

**D - 13 (Maroon Bells Deer)
DATA ANALYSIS UNIT PLAN
Game Management Units 43, 47, and 471**



A view looking south from The Crown, north of Mount Sopris. The Crown serves as important wintering grounds for mule deer, offering sagebrush, rabbitbrush, mountain shrub, Gambel oak, and aspen habitats. However, habitat succession and year-round human recreation have diminished habitat quality on The Crown and other mule deer winter range areas of D-13.



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May 3, 2011

D-13
DATA ANALYSIS UNIT PLAN
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I. DAU PLAN EXECUTIVE SUMMARY

DAU: Maroon Bells Deer D-13

GMUs: 43, 47, and 471

Current Population Estimate: 6,400 deer (post-hunt 2009)

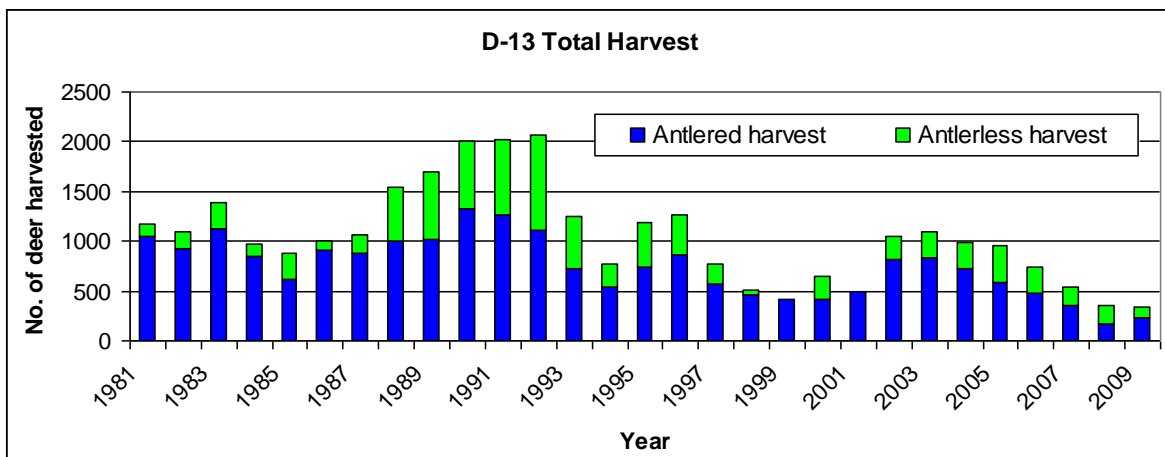
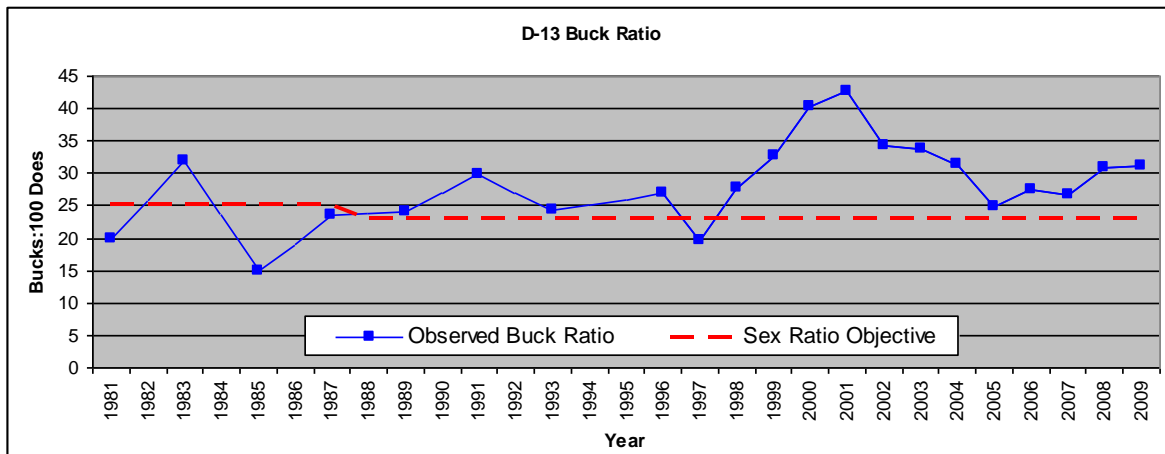
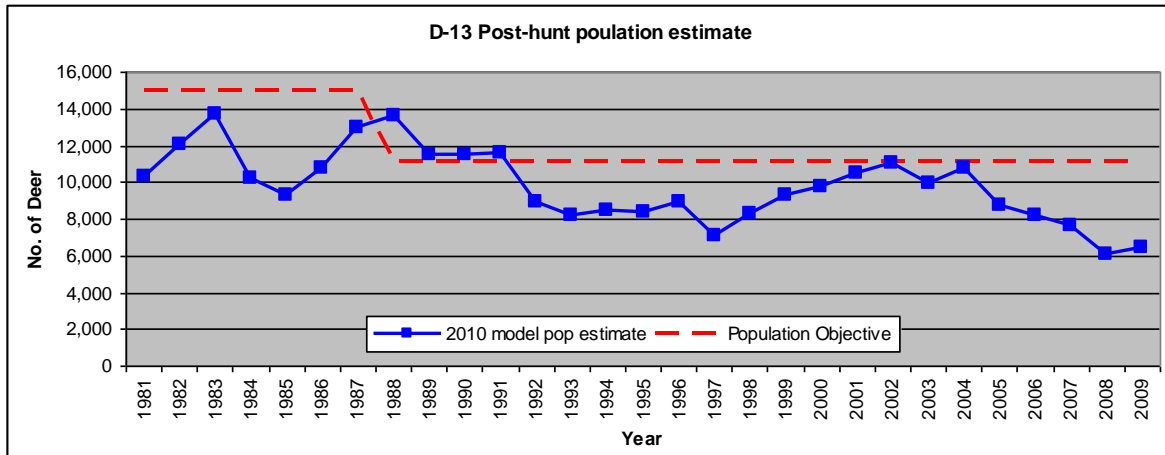
Previous (1988 DAU Plan) Population Objective: 11,100 deer

Current (2011 DAU Plan) Population Objective: 7,500-8,500 deer

Current Sex Ratio Estimate: 28 bucks/100 does (5-year average 2005-2009)

Previous (1988 DAU Plan) Sex Ratio Objective: 23 bucks/100does

Current (2011 DAU Plan) Sex Ratio Objective: 30-35 bucks/100 does



Background

The Maroon Bells deer herd (Data Analysis Unit or “DAU” D-13) is located in northwest Colorado and consists of Game Management Units (GMU) 43, 47, and 471. This DAU encompasses the Crystal River watershed and most of the Roaring Fork River watershed, and lies in Pitkin, Gunnison, Eagle, and Garfield Counties. Major towns include Glenwood Springs, Carbondale, Basalt, Aspen, and Snowmass Village. Wilderness Areas make up 39% of D-13 including all of the Hunter-Frying Pan Wilderness, most of the Maroon Bells-Snowmass Wilderness, and parts of the Collegiate Peaks and Raggeds Wilderness Areas.

Since 1988, the population objective for this herd has been 11,100 deer. However, this objective has only been approached or achieved twice, once from 1988-1991 and later from 2001-2004. Over the past 2 decades, there has been significant loss and degradation of mule deer habitat in D-13, including a boom in housing development in deer wintering habitat, combined with an increase in the human population and increased year-round recreational use of public lands. Several current and historic ecological processes, including long-term fire suppression, have altered plant composition and contributed to plant succession towards less nutritious forage for deer. The current population objective is no longer realistic, given the significant changes in habitat quality and quantity. The 2009 post-hunt population estimate is 6,400 deer. Maintaining the population at a size lower than the current population objective will result in less competition among deer and between deer and elk, better body condition, higher recruitment of fawns, increased population growth rate, and thus more resiliency to hunter harvest, winter kill, and other mortality sources.

The sex ratio objective set in 1988 is 23 bucks:100 does. Since buck licenses became limited by draw only in 1999, a higher buck ratio has been maintained, averaging 28 bucks:100 does over the last 5 years.

Significant Issues

Limited Winter Range - Winter range is considered the most limiting factor for deer in Colorado and this DAU. Only 15% of the land area in D-13 serves as deer winter range. About half of the deer winter range is on public lands and much of it has declined in quality due to long-term fire suppression resulting in habitat succession and also an increase in year-round recreation over the past 10-15 years. The other half of deer winter range is privately owned and much of it has been or could eventually be developed.

Unfavorable Range Conditions - Habitat condition on winter range has declined throughout the DAU. The likely causes include plant successional movement towards later seral stage or climax communities, resulting in part from long-term fire suppression and other processes. Land development in this DAU has precluded the use of prescribed burns on the adjacent public lands because of concerns about the risk of fire damaging personal property.

Land Development – Substantial land development in the Roaring Fork Valley has occurred in the past 10-20 years. Because of the high monetary value of land in the DAU, along with a decline in the livestock industry, there is great financial incentive for large ranches to subdivide and develop into residential housing. Conservation easements are difficult to secure because of the high cost of land. With slightly more than half of mule deer winter range existing on private lands, the need for conservation of existing habitat on private lands is critical.

Recreation impacts - Year-round recreational use, including hiking, dog-walking, dogs off leash, cross-country skiing, mountain biking, 4-wheeling, and snowmobiling, has increased tremendously in the past 10 years. This heightened level of human activity on the landscape is a disturbance to both deer and elk on production grounds and on winter range. These behavioral stressors and additional mortality can negatively affect the deer population directly by limiting fawn survival, as well as indirectly by pushing deer off of preferred feeding and bedding areas.

Potential natural gas development – Mineral rights in the Thompson Creek area have been leased already and many leases are soon to be considered for renewal. Gas development in this area is likely to be detrimental to mule deer and other wildlife. Potential negative impacts to deer include habitat fragmentation; habitat loss; increased vehicle traffic; noise, sound, and light pollution, leading to displacement of deer from traditional fawning grounds and summering areas and direct mortalities due to vehicle strikes.

Low and Decreasing Fawn:Doe Ratio - The fawn:doe ratio has been generally declining over the past 30 years. Possible causes may be related to density-dependent factors that put deer on a lower nutritional plane, loss and degradation of mule deer winter range, long-term fire suppression, drought, increased year-round human recreation and dogs displacing deer from favorable habitats, and past livestock grazing practices.

Competition with Elk - Elk numbers overlapping with D-13 have steadily increased from very few elk a century ago to approximately 5,300 today. Elk may have been forced to expand their historic winter ranges and move to lower elevations where they may compete with deer for limited winter ranges.

Management Alternatives

In the DAU planning process for D-13, we considered 3 alternatives for post-hunt population size objective and 3 alternatives for the post-hunt buck:doe ratio objective.

Population Objective Alternatives

- **Alternative 1: 5,500-6,500 deer:**

This alternative would result in slight decrease or would maintain a status quo (-14% to +2% change) in the population size relative to the current (2009) post-hunt population estimate of 6,400 deer. At this reduced population density, deer should be in better body condition due to lower competition among deer for forage and space. In general, the herd at this reduced density should be more resilient to severe winter conditions than in the past and should be able to sustain a higher level of harvest and other mortality.

To achieve this population objective, antlerless license quotas could increase slightly. Depending on which sex ratio objective is selected, it could be more difficult to draw a buck license at this smaller population size because there would be fewer bucks on the landscape. Harvest success rate may decline because of having more hunters in the field seeking out relatively fewer animals, and hunter crowding may be an issue. On the other hand, the economic impact of deer hunting in the community could increase with more hunters visiting the area.

- **Alternative 2: 6,500-7,500 deer:**

This alternative would maintain or slightly increase (2-17%) the current population size of this herd. There would be less competition for forage and habitat among deer than in the past because the population would be lower than the long-term average (~9,000 deer over the last 20 years). In severe winters, some deer may die due to poor body condition, but in general, the population should be able to rebound to this level fairly quickly under average weather conditions.

To achieve this population objective, antlerless licenses could increase slightly over time. In the short term, licenses may be maintained at the current (low) quotas to allow population growth. When this objective is reached, licenses could increase somewhat thereafter to stabilize the population size. Hunting opportunity, harvest success rates, and economic impact would be intermediate under this alternative compared to Alternatives 1 and 3.

- **Alternative 3: 7,500-8,500 deer: Selected**

This alternative would increase the current population size by 17-33%. This population size range is just below the past 10-year and 20-year averages (~9,000 deer). This population level probably is at the upper end of what is achievable and sustainable long-term while still maintaining adequate hunting opportunity. Because of winter range loss and decadent winter range conditions, habitat improvement projects could be required to consistently hold the population at this increased size, especially during severe winters. If native winter range in the DAU continues to decline, the remaining habitat could further deteriorate due to relatively high concentrations of animals. At this higher population size, the herd may be more susceptible to the effects of a severe winter because individual deer would experience more competition with each other and with elk for limited forage and habitat. The population size may fluctuate more in response to weather conditions and may be slower to recover following a harsh winter.

To achieve this population objective, license numbers would be reduced or maintained at the currently low quota for several years, possibly long-term, to allow population growth. There

would be less opportunity to draw a license and hunters might not be able to draw a license every year. However, those who do successfully draw would likely have a better chance of harvesting a deer because there would be more deer on the landscape. Also, hunters would experience less crowding. At a higher population size, there would be more bucks on the landscape, so it could be easier to maintain a higher buck ratio. If the population size drops due to a harsh winter, both doe and buck license numbers would likely be reduced until the population recovers, so license numbers may be less consistent from year to year. Economic benefits from hunting would be reduced because there would be fewer hunters contributing to local establishments.

Sex Ratio Objective Alternatives

- Alternative 1: 25-30 bucks:100 does:

This alternative would slightly reduce or maintain (-11% to +7% change) the current (2009) observed sex ratio (5-year average of 28 bucks:100 does). There would be no change in the season structure and the herd would be managed for a balance between quality buck hunting and opportunity to draw a buck license. If the total population size increases, there would be a higher number of bucks on the landscape, which would allow more buck licenses to be issued in order to maintain the current buck ratio.

- **Alternative 2: 30-35 bucks:100 does: Selected**

This alternative would increase the current observed sex ratio by 7-25%. The goal would be to produce higher quality bucks. Buck licenses in 2nd and 3rd seasons would be likely be maintained at the lower quotas set in 2008 and 2009, or possibly reduced, to relieve hunting pressure on bucks. The opportunity to draw a buck license would be lower than a decade ago. However, more bucks would survive to maturity, so those hunters who drew a buck license would have more opportunity to harvest a quality buck.

- Alternative 3: 35-40 bucks:100 does:

This alternative would increase the current observed sex ratio by 25-33%. The goal would be to manage for mature trophy bucks, but would limit buck hunting opportunity. Buck licenses in 2nd and 3rd seasons would be reduced to relieve hunting pressure on bucks. Presently, no preference points are required to draw a 2nd or 3rd season buck license, but under this alternative, buck licenses could become highly restrictive, potentially requiring points to draw. Hunters who are successful in drawing a buck licenses would have the opportunity to harvest a high quality buck and could experience less hunter crowding.

CDOW Recommended Objectives

Selected Population Size Objective

The selected post-hunt population objective of 7,500-8,500 deer is a 17-33% increase from the 2009 post-hunt population estimate of 6,400 deer, a 4-16% decrease from the 10-year average estimated population of 8,900, and a 23-32% decrease from the previous objective of 11,100 deer.

Population estimates indicate that the current population objective of 11,100 has not been sustainable over the past 2 decades, nor is it a practical long-term objective given the multitude of mule deer habitat issues in the DAU. Although it may be possible to achieve a higher population for a short time under certain ideal environmental conditions (e.g. a series of mild winters combined with moderate moisture in the summertime), being able to hold a population at a high density long-term is unlikely. The occasional severe weather event, such as high snowfall, freezing rain, or several years of drought, can combine with density-dependent competition and mortality (including predation and hunting) to yield low fawn survival and sometimes reduced adult survival. A population managed at a high density has a lower growth rate than a population at an intermediate density and will experience wider population fluctuations in response to changes in weather, harvest, and other mortality factors. License numbers and hunting opportunity would likewise fluctuate more widely in response to population size.

Instead, at an intermediate population density, such as the ranges given in any of the 3 proposed population objectives, the deer population will have a higher intrinsic growth rate, will rebound more

quickly following a severe winter or other extreme weather event, and deer license quotas should likewise be more consistent between years. The general public would like to see more deer than there currently are, so the selected population objective would aim to increase the current population, but only to a level that is realistically achievable and sustainable.

To achieve an increase from the current population size, habitat improvement and protection will be needed. Existing winter range habitat must be treated to rejuvenate browse plants and any further habitat loss due to land development should be mitigated with habitat improvements elsewhere. Timing restrictions on recreation activities during fawning and early summer should be implemented and/or enforced. In the immediate future, antlerless licenses will likely remain at their currently low quota until the new population objective is reached. At that point, antlerless licenses could be increased to stabilize the population within the new objective range. Having some level of antlerless harvest is useful for maintaining a population at an intermediate density, at which deer body condition, fawn production, and survival rates are generally highest.

Selected Sex Ratio Objective

The selected sex ratio objective of 30-35 bucks:100 does is a 7-25% increase from the 5-year average buck ratio of 28, a -6 to +9% change from the 10-year average buck ratio of 32, and an increase of 30-52% over the previous objective of 23 bucks:100 does. Prior to 1999, it was not practical to attempt to increase the sex ratio above a range of 15-25 bucks:100 does. After 1999, deer hunting in this DAU was changed to totally limited licenses and the number of buck licenses and the amount of the buck harvest could be controlled. Public opinion surveys have indicated that most hunters want the opportunity to hunt and see more and larger bucks. Increasing the sex ratio to 30-35 bucks:100 does should accomplish this goal. The down side of this could mean that buck hunters may only be able to hunt every few years instead of every year.

This plan was approved by the Colorado Wildlife Commission on March 10, 2011.

II. INTRODUCTION AND PURPOSE

Introduction

The purpose of a Data Analysis Unit (DAU) plan is to give the Colorado Division of Wildlife (CDOW) direction in managing a big game species in a given geographical area. It identifies suitable habitat, gives the herd history and current status, and identifies issues and problems. Key features of a DAU plan are the herd size and herd composition objectives, which are developed after considering input from all interested entities. CDOW intends to update these plans as new information and data become available, at least once every ten years.

DAU Plans and Wildlife Management by Objectives

The Colorado Division of Wildlife manages wildlife for the use, benefit, and enjoyment of the people of the state in accordance with CDOW's Strategic Plan and mandates from the Colorado 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, CDOW uses a "management by objective" approach (Figure 1). Big game populations are managed to achieve population and sex ratio objectives established for Data Analysis Units.

DAUs provide the framework to manage individual herds of big game animals. DAUs are generally discrete geographically, and attempt to identify a distinct big game population. However, individual animal movements may at times straddle or encompass more than one DAU. While DAU boundaries are administrative, they represent the best way to encompass the majority of a herd within a biological area, and allow the most practical application of management tools such as hunting to reach objectives. DAUs are typically composed of smaller areas designated as game management units (GMUs), which provide a more practical framework where the management goals can be refined and applied on a finer scale, typically through hunting regulations.

The DAU plan process is designed to balance public demands, habitat capabilities, and herd capabilities into a management scheme for the individual herd. The public, hunters, federal land use agencies, landowners, and agricultural interests are involved in the determination of the plan objectives through input given during public meetings, the opportunity to comment on draft plans, and when final review is undertaken by the Colorado Wildlife Commission.

The objectives defined in the plan guide a long-term cycle of information collection, information analysis, and decision making. The end product of this process is a recommendation for numbers of hunting licenses for the herd. A DAU plan addresses two primary goals: the number of animals the DAU should contain and the sex ratio of those animals expressed as males:100 females. The plan also specifically outlines the management techniques that will be used to reach desired objectives. CDOW attempts to review and update the DAU plans on a 5-10 year basis to align the management objectives with the changing environmental, social, economic, and political conditions that affect Colorado's big game herds. Changes in land development, public attitudes, hunter success, hunter access, research results, disease prevalence, and game damage may all contribute new information needed when reviewing or revising a DAU plan. CDOW strives to maintain a tight link between the inclusion of the public in the development of population objectives and the yearly iteration of data collection, analysis, and renewed decision-making to reach those objectives.

Individual DAUs are managed with the goal of meeting herd objectives. Herd data, which is typically collected annually, is entered into a computer population model to get a population projection. The parameters that go into the model include harvest data from hunter surveys, sex and age composition of the herd gathered by field surveys, and mortality factors such as wounding loss and winter severity, generally acquired from field observations. Roadkilled animals can also contribute to overall mortality and should be incorporated into the model, but at present, this data has not been compiled. The resultant computer population projection is then compared to the herd objective, and a harvest calculated to align the population with the herd objective.

