

BOULDER CREEK DEER HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT D-27 GAME MANAGEMENT UNITS 29 & 38

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Colorado Parks and Wildlife

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DAU D-27 (Boulder Creek) EXECUTIVE SUMMARY

GMUs: 29 and 38
Land Ownership: 60% Private, 21% USFS, 1% BLM, 3% State, 14% City/County Open Space, 1% Other Federal
Post-hunt Population: Previous Objective 6,800 2010 Model Estimate 7,600
New Population Objective Range 6,000-7,500
Post-hunt Sex Ratio: Previous Objective 35:100 2010 Observed 44:100
2010 Model Estimate 45:100 **New Sex Ratio Objective 25-30:100**

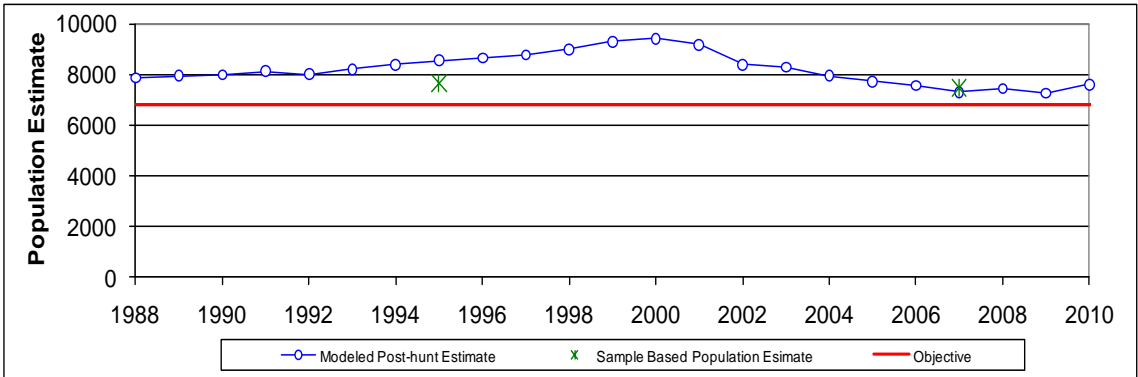


Figure 1: D-27 modeled, observed & objective post-hunt population from 1988 to 2010.

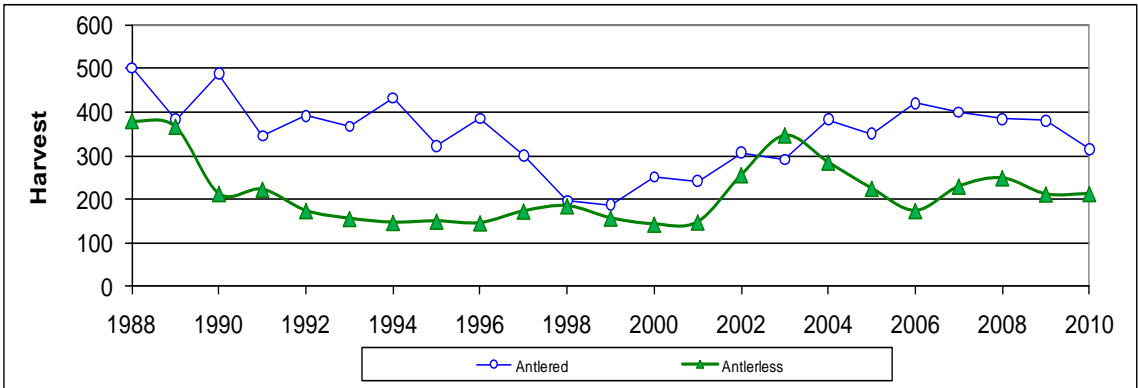


Figure 2: D-27 antlered and antlerless harvest estimates from 1988 to 2010.

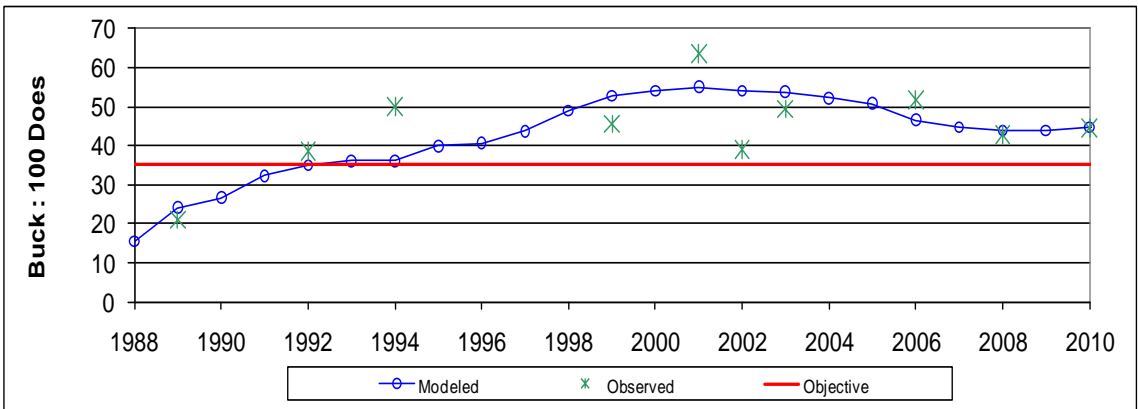


Figure 3: D-27 modeled, observed and objective post-hunt sex ratios from 1988 to 2010.

Background

The Boulder Creek deer herd (D-27) is located in north central Colorado in portions of Clear Creek, Jefferson, Gilpin, and Boulder counties and is composed of game management units (GMUs) 29 and 38. The Boulder deer data analysis unit (DAU) encompasses 896 square miles. Approximately 60% is private land, 21% is U.S. Forest Service (USFS) land, 1% is BLM, 3% is State Land, 14% is city or county open space, and 1% is other federal lands. Most USFS is located in the western ½ of the DAU, while most open space and parks and private lands are located in the eastern portion.

The post-hunt population grew from approximately 8,000 deer in the late 1980s to almost 9,500 deer in the late 1990s and then decreased to the current population of approximately 7,500 deer. This is above the previous population objective of 6,800 deer. Buck to doe ratios increased from approximately 20 bucks:100 does in the late 1980s to over 50 bucks:100 does in the late 1990s and then decreased. Currently the buck to doe ratio is estimated at approximately 45:100, above the previous objective of 35:100.

Significant Issues

Achieving and maintaining desired deer distribution in D-27 is challenging due to hunting restrictions in areas with high deer densities, primarily the eastern portion of the DAU. High deer densities at low elevations in and around urban areas raise several management concerns. First, deer in southwest Boulder have been shown to have the highest prevalence of Chronic Wasting Disease (CWD) ever recorded in Colorado. Second, there is concern that the high numbers of deer present within the city, amongst houses, are attracting predators and creating a risk to human and pet safety. Third, the high numbers of deer in the city also lead to a variety of other conflicts including property damage, deer-vehicle collisions, etc. Reducing deer densities within urban areas is expected to help manage CWD and reduce the frequency of conflicts involving people, predators and deer. However, within this area very little land is open to hunting, so deer densities cannot be reduced via hunting. On lands where hunting is allowed, primarily the western half of the DAU, hunters have expressed concerns about low deer densities and difficulties in finding deer to harvest.

