	Doe Limited	ES OTC	Buck Limited	Doe Limited	
1996	105	120				225
1997	105	60	95			485
1998	80	45	104			489
1999	60	0	73			362
2000	60	0	82			275
2001	60	0	69			271
2002	60	0	62			251
2003	60	0	94			276
2004	60	0	104			318
2005	60	0	127			351
2006	60	0	131			378
2007	60	30	169	5		455
2008	60	35	191	10	5	565
2009	45	70	165	10	5	596
2010	45	70	248	10	5	425

Figure 9. PH-30 License sales

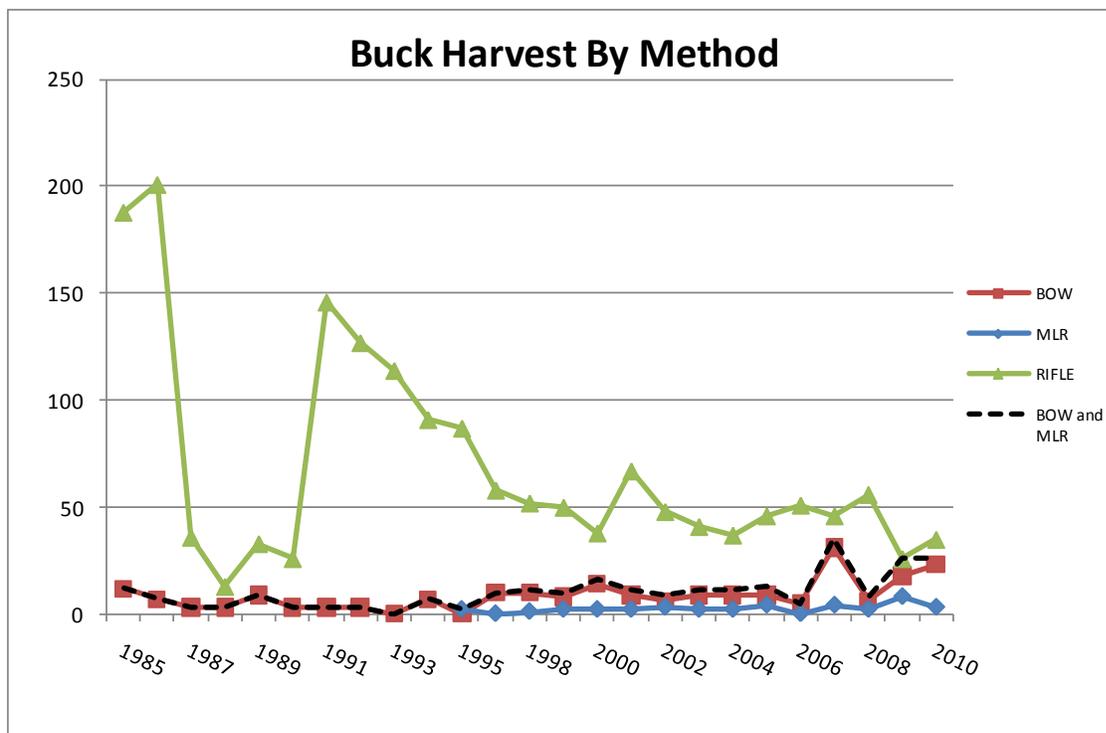


Figure 10. PH-30 Buck Harvest by Method

Game Damage

In recent years, there have been few damage complaints and no damage claims have ever been filed. Historically, in the 1980s, there were several complaints regarding wintering pronghorn from ranchers in the Shaw’s Park area. Anywhere from 150-300 animals concentrated on about 200 acres of private rangeland which lead to perceived conflicts over forage with cattle. Pronghorn have historically migrated to areas west of Canon City intermittently for at least 40 years; however, it was in the 1980s when large concentrations of pronghorn started to appear in Shaw’s Park. In response to that change in wintering pattern, the CPW reduced the herd by almost 200 animals through increased hunter harvest, dispersal hunts, and translocation. Dispersal hunts were also conducted in the Shaw’s Park area during the severe winter of 2007-2008 in response to perceived conflicts with cattle on private rangelands.