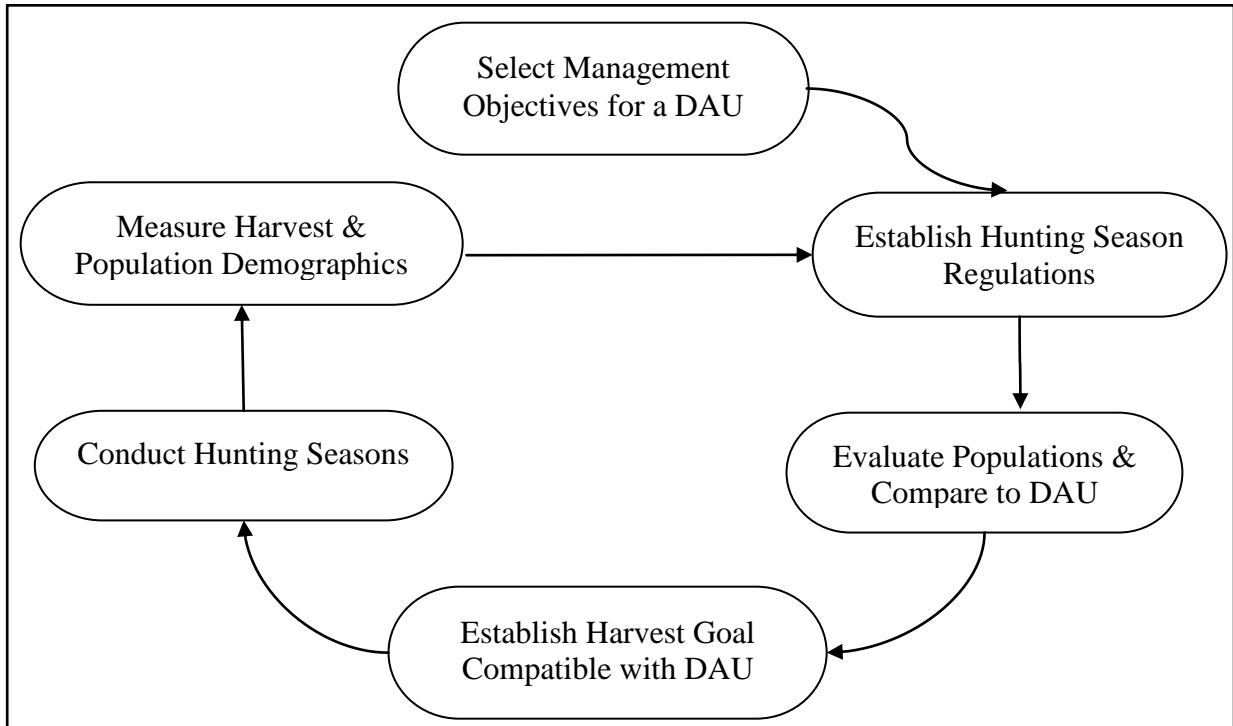


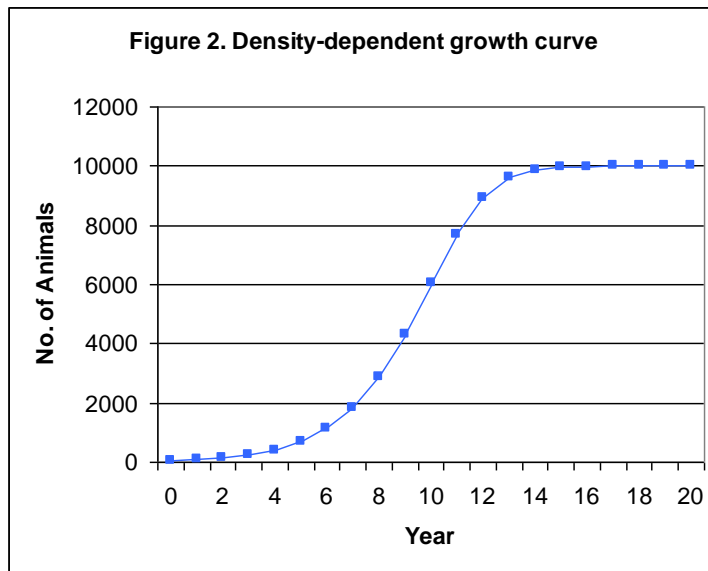
Figure 1. Management by objective process that CDOW uses to manage big game populations on a DAU basis.

Population Dynamics and Managing for Maximum Sustained Yield

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 "density-dependent" or "sigmoid" growth curve (Figure 2). 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 (habitat) are not a limiting factor. Also, during this phase, animals such as white-tailed deer have been known to successfully breed at six months of age and produce a live fawn on their first birthday and older does have been known to produce 3-4 fawns that are very robust

and healthy. Survival rates of all the deer (bucks, does and fawns) are at maximum rates during this phase.



The final or third phase occurs when the habitat becomes too crowded or habitat conditions become less favorable. During this phase the quantity and quality of food, water, cover and space become scarce due to the competition with other members of the population. These types of factors that increasingly limit productivity and survival at higher population densities are known as density-dependent effects. During this phase white-tailed deer fawns can no longer find enough food to grow to achieve a critical minimum weight that allows them to reproduce; adult does will usually only produce 1-

3 fawns; and survival of all deer (bucks, does and fawns) will decrease. During severe winters, large die-offs can occur due to the crowding and lack of food. The first to die during these situations are fawns, then bucks, followed by 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, the antlers are stunted. If the population continues to grow it will eventually reach a point called the maximum carrying capacity or "K". At this point, the population reaches an "equilibrium" with the habitat. The number of births each year is 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 condition 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 maximum sustained yield or "MSY". 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 condition should be good to excellent and range trend should be stable to improving. Game damage problems should not be significant and economic return to the local and state economy should be high. 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 3). 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

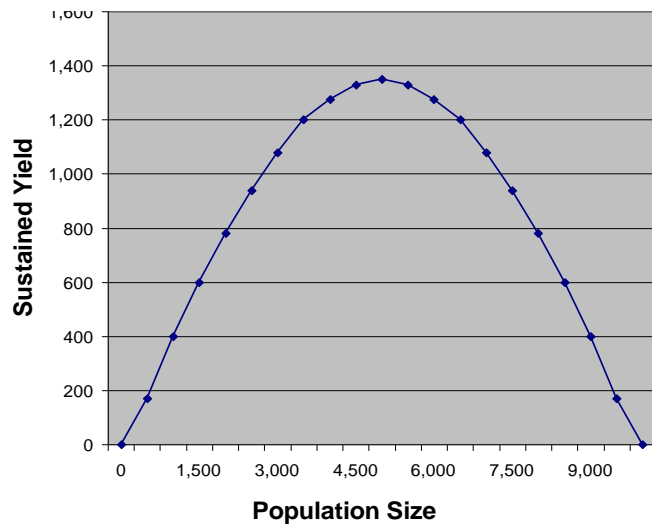
because the population of 3,000 deer has a much higher survival and reproductive rate compared to the population of 7,000 deer. However, at the 3,000 deer level, there will be less game damage and resource degradation but lower watchable wildlife values.

Actually managing deer and elk populations for MSY on a DAU basis is difficult if not impossible due to the amount of detailed information required and because of the complex and dynamic nature of the environment. In most cases we would not desire true MSY management even if possible because the number and quality of bulls and bucks is minimized. 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.

Commonly CDOW eliminates female harvest in populations where productivity is low and populations are below DAU plan objectives. However, this “hands-off” type of management simply exacerbates and perpetuates the problem the DAU plan was intended to address. 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.

Figure 3. Maximum Sustained Yield



III. DESCRIPTION OF DATA ANALYSIS UNIT

Location

The Maroon Bells Deer Data Analysis Unit (DAU) D-13 is located in northwest Colorado and consists of Game Management Units (GMU) 43, 47, and 471 (Figure 4). The DAU is bounded on the north by the Colorado and Frying Pan Rivers and Ivanhoe Creek, on the east by the Continental Divide, on the south by the divide between the Roaring Fork-Crystal River drainages and the East River-Muddy Creek drainages and McClure Pass; on the west by the following divides: Muddy Creek-Crystal River, Roaring Fork-Crystal River drainages, and the Divide Creek-Baldy Creek drainages; and by South Canyon Creek. This unit lies in Pitkin, Gunnison, Eagle, and Garfield Counties. Major towns include Aspen, Basalt, Carbondale, Glenwood Springs and Snowmass Village. Interstate-70 follows the northern tip of the unit. Highways 82, 133, and the Frying Pan Road provide the main access route to the area. Forest Service Wilderness Areas make up 39% of DAU D-13 including all of the Hunter-Frying Pan

Wilderness, most of the Maroon Bells-Snowmass Wilderness and parts of the Collegiate Peaks and Raggeds Wilderness Areas.

Physiography

The Elk Mountains dominates DAU D-13. Twenty-three peaks are higher than 13,000 feet above sea level, while six peaks are above 14,000 feet. This area consists of a series of parallel mountain ranges running mostly NW-SE connected transversely by low saddles. These mountain ranges are divided by the Crystal River, which has a valley floor from 6,500-8,000 ft. The landscape slopes down to the north to the Roaring Fork River and Colorado River valley floors (around 6,000 to 7,000 ft.) Elevations range from a low of 5,740 feet above sea level at the NW corner of the DAU (Colorado River - South Canyon Creek confluence) to a high of 14,265 feet at Castle Peak.

All natural surface water in this area drains into the Colorado River, mostly through the Roaring Fork River. The DAU is about 80% of the Roaring Fork watershed (includes Roaring Fork, Castle Creek, Frying Pan, Maroon Creek, Crystal River, and Snowmass Creek watersheds) and also the South Canyon and Paradise Creek watersheds. Water is diverted to the Arkansas Valley, Pueblo, and Colorado Springs by the Frying Pan-Arkansas project (69,200 acre-feet as of 2009). The 65-year average flow before this project from the entire Roaring Fork watershed was 991,100 acre-feet/year. Water is collected from Chapman Gulch, South Fork of the Frying Pan, Frying Pan, Midway Creek, No Name Creek, and Hunter Creek, then runs through 4 tunnels out of the watershed. Minimum stream levels are maintained. Ruedi Reservoir was built on the northeast edge of this DAU to provide replacement water storage to protect prior water rights downstream.

Climate

The climate varies with altitude. Low elevations have moderate winters and warm summers, and high elevations have long, cold winters and short, mild summers. Precipitation varies from 15 inches annually at 6,000 feet to 30-40 inches at 14,000 feet above sea level. Prevailing winds are out of the west and southwest. Temperature varies from a low of -20 degrees F to a high of 95 degrees F. Deep snow forces deer and elk to migrate to lower elevation and mostly south-facing slope winter ranges. Moisture comes throughout the year, although winter and spring months have more precipitation than summer and fall months.

Vegetation

Elevation and aspect largely determine the vegetation in this unit. The mountain peaks above approximately 11,600 feet are primarily bare rock or alpine communities. Spruce/fir grows mostly between the elevations of 8,000 and 12,500 ft. Aspen and aspen/conifer mixes dominate the slopes from 7,000 to 8,500 feet. Mountain shrublands grow on the lower slopes below 8,500 feet. Piñon and juniper cover the foothills, and sagebrush parks appear on the more level sites as elevation drops. Riparian vegetation runs along the creeks and rivers. Mule deer prefer a mosaic of diverse vegetation types which provide necessary cover and forage.

The vegetation in this DAU can be categorized into five main groups: cropland, riparian, shrublands, forest woodlands, and alpine.

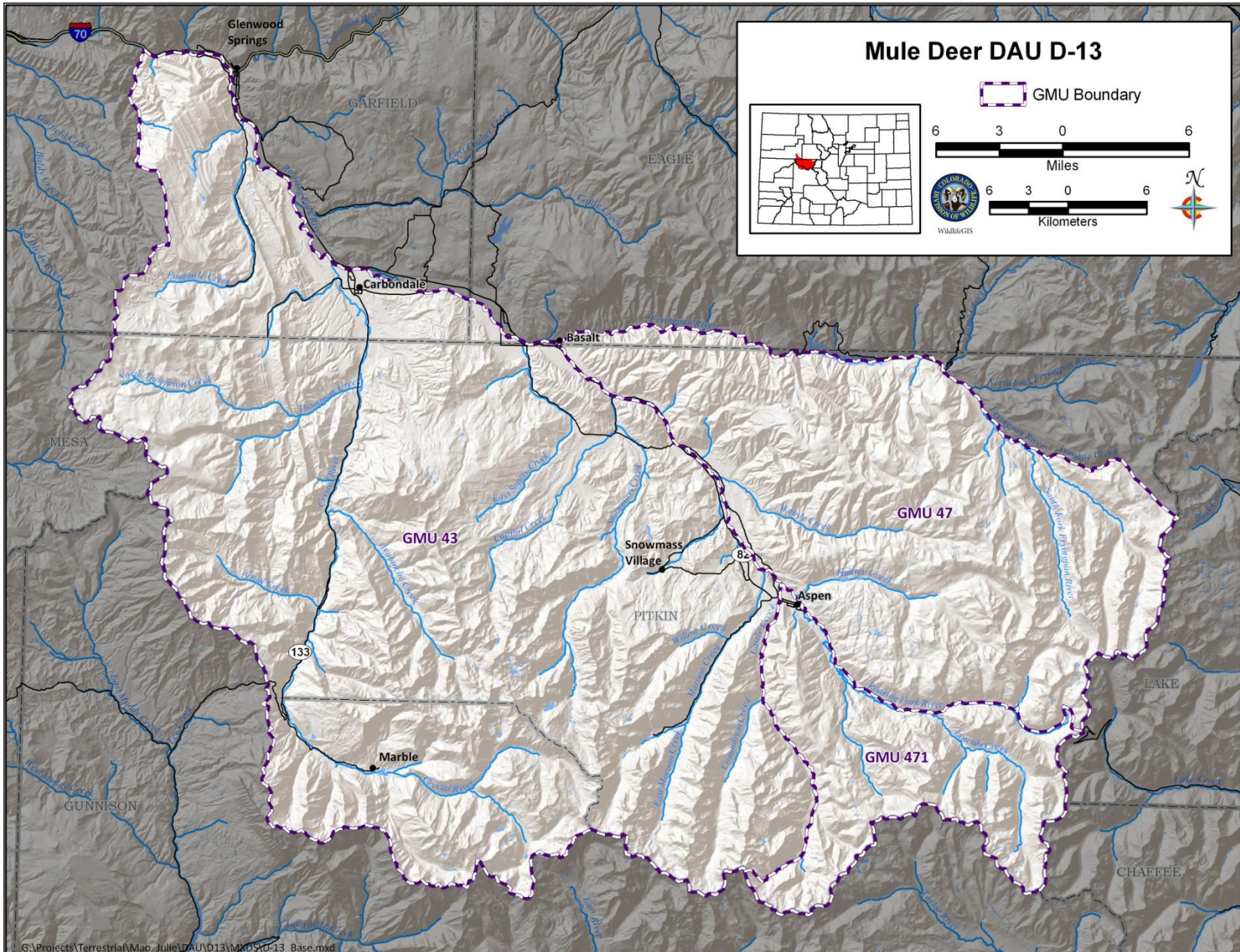


Figure 4. Location of DAU D-13.

Cropland is found in mostly in the lower elevations and valley bottoms along the area between Glenwood and Carbondale, along the Crystal River and in the Snowmass and Sopris Creek area. This land is mostly hay and pasture lands planted with timothy, orchard grass, smooth broome, and alfalfa. In the past, the area was important for other crops such as potatoes. Over the past 30 years many of the productive ranches in this DAU have been converted to 5 to 500-acre ranchettes.

Riparian vegetation is found along the major creeks and rivers. This community supports the greatest abundance and diversity of plant and animal species. Overstory vegetation varies from alpine meadows, spruce-fir, blue spruce, Douglas fir, ponderosa pine, aspen, and narrowleaf cottonwood going from high to low elevations. Willow, of various species, can be found at all elevations along the riparian areas.

Shrublands consist of sagebrush, mountain shrubs, and grassland communities.

- Big sagebrush is the most common land cover at the lower elevations. Rabbitbrush, western and slender Wheatgrass, June grass, Indian ricegrass, Blue-bunch wheatgrass and native clovers commonly grow within the sagebrush.
- Mountain shrubs include serviceberry, snowberry, mountain mahogany, bitterbrush, chokecherry and Gambel's oak. There are some large, homogeneous stands of Gambel's oak in the parts of the DAU such as the Crown and Snowmass Village-Wildcat ranch. The grasses and forbs within these shrublands provide important forage for deer in the fall and spring transition period and during the winter.
- Grasslands occur on the more level sites in forested areas (large bunchgrasses such as Thurber's fescue, basin wildrye, and needlegrass) and in the higher elevation areas (Idaho and Thurber's fescue, Sandberg bluegrass, blue bunch wheat grass mixed with forbs).

Forest woodlands appear in 4 major associations: piñon/juniper, aspen and aspen/conifer mix, Douglas-fir, and spruce/fir.

- Piñon-juniper covers the lower elevation foothills in the northern portions of the DAU such as in the Dry Park and South Canyon Creek area. This type provides good hiding and thermal cover but poor forage.
- Aspen and aspen-conifer woodlands occupy the middle elevations. The understory consists of emerging conifers (where aspen is not the climax species), lush grasses and forbs, and some shrubs. This community provides important cover and is very productive summer forage sites for deer. This type is quite common throughout the DAU and is the namesake of the most famous town in this DAU.
- Douglas-fir shares the middle elevation zone mostly on the moister, usually north-facing aspects, but is much less represented than the aspen woodlands. It is a long-lived species valued for wildlife habitat diversity, scenic value, and big game cover. Douglas-fir is well represented in the lower Thompson Creek drainages.
- Spruce/fir (Engelmann's Spruce and Subalpine Fir) dominates the higher elevations up to timberline in undisturbed sites. It is the dominant overstory in the Maroon Bells, Hunter

Frying Pan, Thompson Creek-Four Mile Park and Kobey Park area. This habitat provides excellent summer forage and cover for deer.

Alpine sites are abundant in this high elevation landscape. They occur on the higher mountain peaks above timberline in all of the wilderness areas in the DAU. Grasses, sedges, and numerous forbs are present. Short willows grow in moister areas. These sites provide summer forage and cover.

Land Status

Land Management

D-13 covers 2,961 km² (1,143 mi²) of land (Table 1 and Figure 5). Land management is distributed as follows: 73% National Forest Service, 20% private, and 6% Bureau of Land Management. Representing <1% are state-owned lands - State Land Board lands and Colorado Division of Wildlife (a small portion of the Christine State Wildlife Area).

Table 1. Area (square kilometers) by GMU and land status in deer DAU D-13. 1 km² = 0.386 mi² = 247 acres. "Other" includes city, county, land trust, and non-governmental organization lands.