Another significant issue is the land management mosaic within the DAU with small, private parcels, where hunting is not allowed, interspersed with fragmented pieces of public lands, where hunting is allowed. There is a county resolution in the Sugarloaf subdivision in Boulder County restricting discharge of firearms, which is limiting hunting access. Additionally, the City of Boulder and Boulder County administer additional large tracts of public land where hunting is not allowed, and city and county open space properties bordering USFS lands prevent hunters from accessing additional federal lands open to hunting.

Management Alternatives

This DAU plan presents 3 population objective and 3 herd composition alternatives.

Post-hunt Population Objective Alternatives

Alternative 1: 5,000-6,000

This would be approximately a 25% reduction from 2010 post-hunt population estimate. Most beneficial for deer related conflicts and CWD management, but the quality of

hunting and wildlife viewing will decline. Given the diverse land managers and strategies in D-27, it is unclear if this alternative can be achieved exclusively through hunting.

Alternative 2: 6,000-7,500

This alternative encompasses the previous objective and would be approximately a 10% reduction from 2010 post-hunt estimate.

Alternative 3: 7,000-9,000

This represents a 20% increase from the previous objective and a 5% increase from the 2010 post-hunt estimate. This alternative would provide more hunting and wildlife viewing opportunities, but human/deer conflicts would likely increase and this alternative is the least favorable for CWD management.

Herd Composition – Post-hunt Sex Ratio Objective Alternatives

Alternative 1: 20-25 bucks:100 does

This would be one-half of the 2010 post-hunt estimate and a reduction from the previous objective. Best strategy for hunting opportunity and CWD, least favorable for quality of hunting and wildlife viewing. This alternative is likely not feasible with hunting alone.

Alternative 2: 25-30 bucks: 100 does

This would be a ~20% decrease from the previous objective and a 30-35% decrease from the 2010 post-hunt estimate.

Alternative 3: 35-40 bucks:100 does

This would be a decrease from the 2010 post-hunt estimate, but contains the previous objective at the lower end of the range. Best strategy to increase hunting and wildlife viewing quality, but limits the opportunity to participate in male harvest and least recommended for CWD management.

New Approved Alternatives

Post-hunt Population Alternative 2: 6,000-7,500

Post-hunt Herd Composition Alternative 2: 25-30 bucks:100 does

The new approved alternatives are near the previous population and sex ratio objectives, but both represent a decrease from recent post-hunt estimates. The new population objective alternative is a small reduction, while the new sex ratio alternative represents a more substantial reduction from the 2010 post-hunt estimate. The new alternatives provide the best balance among hunting, wildlife viewing, deer-related conflicts and CWD management. The new objectives are obtainable on public and private lands open to hunting, but may not be achieved in refuge areas. To monitor progress towards the herd composition objective, the sex ratio will be measured collectively for the entire DAU and also monitored for 2-3 land ownership/management strata to compare huntable public and private lands with refuge areas. While efforts may be pursued to shift the distribution of deer from refuges experiencing deer-related conflicts to lands open to hunting, observed sex ratios on public lands open to hunting should not be driven below the objective range to compensate for higher than objective buck: doe ratios on refuge lands. This strategy is supported by public comments that there are too many deer in areas closed to hunting, but low deer densities and few antlered deer in areas where public hunting recreation occurs.

This herd management plan was approved by the Colorado Parks and Wildlife Commission on December 7th, 2012.

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INTRODUCTION AND PURPOSE

In 2011, the Colorado Division of Wildlife merged with Colorado State Parks to form Colorado Parks and Wildlife (CPW). The agency will be referred to as CPW in this document. CPW manages wildlife for the use, benefit and enjoyment of the people of the state in accordance with CPW’s Strategic Plan and mandates from the Parks and Wildlife Commission and the Colorado Legislature. Colorado’s wildlife resources require careful and increasingly intensive management to accommodate the many and varied public demands and growing human impacts. CPW uses a “Management by Objective” approach to manage the state’s big game populations (Figure 1).

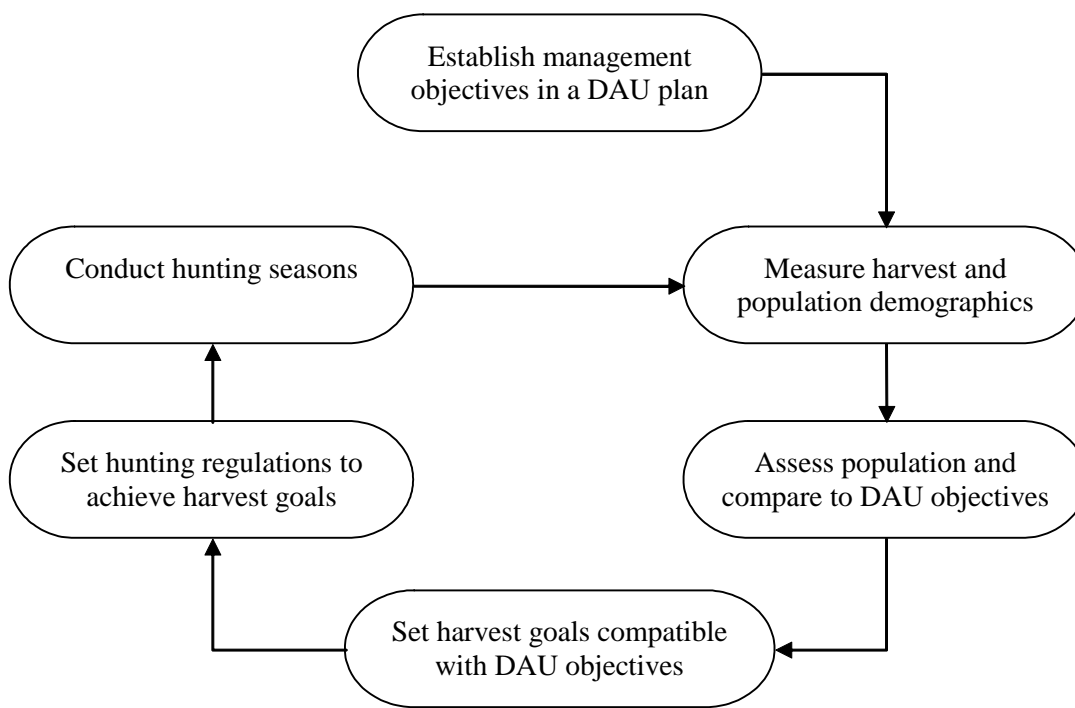


Figure 1: Management by Objective process used by Colorado Parks and Wildlife to manage big game populations by Data Analysis Unit.

In this approach, big game populations are managed to achieve population objectives established for a Data Analysis Unit (DAU). A DAU is the geographic area that includes the year-round range of a big game herd. A DAU includes the area where the majority of the animals in a herd are born, live and die. DAU boundaries are delineated to minimize interchange of animals between adjacent DAUs. A DAU may be divided into several game management units (GMUs) in order to distribute hunters and harvest within a DAU.