In the future, if other game damage complaints arise, these issues can readily be addressed by conducting dispersal hunts and providing hazing equipment or assistance to landowners. Several historic ranches around the Shaw’s Park area have more recently been acquired by the BLM which has lessened concerns with game damage in that area.

CURRENT HERD MANAGEMENT

Current Post-hunt Population

The 2010 post-hunt population estimate for PH-30 is 1060. This population estimate is based on the PH-30 population model along with observed data from aerial inventories. This estimate is above the historic population objective of 750 which was set in 1988.

Current Composition

Annual computer modeling estimates a 2011 pre-hunt ratio of 34 bucks:100 does. The most recent 3-year average observed pre-hunt ratio (2008-2010) is 40 bucks:100 does. The corresponding 3-year average modeled post-hunt ratio is 26 bucks:100 does. Both the current observed pre-hunt ratios and modeled post-hunt estimates are lower than our post-hunt objective of 43 bucks:100 does. Given the current modeled post-hunt ratios there would need to be a significant reduction in licenses in order to achieve the current buck:doe ratio objective of 43 and even then the objective might be unobtainable.

Current Management Strategies

The current population objective of 750 and current sex ratio of 43 bucks:100 does were established in 1988. There have been very few complaints regarding pronghorn in the DAU so the population has not been decreased to objective. Buck:doe ratios are below the current objective of 43, although this objective may be unrealistic for this DAU since pre-hunt ratios do not reach levels that high. The ten year average observed pre-hunt estimate is 30:100. The ten year average modeled post-hunt estimate is 19:100 and never has been above 29:100. Even with a significant reduction in licenses, it may still be impractical to expect a post-hunt 43 buck:100 doe ratio in South Park given that low fawn:doe ratios and ultimately buck recruitment into the population in comparison to other pronghorn herds across the state.

Current Management Problems

Currently, there are very few management concerns in PH-30. Historically there have been game damage complaints just south of South Park during severe winters; however, there are no issues with game damage currently. If conflicts do occur in the future they can be resolved using dispersal hunts and hazing techniques.

One recent concern regarding harvest is the increasing number of bucks harvested by archery hunters. The GMUs within South Park have historically been part of the statewide archery hunt and thus licenses were not limited in number and could be purchased over the counter. In contrast, rifle buck licenses require 6-8 preference points to draw in any of the South Park units. Archery harvest has increased in the past several years likely as a result of an increased number of hunters in the South Park area. There are concerns that South Park will receive even more archery hunting pressure as other GMUs in the State go to limited licensing management for archery pronghorn. As a result of these issues, in November 2010 the Colorado Parks & Wildlife Commission approved the request to remove GMUs 49, 50, 57, 58, 500, 501, and 581 from the statewide archery hunt code and created limited archery units for the 2011-2012 hunting season. Two archery hunt code groups have been created for the South Park DAU to allow for better hunter distribution.

ISSUES AND STRATEGIES

Issue Solicitation Process

Two public meetings were held to discuss this plan in October and November 2006 in Denver and Fairplay, respectively. Survey forms were provided for participants to indicate their preferences for long term objectives. Additionally, the survey was available over the internet and by mail. Postcards were sent to anyone who drew a license in PH-30 in 2004 and 2005 informing them of the questionnaire available on the CPW website. In 2006 when the South Park Elk DAU management plan was being developed a survey/questionnaire was mailed to those interested in elk, deer and pronghorn in South Park. A mailing list was developed from individuals that responded to a news release indicating they were interested in the South Park pronghorn herd.

A follow-up public meeting was held in Hartsel on July 15, 2010 to further discuss pronghorn management in PH-30. The meeting was advertised on the CPW website and in local media. The original survey was also made available to the public at this meeting.

The draft plan was placed on the CPW website for a period of 45 days in April-May 2011 and also sent to the South Park Habitat Partnership Program, Park County, and the appropriate USFS and BLM district offices for comment.