	USFS	Private	BLM	Other	CDOW	State Land Board	Grand Total	% of DAU
GMU 43	1,235	511	160	14	9	2	1,931	65%
GMU 47	678	60	16	5	2	0.02	761	26%
GMU 471	242	26	0	2	0	0	269	9%
D-13 Total	2,155	597	176	21	11	2	2,961	100%
% of DAU	73%	20%	6%	0.7%	0.4%	0.1%	100%	

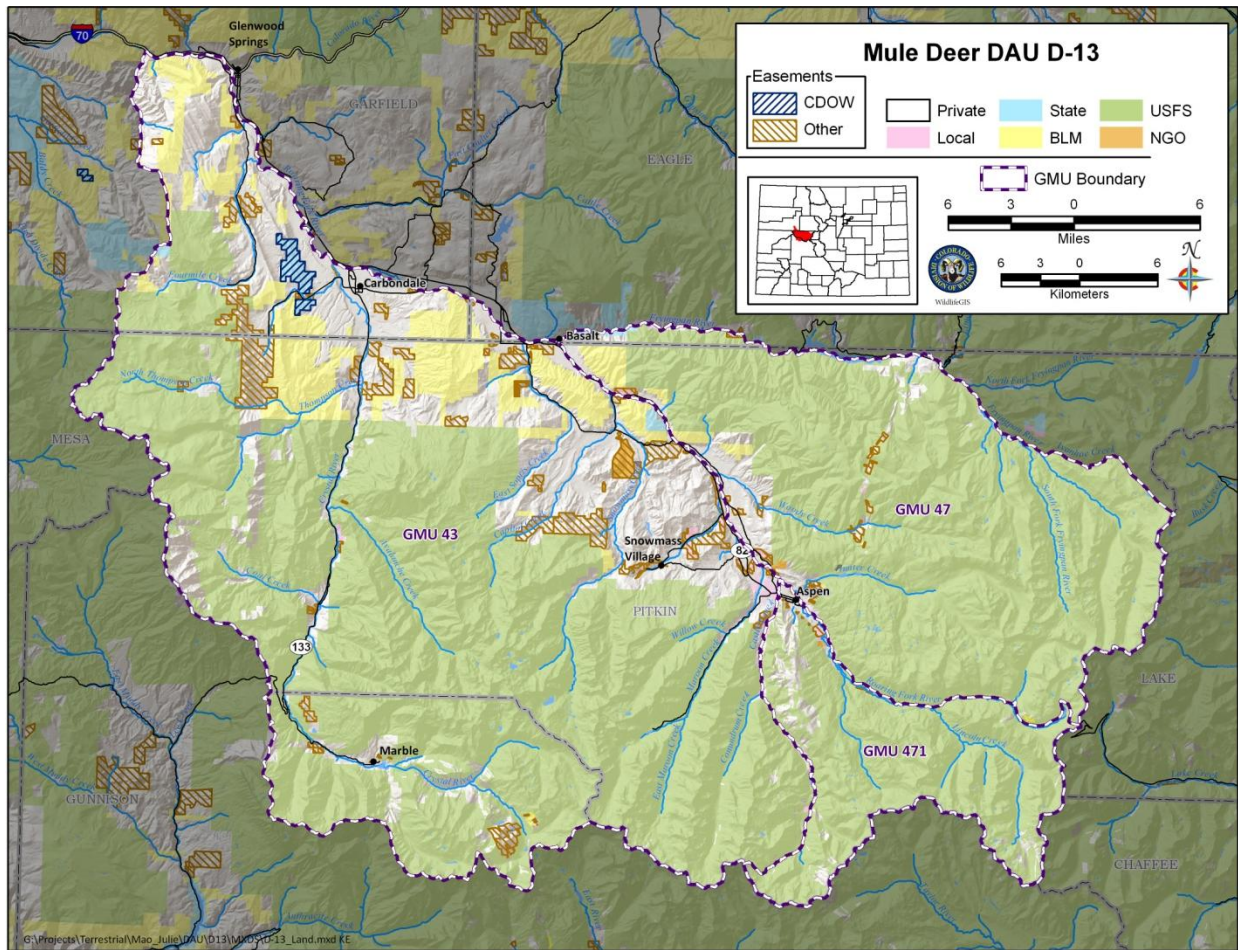


Figure 5. Land status in deer DAW D-13.

Land Use

The largest industry in the area is tourism. Tourism is based on the scenic beauty of the land and the recreational opportunities it provides. The Glenwood Springs Hot Springs Pool and the Fairy Caves are located on the north edge and adjacent to this DAW. This area contains four major, destination ski areas (Aspen, Aspen Highlands, Buttermilk, and Snowmass) and one smaller family ski area (Sunlight).

Hunting and fishing generate substantial economic revenue (Pickton and Sikorowski 2004). Big game hunting draws hunters from all over the country to the DAW. Backpackers, day hikers, and mountain climbers use the four wilderness areas in the unit. Peak baggers scramble to climb all 6 of the 14,000-foot plus peaks in the DAW. Anglers enjoy the Roaring Fork and Frying Pan River “Gold Medal” rivers and the numerous high lakes. Reudi Reservoir provides recreation for wind surfers, skiers, sail boaters, motor boaters, and anglers. Hikers, campers, mountain bikers, wildlife watchers, four-wheelers, snowmobilers, and cross country skiers enjoy the scenic beauty of the mountains. Commercial rafters operate on the Roaring Fork and Colorado River. Motels, restaurants, gift shops, gas stations, and all the local businesses benefit from these visitors.

Construction and real estate development and sales is the second largest industry in the area. Many visitors and the people who serve them have decided to build homes in this area. Fifty-one percent of the deer winter range is privately owned. Conservation easements on private lands comprise only 6% of mule deer winter range, and the remaining 46% of winter

range that occurs on private land either has already been or may be subject in the future to land development. In the past 20 years, large areas of private lands in the DAU have been subdivided and developed, including: the lower Roaring Fork River (Cardiff Glen, Park West, Sopris Park, Rose Ranch/Ironbridge/West Bank); Dry Park/Four Mile Creek (Spring Ridge, Four Mile Creek Ranch); lands around Carbondale (Aspen Glen, Coryell Ranch, Midland Point, River Valley Ranch, Prince Creek Estates, Stark Mesa); Sopris Mountain Ranch on West Sopris Creek; Watson Divide; and areas around Aspen (Aspen Valley Ranch, Chapparral Aspen).

Logging contributes only a very small part to the local economy, but does provide construction materials to the very busy construction sector and firewood for heating. Specialty beams and products, house logs, and dimensional lumber are produced in the area for rustic house construction. Wood shavings provide bedding for animals. Mining timbers are also produced. Timber harvesting in the area has been ongoing since the 1900s. In the past, spruce/fir stands were logged using even-aged methods such as shelterwood cuts, but more recently bark beetle infestations have led to sanitation/salvage methods of timber harvest (P. Nyland, USFS, pers. comm. 2010). In the Fourmile Park-Twin Peaks area, Park Creek, Mancon Park, and Elk Creek Timber Sales were logged in the 1980s and 1990s. A 3,000-acre blowdown of beetle-killed spruce and fir in the Baylor Park-Elk Creek area occurred in August 1999. Over the past decade, approximately 400 acres of the blowdown have been removed as salvage. An additional 1,500 acres of spruce/fir in the Fourmile Park-Twin Peaks area is scheduled for salvage or group selection thinning between 2012-2017. Historically, logging also occurred around Aspen, Woody Creek, Lenado, and East Sopris Creek from the 1890s to the 1960s. In 2009 and 2010, 2 acres of beetle-killed lodgepole pine were removed from Smuggler Mountain in Aspen. In 2011, the USFS plans to remove 200 acres of selected beetle-killed lodgepole on Red Mountain outside of Aspen.

Natural gas wells in the Fourmile Park-Twin Peaks-Thompson Creek area no longer produce gas, although the mining rights have been leased and there is potential for future gas drilling. There is a geological feature used as underground natural gas storage (Wolf Creek Field). Gas from Colbran and Silt area is piped there and pumped down into the ground. In the winter, natural gas is pumped back to towns in the area. There are several old coal mines that are now shut down and have been rehabilitated. This includes the huge Mid-Continent Coal Mine in Coal Basin. There is a small, working alabaster mine in Avalanche Creek.

Public grazing

Some public land in the DAU is used for grazing, although this use has declined with the general decline in agriculture in the DAU. The main areas used for public land grazing include Thompson Creek, Four-mile Creek, Dinkle Lake, Hay Park, Capitol Creek, and Marble/Gallo Hill. Domestic livestock can compete with mule deer for herbaceous forage, although moderate levels of grazing can also help promote shrub growth by limiting grasses. In addition, some private lands are irrigated for hay production or are kept as dry land pasture. These private lands are very beneficial to deer because it preserves open space in their winter range.

BLM Grazing Allotments - The Bureau of Land Management has all or part of 39 grazing allotments in the DAU, 24 of which are currently permitted (Appendix A). The permitted allotments provide 3,557 AUMs of forage for livestock. Use occurs primarily in the spring and summer with some use in the fall. The classes of livestock using these allotments are cattle (94% of AUMs), sheep (6%), and <1% horse.

USFS Grazing Allotments - The National Forest Service has 39 grazing allotments occurring totally or partially in DAU D-13 (Appendix B). Fourteen allotments are currently active with primarily cattle grazing. Seventeen allotments are closed, and 8 allotments are vacant. The period of utilization is variable, but primarily occurs from late June through early October (prior to the opening of the rifle big game season). Classes of livestock using these allotments include cattle, sheep, and horses.

Comparison of Wildlife and Livestock AUMs – This analysis is based upon 2009 posthunt population size estimates and 2008-2010 public land grazing levels.

- Deer AUMs* - 7,758 (6,400 deer/9.9 deer mon./AUM X 12 mon. = yearly total)
- Elk AUMs* – 25,440 (5,300 elk/2.5 elk mon./AUM X 12 mon. = yearly total)

It is important to note that most of the deer and elk are not consuming a full AUM equivalent in the winter (November – March). Instead, these animals are mostly surviving on stored fat reserves. Therefore, these 12-month figures are inflated and in reality would be much lower.

- USFS Livestock AUMs – 11,370 (authorized use - yearly total)
- BLM Livestock AUMs – 3,557 (authorized use - yearly total)
- Private Land Livestock AUMs – unknown

IV. Habitat Resource

Habitat Distribution

The distribution of mule deer winter and overall ranges between public and private lands in the DAU is shown in Table 2. The lower elevations that deer use as winter range comprise 15% of the DAU's total area. Of this winter range, 49% are on public lands, 6% are in conservation easements on private land, and 45% are on private lands without conservation easements. Overall mule deer range in D-13 is 80% public lands, 3% on conservation easements, and 18% on private lands without specific conservation protection.

Table 2. Distribution of mule deer winter and overall range between public and private lands in deer DAU D-13. 1 km² = 0.386 mi² = 247 acres.

Range	Public Lands		Private Lands under Conservation Easements (CE)		Private Lands without CEs		Total km ²	% of Overall range
	km ²	% of range	km ²	% of range	km ²	% of range		
Winter range	216	49%	28	6%	201	45%	445	15%
Overall range	2,357	80%	76	3%	528	18%	2,961	100%

Winter Range - DAU D-13 contains 445 km² (172 mi²) of mule deer winter range (Tables 2 and 3). Major wintering areas for deer include: Dry Park, Holgate Mesa, Jerome Park, lower Thompson Creek, Prince Creek, The Crown, Light Hill, Williams Hill, Arbany/Kittle, and Triangle Peak. Winter range is the most limiting factor for deer in this DAU. Deer winter range is mostly shrubland habitat (sagebrush, serviceberry, Gambel's Oak, etc.) below 8,500 feet and usually on south-facing or wind-swept ridges where snow does not accumulate. In the winter, deer rely mostly on browse plants that are sticking up through the snow for food. The bulk of the winter range occurs on private land (51%), followed by BLM land (32%), and National Forest Service land (13%). Representing <3% are state-owned lands. Winter range dates for this area are from December 1 to April 30.

Table 3. Area (km²) of land status (by land manager) of mule deer winter range in DAU D-13. 1 km² = 0.386 mi² = 247 acres.

	BLM	USFS	CDOW	State Land Board	City and County	Private	Total
GMU 43	130	19	8	2	2	210	371
GMU 47	14	39	1	0	1	19	75
GMU 471	0	0	0	0	0	0	0
Total Winter Range	144	58	9	2	2	229	445
% of Winter Range	32%	13%	2%	0.4%	1%	51%	100%

D-13 contains 95 km² (37 mi²) of severe winter range (Figure 6). Severe winter range is defined as that part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten.

There are 108 km² (42 mi²) of winter concentration areas (Figure 6). Winter concentration areas are defined as those parts of the winter range where densities are ≥200%

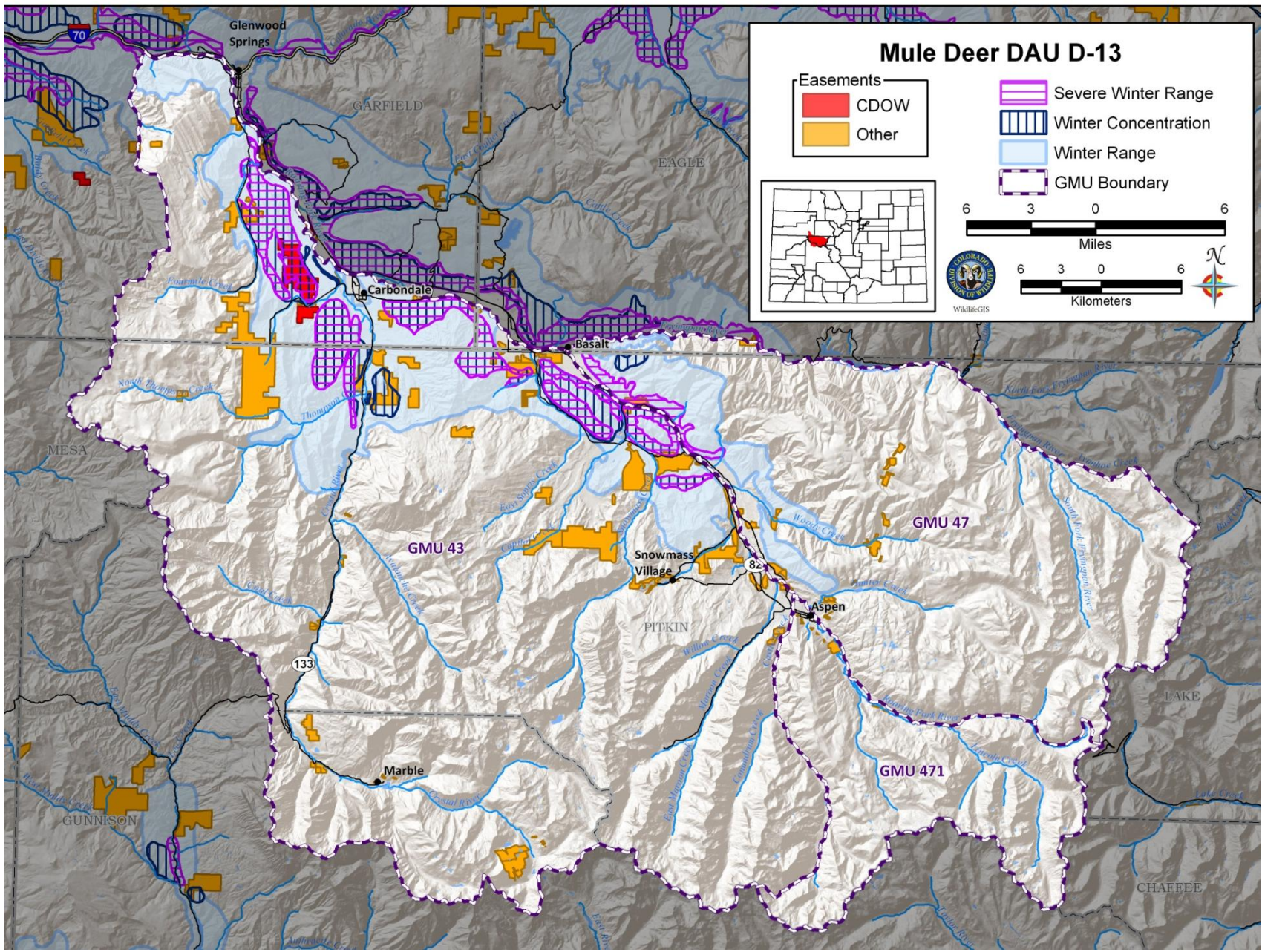


Figure 6. Mule deer winter range and conservation easements in DAU D-13.

greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.

Habitat Condition and Capability

Mule deer winter range in D-13 is in poor condition due to senescence and succession of plant communities, as well as habitat loss due to land development. As a result of long-term fire suppression, piñon and juniper woodlands have invaded sagebrush shrublands and converted them to much less productive sites. Piñon and juniper stands tend to be mature with a closed canopy that severely reduces understory vegetation. Also, many of the mixed mountain and sagebrush shrublands are over-mature and less productive. Browse seedlings and young plants are not abundant, and in many areas the grass/forb understory is sparse and lacks diversity.

Heavy livestock grazing, in combination with drought, occurred on many rangeland areas in D-13 from the late 1800's to the 1960's. Prior to the Taylor Grazing Act of 1934, grazing was not regulated on public lands. Modern-day range management practices were not widely applied prior to the 1960s. During this earlier period, many big game winter ranges were grazed excessively. Range degradation from this period is still apparent in D-13 due to the long lifespan and low turnover rate of many shrubland communities. In some cases, damage to riparian areas has been long-term. In other cases, inappropriate grazing has caused some sagebrush habitats to have a higher shrub canopy density than can be achieved under more natural conditions. When the canopy density exceeds 20-25%, the understory plants are greatly reduced, making natural fire much less likely to burn these areas and return the landscape to a more natural and desirable mosaic. Since the late 1960's the BLM and U. S. Forest Service have developed improved grazing management plans that have addressed much of the historic livestock problems. Also, due to the general decline in agriculture in the area, there is much less public land grazing today compared to 40 years ago.

Some key areas of mule deer winter range, including the lower Four-mile Creek/Dry Park area, Prince Creek/Stark Mesa, and West Sopris Creek, have been degraded by intense urban development. While deer still might winter in these areas, it is not as productive due to loss of habitat to roads, structures, fences and vegetation alterations. Also, free-ranging dogs can chase and kill deer and reduce vital fat reserves. Land development has also resulted in concern about the use of prescribed burns on the adjacent public lands for fear of fire getting out of control and destroying private property.

Another complicating factor at lower elevations (below 7,500 feet) is the presence of fire-tolerant invasive weeds such as cheatgrass (*Bromus tectorum*). Soil-disturbing habitat treatments and prescribed fire meant to rejuvenate native plants could actually promote the growth and spread of cheatgrass and other pioneering weeds. Cheatgrass out-competes native grasses to form a monoculture in the vegetation understory and also increases wildfire frequency, and has been particularly detrimental to mule deer habitats in Nevada, Idaho, and Utah (Cox et al. 2009). In those states, large expanses on the order of hundreds of thousands of acres of sagebrush/steppe habitat, totaling over 12 million acres (5 million hectares) have been lost due to cheatgrass (Cox et al. 2009). Cheatgrass in D-13 is currently found primarily at the lower elevations and is especially problematic in sagebrush shrublands (B. Hopkins, BLM, pers. comm. 2010).

Other invasive weeds that diminish native habitat quality include various thistle, knapweed, and toadflax species. In D-13, of particular concern is a yellow toadflax infestation in Carbonate Creek near Marble, which is on mule deer summer range. The USFS has used chemical treatment and biological control with insects to attempt to contain the infestation (W. Ives, USFS, pers.comm. 2010).

A multitude of habitat improvement projects, including prescribed burns, removal of piñon-juniper encroachments, and improvement of sagebrush, oak, and mountain shrub habitats, have been conducted or are on-going (Table 4). Various government agencies and private organizations have contributed to these projects. Due to the loss of important deer winter range throughout Colorado, the continued preservation and improvement of existing habitat is paramount.

Table 4. Habitat projects in DAU D-13.

<u>Dates</u>	<u>Location</u>	<u>Acres</u>	<u>Treatment Type</u>	<u>Agency or Organization</u>	<u>Cost</u>
Past and ongoing projects:					
5/07-present	East Sopris Project (Light Hill) (GMU 43)	561	Hydro-Axe oak and serviceberry	BLM/CDOW	\$135,000
5/07-present	East Sopris Project (Light Hill) (GMU 43)	40	Hand cut/pile P-J	BLM	\$40,000
6/05-8/05	Light Hill (GMU 43)	20	Hand cut oak	BLM	\$10,000
6/05-8/05	Light Hill (GMU 43)	10	Chemical spray oak	BLM	\$2,500
2/07-6/09	Prince Creek Subdivision (GMU 43)	187	Roller chop oak, then broadcast burn slash	BLM	\$125,000 (mechanical) \$20,000 (fire)
2/07-6/09	Prince Creek Subdivision (GMU 43)	8	Chemical spray oak	BLM	\$3,000
9/1/08-9/15/08	Oak Meadows 4 Mile Rd (GMU 43)	71	Hydro-axe	BLM	\$52,824
8/1/09-9/15/09	Oak Meadows 4 Mile Rd (GMU 43)	10	Hand cut/Pile oak	BLM	\$15,000
5/1/10-5/30/10	Crown Mtn Communications Site (The Crown) (GMU 43)	15	Hand cut/Pile oak	BLM	\$12,000
2010-2011	East Sopris Prescribed Burn (GMU 43)	100	Prescribed Burn	BLM	\$20,000
2010-2012	East Sopris Hand Cut (GMU 43)	20	Hand cut/Pile P/J	BLM	\$30,000
2010-2012	Mountain Springs Ranch (GMU 43)	50	Forest Health Treatment (Timber and Aspen Management with some hydro axe in brush)	BLM	\$75,000
Future scheduled projects:					
2011-2021	White River National Forest within D-13	37,000	Mechanical and prescribed fire – oak, aspen, P/J	USFS	\$12 million

Conservation Easements

Eighty-eight km² (3%) of mule deer overall range in D-13 are currently held under conservation easements or similar protection, including 76 km² of private lands (Table 2 and Figures 5 and 6). Among winter range, 36 km² (8%) are protected through conservation easements, including 28 km² of private lands. Because winter range is severely limited in this DAU and because of the high monetary incentive for land development in this area, conservation of any remaining winter range habitat, as well as production areas, is imperative.

Conflicts

Game damage due to deer is no longer a major problem in the DAU compared to in the 1980s and early 1990s due to the general decline in livestock and agricultural uses.