Management decisions within a DAU are based on a herd management plan. The primary purpose of a herd management plan is to establish population and herd composition (i.e., the number of males per 100 females) objectives for the DAU. There are many factors that are considered in selecting objectives for a particular DAU,

including the social and biological carrying capacities of the area, population dynamics and the concept of maximum sustained yield (Appendix B).

The herd management plan also describes the strategies and techniques that will be used to reach herd objectives. During the DAU planning process, public input is solicited and collected by way of questionnaires, public meetings and comments to the Parks and Wildlife Commission. The intentions of CPW are integrated with the concerns and ideas of various stakeholders including the U.S. Forest Service (USFS), the Bureau of Land Management (BLM), hunters, guides and outfitters, private landowners, local chambers of commerce and the general public. In preparing a herd management plan, agency personnel attempt to balance the biological capabilities of the herd and its habitat with the public's demand for wildlife recreational opportunities. Herd management plans are approved by the Parks and Wildlife Commission and are reviewed and updated every 10 years.

The herd management plan then serves as the basis for the annual herd management cycle. In this cycle, the size and composition of the herd is assessed and compared to the objectives defined in the herd management plan. Hunting seasons are then set and licenses are allocated to either maintain or move toward the objectives.

DESCRIPTION OF DAU

Location

The Boulder Creek deer herd DAU is located in north central Colorado in portions of Clear Creek, Jefferson, Gilpin, and Boulder counties. The DAU contains GMUs 29 and 38 (Figure 2). The DAU is bounded by I-70 and US 40 on the south; the Continental Divide on the west; the Brainard Lake Road and Left hand Canyon on the north; and I-25 on the east. Municipalities include Denver, Boulder, Golden, Nederland, Central City, Black Hawk and Idaho Springs. Much of the central portion of the DAU contains unincorporated subdivisions. The elevation gradient across the DAU runs from approximately 5,300 feet in the eastern portion to over 13,000 feet on the Continental Divide on the western edge.

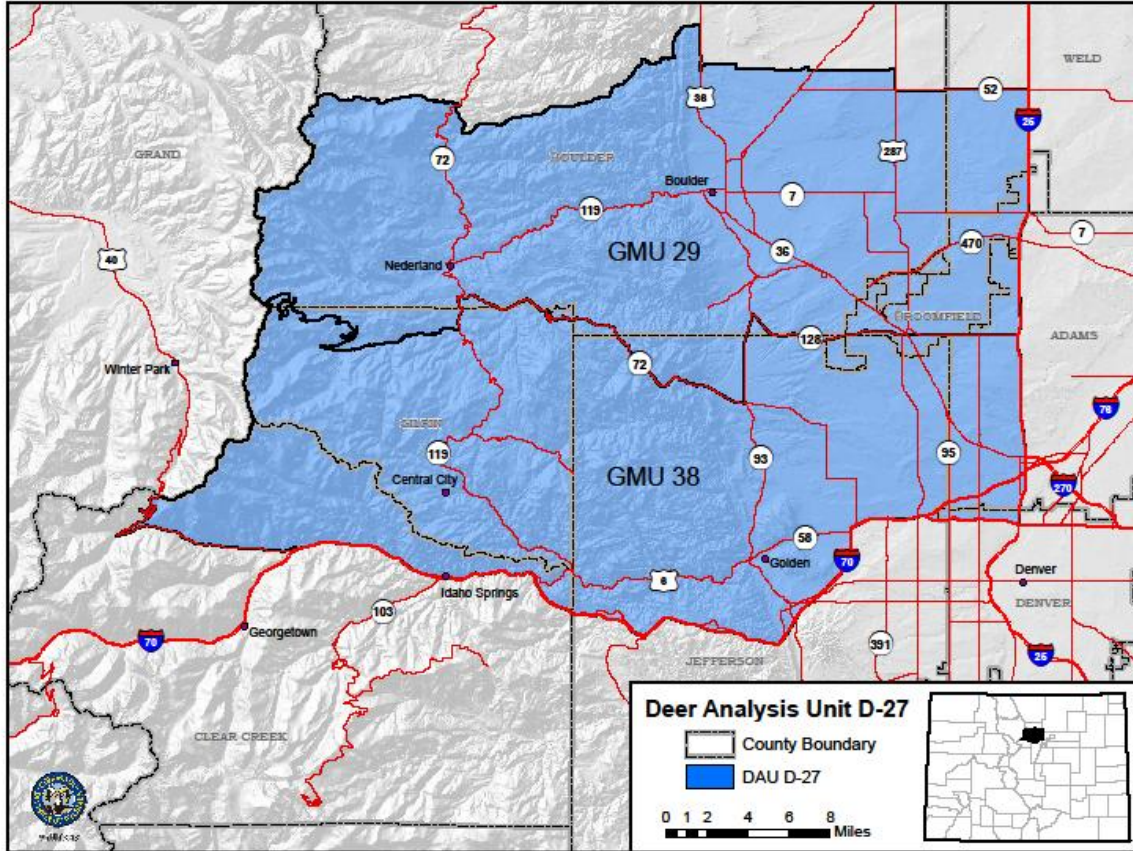


Figure 2: Geographic location of deer Data Analysis Unit D-27, GMU 29 and GMU 38.

Climate

The climate varies greatly from east to west across the D-27, depending on elevation. The eastern portion has comparatively warm summer temperatures and mild winters. The western portion is much colder with snow covering timbered areas and north facing slopes from November through May.

Much of the D-27 has relatively mild winters influenced by Chinook winds. Wind and typically mild and sunny conditions on deer winter range keep southern and western exposures virtually snow free during the winter. Along the foothills, where a large proportion of deer winter range occurs, temperatures are comparatively mild and winter weather moderate, punctuated with several snowfall events, followed by quick warming and melting of snow. Weather-related winter deer mortality is not a major factor.

Vegetation

Vegetation is diverse depending on elevation and climate. The lowest elevation is in the Great Plains life zone, which is comprised of short grass prairie. There is a band of remnant tallgrass prairie immediately east of the initial foothills. Much of the remaining tallgrass is on City of Boulder, Boulder County Open Space and Rocky Flats.

Foothills shrubs range from approximately 5,500 feet up to 7,500 feet. Species include mountain mahogany, juniper and currants. Mountain riparian communities are found

along streams, wetlands and irrigation ditches from 5,600 to 11,000 feet. Willows, chokecherries, alders and narrowleaf cottonwoods are common species. Ponderosa pine dominated communities are found up to 8,500 feet with Douglas fir covering many north-facing slopes in the foothill. There are some agricultural fields, mainly hay and pasture, found in suitable areas up to 9,000 feet.

The DAU contains subalpine forests from 8,500 feet up to timberline at approximately 11,600 feet. Within the subalpine forest zone, lodgepole pine intermixed with aspen dominates up through 10,500 feet. Spruce/fir subalpine forest interspersed with meadows is dominant up to timberline. Stands of limber and bristlecone pine also occur at higher elevations. Alpine tundra, alpine willows and rock dominate above timberline.