Issue Identification

Fifty-eight questionnaires were completed and returned to the CPW. Please refer to Appendix A for the complete questionnaire and complete survey results.

At the meeting in Hartsel, four individuals attended the meeting and offered several comments on pronghorn management in South Park. Each individual represented a different interest including a local landowner, a hunter, a rancher, and a nature photographer. Most were in favor of slightly increasing herd size as long as the habitat can support the herd. Three individuals filled out the original questionnaire. There were no complaints regarding game damage or too many pronghorn.

Of the individuals that completed the questionnaire 32% indicated they would like the population to increase slightly, 28% increase moderately, and 30% increase greatly. There was a greater range of answers regarding the buck:doe ratio with 19% requesting no change (20:100), 27% wanted it to increase slightly (25:100), 20% wanted a moderate increase (30:100), and 24% wanted even a greater increase (35:100).

While the draft plan was on the website, only 1 email comment was received in which a slight population increase was preferred along with managing the DAU for quality bucks. Comments were also received from the USFS South Park Ranger District and from the South Park Habitat Partnership Program Committee and are compiled in Appendix B.

DEVELOPMENT OF MANAGEMENT ALTERNATIVES

Population Objective Alternatives:

Population Alternative 1: 700 – 900 (~25% reduction from current estimate)

This alternative includes the current objective of 750, but given the current population estimate this option would require an increase in licenses for a period of time until population numbers were reduced. Once this objective was reached, the opportunity for licenses would decrease.

Population Alternative 2: 1000 – 1200 (contains current estimate)

This alternative would be consistent with the current population estimate and would reflect similar license trends. With average weather conditions, game damage concerns should be minimal and the habitat should be adequate to support this population level.

Population Alternative 3: 1250 – 1400 (~25% increase from current estimate)

This alternative would require a reduction in licenses and likely result in an increase in preference points needed to draw licenses. It is questionable whether this population size could be maintained due to frequent bouts of low recruitment. Density dependent effects may be seen as the availability and quality of the habitat could be inadequate to sustain this number of pronghorn. A pronghorn herd at this size would also be more susceptible to a large population decline in the event of a severe winter or drought and more likely to cause game damage conflicts.

Herd Composition-Post Season Sex Ratio Objective Alternatives

Composition Alternative 1: 25 –30 bucks:100 does (current composition status)

This alternative would be consistent with current modeled ratios but represents a decrease from the current objective. This alternative would continue to provide greater hunter opportunity.

Composition Alternative 2: 30 –35 bucks:100 does

This alternative would be a slight increase from the current composition status and a decrease from the current objective. Historically sex ratios tend to be slightly lower than this, but with the increasing buck:doe ratios seen in the past few years this alternative is likely attainable. This alternative could maximize hunter opportunity and buck quality, in regards to horn size and maturity, and would likely reflect current preference point levels.

Composition Alternative 3: 35 – 40 bucks:100 does

This alternative would be a greater increase from the current composition status, although still a decrease from the current objective. This alternative would require a reduction in licenses resulting in an increase in preference points needed to draw. It may be difficult to obtain this objective given the low recruitment of this population.

Composition Alternative 4: 40 – 45 bucks:100 does (contains previous objective)

This alternative encompasses the current objective of 43; however, historically this population has never been able to achieve this ratio even with conservative buck harvest.

PREFERRED ALTERNATIVES

Post-hunt Population Level and Herd Composition-Sex Ratio Objective Alternative

Population Alternative #2 (1,000-1,200)

This alternative is recommended based past herd performance and public input. Historic post-hunt population levels have remained within this range for over 10 years and there was no desire to bring the population level down to the previous objective of 750 animals. The current population estimate (1,060 post-hunt 2010) is at the low end of the recommended objective so there is opportunity to slightly increase the herd as desired by the public. Since this pronghorn herd is at the upper extent of its normal habitat range, it may be challenging to attempt to increase herd size above this objective.