IV. Herd Management History

Disclaimer for Population Size Estimate

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 30% of the animals can be observed and counted. Most population estimates are derived using computer model simulations that involve estimations for mortality rates, hunter harvest, wounding loss and annual production. These simulations are then adjusted to align on measured post-hunting season age and sex ratio classification counts and in some cases density estimates derived from line transect and quadrant surveys. It is recommended that the population estimates presented in this document be used only as an index or as trend data and not as an absolute estimate of the deer population in the DAU.

Post-hunt Population Size

CDOW biologists estimate the deer population size in the DAU using a computer modeling process. Starting in the early 1970s, CDOW used a computer modeling program called ONE POP. In the early 1980s, CDOW switched to a personal computer program based program called POP II. After 1999, CDOW has used a computer spreadsheet model to predict population size. In 2008, these spreadsheet models were standardized statewide using modeling methods developed by White and Lubow (2002). For the D-13 model, the biological parameters (i.e., juvenile and adult survival, and wounding loss) for input were constrained to reflect values obtained from field measurement of deer populations in western Colorado (Piceance Basin and Middle Park mule deer survival studies, 1997 – 2008). All models work in basically the same manner, using post-hunt age and sex ratios, harvest, and juvenile and adult survival rates to estimate population size. The best model is selected based on statistical fit to observed data. The results of the modeled population estimates are summarized in Figures 7a and 7b.

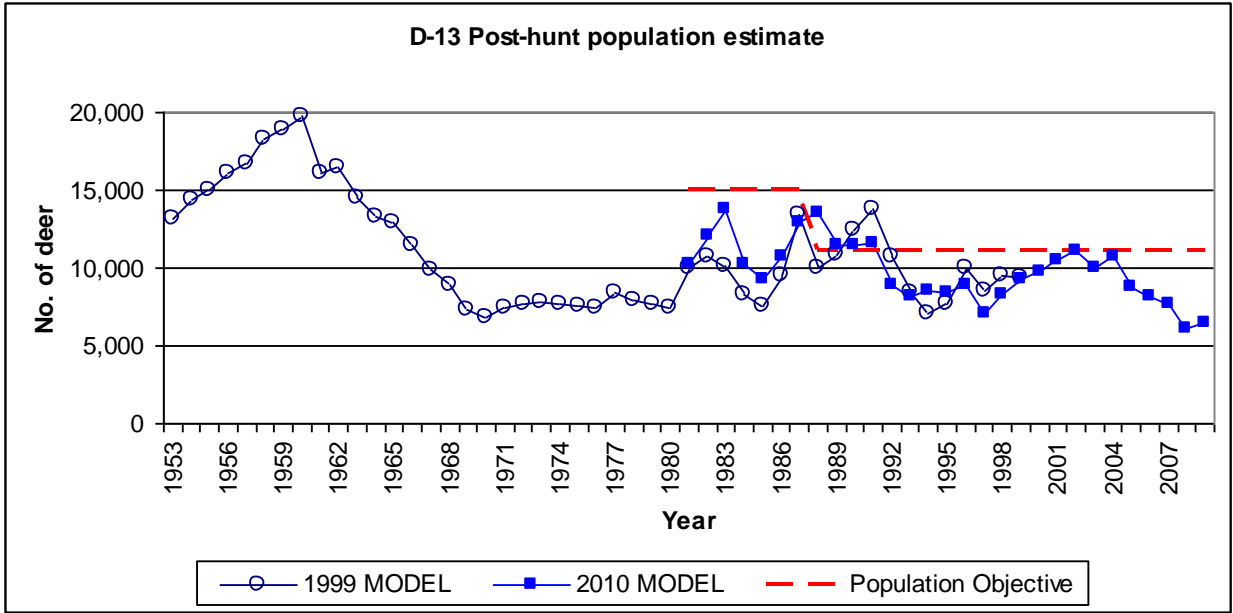


Figure 7a. Post-hunt population estimates of deer in DAU D-13, 1953-2009.

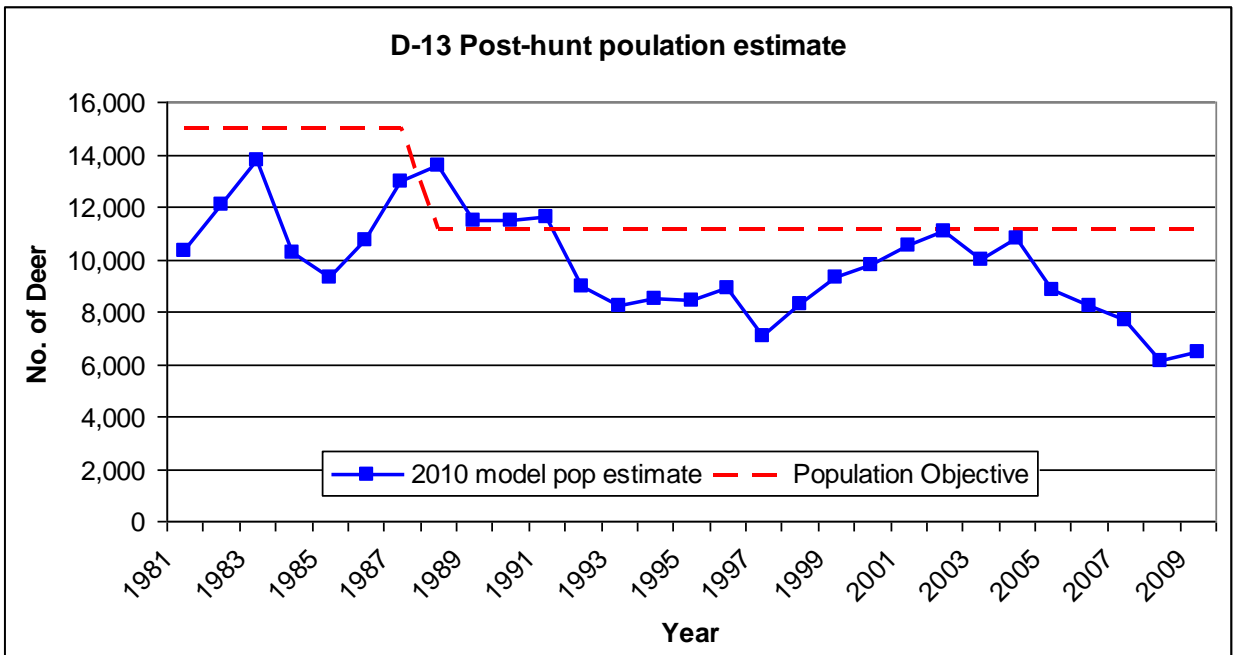


Figure 7b. Post-hunt population estimates of deer in DAU D-13, 1981-2009.

Since 1953, the population has exhibited 4 peaks. The first peak was in the early late 1950s to the early 1970s. The population peaked at a high level of 19,700 deer in 1960, and then declined to about 6,800 deer in 1970. From 1971, the population climbed to a new peak of about 14,000 (post-hunting season) in 1983. The winter of 1983-84 was very severe and the population crashed but rebounded back to another peak in the late 1980s. The deer herd suffered another crash from the severe weather in the spring of 1993. The herd increased again in the late 1990s/early 2000s after buck hunting became completely limited by draw only. As the herd approached the population objective, antlerless licenses were increased to slow the population's

growth, but in the mid to late 2000s the population dropped sharply. Several years of low fawn:doe ratios combined with an increase in antlerless harvest in the 2000s and capped with the severe winter of 2007-2008 suggest that density-dependence, along with declining habitat conditions and random weather events, contributed to the decline. The current (2009) post-hunt population estimate is approximately 6,400 deer. The 5-year average population estimate is 7,400 deer, and the 10-year average is 8,900 deer.

Post-Hunt Herd Composition

Age and sex classification surveys using a helicopter have been conducted in the DAU since 1974. These surveys are flown “post-hunt” in December/early January. During the early years, the surveys were conducted every other year. Since 1996, surveys have been conducted every year.

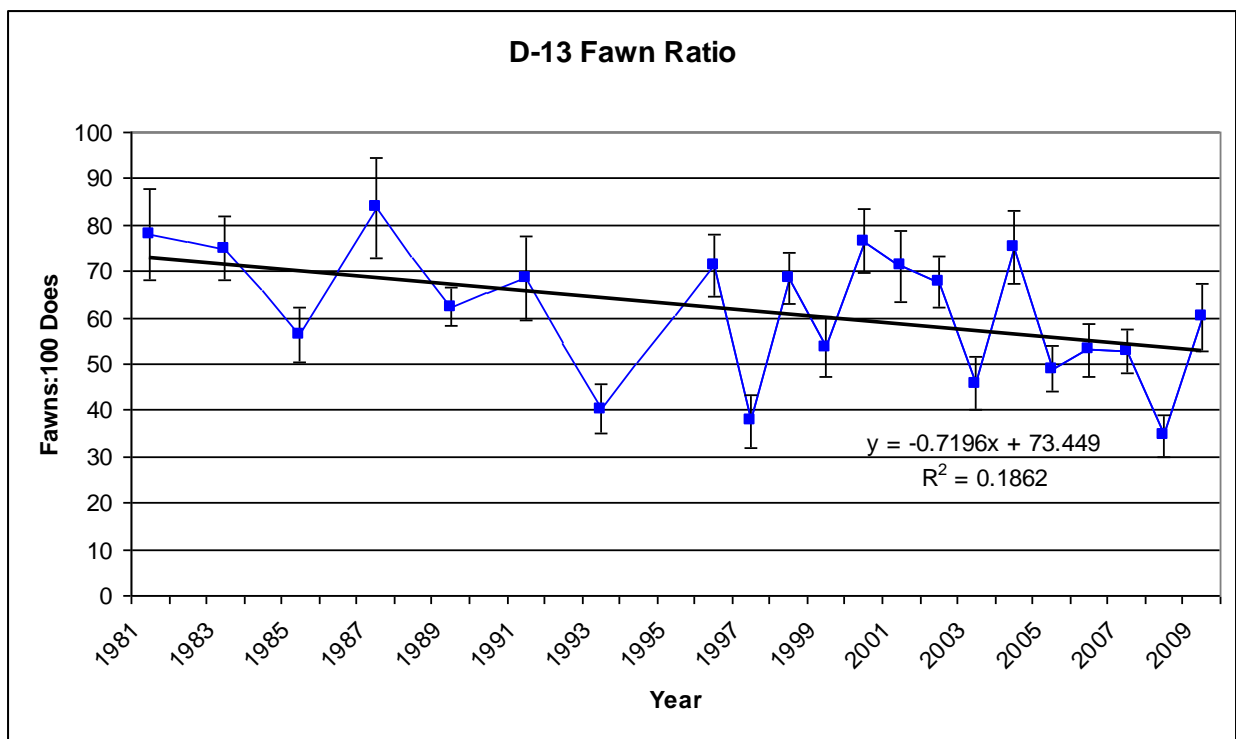


Figure 8. Fawn:doe ratio in DAU D-43, 1981-2009. The observed fawn ratios are shown in blue. The bars indicate the 95% confidence interval of the field estimate. The fitted linear trendline is shown in black.

Fawn Ratios – The post-hunt fawn:doe ratio is used as an index of herd productivity. This index grossly reflects the combined summer natality and summer-to-early winter survival rate of fawns relative to does. In D-13, the fawn:doe ratio has generally been declining over the past 3 decades (Figure 8). This trend is typical of many mule deer herds in Colorado and throughout the Western US, and is usually presented as an indication of a mule deer decline. The cause of the decline in fawn ratio may be related to the decreasing quality and quantity of mule deer habitat. In the 1980s, the fawn ratio in D-13 averaged 71 fawns:100 does; in the 1990s, 57 fawns:100 does, and in the 2000s, 59 fawns:100 does. The current 5-year average (2005-2009) is 50 fawns:100 does.

Buck Ratios - The post-hunt buck:doe ratio is used as an index of buck quality of the herd. Higher buck ratios indicate more (and by assumption, larger/older/higher quality) bucks in the population. In the 1988 DAU plan, the sex ratio objective was set at 23 bucks:100 does. In the 1980s to 1990s, the buck:doe ratio averaged 25 (Figure 9). After 1999, when buck licenses became limited by draw only, the buck ratio peaked at 43 bucks:100 does, but declined somewhat thereafter. The average in the 2000s was 32 bucks:100 does, and the 5-year average (2005-2009) is 28 bucks:100 does.

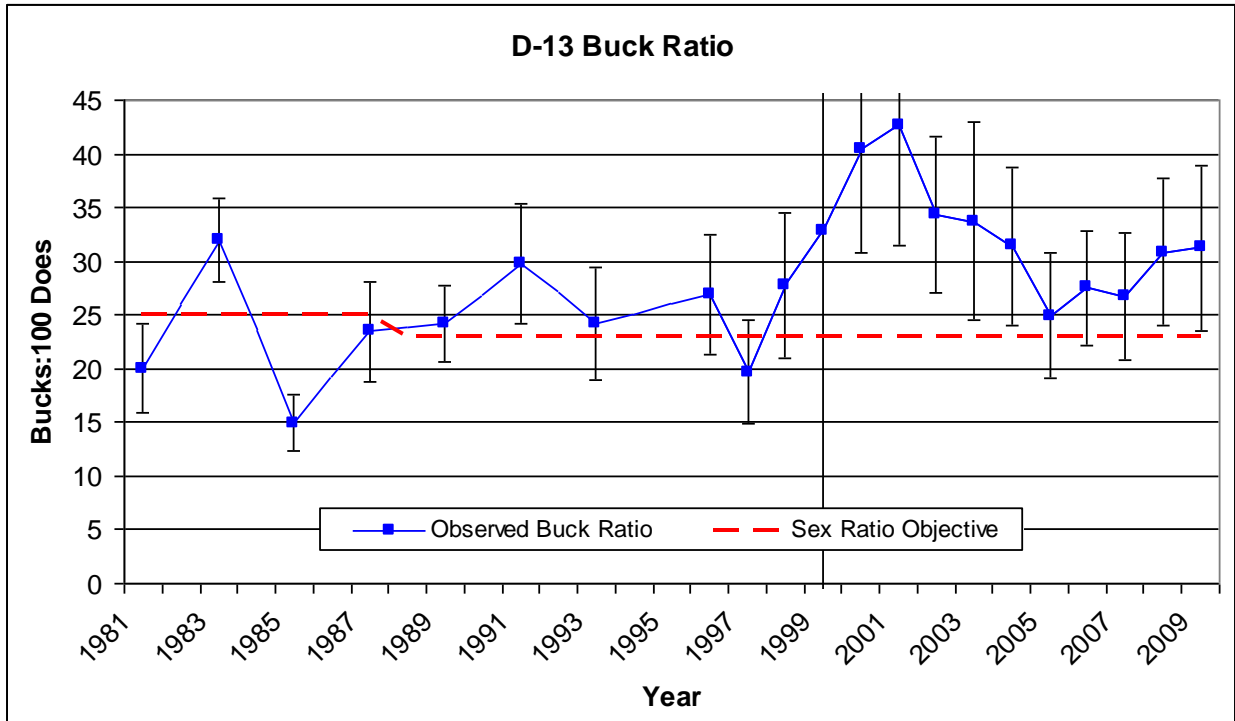


Figure 9. Observed buck:doe ratios in DAU D-13, 1981-2009. The bars indicate the 95% confidence interval (CI) of the field estimate for the buck:doe ratios. The buck:doe estimate for 1999 has an especially large CI. The dashed red line indicates the sex ratio objective of 25 prior to 1988 and 23 from 1988 to present.

Harvest History and Hunting Seasons

Hunting Season History - From simple 30-day seasons to more complicated split deer, split elk and combined deer and elk seasons have been used to manage deer through the years. In the early 1960s, a hunter could take 2 or more deer. From 1971 to 2002, each hunter was limited to taking 1 deer. Since 2003, hunters have been allowed a 2nd deer license under List B (specific units and private-land-only licenses). The DAU has a very limited September season for bucks in that portion of the DAU located in the Maroon Bells Wilderness Area, the Hunter-Frying Pan Wilderness Area, and all of GMU 471. This season has been available since at least 1985.

In 1986 the Wildlife Commission approved an either-sex archery, limited muzzleloading and three combined unlimited buck and limited doe seasons as the general statewide season structure. The three-combined rifle seasons were 5, 12 and 9 days in length, and were used as a method to spread increasing hunter pressure. Also in 1986, in an attempt to improve the quality of bucks, deer antler-point restrictions were approved statewide, limiting harvest of bucks to those with three points or more on one antler. Although antler-point restrictions worked well for elk by delaying the kill one year, bucks show more variation in antler development among age classes than bull elk do. Bucks usually have small two-point antlers as yearlings but occasionally they are 3- or 4-point bucks. Consequently, many hunters shot deer that were not legal, and in some cases, the deer were even abandoned. Antler-point restrictions for bucks were abandoned over much of the state by the 1991 season.

In 1992, out of a growing concern about a mule deer decline, much of the state's deer hunting was restricted to a three-day buck hunt. Deer hunting for the remainder of days was limited to hunting does. This structure was very unpopular with hunters and was abandoned after 1994. In 1995, buck hunting was extended to the first five days of each of the three combined seasons. Buck licenses remained unlimited (or over-the-counter) until 1999.

Starting in 1999, all deer hunting in the state West of Interstate 25 has been totally limited (i.e., by draw only) for archery, muzzleloading and regular rifle seasons (Figures 10 and 11).

In 2000, the DOW began a new 5-year season structure that included:

- 1) a limited buck or either-sex archery season
- 2) a limited muzzleloading season for bucks and does
- 3) two combined rifle seasons (second and third season) for limited bucks and antlerless deer
- 4) a very limited fourth season for buck deer. In order to qualify for the limited 4th season buck deer hunt, the DAU has to average more than 25 bucks:100 does for the previous three years and be at or above the long-term sex ratio objective.

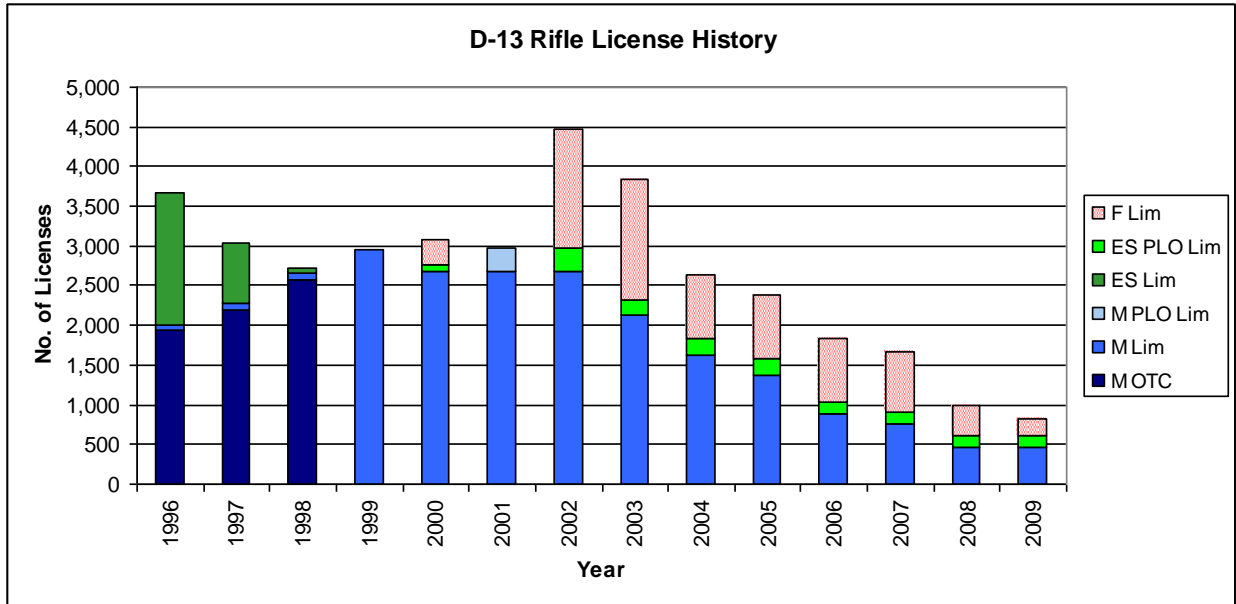


Figure 10. Rifle license history for deer DAU D-13 from 1996-2009. M = male, ES = either sex, F = female and fawns of either sex (antlerless). OTC = over the counter, Lim = limited by draw only, PLO Lim = private-land-only and limited by draw only.