Land Use

The Boulder Creek deer herd DAU encompasses 896 square miles. Approximately 60% (538 mi²) is private land, 21% (188 mi²) is USFS land, 1% (9 mi²) is BLM, 3% (27 mi²) is State Land, 8% (72 mi²) is City of Boulder and Boulder County Open Space, 1% (9 mi²) is Jefferson County Open Space, 1% (8 mi²) is Clear Creek County Open Space, 4% (36 mi²) is other city and county land, and 1% (9 mi²) is other federal lands. Most USFS is located in the western ½ of the DAU, while most city and county open space and park land is located in the eastern portion (Figure 3).

Outdoor recreation on public lands is substantial. Hiking, four wheeling, horseback riding, motorcycle riding, mountain bike riding, angling, hunting and wildlife viewing are primary uses. Hunting is not currently allowed on any city or county open space lands or parks, with the exception of the Jefferson County Open Space Centennial Cone property.

Much of the private lands have the potential to be developed into residential subdivisions. Agriculture activities on private land consist of hay production and cattle and horse grazing. There are 2 grazing allotments on the USFS's Boulder Ranger District. The Mammoth allotment is for a total of 88 cow/calf pairs (60 on National Forest and 28 on private) and run from July 7 to September 7. The Caribou allotment is for 110 cow/calf pairs from July 10 through September 10. The Caribou allotment has not been grazed for the last 10 years. There are 3 allotments on the Clear Creek Ranger District within the DAU. The allotments are the Fall River, Gilpin and Central City allotments. The Fall River allotment has not been grazed for more than a decade. Twenty cow/calf pairs and a bull are permitted on the Gilpin and Central City allotments combined, which may be grazed from July 1 to September 30.

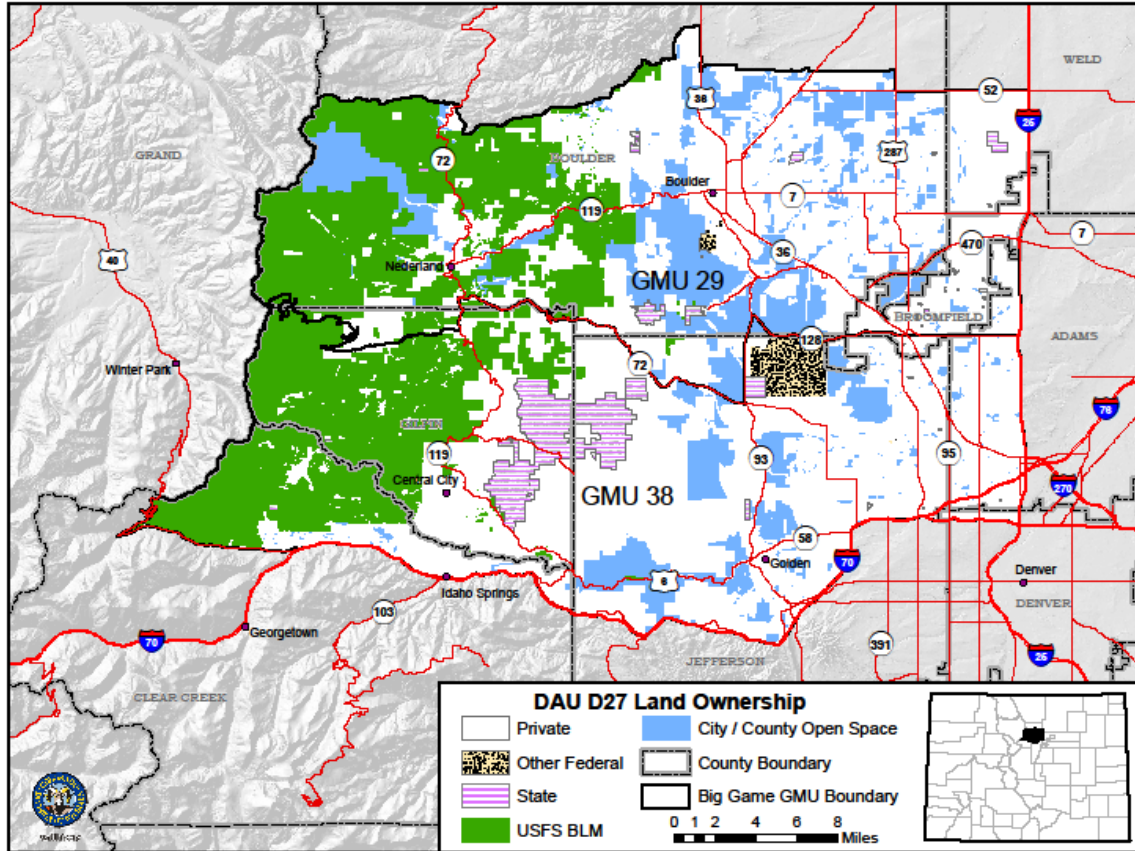


Figure 3: Land ownership in deer DAU D-27.

Deer Distribution

The entire DAU falls under the broad category of overall mule deer range (Figure 4). High elevation summer range is abandoned in the colder months for winter range. Winter range occurs in the central and eastern parts of the DAU below 9,000 feet. Resident deer herds occur along the foothills and plains and concentrate around Boulder and Golden. While mule deer range occurs throughout D-27, white-tailed deer range occurs only on the eastern plains portions of the DAU (Figure 5). For the purposes of licensing and management discussions, mule deer and white-tailed deer are treated jointly as a single category of deer.

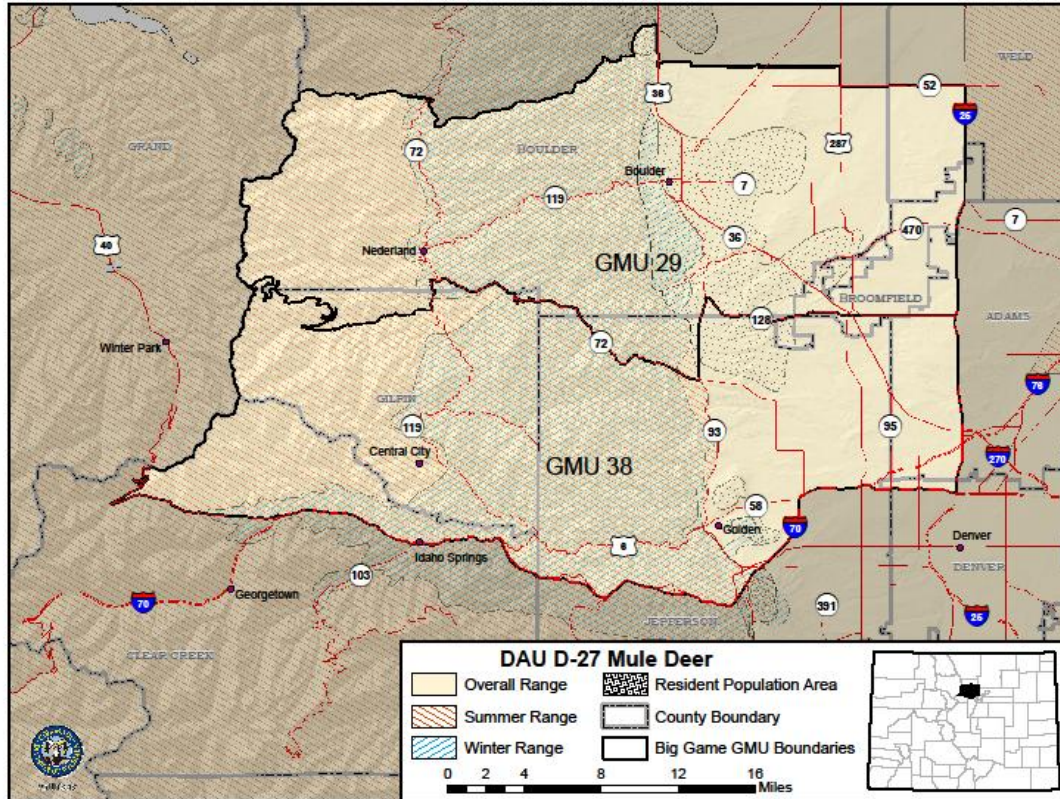


Figure 4: Overall, summer and winter ranges of mule deer in DAU D-27.