Composition Alternative #2 (30-35 bucks:100 does)

This alternative is recommended based on the desire to offer quality buck hunting opportunity while still maximizing hunter opportunity. Public comment supports this alternative and although the post-hunt buck:doe ratio is currently below this level it is projected to increase within this range based recent management strategy. Also with the new limited license structure for archery season this year, wildlife managers will likely have increased ability to manage buck:doe ratios. Past herd performance indicates this objective is achievable while still offering reasonable buck hunting opportunity.

Appendix A. Survey form used for public input during DAU outreach process. Results and percentage of respondents selecting each response inserted into survey.

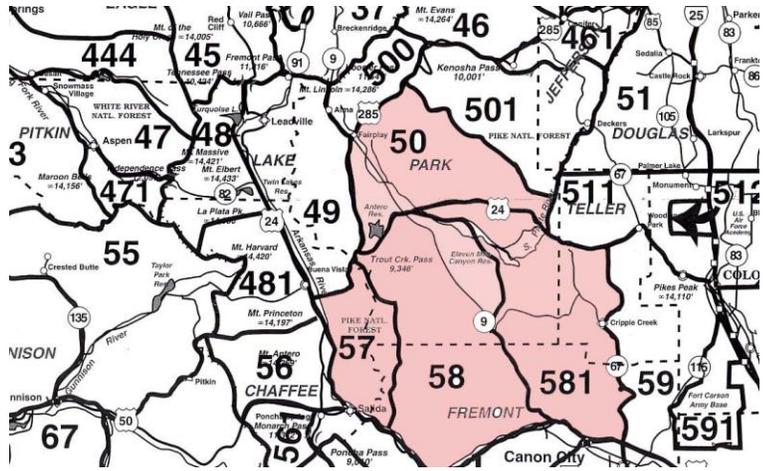
PRONGHORN

ABOUT THIS QUESTIONNAIRE

- The primary purpose of this questionnaire is to gather public input that will be used by the Colorado Division of Wildlife in the development of pronghorn antelope management plans for Game Management Units (GMUs) 50, 57, 58, & 581. Your input will be used by wildlife managers to help establish long-term objectives for the age and sex structure and the size of the pronghorn population.
- Your input is important to us. Please take a few minutes to complete and return this questionnaire at your earliest convenience. We would appreciate receiving all public comments by **July 30, 2010**.
- Your responses will remain confidential.
- **In this questionnaire, Game Management Units (GMUs) 50, 57, 58, & 581 will be referred to as “the designated area”.**
- When completed, please mail survey to:

Policy and Regulations Section
Colorado Division of Wildlife
6060 Broadway, Denver CO 80216-9983
Attn: Heather Halbritter

Thanks again for your input!



First, please examine the map and written description of Game Management Units (GMUs) 50, 57, 58, & 581 located in central Colorado, then go to Question 1.

Description of GMU 50: Those shaded portions of Park county bounded on the north by US 285; on the east by Park Co Rd 77; on the south by US 24; and on the west by US 285.

Description of GMU 57: That shaded portion of Chaffee, Park and Fremont counties bounded on the north by US 24; on the east by Kaufman Ridge and Badger Creek; on the south by US 50 and Colo 291; and on the west by the Arkansas River.

Description of GMU 58: That shaded portion of Fremont and Park counties bounded on the north by US 24; on the east by Park Co Rd 59 and Colo 9; on the south by US 50; and on the west by Kaufman Ridge and Badger Creek.

Description of GMU 581: Those shaded portions of Park, Teller and Fremont counties bounded on the north by US 24; on the east by Colo 67; on the south by US 50; and on the west by Colo 9 and Park Co Rd 59.