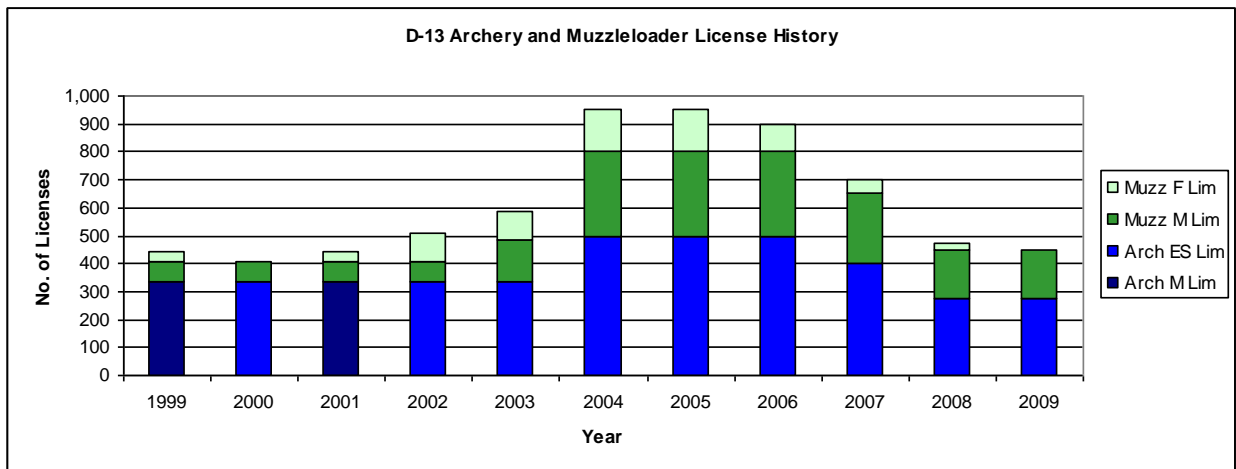


Figure 11. Archery and muzzleloader licenses for deer DAU D-13 from 1999-2009. Prior to 1999, archery and muzzleloader deer licenses were valid statewide. M = male, ES = either sex, F = female and fawns of either sex (antlerless).

As described elsewhere in this document, loss of habitat due to land development, degradation of remaining habitat due to fire suppression and consequent plant succession, increased recreational activity, and increased road-kill have all negatively impacted the deer herd. The effective habitat carrying capacity for deer has declined, limiting the ability to maintain the population at the 1988 DAU plan objective of 11,100 deer. Because the population was below the population objective in the 1990s, antlerless licenses were not issued until 2000 (Figures 10 and 11). When the population reached objective in 2002, antlerless licenses were increased for 2 years to stabilize the population size. However, from 2005-2008, the population declined steadily. In 2004, antlerless licenses were reduced by half from the 2002/2003 quota, and due to concerns about high mortality in the severe winter of 2007-08, the antlerless quota

was further reduced in 2008 and 2009 (Figures 10 and 11). Starting in 2003, buck licenses were reduced each year through 2008 (Figures 10 and 11).

License Demand – An examination of license application rates in the past 3 years indicates that there is relatively low demand in the draw for doe licenses and moderate demand for buck licenses (See Appendix C for all hunt codes). All licenses have sold out eventually either as leftover licenses or earlier. Besides the early high-country buck licenses and the 4th rifle season buck license, no other licenses in D-13 require preference points, indicating that license quotas are either meeting or exceeding demand. As an example (Table 5), in 2007, doe licenses for 2nd and 3rd rifle season were in low demand in the draw but sold out as leftover licenses. Even after an almost 50% decrease in the quota in 2008 and another substantial decrease in 2009, these doe licenses were still not highly in demand. Buck licenses for 2nd and 3rd rifle season have sold out at Choice 1, and in 2007, the quota was just slightly less than number of the 1st choice applications. After buck licenses were reduced in 2008, demand for these seasons exceeded the quota, but still did not require preference points to draw.

Table 5. License demand for 2nd and 3rd doe and buck rifle seasons in DAU D-13, 2007-2009. These licenses represent about half of the total license quota for the DAU. “Quota” is the maximum number of licenses CDOW could issue; “Sold out” is the stage at which the hunt code sold out; “1st choice demand” is the number of 1st choice applicants as a percentage of the license quota.

Year	Doe 2nd and 3rd Rifle				Buck 2nd and 3rd Rifle			
	Quota	Sold out	1st choice applicants	1st choice demand relative to quota	Quota	Sold out	1st choice applicants	1st choice demand relative to quota
2007	750	Leftovers	79	11%	650	Choice 1	716	110%
2008	375	Leftovers	61	16%	400	Choice 1	598	150%
2009	200	Choice 5	80	40%	400	Choice 1	534	134%

Total Harvest - Harvest under an unlimited license structure is a crude estimation of population performance over time (Figure 12). From 1953 to the early 1960s, the harvest generally increased until the mid-1960s when the total harvest began a general decline. In 1971, the Wildlife Commission was concerned enough about the mule deer decline that they instituted a statewide bucks-only season and hence the very low harvest that year. In 1999, CDOW limited all deer licenses statewide and also restricted the take of antlerless deer. Starting in 2003, a limited number of 2nd deer licenses have been available in certain units and seasons (List B), including leftover private-land-only and antlerless licenses in D-13.

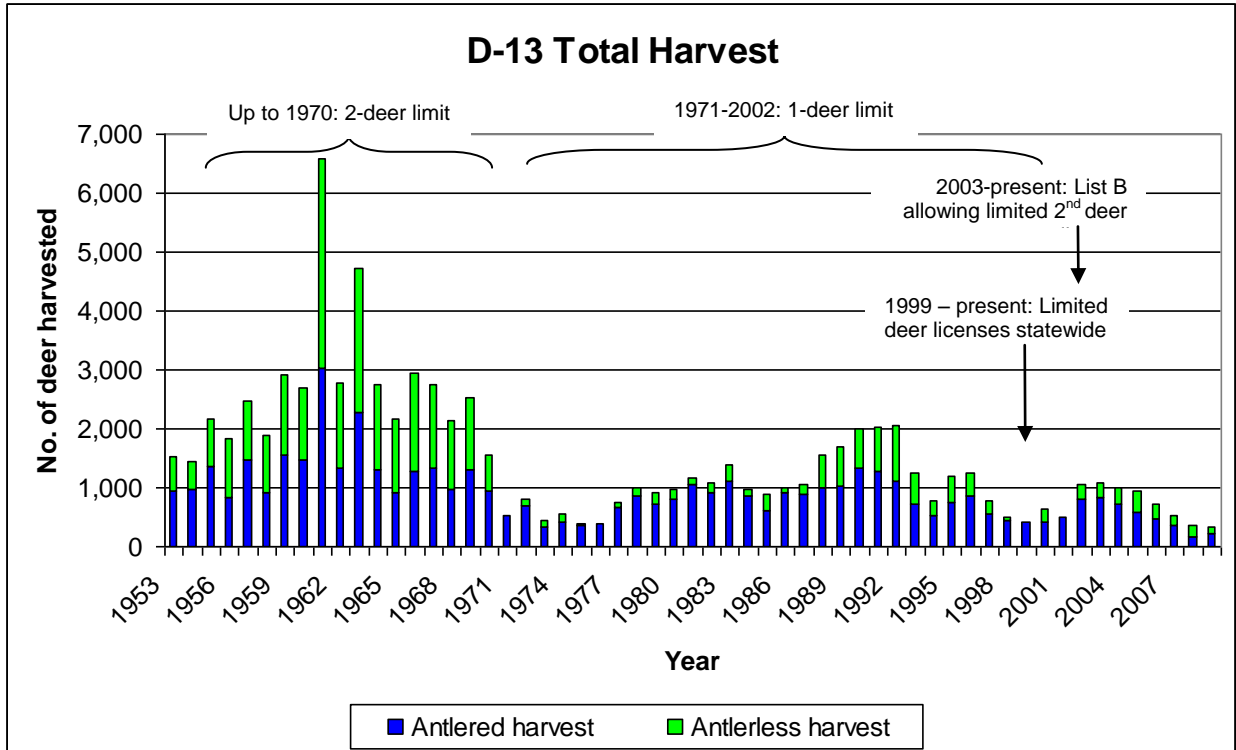


Figure 12. Total deer harvest in DAU D-13, 1953-2009.

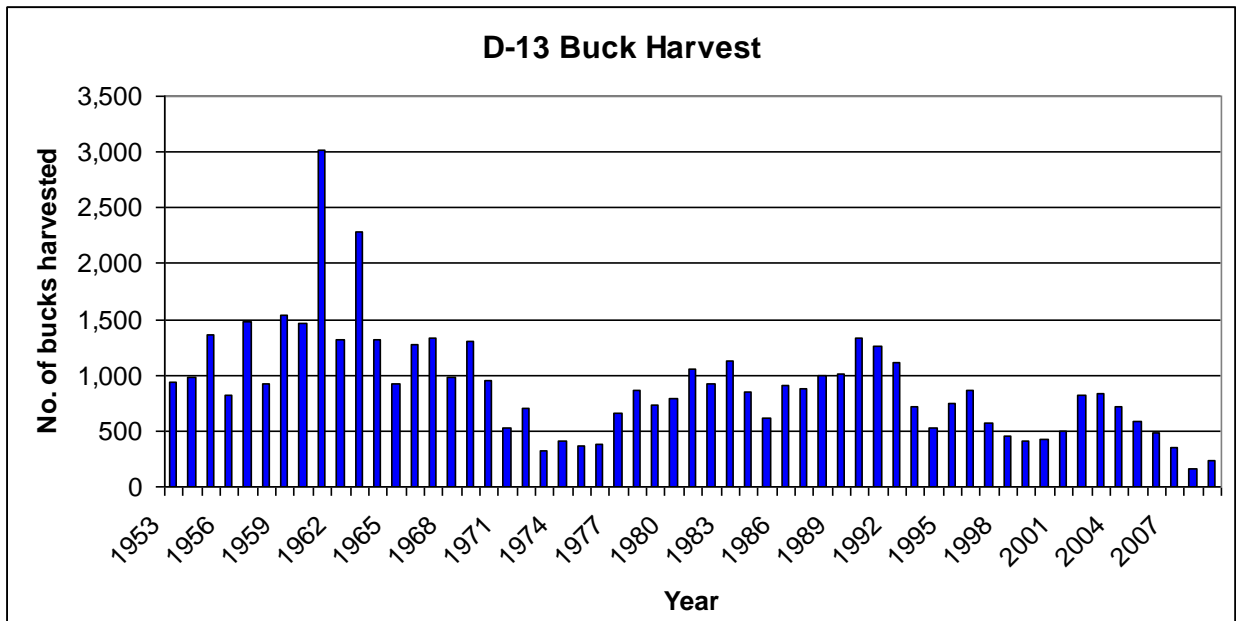


Figure 13. Antlered deer harvest in DAU D-13, 1953 – 2009.

Buck Harvest – Historically, buck harvest was greater when hunters were allowed 2 deer licenses until 1971 (Figure 13). From 1953-1970, buck harvest averaged 1,344 bucks annually, with a peak of 3,021 in 1961 and a low of 827 in 1956. From 1971-1998, when buck licenses were restricted to 1 license per hunter annually but still unlimited (over-the-counter), the buck

harvest averaged 777 bucks per year (low of 327 bucks in 1973; high of 1,328 in 1990). Since 1999, when buck licenses became limited by draw only, the average buck harvest has been 502 (low of 166 bucks in 2008; high of 829 bucks in 2003). In recent years, buck harvest has declined due to a gradual reduction of licenses in D-13 since the mid-2000s (Figures 10 and 11).

Antlerless Harvest – Antlerless harvest includes both doe and fawn harvest, with fawns comprising, on average, 8% of antlerless harvest. Antlerless harvest shows a similar trend to total harvest, increasing during the period 1953-1961, then declining with a smaller peak in the early 1990s (Figure 14). As mentioned earlier, antlerless harvest was prohibited in 1971. Because of CDOW’s restrictive management, antlerless harvest has been low since 1970. In 1999, the Colorado Wildlife Commission approved more restrictive rules and since then, antlerless harvest has been very limited in this DAU. In 1999 and 2001, there were no antlerless or either-sex licenses issued in D-13. As the population grew and reached objective in 2002 (Figure 7), antlerless licenses (Figures 10 and 11) were increased in 2002 and 2003 but were gradually reduced as the population declined after 2004. Within the past 10 years, antlerless harvest peaked in 2005 at 365 antlerless deer. With the progression of license reductions over the past 6 years, antlerless harvest declined, with a recent low of 100 antlerless deer harvested in 2009.

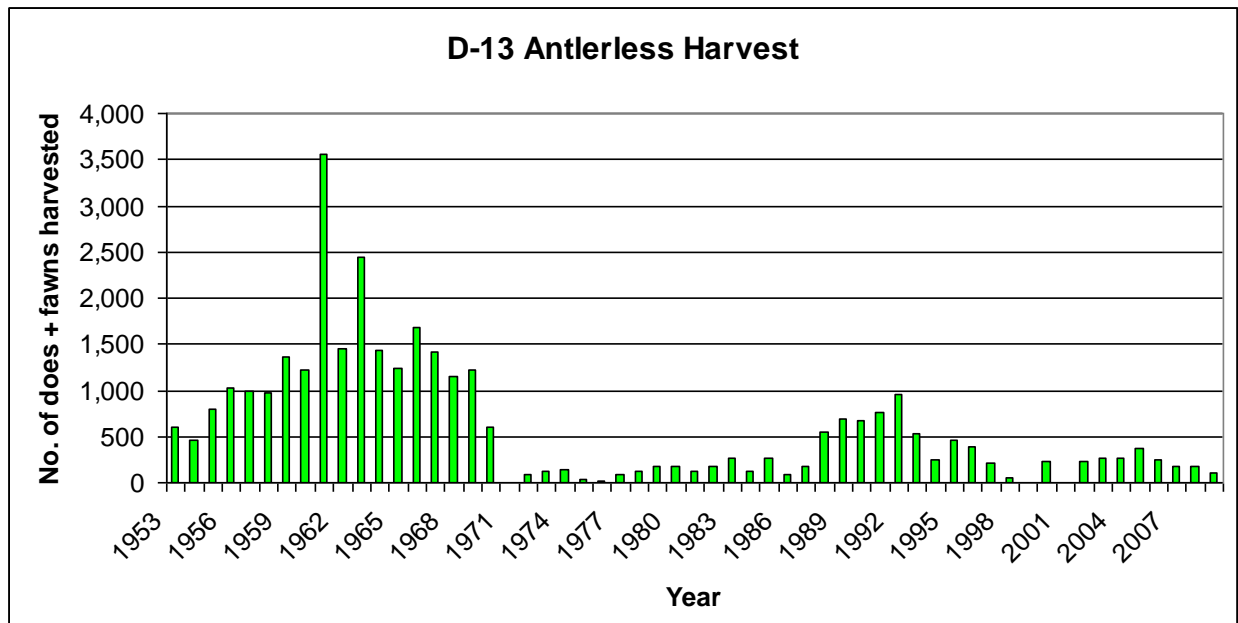


Figure 14. Antlerless deer harvest in DAU D-13, 1953 – 2009.

Hunting Pressure - There have been three distinct peaks in hunting pressure in D-13 (Figure 15). One occurred in the early 1960s when many additional and antlerless licenses were issued. Another even higher peak occurred in the late 1980s-early 1990s. This second peak is rather unusual for deer hunting in Colorado. Starting in 1999, all the deer hunting licenses in the DAU became totally limited and hunting pressure dropped off for several years. As license quotas were raised in the early and mid-2000s when the population approached objective, there was another smaller peak in hunting pressure that has since dropped as the population size and number of licenses issued declined in the late 2000s.

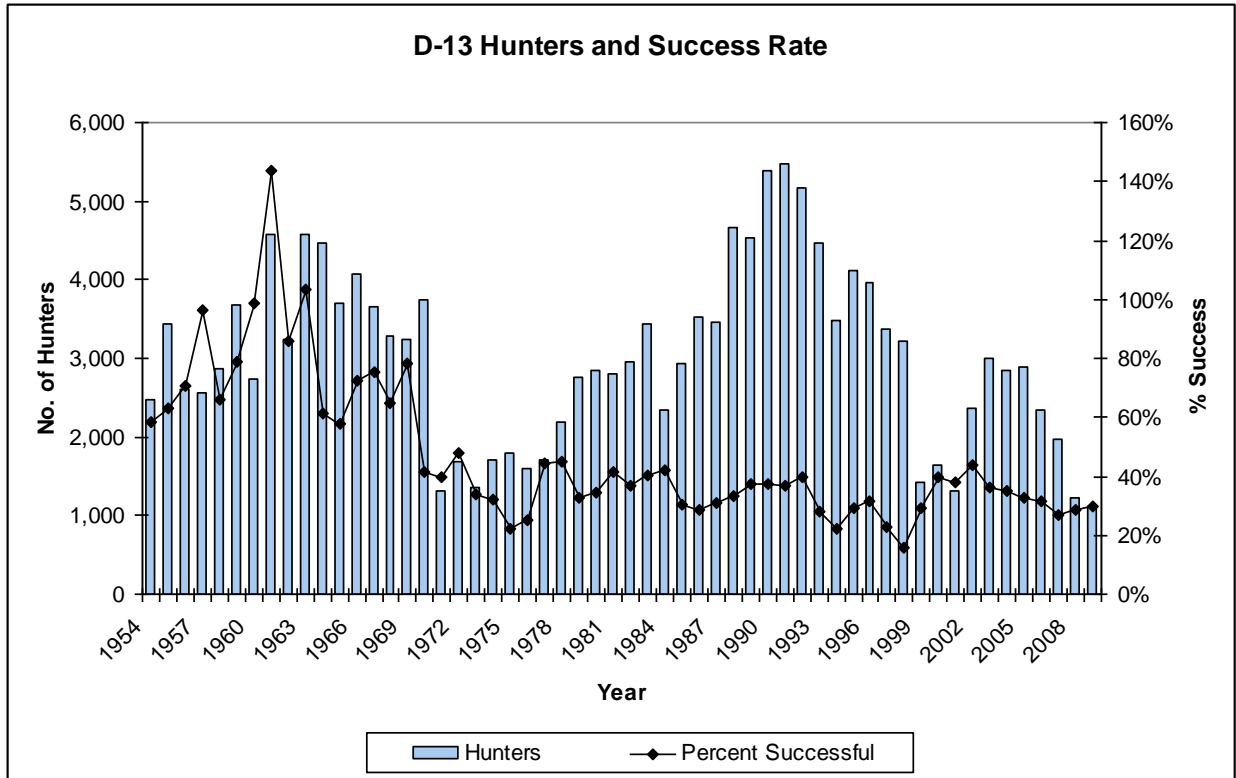


Figure 15. Number of hunters and hunter success rate in deer DAU D-13, 1954-2009.

Hunter Success - Deer hunting success peaked in the 1961 at 144% when each hunter could take 2 or more deer. Hunter success declined through the mid-1970s and since then has been fairly stable, averaging 34% from 1971-2009.

V. Current Management Status

Previous (1988 DAU plan) Objectives

Population Size Objective = 11,100 deer
Sex Ratio Objective = 23 bucks/100 does

Current Population (up to 2009)

Population Size Estimate = 6,400 deer
5-year Average Sex Ratio = 28 bucks/100 does

Current Management Problems

The cumulative effect of the following issues impacting mule deer in D-13 is that the DAU can no longer sustain as many deer as it could several decades ago.

1. Limited Winter Range - Winter snow forces deer down out of the higher elevations of the DAU to limited lower-elevation areas such as Dry Park, Holgate Mesa, the Crown, Light Hill, Williams Hill, Arban/Kittle, and Triangle Peak. Winter range is considered the most limiting factor for deer in Colorado and this DAU. Only 15% of the land area in D-13 serves as deer winter range. About half of the deer winter range is on public lands and much of it has declined in quality due to long-term fire suppression resulting in habitat succession and also an increase in year-round recreation over the past 10-15 years. The other half of deer winter range is privately owned and much of it has been or will eventually be developed. During light to normal winters, the over-winter mortality rates probably do not exceed 15 - 20% of the total deer herd. However, during severe winters, deer can be severely concentrated in the valley floors on very limited south-facing or wind-swept slopes. Competition for food is acute, resulting in high winter mortality, especially for fawns. For example, during the severe winter of 2007-08, in the two long-term deer survival study sites in the Northwest Region, the over-winter mortality rate of radiocollared fawns was 68% in Middle Park (D-9) and 58% in the Piceance Basin (D-7). In contrast, adult doe mortality during the same winter was 21% in Middle Park and 16% in the Piceance (CDOW, unpublished data).
2. Unfavorable Range Conditions - As discussed in the Habitat Resource section (see Section IV), big game habitat condition on winter ranges has declined throughout the DAU. It appears that the causes of most range problems include: plant successional movement towards more late seral stage or climax communities, inappropriate historic livestock grazing, and localized excessive big game use (a possible result of loss of traditional winter ranges to development and over-populations of deer in the 1960s). Land development in this DAU has precluded the use of prescribed burns on the adjacent public lands because of concerns about the risk of fire damaging personal property.
3. Land Development – Substantial land development in the Roaring Fork Valley has occurred in the past 10-20 years, including on mule deer winter range areas such as lower Four-mile Creek/Dry Park area, Prince Creek/Stark Mesa, and West Sopris Creek. Because of the high monetary value of land in the DAU, along with a decline in the

livestock industry, there is great financial incentive for large ranches to subdivide and develop into residential housing. Conservation easements are difficult to secure because of the high cost of land. With slightly more than half of mule deer winter range existing on private lands, the need for conservation of existing habitat on private lands is critical.