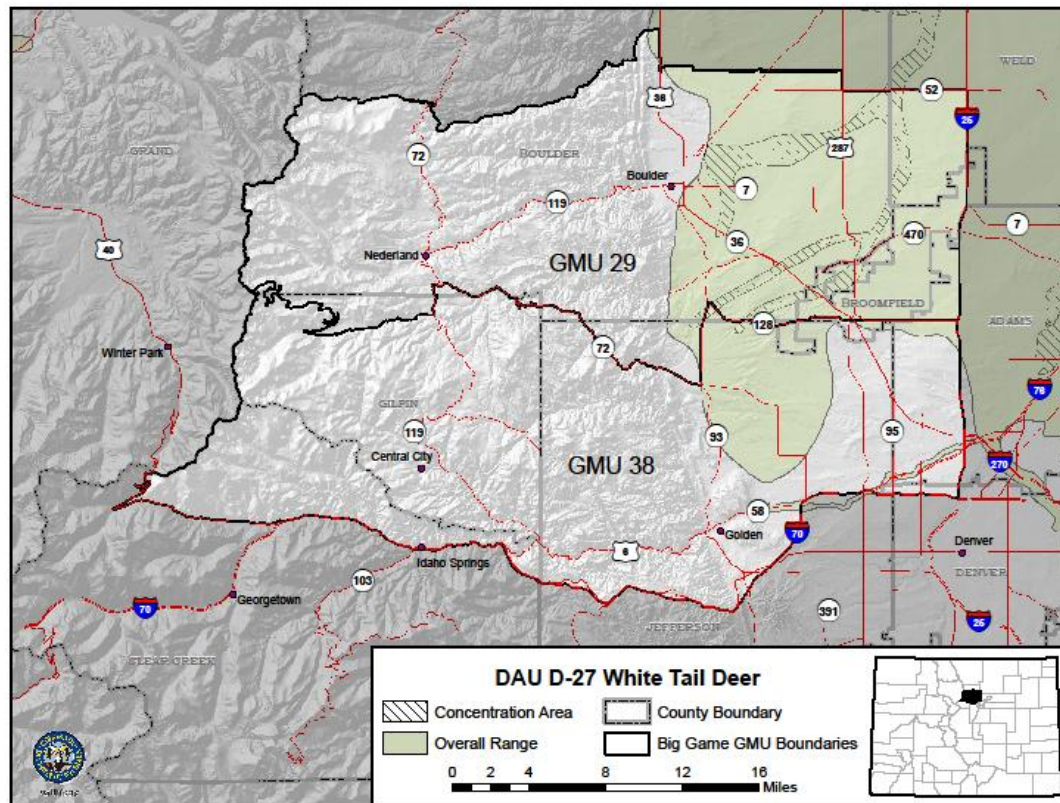


Figure 5: Overall, summer and winter ranges of white-tailed deer in DAU D-27.

HABITAT RESOURCES

A relatively large percentage of the DAU is either city or county parks and open space (~18%) or developed suburban neighborhoods; all of which provide deer a refuge from hunters. Most of these lands occur in the eastern half of the DAU. This situation creates two problems, unnaturally high deer numbers and refuges where hunting cannot be used to reduce numbers.

The quantity and quality of winter range is likely the limiting factor for the Boulder Creek deer herd. Residential development has been the most dramatic influence on winter deer habitat. While housing sprawl and fragmentation of winter range has a detrimental effect on deer through direct displacement, it may also have a secondary effect through supplemental feeding by providing high quality forage of ornamental landscape plantings and a reduction in natural predation rates. Some homeowners feed deer, which inflates carrying capacity and may exacerbate transmission of CWD. Any situation, which artificially increases deer density, such as backyard feeding or ornamental plantings, may have the potential to act as a catalyst for increasing CWD prevalence and transmission.

Plant succession to forested habitat types during the last century has also caused a decline in the amount and quality of deer forage. Several large wild fires and controlled burns during the last 20 years have helped to improve deer habitat.

D-27 is currently experiencing a mountain pine beetle infestation that is increasing annually. Heavy infestations currently occur at elevations where mixed stands of ponderosa and lodgepole pine occur. Mountain pine beetle activity in ponderosa pine is expected to continue to increase over the next several years. While there is a great deal of information on the effects of the mountain pine beetle on forest health, little is known about the effects of this infestation on wild ungulate populations. Current speculation suggests that the death of beetle-killed trees and the consequent opening of the forest canopy will enhance understory forage for mule deer. CPW will continue to monitor the mountain pine beetle infestation and its effects on deer habitat and distribution.

HERD MANAGEMENT HISTORY

Post-hunt Population Size

The current deer population is estimated at approximately 7,600 deer, above the previous population objective of 6,800 deer. The DAU and GMU boundaries changed in 1987. A significant area was excluded from the northern part of the DAU, decreasing the size of the DAU. Due to the decrease in area, D-27's population size and harvest presumably also changed. It is not practicable to speculate how many deer were removed from the DAU, or how harvest changed with the removal of this area, or even if herd composition differed between the old DAU and the new DAU. Due to the boundaries changes, population models have been constructed with data subsequent to 1987.

The herd post-hunt population grew from approximately 8,000 deer in the late 1980s to almost 9,500 deer in the late 1990s and then decreased to the current population of approximately 7,500 deer (Figure 6).