BACKGROUND INFORMATION

1. Are you... 92% a resident of Colorado
8% a non-resident of Colorado

2. Do you live in the designated area (GMUs 50, 57, 58, & 581)?
72% No
28% Yes If yes, how many years? ____ years

3. Do you own or lease property in the designated area (GMUs 50, 57, 58, & 581)?
57% No
43% Yes If yes, how many acres? ____ acres
Do you ranch or farm on the property you own or lease in the designated area?
____ No ____ Yes

4. Do you own a business in the designated area (GMUs 50, 57, 58, & 581)?
89% No
11% Yes

5. Do you guide or outfit for big game hunters in the designated area (GMUs 50, 57, 58, & 581)?
98% No
2% Yes

6. Are you 98% Male 2% Female

7. What is your age?
0% 20 and under 16% 21-40 74% 41-60
10% 61-80 0% over 80

8. Do you hunt? 2% No 98% Yes

9. Do you fish? 5% No 95% Yes

All percentages are based on 61 survey responses except for questions 8 and 9 in which only 60 people responded to.

PEOPLE AND PRONGHORN

1. Please indicate how interested you are in doing each of the following in the designated area (GMUs 50, 57, 58, & 581).
(Circle one number for each item)

How interested are you in	Not at all Interested				Very Interested	Don't Know
seeing pronghorn?	1	2	3	4 (12%)	5 (88%)	6
hunting pronghorn?	1 (3%)	2	3 (9%)	4 (10%)	5 (78%)	6
learning more about pronghorn management?	1 (2%)	2 (2%)	3 (12%)	4 (25%)	5 (59%)	6
providing input for decisions about pronghorn management ?	1 (3%)	2	3 (10%)	4 (25%)	5 (61%)	6

2. Please indicate how concerned you are about each of the following possible problems in the designated area (GMUs 50, 57, 58, & 581).
(Circle one number for each item)

How concerned are you about	Not at all Concerned				Very Concerned	Don't Know
a) Pronghorn-auto accidents	1 (36%)	2 (23%)	3 (10%)	4 (16%)	5 (11%)	6 (3%)
b) economic losses to ranchers/farmers from pronghorn damage to rangelands/hay/ crops/fences	1 (33%)	2 (15%)	3 (20%)	4 (13%)	5 (15%)	6 (5%)
c) damage from pronghorn to homeowners' trees, shrubs and gardens	1 (51%)	2 (11%)	3 (13%)	4 (10%)	5 (10%)	6 (5%)
d) predation on the pronghorn population from coyotes, bears and mountain lions	1 (7%)	2 (10%)	3 (20%)	4 (26%)	5 (34%)	6 (3%)
e) the reduction of pronghorn habitat due to increased human population and development	1 (5%)	2 (3%)	3 (11%)	4 (18%)	5 (62%)	6 (0%)
f) the potential of starvation of pronghorn during the winter	1 (3%)	2 (8%)	3 (8%)	4 (31%)	5 (49%)	6 (0%)
g) pronghorn spreading diseases to livestock, pets or humans	1 (30%)	2 (21%)	3 (13%)	4 (10%)	5 (23%)	6 (3%)
h) pronghorn competing with livestock for forage	1 (33%)	2 (16%)	3 (16%)	4 (13%)	5 (18%)	6 (3%)
i) the revenue that pronghorn hunting and viewing provides for local businesses	1 (7%)	2 (10%)	3 (18%)	4 (25%)	5 (36%)	6 (5%)

3. How do you personally feel about pronghorn in the designated area (GMUs 50, 57, 58, & 581)? (Check one)

- I do not enjoy the presence of pronghorn in the designated area and regard them as nuisances.
- 15% I enjoy the presence of pronghorn in the designated area, BUT I worry about problems pronghorn may cause.
- 83% I enjoy the presence of pronghorn in the designated area, BUT I do not worry about problems pronghorn may cause.
- 2% I have no particular feelings about pronghorn in the designated area.