4. Recreation impacts - Year-round recreational use, including hiking, dog-walking, cross-country skiing, mountain biking, 4-wheeling, and snowmobiling, has increased tremendously in the past 10 years. The Crown, south of Carbondale, in particular has seen a significant increase in mountain biking and hiking activities just in the past 5 years. This heightened level of human activity on the landscape is a disturbance to both deer and elk on production grounds and on winter range. Dogs off-leash also contribute to the harassment and mortality of wildlife. These behavioral stressors and additional mortality can reduce recruitment of fawns into the population directly by limiting fawn survival, as well as indirectly by pushing deer off of preferred feeding and bedding areas. For example, increased mountain biking activity on public lands has pushed deer and elk onto private lands in the spring. At present, this distributional shift during fawning has not caused game damage issues, but could become an issue on private lands such as around Holgate Mesa if mountain biking trails are developed in this area. Conflicts between mountain bikers and hunters in the fall are also increasing on public lands.
5. Potential natural gas extraction – At present, there is no active natural gas drilling in the Thompson Creek/Four-mile area, but there is potential for future gas development as gas extraction technology advances and extraction becomes more cost-effective. Mineral rights have been leased already and many leases are soon to be considered for renewal. Gas development in this area could be detrimental to mule deer and other wildlife. Potential negative impacts include habitat fragmentation; habitat loss; increased vehicle traffic; and noise, sound, and light pollution. These impacts could lead to displacement of deer from traditional fawning grounds and summering areas and direct mortalities due to vehicle strikes.
6. Low and Decreasing Fawn to Doe Ratio - The age ratio (fawns per 100 does) has been generally declining over the past 30 years. Possible causes may be related to density-dependent factors that put deer on a lower nutritional plane, loss and degradation of mule deer winter range, long-term fire suppression, drought, increased year-round human recreation and dogs displacing deer from favorable habitats, and past livestock grazing conditions.
7. Competition with Elk - Elk numbers in DAU have steadily increased from very few elk a century ago to approximately 5,300 today (4,200 elk in GMUs 43 and 471, DAU E-15; and 1,100 in GMU 47, DAU E-16). Due to unregulated market hunting, prior to 1900, elk were basically extirpated in the DAU and were reintroduced in the early 1900s. Elk numbers increased during the course of the 20th century, and recently burgeoned in the mid-1980s to early 1990s. As a result, elk may have been forced to expand their historic winter ranges and move to lower elevations where they compete with deer for limited winter ranges. Elk have more versatile food habits and are a stronger and more aggressive animal than deer. Deer on the other hand are very specialized in their dietary requirements and can be forced out of prime foraging areas by the more aggressive elk.

The increase of elk in the DAU has probably been to the detriment of deer. Only in the past 10 years have elk numbers declined, gradually dropping during the 2000s to the population size last seen in the 1980s.

VII. Issues and Strategies

Issue Solicitation Process

An important aspect of the DAU planning process is obtaining input from all segments of the affected local populations, including the BLM, US Forest Service, HPP committees, and the interested public. In 2002, a draft DAU plan for D-13 was written, and agency, HPP, and public comments were received (Appendix D). However, due to management concerns associated with the discovery of CWD on the western slope of Colorado, the DAU planning process was put on hold until the present time.

In 2010, CDOW requested input from the federal agencies, HPP committees, county commissioners, and the general public. A new draft DAU plan was posted on the CDOW website for 30 days, and the plan alternatives were presented in a public meeting in Carbondale on August 26, 2010. A press release was issued to solicit input on deer issues in D-13 and to encourage members of the public to attend the public meeting, review the draft plan and the proposed alternatives, and to submit comments and fill out the questionnaire to state their preferences on deer management. Issues and alternatives were also presented to the Pitkin and Garfield Boards of County Commissioners in August and October 2010. Written comments and a compilation of the public questionnaires are attached in Appendix E.

Public Issues and Concerns

Six people attended the public meeting in Carbondale. Comments from participants included:

- There is a need for habitat treatments, including prescribed fire. Agencies need to pool their efforts and the message needs to get out to the public and landowners on the need for fire treatments.
- Land development has been intense especially in the last 10 years.
- There are too many predators (coyotes, lions, bears).
- Roadkills contribute to deer mortality.
- There should not be doe licenses.

Four questionnaire responses were received (Appendix E). The respondents were all deer hunters and considered deer hunting to be one of their more important recreational activities. Seeing more deer was on average the most important aspect of deer hunting for these respondents. Being able to draw a buck license every year and experiencing less hunter crowding were moderately important. Harvesting a deer each year, being able to draw a doe license each year, and seeing more mature bucks was relatively less important. Among the population objective alternatives, Alternative 3 (7,500 – 8,500 deer) was ranked most preferred, Alternative 2 (6,500 – 7,500 deer) was ranked a close 2nd, and Alternative 1 (5,500 – 6,500 deer) was ranked 3rd. For the sex ratio objective, Alternative 2 (30-35 bucks/100 does) was most preferred,

Alternative 3 (35-40 bucks/100 does) was ranked 2nd, and Alternative 1 (25-30 bucks/100 does) was ranked 3rd.

County Commissioners' Issues and Concerns

The Pitkin County Commissioners expressed interest in creating “a more sustainable environment for the deer population” and sought input on how they could further contribute to improving the mule deer population (Appendix F). CDOW responded with recommendations (Appendix F) including:

1. Continual implementation of the Pitkin County Land Use Code
2. Enforcement of the measures outlined in the land use decision documents with follow-up after construction
3. Continue with open space acquisitions for critical wildlife areas with wildlife values as the primary objective. This may conflict with trail and recreational use for these areas.
4. Work with the Division on management plans for these open space acquisitions with the potential for habitat improvement projects.
5. Creation of a habitat mitigation fund through an assessment on all new development to be earmarked for habitat improvement projects within the county. These monies could be used to leverage other dollars for habitat projects on private and public lands.
6. Assist the Division with educating the public on the importance of winter range areas and the need for trail and area closures. This may involve the creation of brochures, use of educational signs for important habitat areas, local educational television and radio spots, etc.

Federal Agencies' Issues and Concerns

BLM's Colorado River Valley Field Office emphasized several issues regarding habitat condition in D-13. Although the BLM's land health assessments evaluated habitat to be meeting standards at the landscape scale, there are smaller scale habitat concerns including: noxious weeds, pinon-juniper encroachment into sagebrush shrublands, sagebrush decadence, localized over-browsing of shrubs by deer and elk, lack of plant diversity, and private land development on deer and elk winter range (Appendix G).

HPP Committee's Issues and Concerns

The Lower Colorado River Habitat Partnership Program (HPP) expressed concern about mule deer winter range. The HPP committee intends to participate in habitat projects that would benefit mule deer winter range, as well as to help establish conservation easements to protect existing winter range. The committee supports Alternative 2 (6,500-7,500 deer) for the population objective and Alternative 2 (30-35 bucks/100 does) for the sex ratio objective (Appendix H).

VIII. Alternative Development

Population Objective Indexing

Population modeling is an evolving process whereby modeled estimates can change over time based on additional data or improved modeling methodology. As such, when modeled estimates change irrespective of an actual change in the population, it is reasonable to adjust or index population objectives relative to the new modeled estimate accordingly. The basis of harvest-based population management is to increase harvest when a population exceeds objective, decrease harvest when a population is below objective, and maintain harvest when a population is at objective. Because population objectives are only meaningful in the relative context of the population estimates available at the time the objective was established, indexing the objective maintains the integrity of the objective based on the fundamental criteria of whether there are too many, too few, or the desired number of animals in the population.

The following is an example of objective indexing:

In 2007, a population objective range of 5,000 to 6,000 animals based on an estimated population of 8,000 animals is approved by the Wildlife Commission. However, based on newer information (e.g., occasional sample-based population estimates) the 2010 population model shows a 2007 population estimate of 10,000 animals is more defensible. In this case the objective would be indexed by multiplying $10,000/8,000$ by the original objective range to yield a new objective range of 6250-7500.

Indexed objectives will be rounded to the nearest multiple of 10, 50, 100, 500, or 1,000 based on whether 10% of the objective is < 50, <100, < 500, < 1000, or ≥ 1000 , respectively. For example, if a new indexed objective is 5433, 10% would be 543. Therefore, the objective would be rounded to the nearest 500 (i.e., 5,500). Median values will be rounded up (e.g., 6250 from the indexing example would be rounded to 6,500).

Post-hunt Population and Sex Ratio Objective Alternatives

Population size and composition must be considered when determining objectives and management strategies. Both of these characteristics can dramatically influence management regimes. The objectives we are considering to guide deer management in D-43 for the next 10 years are listed below.

- *Population Objective Alternatives*
5,500-6,500 deer; 6,500-7,500 deer; 7,500-8,500 deer
- *Sex Ratio Objective Alternatives*
25-30 bucks:100 does; 30-35 bucks:100 does; 35-40 bucks:100 does

Impacts of Population Objective Alternatives

The population objective determines the targeted overall number of deer in the herd, regardless of sex or age class. Changes in population size objectives will impact interspecific competition, body condition of deer, quality of the habitat, and available licenses. Because native winter range habitat has degraded over the past several decades primarily due to fire suppression, the previous population objective (11,100 deer) established in the 1988 DAU plan is not sustainable.

Alternative 1: 5,500-6,500 deer:

This alternative would result in slight decrease or would maintain a status quo (-14% to +2% change) in the population size relative to the current (2009) post-hunt population estimate of 6,400 deer. At this reduced population density, deer should be in better body condition due to lower competition among deer for forage and space, although annual variation in weather conditions and future habitat conditions can affect the health and productivity of the herd. The fawn ratio could increase if does are in better body condition to nurse their young, resulting in fawns experiencing higher survival rates. In general, the herd at this reduced density should be more resilient to severe winter conditions than in the past and should be able to sustain a higher level of harvest and other mortality.

To achieve this population objective, antlerless license quotas could increase slightly. Depending on which sex ratio objective is selected, it could be more difficult to draw a buck license at this smaller population size because there would be fewer bucks on the landscape. Harvest success rate may decline because of having more hunters in the field seeking out relatively fewer animals, and hunter crowding may be an issue. On the other hand, the economic impact of deer hunting in the community could increase with more hunters visiting the area.

Alternative 2: 6,500-7,500 deer:

This alternative would maintain or slightly increase (2-17%) the current population size of this herd. There would be less competition for forage and habitat among deer than in the past because the population would be lower than the long-term average (~9,000 deer over the last 20 years). In severe winters, some deer may die due to poor body condition, but in general, the population should be able to rebound to this level fairly quickly under average weather conditions.

To achieve this population objective, antlerless licenses could increase slightly over time. In the short term, licenses may be maintained at the current (low) quotas to allow population growth. When this objective is reached, licenses could increase somewhat thereafter to stabilize the population size. Hunting opportunity, harvest success rates, and economic impact would be intermediate under this alternative compared to Alternatives 1 and 3.

Alternative 3: 7,500-8,500 deer:

This alternative would increase the current population size by 17-33%. This population size range is just below the past 10-year and 20-year averages (~9,000 deer). This population level probably is at the upper end of what is achievable and sustainable long-term while still maintaining adequate hunting opportunity. Because of winter range loss and decadent winter range conditions, habitat improvement projects could be required to consistently hold the population at this increased size, especially during severe winters. If native winter range in the DAU continues to decline, the remaining habitat could further deteriorate due to relatively high concentrations of animals. At this higher population size, the herd may be more susceptible to the effects of a severe winter because individual deer will experience more competition with each other and with elk for limited forage and habitat. The population size may fluctuate more in response to weather conditions and may be slower to recover following a harsh winter.

To achieve this population objective, license numbers would be reduced or maintained at the currently low quota for several years, possibly long-term, to allow population growth. There would be less opportunity to draw a license and hunters might not be able to draw a license every year. However, those who do successfully draw would likely have a better chance of harvesting

a deer because there would be more deer on the landscape. Also, hunters would experience less crowding. If the population size drops due to a harsh winter, both doe and buck license numbers would likely be reduced until the population recovers, so license numbers may be less consistent from year to year. Economic benefits from hunting would be reduced because there would be fewer hunters contributing to local establishments.

Impacts of Sex Ratio Objective Alternatives

The sex ratio objective sets the desired number of bucks per 100 does. This characteristic most directly impacts the number of antlered licenses issued and the quality and quantity of bucks that are available to be harvested. Since the population size objective is established separately, the total number of deer would remain the same. Therefore there would not be any effect of different levels of sex ratio on habitat condition, the need for habitat improvement projects, or game damage/human conflicts.

Alternative 1: 25-30 bucks:100 does:

This alternative would slightly reduce or maintain (-11% to +7% change) the current (2009) observed sex ratio (5-year average of 28 bucks:100 does). There would be no change in the season structure and the herd would be managed for a balance between quality buck hunting and opportunity to draw a buck license. If the total population size increases, there would be a higher number of bucks on the landscape, which would allow more buck licenses to be issued in order to maintain the current buck ratio.

Alternative 2: 30-35 bucks:100 does:

This alternative would increase the current observed sex ratio by 7-25%. The goal would be to produce higher quality bucks. Buck licenses in 2nd and 3rd seasons would be likely be maintained at the lower quotas set in 2008 and 2009, or possibly reduced, to relieve hunting pressure on bucks. The opportunity to draw a buck license would be lower than a decade ago. However, more bucks would survive to maturity, so those hunters who drew a buck license would have more opportunity to harvest a quality buck.

Alternative 3: 35-40 bucks:100 does:

This alternative would increase the current observed sex ratio by 25-33%. The goal would be to manage for mature trophy bucks, but would limit buck hunting opportunity. Buck licenses in 2nd and 3rd seasons would be reduced to relieve hunting pressure on bucks. Presently, no preference points are required to draw a 2nd or 3rd season buck license, but under this alternative, buck licenses could become highly restrictive, potentially requiring points to draw. Hunters who are successful in drawing a buck licenses would have the opportunity to harvest a high quality buck and could experience less hunter crowding.

IX. CDOW Recommended Objectives

Current Post-hunt Population Estimate: 6,400 deer (post-hunt 2009)
10-year Average Population Estimate: 8,900 deer (post-hunt 2000-2009)
Previous (1988 DAU Plan) Population Objective: 11,100 deer
Current (2011 DAU Plan) Population Objective: 7,500-8,500 deer

Current Sex Ratio Estimate: 28 bucks/100 does (5-year average)
10-year Average Sex Ratio: 32 bucks/100 does (post-hunt 2000-2009)
Previous (1988 DAU Plan) Sex Ratio Objective: 23 bucks/100does
Current (2011 DAU Plan) Sex Ratio Objective: 30-35 bucks/100 does

Justification and Rationale:

Population Size Objective: The selected post-hunt population objective of 7,500-8,500 deer is a 17-33% increase from the 2009 post-hunt population estimate of 6,400 deer, a 4-16% decrease from the 10-year average estimated population of 8,900, and a 23-32% decrease from the 1988 DAU plan objective of 11,100 deer.

Population estimates indicate that the previous population objective of 11,100 has not been sustainable over the past 2 decades, nor is it a practical long-term objective given the multitude of mule deer habitat issues in the DAU. Although it may be possible to achieve a higher population for a short time under certain ideal environmental conditions (e.g. a series of mild winters combined with moderate moisture in the summertime), being able to hold a population at a high density long-term is unlikely. The occasional severe weather event, such as high snowfall, freezing rain, or several years of drought, can combine with density-dependent competition and mortality (including predation and hunting) to yield low fawn survival and sometimes reduced adult survival. A population managed at a high density has a lower growth rate than a population at an intermediate density and will experience wider population fluctuations in response to changes in weather, harvest, and other mortality factors. License numbers and hunting opportunity would likewise fluctuate more widely in response to population size.

Instead, at an intermediate population density, such as the ranges given in any of the 3 proposed population objectives, the deer population will have a higher intrinsic growth rate, will rebound more quickly following a severe winter or other extreme weather event, and deer license quotas should likewise be more consistent between years. The general public would like to see more deer than there currently are, so the selected population objective of 7,500-8,500 deer would aim to increase the current population, but only to a level that is realistically achievable and sustainable.

To achieve an increase from the current population size, habitat improvement and protection will be needed. Existing winter range habitat must be treated to rejuvenate browse plants and any further habitat loss due to land development should be mitigated with habitat improvements elsewhere. Timing restrictions on recreation activities during fawning and early summer should be implemented and/or enforced. In the immediate future, antlerless licenses will likely remain at their currently low quota until the new population objective is reached. At that point, antlerless licenses could be increased to stabilize the population within the new objective range. Having some level of antlerless harvest is useful for maintaining a population at

an intermediate density, at which deer body condition, fawn production, and survival rates are generally highest.

Sex Ratio Objective: The selected sex ratio objective of 30-35 bucks:100 does is a 7-25% increase from the 5-year average buck ratio of 28, a -6 to +9% change from the 10-year average buck ratio of 32, and an increase of 30-52% over the previous objective of 23 bucks:100 does. Prior to 1999, it was not practical to attempt to increase the sex ratio above a range of 15-25 bucks:100 does. After 1999, deer hunting in this DAU was changed to totally limited licenses and the number of buck licenses and the amount of the buck harvest could be controlled. Public opinion surveys have indicated that most hunters want the opportunity to hunt and see more and larger bucks. Increasing the sex ratio to 30-35 bucks:100 does should accomplish this goal. The down side of this could mean that buck hunters may only be able to hunt every few years instead of every year.

X. Approval Page

This plan was approved by the Colorado Wildlife Commission on March 10, 2011.