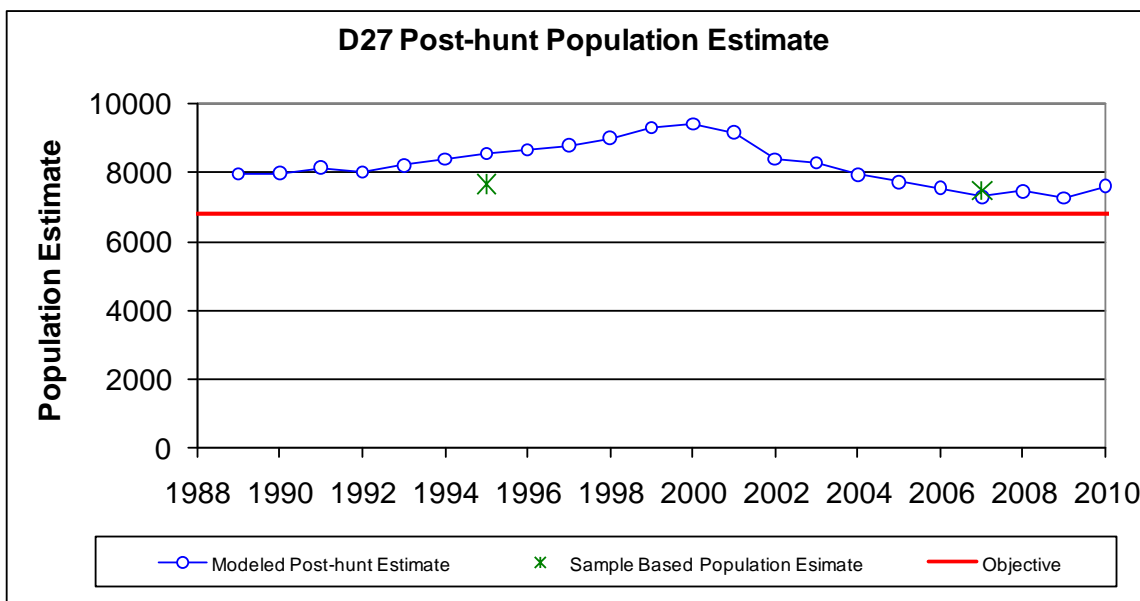


Figure 6: D-27 modeled, observed & objective post-hunt population from 1988 to 2010.

Population estimates are derived from computer models, which incorporate population estimates based on quadrat survey methodology, estimates of mortality, initial population size, sex ratio at birth, observed age ratios, hunter harvest and wounding loss. Estimating population numbers of wild animals over large geographic areas is a difficult and approximate science. Numerous attempts have been made to accurately count known numbers of wild animals in large fenced areas. All of these efforts have failed to count 100% of the animals. CPW recognizes the difficulties of estimating the size of deer populations as a challenge in managing populations and attempts to maximize the accuracy of these estimates by using the latest technology and inventory methodology available. As better information and techniques becomes available (e.g., new estimates of survival/mortality, wounding loss, sex ratios, density, or new modeling techniques and software) they are evaluated and used where appropriate. The population estimate presented in this document should, therefore, not be considered a completely accurate enumeration of the animals in the DAU.

A population estimate of 7,600 based on helicopter quadrat survey methodology was obtained in 1995. In 2007, a population estimate of 7,500 was obtained based on mark-resight methodology for the population in southwest Boulder and on helicopter quadrat survey methodology in the rest of the DAU. Both of these estimates were for the area of the DAU west of Highway 93 and also included North and South Table Mountains. The 2007 survey also revealed that approximately 1/4 of the deer winter in GMU 29 and 3/4 winter in GMU 38.

The City of Boulder Open Space and Mountain Parks conducted standardized deer counts on a 16 square-mile study area each early April from 1983-2001. The data collected from the first 4 years of the study indicated the deer population within their study area was increasing at an average annual rate of 10% per year (City of Boulder Open Space and Parks Departments, 1987). Further analysis indicated an increasing population from 1983-1988 (City of Boulder, unpublished data), then the population leveled at the end of the decade and appears to have declined during the 1990's (C. Richardson, unpublished data). Development and increased traffic within the study area on the west side of Boulder may have caused changes to wintering areas. In addition, other factors such as invasive weeds, disease and changes in alternative foods (landscaping) may have contributed to changes in deer numbers (City of Boulder Open Space and Mountain Parks unpublished report). Another study in southwest Boulder from 2005 – 2007 found that there had been a 45% decrease in the deer population between 1987 and 2005. This study suggested that CWD may have played a role in that decline (Miller et al. 2008).

Post-hunt Herd Composition

Herd composition counts are conducted with helicopter surveys on winter range. There are 10 years of observed post-hunt age and sex ratio data between 1988 and 2010 (Figure 7). The counts are conducted during the breeding season while bucks are with does and prior to antler-drop. Counts occur from late November through December. These herd composition flights allow observers to individually categorize each animal as yearling male, 2-year old male, male over 3 years of age, female or juvenile (< 1 year old). All composition counts are given as number of males and juveniles per 100 females. These counts are actual field observations and are not the results of computer modeling efforts. Composition counts in 2001 were conducted using random-stratified helicopter quadrats. All other years were conducted using ad-hoc survey methodology. Buck to doe ratios increased from approximately 20 bucks:100 does in the late 1980s to over 50 bucks:100 does in the late 1990s and then decreased. Currently the buck to doe ratio is estimated at approximately 45:100, which is above the previous objective of 35:100 (Figure 7).

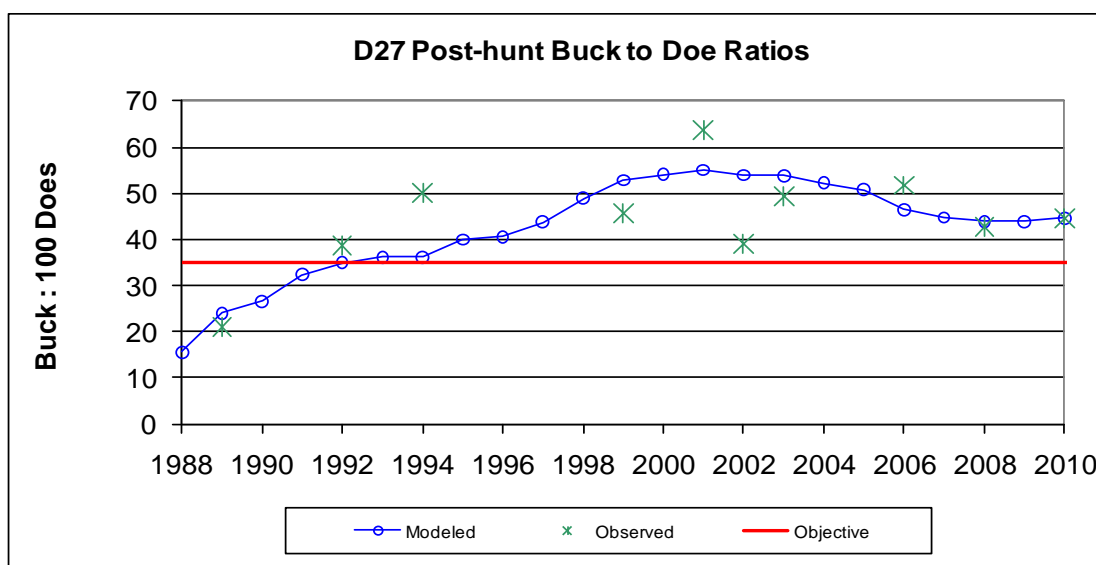


Figure 7: Modeled, observed, and objective sex ratios for D-27 from 1988 to 2010.