Percentages based upon the following number of survey responses:
Question 1: 59
Question 2: 61
Question 3: 60

PRONGHORN MANAGEMENT

1. How would you like the pronghorn population in the designated area (GMUs 50, 57, 58, & 581) to change, if at all? *(Check one)*

- decrease greatly (over 50%)
- 2% decrease moderately (26-50%)
- decrease slightly (1-25%)
- 8% no change
- 32% increase slightly (1-25%)
- 28% increase moderately (26-50%)
- 30% increase greatly (over 50%)
- don't know

2. How would you like the number of buck (male) pronghorn in the designated area (GMUs 50, 57, 58, & 581) to change, if at all? *(Check one)*

- decrease greatly (5 bucks/100 does)
- 5% decrease moderately (10 bucks/100 does)
- 2% decrease slightly (15 bucks/100 does)
- 19% no change (20 bucks/100 does)
- 27% increase slightly (25 bucks/100 does)
- 20% increase moderately (30 bucks/100 does)
- 24% increase greatly (35 or over bucks/100 does)
- 3% don't know

3. How would you rate the overall success of the Colorado Division of Wildlife's pronghorn management in the designated area (GMUs 50, 57, 58, & 581)? *(Circle one)*

poor	fair	good	very good	excellent	no opinion
9%	14%	31%	26%	3%	17%

4. Overall, how would you rate the quality of pronghorn hunting opportunities available in the designated area (GMUs 50, 57, 58, & 581)? *(Circle one)*

poor	fair	good	very good	excellent	no opinion
22%	24%	28%	12%	0%	14%

Percentages based upon the following number of responses:
Question 1: 60
Question 2: 59
Question 3 and 4: 58

PRONGHORN HUNTING

1. 1. Have you ever hunted pronghorn in Colorado?
22% No (*Please go to next page*)
78% Yes - how many years?
 _____ years

2. Have you ever hunted pronghorn in the designated area (GMUs 50, 57, 58, & 581)?
45% No (*Please go to next page*)
55% Yes - how many years?
 _____ years

3. Overall, how satisfied or dissatisfied have you been with your past pronghorn hunting experiences in the designated area (GMUs 50, 57, 58, & 581)? (*Circle one*)

very dissatisfied	somewhat dissatisfied	slightly dissatisfied	neutral	slightly satisfied	somewhat satisfied	very satisfied
3%	6%	11%	21%	3%	35%	21%

4. Overall, to what extent have you felt crowded by other hunters while pronghorn hunting in the designated area (GMUs 50, 57, 58, & 581)? (*Circle one*)

extremely crowded	moderately crowded	slightly crowded	not at all crowded
0%	16%	39%	45%

5. Which ONE factor is the MOST important to you when pronghorn hunting in the designated area (GMUs 50, 57, 58, & 581): (*Check one*)
29% few contacts with other hunters
37% obtaining meat
34% to get a trophy pronghorn

Percentages based upon the following number of responses:
 Question 1: 60
 Question 2: 51
 Question 3: 34
 Question 4: 31
 Question 5: 35

6. In the past 5 years (2001-2005), indicate the number of years you have hunted pronghorn in the following units: (*please refer to map on page 2*)
 Unit 50 _____ # of years Unit 57 _____ # of years Unit 58 _____ # of years
 Unit 581 _____ # of years

Results for Question 6:

	1-2 years	3-5 years	5+ years	# of responses
Unit 50	67%	33%		12
Unit 57	67%	33%		9
Unit 58	70%	30%		10
Unit 581	29%	57%	14%	7

Appendix B. Comments received during the 45 days the draft plan was posted online and shared with other agencies: April – May 2011.

1) Increase herd size to 1200 < and increase buck tags. There is no reason why not to increase the herd size here since there are no complaints.

2) *From the South Park Ranger District of the Pikes Peak National Forest:* I have reviewed the Pronghorn Management Plan for South Park and would like to provide a few comments. I'm uncertain of the level of detail these Management Plans require for their intended use of managing the size and sex ratio of a big game herd. I understand that drought and severe winter weather are the prominent factors that influence herd size. However, I believe that the public may benefit from more information regarding other factors affecting pronghorn that are specific to the South Park area. For instance, the plan may include a discussion on how range conditions have been heavily influenced by historic and current land management practices, how changes in water use and availability have specifically impacted this species, and how fencing, such as those found along US Hwy 24 and State Hwy 9, have restricted pronghorn seasonal migration, as well as daily movements. A discussion of these factors may provide insight into how land management practices may improve habitat quality for this species within the DAU, which may facilitate a larger, and more robust population that is less susceptible to fluctuations in herd size. In addition, a definition of what is considered "marginal habitat" would aid in supporting use of this terminology within the plan.