XI. LITERATURE CITED

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APPENDIX A: BLM grazing allotments within DAU D-13

Active Allotments

Allotment Number	Allotment Name	Percent area within D-13	Area (km ²) within D-13	Acres within D-13	AUMs in D-13	Cattle	Horse	Sheep	Yearling Cattle
08212	Paradise Cr	100%	12.2	3,014	204			YES	
08216	Delaney	3%	0.1	18	2	YES			
08217	S Canyon	100%	6.9	1,710	121	YES			
08227	Skeen	3%	0.2	53	1	YES			
08323	Diamond Flats	100%	6.9	1,700	258	YES			
08324	Driveway/Three Mile	98%	5.4	1,334	156	YES			
08329	Fender	100%	3.7	906	66	YES			
08331	Light	100%	11.6	2,869	99	YES	YES		
08334	Crown Com	100%	8.4	2,065	342	YES			
08335	Crown	100%	10.3	2,557	294	YES			
08336	Vasten Homestead Com	100%	2.9	718	242	YES			
08337	Crown Ind	100%	6.6	1,620	235	YES			YES
08338	Driveway Com	100%	0.6	156	88	YES			
08339	Fender Ind	100%	2.3	566	75	YES			
08340	Cerise	100%	3.7	920	108	YES			
08341	Prince Cr	100%	9.4	2,321	336	YES			
08342	Crystal River	100%	18.6	4,590	390	YES			
08344	Mt Sopris	100%	7.4	1,833	21	YES			
08346	Thomas	100%	11.0	2,722	80	YES			YES
08347	Potato Bill	100%	3.4	836	16	YES			
08348	N Thompson Cr Com	100%	26.4	6,512	250	YES			
08352	Dry Park	100%	3.1	766	46	YES			
08354	McBride	100%	2.6	649	111	YES			
08402	Cantley Homestead	100%	1.3	331	16	YES			
TOTAL:			165	40,769	3,557				

Vacant Allotments

Allotment Number	Allotment Name	Percent area within D-13	Area (km ²) within D-13	Acres within D-13
08224	Hilton/Porter Com	20%	0.8	187
08225	Hilton 1	44%	0.9	229
08226	Hilton 2	100%	0.2	40
08325	Spear	100%	1.0	245
08326	Motz	100%	0.8	193
08328	Wheatley	100%	8.7	2,157
08330	Light Hill	100%	6.3	1,566
08332	Kent	100%	3.2	785
08333	Christensen	100%	1.8	442
08343	Thompson Cr	100%	10.6	2,626
08345	Prince	100%	0.2	40
08349	Red Canyon 1	100%	2.4	601
08350	Little Woody Cr	100%	5.1	1,255
08351	Williams Hill	100%	2.3	567
08353	Smith 2	100%	2.5	621
TOTAL:			46.8	11,556

APPENDIX B: U.S. Forest Service grazing allotments within DAU D-13

Active Allotments

Allotment Number	Allotment Name	Status	Percent within D-13	Area (km ²) within D-13	Area (acres) within D-13	AUMs	CATTLE	SHEEP	GOATS	HORSES	MULES
00102	Capitol Creek C&H	Active	100%	39	9,533	1,239	YES	NO	NO	NO	NO
00109	East Sopris C&H	Active	100%	33	8,156	913	YES	NO	NO	NO	NO
00123	West Snowmass C&H	Active	100%	5	1,255	117	YES	NO	NO	NO	NO
00303	Coal Basin C&H	Active	100%	80	19,850	1,579	YES	NO	NO	NO	NO
00307	Lake Ridge C&H	Active	100%	49	11,991	1,190	YES	NO	NO	NO	NO
00309	Nettle Creek C&H	Active	100%	8	2,077	194	YES	NO	NO	NO	NO
00310	North Thompson/Fourmile C&H	Active	100%	147	36,335	4,513	YES	NO	NO	YES	NO
00313	Threemile C&H	Active	100%	18	4,430	173	YES	NO	NO	NO	NO
00314	West Sopris C&H	Active	100%	39	9,583	783	YES	NO	NO	NO	NO
00325	Upper Crystal River S&G	Active	100%	153	37,851	670	NO	YES	NO	YES	NO

TOTALS: 571 141,060 11,370

Vacant and Closed Allotments

Allotment Number	Allotment Name	Status	Percent within D-13	Area (km ²) within D-13	Area (acres) within D-13
00111	Hunter/Midway	Vacant	100%	68	16,909
00114	No Name	Vacant	100%	49	11,997
00115	Owl Creek C&H	Vacant	100%	15	3,623
00116	Red Canyon C&H	Vacant	100%	95	23,587
00117	Red Mtn C&H	Vacant	100%	50	12,292
00124	Woody Creek C&H	Vacant	100%	24	5,964
00305	Frying Pan C&H	Vacant	35%	42	10,382
00320	Ivanhoe	Vacant	18%	14	3,445
00106	Conundrum	Closed	100%	71	17,535
00108	Brush/East Snowmass	Closed	100%	67	16,475
00110	Grizzly/Tabor	Closed	100%	79	19,551
00112	Independence	Closed	100%	23	5,699
00118	Richmond/Difficult	Closed	100%	91	22,584
00315	Wheatley	Closed	100%	10	2,434
	Misc-16	Closed	80%	36	8,989
	Misc-17	Closed	99%	235	58,050
	Misc-18	Closed	86%	240	59,401
	Misc-20	Closed	100%	200	49,526
	Misc-21	Closed	100%	62	15,328
	Misc-22	Closed	100%	98	24,139
	Misc-23	Closed	100%	71	17,478
	Misc-6	Closed	100%	21	5,146
	Misc-9	Closed	100%	49	12,026
	No Name	Closed	100%	35	8,543
	Private	Closed	23%	5	1,146

TOTALS: 1,749 432,246

APPENDIX C: License draw information for D-13, 2007-2009. “# of Licenses Sold” is sometimes less than “License Quota” because of licenses that were voided or returned.

2007 DAU D-13 DRAW INFORMATION										
Hunt Code	Method of Take/Season	Sex	License Quota	# of Lics Sold	Sold Out	# of 1st Choice Applicants			Min Pref Pts	
						resident	nonres	total	resident	nonres
DE043O1A	Archery	Either	400	388	Leftovers	54	22	76	0	0
DM043O1M	Muzz	Buck	250	226	At Choice 2	85	127	212	0	0
DF043O1M	Muzz	Doe	100	96	Leftovers	19	0	19	0	0
DM043E1R	Rifle/Early	Buck	30	24	At Choice 1	120	52	172	5	7
DM047E1R	Rifle/Early		25	22	At Choice 1	25	4	29	0	0
DM471E1R	Rifle/Early		25	25	At Choice 1	38	5	43	1	2
DE043P2R	Rifle/PLO-2nd	Either	150	146	Leftovers	13	11	24	0	0
DE043P3R	Rifle/PLO-3rd				Leftovers	9	14	23	0	0
DF043O2R	Rifle/2nd	Doe	750	739	Leftovers	48	4	52	0	0
DF043O3R	Rifle/3rd				Leftovers	22	5	27	0	0
DM043O2R	Rifle/2nd	Buck	650	630	At Choice 1	169	178	347	0	0
DM043O3R	Rifle/3rd				At Choice 1	128	241	369	0	0
DM043O4R	Rifle/4th	Buck	30	28	At Choice 1	150	85	235	2	3

2008 DAU D-13 DRAW INFORMATION										
Hunt Code	Method of Take/Season	Sex	License Quota	# of Lics Sold	Sold Out	# of 1st Choice Applicants			Min Pref Pts	
						resident	nonres	total	resident	nonres
DE043O1A	Archery	Either	275	248	At Choice 4	64	16	80	0	0
DM043O1M	Muzz	Buck	175	160	At Choice 2	76	64	140	0	0
DF043O1M	Muzz	Doe	50	45	Leftovers	10	0	10	0	0
DM043E1R	Rifle/Early	Buck	20	16	At Choice 1	94	41	135	5	8
DM047E1R	Rifle/Early		20	20	At Choice 1	30	10	40	1	2
DM471E1R	Rifle/Early		20	19	At Choice 1	24	22	46	1	3
DE043P2R	Rifle/PLO-2nd	Either	150	142	Leftovers	16	8	24	0	0
DE043P3R	Rifle/PLO-3rd				Leftovers	13	2	15	0	0
DF043O2R	Rifle/2nd	Doe	375	359	Leftovers	33	5	38	0	0
DF043O3R	Rifle/3rd				Leftovers	23	0	23	0	0
DM043O2R	Rifle/2nd	Buck	400	387	At Choice 1	133	158	291	0	0
DM043O3R	Rifle/3rd				At Choice 1	133	174	307	0	0
DM043O4R	Rifle/4th	Buck	10	10	At Choice 1	126	57	183	3	4

2009 DAU D-13 DRAW INFORMATION										
Hunt Code	Method of Take/Season	Sex	License Quota	# of Lics Sold	Sold Out	# of 1st Choice Applicants			Min Pref Pts	
						resident	nonres	total	resident	nonres
DE043O1A	Archery	Either	275	247	At Choice 4	64	22	86	0	0
DM043O1M	Muzz	Buck	175	152	At Choice 2	73	58	131	0	0
DF043O1M	Muzz	Doe	25	24	At Choice 2	24	0	24	0	0
DM043E1R	Rifle/Early	Buck	20	19	At Choice 1	148	35	183	5	10
DM047E1R	Rifle/Early		20	20	At Choice 1	30	0	30	1	0
DM471E1R	Rifle/Early		20	20	At Choice 1	29	7	36	1	1
DE043P2R	Rifle/PLO-2nd	Either	150	142	Leftovers	19	10	29	0	0
DE043P3R	Rifle/PLO-3rd				Leftovers	23	3	26	0	0
DF043O2R	Rifle/2nd	Doe	200	192	At Choice 5	45	3	48	0	0
DF043O3R	Rifle/3rd				At Choice 5	32	0	32	0	0
DM043O2R	Rifle/2nd	Buck	400	374	At Choice 1	169	134	303	0	0
DM043O3R	Rifle/3rd				At Choice 1	108	123	231	0	0
DM043O4R	Rifle/4th	Buck	10	10	At Choice 1	123	47	170	4	4

APPENDIX D: 2002 Federal Agency and Public Comments

Input from Federal land management agencies, HPP committee, and the general public was sought in 2002 when Gene Byrne, now-retired Terrestrial Biologist, was preparing earlier draft DAU plans for several elk and deer herds. However, due to management concerns associated with the discovery of CWD on the western slope of Colorado, the DAU planning process was put on hold until the present time. Below is a selected summary of issues and concerns regarding mule deer raised in 2002:

2002 meetings with Federal Agencies

Meeker Meeting – 4/26/02

A meeting was held with the federal land management agencies at the Meeker BLM office on April 26, 2002. Letters to the Routt and White River National Forests and Glenwood Springs, Little Snake, Meeker and Kremmling Resource Areas were sent out inviting the forest supervisors and area manager and appropriate staff to these meetings. The meeting was not too well attended, especially by personnel from the southern portion of the White River National Forest. Consequentially, a second meeting was held at the Glenwood Springs DOW office on July 17, 2002 to solicit more input from these wildlife biologists and range conservationists. Some of the comments received at these meeting include:

Meeker Meeting – 4/26/02

Deer Issues

- The Glenwood Springs BLM Area agreed that winter range is deteriorating as more and more private lands are developing, which then puts more pressure on the BLM ranges. He thinks some of the BLM range is in poor condition. He also mentioned that we need to think about how ranching is changing (e.g. non-traditional ranches near Aspen) because it will complicate things.
- Blanco District was concerned about competition by elk with deer. If the DOW reduces the deer population objective, elk might continue to increase and reduce forage base.

Glenwood Springs meeting 7/16/02

This meeting was attended by 6 people from the White River National Forest: Vernon Phinney, Thomas Matza, Joe Doerr, Keith Giezentanner, Wayne Nelson, and Phil Nyland. There were two people from the BLM Glenwood Spring Resource Area: Tom Fresques and Mike Kinser. The White River Elk herd (E-6) and the Brush Creek Deer herd (D-14) were specifically discussed while the other DAUs (D-8, D-13, D-43, D-53, E-12, E-15 & E-16) were discussed in general with similar trends and issues that apply to E-6 and D-14.

Deer Issues

- ❑ Mountain mahogany browse plants are generally in excellent condition in the Glenwood Springs Resource Area.
- ❑ Fire suppression has hurt the long-term condition and trend of mule deer ranges in these DAUs.
- ❑ Intense land development and related issues have removed and degraded mule deer winter ranges in these DAUs.
- ❑ High elk populations will compete with mule deer especially in recently treated areas such as prescribed burns and on winter range areas.
- ❑ There was general approval of everyone in the meeting that an average 10% reduction in the current deer population and an increase in the sex ratio objective by an average of 14% for all of the DAU plans are reasonable goals.

Public Issues and Concerns

Two public meetings were held to determine public issues and concerns. Both meetings were advertised in the local newspapers and on the local radio stations. The first meeting was on 5/8/02 at the Carbondale Days Inn from 4 pm to 8 pm. The second meeting was at the Gypsum Town Hall on 5/9/02 from 4 pm to 8 pm. Both meeting were conducted in the open house format. There was a station and posters for each DAU and DAU plan. Additional stations were set up to explain the DAU planning process and population dynamics. Questionnaires for deer and elk were provided and attendees were encouraged to fill them out at the meeting. Some preferred to take the questionnaires and mail them back to the DOW. All of the local DWMS, Pat Tucker, AWM and Gene Byrne, terrestrial Biologist were in attendance to answer questions and serve the public. Additionally, the DAU plans and questionnaires were made available at the Glenwood Springs office.

Results:

Attendance - only two people showed up at the Carbondale meeting and 5 people at the Gypsum meeting. Only 4 questionnaires were completed and turned in for analysis.

1. Are you...
4 a resident of Colorado? 0 a non-resident
of Colorado?

2. Do you live in GMUs 25, 26, 34, 35, 36, 43, 44, 45, 47, 444,
471?
4 Yes

0 No

3. Do you own or lease property in GMUs 25, 26, 34, 35, 36, 43, 44, 45, 47, 444, 471?

1 No

3 Yes , If yes, how many acres 3.5, 1,580?

4. Which group(s) do your opinions about deer management most represent?

(Check all that apply)

1. 2 Rancher/farmer

2. 1 Business owner

3. 1 Landowner

4. 1 Guide/outfitter

5. _____ Government employee

6. 3 Hunter/sportsperson

7. 1 Environmental/conservation interest

8. _____ Other, please explain: BS in Wildlife Biology

If you checked more than one response in Question 4 above, write the number of the ONE GROUP listed that you **most represent** -

1. _____ Rancher/farmer

2. _____ Business owner

3. _____ Landowner

4. _____ Guide/outfitter

5. _____ Government employee

6. 2 Hunter/sportsperson

7. _____ Environmental/conservation interest

1. Other, please explain

5. Please indicate, by order of preference, what seasons you prefer to hunt (with "1" being the highest preference and "4" being the lowest preference).

Type Hunter						
Archery	3	4	2			
Muzzleloading	2	3				
Regular	1	1	1	1		
Other		2				
Do Not Hunt						

DEER MANAGEMENT

1. Over the past 40 years, deer populations have been up and down but mostly in a general decline. Even though we have fewer deer than we had 40 years ago, the Colorado Division of Wildlife believes that it would be unwise to attempt to increase deer numbers at this time. Deer habitat quantity and quality has been reduced or lost by land development, highways, fire suppression and competition with increasing elk herds, etc. For the health of all wildlife, it is very important to maintain forage in good condition. Also, the CDOW believes that with smaller deer herds, there will be higher reproduction and survival rates. In many cases, having smaller herds should result in the same or even more surplus deer for the hunters to harvest. The CDOW is not recommending an increase in the deer population objective at this time and feels that a decrease is necessary. With this in mind in mind, how would you like the deer populations to change?

Check only one for each DAU:

	D8	D13	D14	D43	D53
DOW Rec. Decrease*	-16%	-15%	-10%	-15%	-8%
Decrease over 25%					
Decrease 11-25%	1		1		
Decrease 1-10%		1			
No Change	2	1	1	1	1
Feel Deer population Objectives should increase	1	1	1	1	1

* % Decrease compared to the current (2001) post-hunting season population

2. The Glenwood Springs area deer herds are currently managed for a sex ratio objective of 23-35 bucks per 100 does. This is the ratio of buck deer to doe deer at the end of the fall hunting season. The current regulations allow a buck deer hunters to harvest any antlered deer with a minimum of 5-inch antler. Because all deer hunting in the Glenwood Springs area is now totally limited (no more over-the-counter licenses), the DOW is able to manipulate the buck:doe ratio by the number of licenses that are issued. Therefore, with the exception of D14 and D53, the DOW is considering increasing the buck ratios to a

range of 25-35 bucks per 100 does per DAU. How satisfied are you with these recommendations? **(Please check one box per DAU):**

Deer Herd (DAU)	Current Sex Ratio Obj.	DOW Recommend Sex Ratio Obj.	Very Dissatisfied	Somewhat Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Somewhat Satisfied	Very Satisfied
D8	23	30		1		1			2
D13	23	30		1		1			1
D14*	35	35		1		1			1
D43	24	30		1		1			1
D53*	30	25		1		1			1

* D14 has been managed as a trophy deer area since 1992 with a sex ratio objective of 35 bucks:100 does

- D53 - despite 39% drop in buck harvest over the past 3 years, the buck ratio has remained at an average of 25.6 bucks:100 does

DEER HUNTING

1. Overall, how satisfied or dissatisfied have you been with the deer hunting in the Glenwood Springs area deer herds in the past 5 seasons? **(Please check one box per herd that you have personally hunted)**

Deer Herd (DAU)	Very Dissatisfied	Somewhat Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Somewhat Satisfied	Very Satisfied
D8						2	1
D13						1	
D14						1	1
D43						1	1
D53		1				1	1

2. Overall, how satisfied or dissatisfied have you been with the hunter crowding while deer hunting in the Glenwood Springs area deer herds in the past 5 seasons? **(Please check one box per herd that you have personally hunted)**

Deer Herd (DAU)	Very Dissatisfied	Somewhat Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Somewhat Satisfied	Very Satisfied
D8		1	1			1	
D13						1	
D14		1				1	
D43		1				1	
D53			2			1	

3. Overall, how would you rate the deer hunting opportunities in the Glenwood Springs area deer herds?

Deer Herd (DAU)	Very Dissatisfied	Somewhat Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Somewhat Satisfied	Very Satisfied
D8					1	1	1
D13					1		
D14					1		1
D43					1		1
D53					2	1	

Additional Comments:

1. Leave the draw for bucks only on all seasons until November 10
2. No deer hunting in the mating season - after November 10
3. Have 3-point antler or better restriction for deer hunting

Appendix E. 2010 Public Questionnaire Responses and Comments

Text of D-13 questionnaire:

1. Are you a deer hunter?

YES (CONTINUE WITH QUESTION 2) NO (GO TO QUESTION 9)

2. As a recreational activity, how important is deer hunting for you compared to your other recreational activities? (check one)

- MY MOST IMPORTANT RECREATIONAL ACTIVITY
 ONE OF MY MORE IMPORTANT RECREATIONAL ACTIVITIES
 NO MORE IMPORTANT THAN ANY OTHER RECREATIONAL ACTIVITY
 LESS IMPORTANT THAN MOST OF MY OTHER RECREATIONAL ACTIVITIES
 NOT AT ALL IMPORTANT TO ME AS A RECREATIONAL ACTIVITY

3. Which aspects of deer hunting are most important to you?

Rank the following from MOST important (1) to LEAST important (6):

- HARVESTING A DEER EVERY YEAR
 BEING ABLE TO DRAW A BUCK LICENSE EVERY YEAR
 BEING ABLE TO DRAW A DOE LICENSE EVERY YEAR
 SEEING MORE MATURE BUCKS
 SEEING MORE DEER
 EXPERIENCING LESS HUNTER CROWDING

4. Please indicate how many seasons you have hunted deer in each of the following GMUs.

GMU 43: GMU 47: GMU 471:
 SEASONS SEASONS SEASONS

5. Which of the following GMUs did you hunt deer in 2009?

GMU 43 GMU 47 GMU 471 none of these GMUs

6. Which best describes the land you deer hunt in GMU 43, 47, or 471? (check all that apply)

- PRIVATE LAND WHICH I OWN
 PRIVATE LAND THAT I LEASE
 PRIVATE LAND I DON'T OWN BUT HUNT FOR FREE
 FEDERAL, STATE OR COUNTY PUBLIC LANDS
 UNSURE

7. In how many years of the past 3 have you applied for antlerless deer permits in GMUs 43, 47, or 471?

0 YEARS 1 YEAR 2 YEARS 3 YEARS

8. Which best describes your 2009 deer harvest in GMUs 43, 47, or 471?

- I DID NOT HUNT DEER IN GMUS 43, 47, or 471 (GO TO QUESTION 8)
 I HUNTED BUT DID NOT HARVEST A DEER.
 I HARVESTED A BUCK
 I HARVESTED A DOE

9. Overall, how satisfied or dissatisfied were you with your 2009 deer hunting experience in GMUs 43, 47, and/or 471?

VERY SATISFIED SOMEWHAT SATISFIED NEITHER SATISFIED NOR DISSATISFIED SOMEWHAT DISSATISFIED VERY DISSATISFIED

10. Do you live in GMU 43, 47, or 471? (see attached map) YES NO

11. Do you own huntable property in GMU 43, 47, or 471? YES NO

12. Do you guide or outfit for deer in GMU 43, 47, or 471? YES NO

HERD POPULATION ALTERNATIVES

Alternative 1: 5,500-6,500 deer:

This alternative would result in a slight decrease in the population size or would maintain a status quo relative to current population estimate of 6,400 deer. In general, the herd at this reduced density should be more resilient to severe winter conditions than in the past and should be able to sustain a higher level of harvest and other mortality.

To achieve this population objective, antlerless license quotas could increase slightly. Depending on which sex ratio objective is selected, it could be more difficult to draw a buck license at this smaller population size because there would be fewer bucks on the landscape. Harvest success rate may decline because of having more hunters in the field seeking out relatively fewer animals, and hunter crowding may be an issue. On the other hand, the economic impact of deer hunting in the community could increase with more hunters visiting the area.

Alternative 2: 6,500-7,500 deer:

This alternative would maintain or slightly increase the current population size of this herd. There would be less competition for forage and habitat among deer than in the past. In severe winters, some deer may die due to poor body condition, but in general, the population should be able to rebound to this level fairly quickly under average weather conditions.

To achieve this population objective, antlerless licenses could increase slightly over time. In the short term, licenses may be maintained for a year or so at the current quotas to allow population growth. If the high fawn ratio seen last year continues, the population should reach this objective quickly. Licenses could increase thereafter to stabilize the population size. Hunting opportunity, harvest success rates, and economic impact would be intermediate compared to Alternatives 1 and 3.

Alternative 3: 7,500-8,500 deer:

This alternative would increase the current population size. This population level probably is at the upper end of what is achievable and sustainable long-term while still maintaining adequate hunting opportunity. There would be more competition among deer, and the population would be less resilient to severe winters compared to Alternatives 1 and 2. Thus, the population size may fluctuate more in response to weather conditions and may be slower to recover following a harsh winter.