Licenses

Previous license allocation for GMUs 29 and 38 are shown in Table 1 and Table 2, respectively. Over the last 23 years, season structure and license numbers have changed. Prior to 1999, archery and antlered rifle licenses were unlimited in number and muzzleloader antlered and antlerless licenses were limited in number but valid statewide. Since 1999, all of these licenses have been limited in number. Since 1999, in an attempt to bring the population and the buck:doe ratio down to objective, there has been a steady increase in the number of licenses available in both GMUs. With the exception of 2010, in every year subsequent to 1999 some of the licenses offered have gone unsold.

When available, antlerless rifle (1988 – 1991 and 1998 to present) and either sex rifle (1992 – 1997) licenses in D-27 have been limited in number. A private land only antlerless season was added to GMU 29 in 2002 and to GMU 38 in 2003. In 2004, a late antlerless and a late either sex season was created with licenses valid only in the Jefferson County portion of GMU 38. This season was created to facilitate hunting on Jefferson County's Centennial Cone property. In GMU 29 prior to 2004, licenses during the rifle antlerless seasons floated between the 2nd, 3rd and 4th seasons and rifle antlered licenses floated between the 2nd and 3rd seasons, with the 4th antlered rifle season specified. In 2004, the number of licenses was specified for each rifle season. This was done in response to concerns in the Sugarloaf Subdivision over the number of hunters in the area during each season. Specifying license numbers in each season regulates the number of hunters participating in each season. In GMU 38, rifle licenses continue to float between seasons to allow more flexibility in hunter opportunity. In 2002 and 2003, all rifle antlerless licenses in GMU 29 had 2 carcass tags. The purpose of the double carcass tags was to lower deer densities in and near areas CWD infected deer had been detected in an attempt to prevent CWD from spreading.

D-27 Boulder Creek Deer Herd Management Plan

Table 1: Number of deer licenses in GMU 29 from 1988 to 2010. ES = Either Sex; NS = Not an established season; PLO = Private Land Only, A'less = Antlerless.

Season	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Arch ES	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	140	140	175	175	175	175	175	175	175	175	175	175
Muzzle ES	OTC	OTC	OTC	OTC	OTC	OTC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Muzzle A'less	NS	NS	NS	NS	NS	NS	SW	SW	SW	SW	SW	25	25	35	35	35	35	35	35	35	35	35	35
Rifle A'less 2	350	300	125	100	NS	NS	NS	NS	NS	NS	100	100	100	180	250	150	25	25	25	25	25	25	25
Rifle A'less 3	"	"	"	"	NS	NS	NS	NS	NS	NS	"	"	"	"	"	"	25	25	25	25	25	25	25
Rifle A'less 4	"	"	"	"	NS	NS	NS	NS	NS	NS	"	"	NS	NS	"	"	25	25	25	25	25	25	25
PLO A'less	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	100	200	200	100	100	100	100	100	100
Muzzle Antler	NS	NS	NS	NS	NS	NS	SW	SW	SW	SW	SW	15	25	40	40	40	60	60	60	60	60	60	60
Rifle Antler 2	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	180	130	200	250	250	125	125	125	125	125	125	125
Rifle Antler 3	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	"	"	"	"	"	125	125	125	125	125	125	125
Rifle Antler 4	OTC	OTC	OTC	OTC	OTC	OTC	OTC	SW	SW	SW	SW	"	50	75	100	100	100	100	100	100	100	100	100
Rifle ES 2	NS	NS	NS	NS	25	135	35	135	135	175	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Rifle ES 3	NS	NS	NS	NS	85	"	100	"	"	"	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Rifle ES 4	NS	NS	NS	NS	"	"	"	"	"	"	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 2: Number of deer licenses in GMU 38 from 1988 to 2010. ES = Either Sex; NS = Not an established season; ; PLO = Private Land Only, A'less = Antlerless.

Season	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Arch ES	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	260	260	260	260	260	260	260	260	275	275	275	275
Muzzle ES	OTC	OTC	OTC	OTC	OTC	OTC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Muzzle A'less	NS	NS	NS	NS	NS	NS	SW	SW	SW	SW	SW	30	30	50	50	50	50	50	50	50	50	50	50
Rifle A'less 2	415	415	220	175	NS	NS	NS	NS	NS	NS	200	200	200	200	400	200	200	150	150	200	200	200	200
Rifle A'less 3		"	"	"	NS	NS	NS	NS	NS	NS	"	"	"	"	"	"	"	"	"	"	"	"	"
Rifle A'less 4		"	"	"	NS	NS	NS	NS	NS	NS	"	"	NS	NS	"	"	"	"	"	"	"	"	"
PLO A'less	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	250	250	250	250	275	275	275	275
Late A'less	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	20	20	30	50	50	50	50
Muzzle Antler	NS	NS	NS	NS	NS	NS	SW	SW	SW	SW	SW	25	35	50	50	50	100	100	100	140	140	140	140
Rifle Antler 2	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	470	370	400	500	500	500	500	500	550	550	550	550
Rifle Antler 3	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	OTC	"	"	"	"	"	"	"	"	"	"	"	"
Rifle Antler 4	OTC	OTC	OTC	OTC	OTC	OTC	OTC	SW	SW	SW	SW	"	100	150	200	200	300	300	300	300	300	300	300
Rifle ES 2	NS	NS	NS	NS	55	275	65	265	265	350	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Rifle ES 3	NS	NS	NS	NS	170	"	200"	"	"	"	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Rifle ES 4	NS	NS	NS	NS	"	"	"	"	"	"	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Late ES	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	20	20	30	50	100	125	125

Hunting Pressure

From 1988 to 1999, licenses in many of the seasons were not limited in number, so hunting pressure was determined by the number of hunters that chose to hunt those units. The number of hunters declined steadily during that period from nearly 2,500 hunters in 1988 to approximately half of that 1998 (Figure 8). The explanation for the decrease is most likely due to the change in land use and ownership in D-27. In the past 30 years, lands that allowed hunting have been purchased by local parks and open space departments and hunting is no longer permitted. Residential development has also removed many hunting opportunities. Consequently, many deer hunters lost places to hunt and either quit hunting or began hunting other areas.

Since 1999, hunting pressure in D-27 has been limited by the number of licenses issued by CPW. However, 2010 was the first year that licenses sold out. In general, the numbers of hunters in both GMUs trend with the number of licenses available. The number of hunters increased in both units from 2000 to 2003, after which license numbers in GMU 29 stabilized, while license numbers in GMU 38 continued to rise (Figure 9 and Figure 10).