3) *Letter from the South Park HPP Committee:*



**SOUTH PARK
HABITAT PARTNERSHIP PROGRAM
PO Box 681
Fairplay, CO 80440-0681**

May 18, 2011

Heather Halbritter
Terrestrial Biologist
Northeast Region
6060 Broadway
Denver, CO 80216

Ms Halbritter,

The South Park Habitat Partnership committee has reviewed the Pronghorn Data Analysis Unit Plan for PH-30. The committee discussed population objectives and buck/doe ratios at our last meeting on May 4, 2011. The South Park HPP committee has not received any requests for mitigation based on damages from pronghorn. Therefore we do not believe pronghorn are causing any appreciable damage to public or private lands in South Park. The Sportsman's representative on the committee would like to see more pronghorn in the park. The SPHPP committee approves Alternative 2 which calls for a population objective range of 1,000 to 1,200 animals and a buck/doe ratio of 30/100. Thank you for the opportunity to comment.

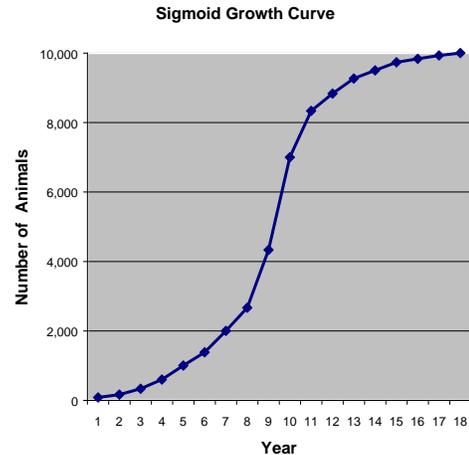
Sincerely,

/s/ Erik B Brekke

Erik Brekke

Appendix C. 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" (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 population growth.

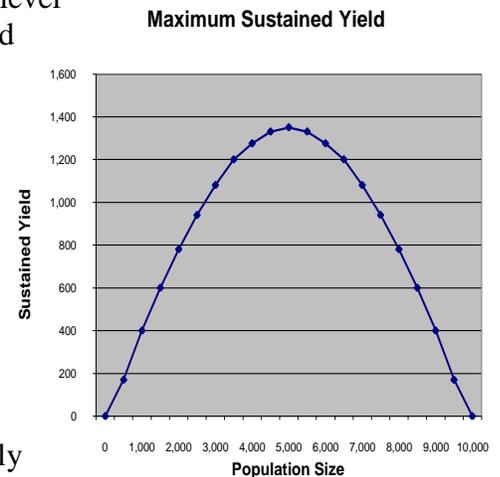


The second phase occurs when the population number is at a moderate level. This phase is characterized by high reproductive and survival rates. During this phase, food, cover, water and space are not a limiting factor. During this phase, for example, animals such as white-tailed deer have been known 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 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, 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 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, antlers 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 "hunnable 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 (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 becomes 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 because 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 but lower watchable wildlife values.



Actually managing deer and elk populations for MSY on a DAU basis 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, annually, and trend over time. In most cases we would not desire true MSY management even if possible because of the potential for overharvest and the number of mature of bulls and bucks is minimized because harvest reduces recruitment to older age classes. However, the concept of MSY is useful for understanding how reducing densities and pushing asymptotic 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.

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 populations where productivity is low and when populations are below DAU plan objectives is counterproductive

and creates a management paradox. In that, for populations limited by density dependent processes, this “hands-off” type of management simply exacerbates and perpetuates the problem of the population being resource limited, and countermands the goals and objectives of the DAU plan. As Bartmann et al. (1992) suggest, because of density-dependent processes, it would be counterproductive to reduce female harvest when juvenile survival is low and increase harvest when survival is high. Instead, a moderate level of female harvest helps to maintain the population below habitat carrying capacity 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 aptly set must be below carrying capacity.

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.