To achieve this population objective, license numbers would be reduced or maintained at the currently low quota for several years, possibly long-term, to allow population growth. There would be less opportunity to draw a license and hunters might not be able to draw a license every year. However, those who do successfully draw would likely have a better chance of harvesting a deer because there would be more deer. Also, hunters would experience less crowding. At a higher population size, there would be more bucks on the landscape, so it could be easier to maintain a higher buck ratio. If the population size drops due to a harsh winter, both doe and buck license numbers would likely be reduced until the population recovers, so license numbers may be less consistent from year to year. Economic benefits from hunting would be reduced because there would be fewer hunters contributing to local establishments.

13. After reading the text box above, please indicate your support/opposition for the following population alternatives for GMUs 43, 47, and 471.

	<u>STRONGLY</u> <u>SUPPORT</u>	<u>SOMEWHAT</u> <u>SUPPORT</u>	<u>NEITHER</u> <u>SUPPORT NOR</u> <u>OPPOSE</u>	<u>SOMEWHAT</u> <u>OPPOSE</u>	<u>STRONGLY</u> <u>OPPOSE</u>
Alternative 1: 5,500-6,500 deer					
Slight decrease / maintain current population size	1	2	3	4	5

Alternative 2: 6,500-7,500 deer Maintain current population size / slight increase	1	2	3	4	5
--	---	---	---	---	---

Alternative 3: 7,500-8,500 deer Increase the population size	1	2	3	4	5
--	---	---	---	---	---

Herd Composition Alternatives

Alternative 1: 25-30 bucks:100 does:

This alternative would slightly reduce or maintain (-11% to +7% change) the current (2009) observed sex ratio (5-year average of 28 bucks:100 does). There would be no change in the season structure and the herd would be managed for a balance between quality buck hunting and opportunity to draw a buck license. If the total population size increases, there would be a higher number of bucks on the landscape, which would allow more buck licenses to be issues in order to maintain the current buck ratio.

Alternative 2: 30-35 bucks:100 does:

This alternative would increase the current observed sex ratio by 7-25%. The goal would be to produce higher quality bucks. Buck licenses in 2nd and 3rd seasons would be likely be maintained at the lower quotas set in 2008 and 2009 to relieve hunting pressure on bucks. The opportunity to draw a buck license would be lower than a decade ago. However, more bucks would survive to maturity, so those hunters who drew a buck license would have more opportunity to harvest a quality buck.

Alternative 3: 35-40 bucks:100 does:

This alternative would increase the current observed sex ratio by 25-33%. The goal would be to manage for mature trophy bucks, but would limit buck hunting opportunity. Buck licenses in 2nd and 3rd seasons would be reduced to relieve hunting pressure on bucks. Presently, no preference points are required to draw a 2nd or 3rd season buck license, but under this alternative, buck licenses could become highly restrictive, potentially requiring points to draw. Hunters who are successful in drawing a buck licenses would have the opportunity to harvest a high quality buck and could experience less hunter crowding.

14. After reading the text box above, please indicate your support/opposition for the following buck to doe ratio alternatives for GMUs 43, 47, and 471.

	<u>STRONGLY</u> <u>SUPPORT</u>	<u>SOMEWHAT</u> <u>SUPPORT</u>	<u>NEITHER</u> <u>SUPPORT NOR</u> <u>OPPOSE</u>	<u>SOMEWHAT</u> <u>OPPOSE</u>	<u>STRONGLY</u> <u>OPPOSE</u>
Alternative 1: maintain the sex ratio at 25-30 bucks/100 does	1	2	3	4	5
Alternative 2: slightly increase the sex ratio to 30-35 bucks/100 does	1	2	3	4	5
Alternative 3: increase the sex ratio to 35-40 bucks/100 does	1	2	3	4	5

Questionnaire Responses: (3 Respondents)

Question	1	2	3	4	Summary/averaged responses
1. Are you a deer hunter?	Y	Y	Y	Y	Y (4)
2. As a recreational activity, how important is deer hunting for you compared to your other recreational activities? a = most important; b = one of my more important; c= no more important than any other; d = less important; e= not at all important	b	b	b	b	One of my more important recreational activities (4)
3. Which aspects of deer hunting are most important to you? (1) most important to (6) least important					
harvesting a deer every year	2	5	4	6	4.3
being able to draw a buck license every year	5	4	1	2	3.0
being able to draw a doe license every year	4	6	2	5	4.3
seeing more mature bucks	6	2	6	3	4.3
seeing more deer	1	2	3	1	1.8
experiencing less hunter crowding	3	2	5	4	3.5
4. Please indicate how many seasons you have hunted deer in each of the following GMUs.					
GMU 43	9	20	8	0	9
GMU 47	0	0	0	2	1
GMU 471	0	0	0	0	0
5. Which of the following GMUs did you hunt deer in 2009?					
GMU 43	Y	N	N	N	1
GMU 47	N	N	N	N	0
GMU 471	N	N	N	N	0
none	N	Y	N	Y	2
6. Which best describes the land you deer hunt in GMU 43, 47, or 471? (check all that apply) a = private land which I own; b = private land that I lease; c = private land I don't own but hunt for free; d = public land; e = unsure	d	d	c, d	d	public land (4); private land I don't own but hunt for free (1)
7. In how many years of the past 3 have you applied for antlerless deer permits in GMUs 43, 47, or 471?	3	0	2	0	1.3
8. Which best describes your 2009 deer harvest in GMUs 43, 47, or 471? a = I did not hunt deer in GMUs 43, 47, or 471; b = I hunted but did not harvest; c = I harvested a buck; d = I harvested a doe	d	a	a	a	Did not hunt in D-13 (3); Harvested a doe (1)
9. Overall, how satisfied or dissatisfied were you with your 2009 deer hunting experience in GMUs 43, 47, and/or 471? a = very satisfied; b = somewhat satisfied; c = neutral; d = somewhat dissatisfied; e = very dissatisfied	a				Very satisfied (1); N/A (3)
10. Do you live in GMU 43, 47, or 471? (see attached map)	Y	Y	Y	N	Y (3); N (1)
11. Do you own huntable property in GMU 43, 47, or 471?	N	N	N	N	N (4)
12. Do you guide or outfit for deer in GMU 43, 47, or 471?	N	N	N	N	N (4)
13. After reading the text box above, please indicate your support/opposition for the following population alternatives for GMUs 43, 47, and 471. 1 = strongly support; 2 = somewhat support; 3 = neutral; 4 = somewhat oppose; 5 = strongly oppose Alternative 1: 5,500-6,500 deer	4	5	4	5	4.5

Alternative 2: 6,500-7,500 deer	1	1	1	4	1.8
Alternative 3: 7,500-8,500 deer	2	1	2	1	1.5
14. After reading the text box above, please indicate your support/opposition for the following buck to doe ratio alternatives for GMUs 43, 47, and 471. 1 = strongly support; 2 = somewhat support; 3 = neutral; 4 = somewhat oppose; 5 = strongly oppose					
Alternative 1: 25-30 bucks/100 does	2	5	3	4	3.5
Alternative 2: 30-35 bucks/100 does	2	1	1	2	1.5
Alternative 3: 35-40 bucks/100 does	3	1	2	3	2.3

Written comments: (2 respondents)

Comment 1: As an occasional High Country Deer hunter (but mostly just applicant) and occasional elk and deer hunter of units 47 and 43, but avid hunter nonetheless, I personally enjoy seeing as much game as possible, and I believe other hunters do too. I also like that the tags in 47 aren't too hard to draw, but I wish to see more mature bucks on those High Country and backcountry mid season hunts. I don't have a great preference one way or the other as to what I want to see for the buck:doe ratio. I get that with a lower buck:doe ratio, there is a chance of drawing 2nd or 3rd choice tags, but I of course want to see a lot of bucks too. So, for me a good compromise is the higher deer population, with a 30-35 buck:doe ratio. The 10 year average success rate of the unit 47 high country deer tag is lagging significantly behind units 471 and 43 high country hunts. Buck deer success during 2nd and 3rd seasons in 47 and 471 is also lacking compared to 43 and. My point is that I would like to see doe harvests directed primarily towards unit 43 and the private lands that need it. Harvesting public land does seem to hurt deer hunting opportunities due to range fidelity issues among doe groups. While I haven't seen mule deer studies to back up that statement, I have seen whitetail studies that do. I understand they are different species, but I suspect the concept applies to mule deer does as well. Bucks born on public land should be more likely to return to that public land. So instead of having a 2nd and 3rd season doe tag that is good in all three units, I'd like to see a tag that is good only for unit 43, and then either a 47 and 471 or 47/471 tag.

Comment 2: I spend a lot of time in Unit 43. I do not believe the deer number to be very high. Increasing the deer population in Colorado is going to be a daunting task with the type of people we have flocking to our state. Wildlife will no longer have a place in this state if we keep going down the current path we are on. With Developers, Realtors and Bankers, it's all about money now. With all the development in recent years the winter range for the deer population is almost nonexistent. The only range they have left is because of the ranchers and we should thank what ranchers we have left, for providing what little they can. The wildlife need river bottoms to survive, but with highways and new fences it is getting harder for them to get to water. They will need to rely on Lakes and higher water sources which freeze in the winter and they will be back to square one. And these underpasses are joke, what herbivore would use a long dark "cave" to get across a road? Overpasses like they use in Canada would help, but then again it's still all about money and those would be too expensive. The only solution I can conclude would work is to get rid of half the human population in the area, but I don't see that happening either. This state will soon just be one big happy playground for people, no wildlife in sight, kind of like L.A. The one thing I am sure of is that, managing wildlife numbers to increase room for people is NOT the answer! I do know Hunting License profits should go towards the Division of Wildlife to manage our wildlife in Colorado, not into a general fund.

Appendix F. County Commissioners' Comments

Pitkin County Commissioners' Comments:



Pitkin County Commissioners
530 E. Main Street, 3rd Floor
Aspen, CO 81611
970-920-5200, Fax 970-920-5198

September 27, 2010

Julie Mao, Terrestrial Biologist
Colorado Division of Wildlife
50633 Highways 6 and 24
Glenwood Springs, Colorado 81601

Dear Julie,

Thank you for the opportunity to comment on the 2010 Data Analysis Unit Plan draft for Game Management Units 43, 47 and 471, D-13(Maroon Bells Deer). Unfortunately, the Plan creates a number of questions that may not easily be addressed, but which we hope we can work together to address from here forward.

We would like to understand how to create a more sustainable environment for the deer population. You note that the major human factors of a reduced population include loss of winter range, lack of controlled burns for habitat improvement and disturbance due to recreation. Choosing one of the proposed alternatives would theoretically have implications for our land use actions in Pitkin County, thus it is important for us to understand what implications it has to the residents of our county.

Pitkin County supports a sustainable wildlife population. However, rather than choose a alternative we need to understand what population is optimal and realistic given our current land use regulations, zoning and the regional picture. To date:

- Pitkin County supports educating the public and specific homeowner groups regarding the impacts of recreation on wildlife.
- Pitkin County supports trail closures during critical wildlife time periods.
- Pitkin County currently has regulations regarding mule deer in the Pitkin County Land Use Code relative to winter range.
- A brief analysis of land within Pitkin County indicates the following areas are within the 51% of the winter range habitat identified in the plan as being on private lands:
 - Northern Red Mountain;
 - Starwood Subdivision;
 - Lenado and parcels to the NE of Woody Creek Road;
 - Rural and Remote parcels that are part of the Chaparral Subdivision approvals;
 - Lower River road and North River Road;
 - Brush Creek Village Subdivision and the surrounding larger tracts;
 - Watson Divide;

Pitkin County Commissioners
530 E. Main Street, 3rd Floor
Aspen, CO 81611
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- The valley floor of Snowmass and Capitol Creek ;
- East Sopris Road Creek Valley floor;
- Section 36;
- West Sopris Creek Road valley floor and Stone Road;
- Prince Creek Road and the Lost Basin property;
- Crystal River Valley Floor south to approximately Red Dog Road.

The last sentence on page 18 of the plan states: "Because Winter range is severely limited in this DAU and because of the high monetary incentive for land development in this area, conservation of any remaining winter range, as well as production areas, is imperative."

In general, the areas listed above are developed or approved for development. Unless an area was approved prior to 1978, wildlife has been reviewed as part of the approval process based on the Land Use Code provisions in place at the time. In most cases density has been reduced significantly from underlying zoning and open space lands have been set aside within the development in order to, in part, support the wildlife. Approximately thirteen (13) open space purchases or conservation easements are located within mule deer winter range five (5) of which are either wholly or partly within critical winter range.

Due to the standards and criteria of our Land Use Code and our frequent contact with the DOW on development and recreation issues, we would like to request feedback concerning what other measures Pitkin County can do to improve the mule deer population.

Additionally, since approximately 80% of the land in the planning area is federal land, we would also like to know how this plan is to be incorporated into the USFS and BLM Management Plans for areas within Pitkin County and in the region. According to your plan, 49 % of the winter range habitat, which is the most critical habitat type for mule deer, is located on Federal or State owned land.

Thank you for the ability to comment on the Mule Deer Management Plan and we look forward to working with you.

Sincerely,



George Newman
Chair, Pitkin County Board of County Commissioners

CDOW's response to Pitkin County:

October 14, 2010

Pitkin County Commissioners
530 E. Main Street
Aspen, CO 81611

RE: D-13 Draft Management Plan

Dear George:

Thank you for your response and comments regarding our mule deer draft management plan for D-13 which encompasses Pitkin County. The Division would like to express our appreciation for all that the county has done. Pitkin County has one of the most progressive land use codes in the state which considers and protects wildlife and their habitat. We appreciate the willingness of the county to work with the Division on wildlife and habitat issues within the county.

The questions and concerns you raise are valid and not easily answered. Creating a sustainable environment for mule deer is a challenging and ever changing process but a goal which we share with you. As our human population continues to increase additional pressures will be placed on our wildlife populations and their habitat. The loss of habitat to development, habitat fragmentation, the tremendous demand and increase for recreational opportunities, and the difficulty implementing and funding habitat improvement projects presents challenges to us. All of these factors play a role in what is really sustainable and as we brought forth, our current population objectives are not sustainable. The three different alternatives presented in the plan are all obtainable and sustainable in our opinion. They are not unrealistic objectives that we will always be striving to achieve. Our goal is to have a healthy and viable mule deer population which the public and sportsmen will enjoy.

A sustainable environment starts with good healthy habitat. For the most part our summer ranges are more abundant and not much of an issue. Transitional and winter ranges are where the work needs to be done. Continuity between all habitat areas is vital. We need to work with and have the support of the county and federal land management agencies to try and set back succession and create a more vibrant and healthy range condition. Continual education of the public to the importance of winter range, the need for habitat improvement, and the need to recreate outside of winter range areas is important as well.

The draft DAU management plan will be reviewed by the U.S. Forest Service and Bureau of Land Management. It is their decision how they will incorporate the Division's DAU plan into their land management strategies. However, the Division is actively engaged with the U.S. Forest Service and Bureau of Land Management in their area-wide and local management planning efforts. We will use this DAU plan, as well as plans for other wildlife species, as an important basis for our recommendations to these agencies, including the amount, arrangement and quality of habitat necessary to support sustainable wildlife populations on federal lands and the specific management practices and protections necessary to maintain these populations. For instance, we

will continually work with these agencies regarding habitat improvement projects and try to find ways to get these projects implemented. Currently, the USFS has a fairly aggressive habitat improvement plan that the Division helped to identify critical areas of need. It is going through the scoping process and we hope to start implementing some of the projects as early as next year if all goes well. We are also working with the BLM on potential projects such as what we did with them on Light Hill. It is important to know and realize that the Division is advisory to these agencies just as we are with the county. The Division provides comments and recommendations to these agencies but the final decisions are theirs to make.

Measures in which the county can help with the mule deer populations may include the following:

7. Continual implementation of your LUC
8. Enforcement of the measures outlined in the land use decision documents with follow-up after construction
9. Continue with open space acquisitions for critical wildlife areas with wildlife values as the primary objective. This may conflict with trail and recreational use for these areas.
10. Work with the Division on management plans for these open space acquisitions with the potential for habitat improvement projects.
11. Creation of a habitat mitigation fund through an assessment on all new development to be earmarked for habitat improvement projects within the county. These monies could be used to leverage other dollars for habitat projects on private and public lands.
12. Assist the Division with educating the public on the importance of winter range areas and the need for trail and area closures. This may involve the creation of brochures, use of educational signs for important habitat areas, local educational television and radio spots, etc.

As always, we deeply appreciate the support the county has shown for the Division. We respect your concerns and comments and look forward to continuing our great working relationship.

Sincerely,

Perry Will
Area Wildlife Manager

Cc: C. Houben, R. Velarde, B. Petch, J. Mao, J. Groves, K. Wright

Appendix G. BLM comments



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado River Valley Field Office
2300 River Frontage Rd.
Silt, Colorado 81652
970-876-9000



IN REPLY TO:
CON040
CO-140
1110

November 4, 2010

Perry Will - Area Wildlife Manager
Colorado Division of Wildlife
50633 Highway 6 & 24
Glenwood Springs, CO 81601

Dear Mr. Will,

The Bureau of Land Management (BLM), Colorado River Valley Field Office (CRVFO) appreciates the opportunity to comment on the Data Analysis Unit (DAU) plans for the Maroon Bells deer herd (D-13) and the Sweetwater Creek deer herd (D-43). BLM lands within D-13 and D-43 are the center of both conflict and opportunity. BLM land management issues are complex due to: changing regional and local economies, population growth, shifting demographics, the expansion of residential areas on private lands, tourism, and local and destination-based recreation demand.

Acknowledging the states' role in managing big game populations, the CRVFO would like to provide information on habitat conditions in D-13 and D-43. BLM utilizes land health standards to describe conditions needed to sustain public land health. The standards are applied on a landscape scale, address the potential of the landscape, and relate to all uses of the public lands. Land health assessments were completed in D-43 in 2006 and 2008. A land health assessment was performed in D-13 in 2010, however a report of the findings will not be available until spring of 2011.

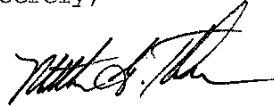
On a watershed basis, standards for public land health are being achieved on BLM lands at the time of the land health assessment in D-43 and preliminarily indications are that land health standards are being achieved in D-13 also. No forage issues between livestock and big game were identified. The interdisciplinary team did note certain localized land health concerns, which were not severe or widespread enough to rate any of the landscapes as not meeting the standards. These include:

- Presence of noxious weeds and undesirable species such as cheatgrass,
- Pinyon-juniper woodland encroachment into sagebrush shrublands,
- Sagebrush decadence,
- Locally heavy browsing (hedging) of shrubs due to concentrated winter use by both mule deer and elk,
- Lack of vegetative diversity, and

- Private land development in winter range (predominantly D-13)

The CRVFO has been performing habitat treatments and adjusting livestock allotment management plans to address these localized concerns. We appreciate your consideration of these habitat issues as you establish mule deer population and sex ratio objectives. Please direct any questions to Brian Hopkins of my staff. He can be reached at (970) 876-9073 or brian_hopkins@blm.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Matthew Thorburn". The signature is fluid and cursive, with a long horizontal stroke at the end.

Matthew Thorburn
Supervisory Natural Resource Specialist

Appendix H. HPP Comments



COLORADO DIVISION OF WILDLIFE HABITAT PARTNERSHIP PROGRAM

Lower CO River Habitat Partnership Program
PO Box 1124
Silt, CO 81652

Julie Mao, Terrestrial Biologist
Colorado Division of Wildlife
50633 US Hwy 6 & 24
Glenwood Springs, CO 81601

December 7, 2010

RE: D-13 and D-43 Management Updates

Dear Julie,

After reviewing and discussing the information that was presented regarding the D-13 and D-43 management units, below is the consensus of the Lower CO River HPP Committee.

For management unit D-13 the committee supports maintaining the current population. This would be population objective alternative 2, 6,500 – 7,500 total deer population. The committee agrees that the buck/doe ratio needs to be increased so, we suggest alternative 2 for the buck/doe ratio, 30-35 bucks per 100 does.

For management unit D-43 the committee supports alternative 2 for the population objective, 5,000-6,000 total deer. The committee would like to see an increase in the buck/doe ratio, so the committee supports alternative 3, 32-36 bucks per 100 does.

The committee agrees that a great concern and limiting factor for the deer populations in these management units is winter range. This committee would like to help improve the current winter range conditions, by looking to participate in large scale habitat projects that are focused on improving the quality and quantity of the forage on the winter range for mule deer in these areas. As well the committee would like to help sustain winter range through participating in securing land in Conservation Easements to help ensure the availability of future winter range in these management units to future deer populations. This would help to sustain the deer populations at the objective with quality mule deer that are healthy. Increasing the quality and quantity of the winter range habitat would also help to reduce the impact on the deer population from competition from elk for this habitat.

Thank you for your time.

Lower CO River HPP Committee