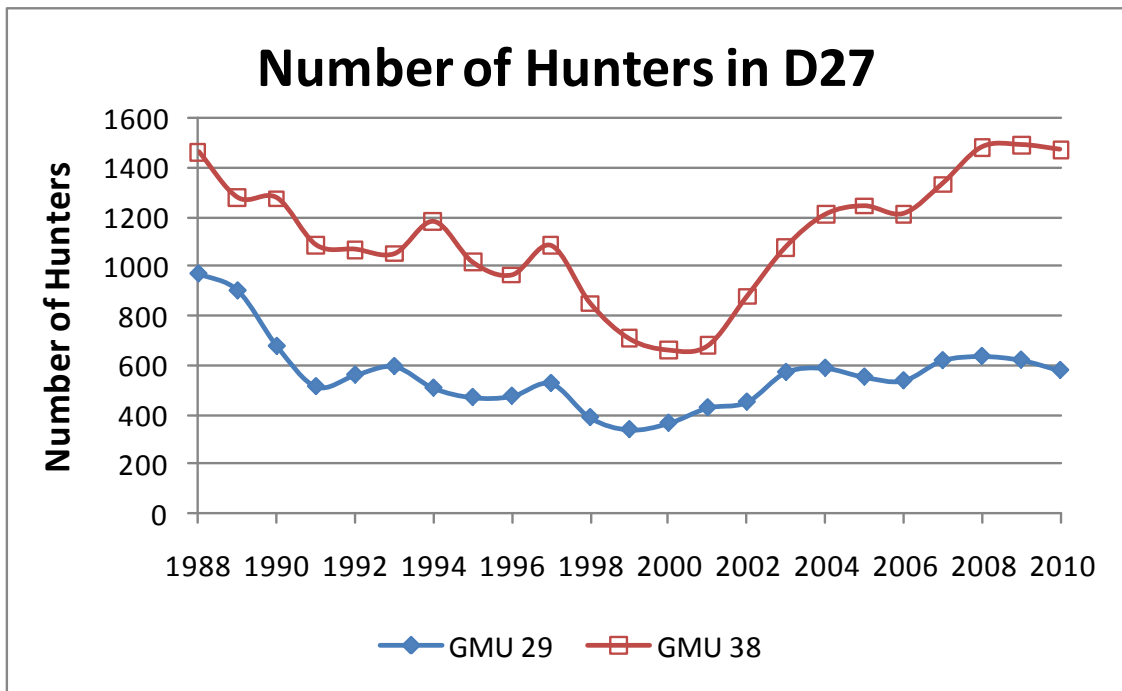


Figure 8: Total number of hunters in GMUs 29 and 38 from 1988 to 2010.

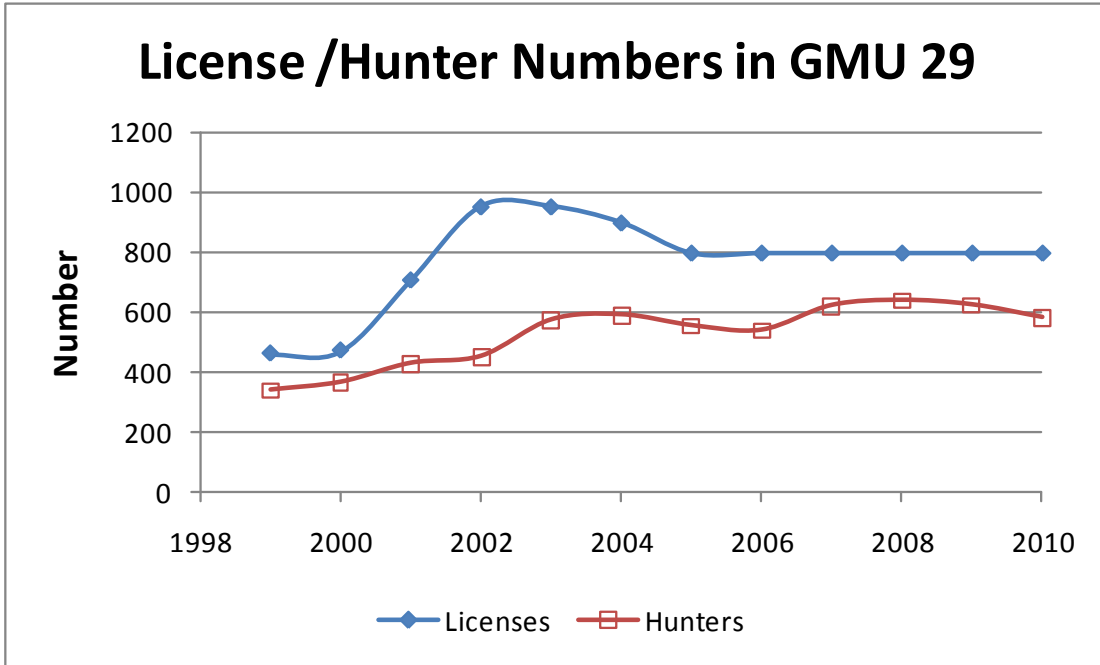


Figure 9: Number of licenses offered and hunters in GMU 29 from 1999 to 2010.

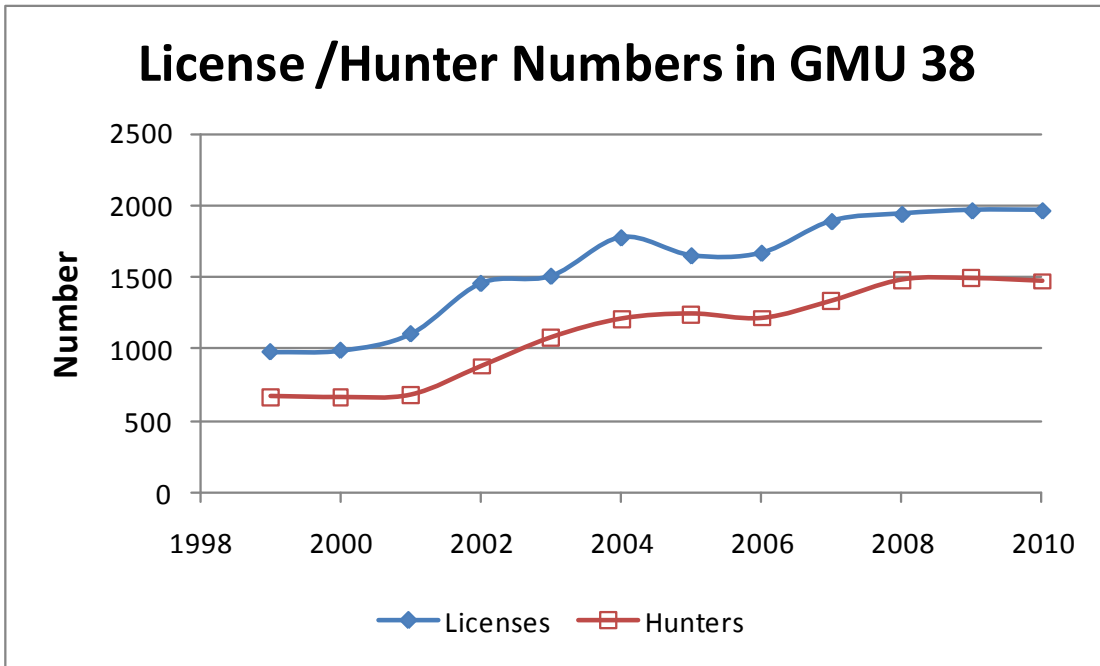


Figure 10: Number of licenses offered and hunters in GMU 38 from 1999 to 2010.

Harvest

Deer harvest in D-27 has followed the trend in hunter numbers. A high harvest in 1988 was followed by a decreasing trend until 1999, which then was followed by an increasing trend (Figure 11 and Figure 12). The increased antlerless harvest in 2002 and 2003 is partially the result of double carcass tags for antlerless licenses in those years.

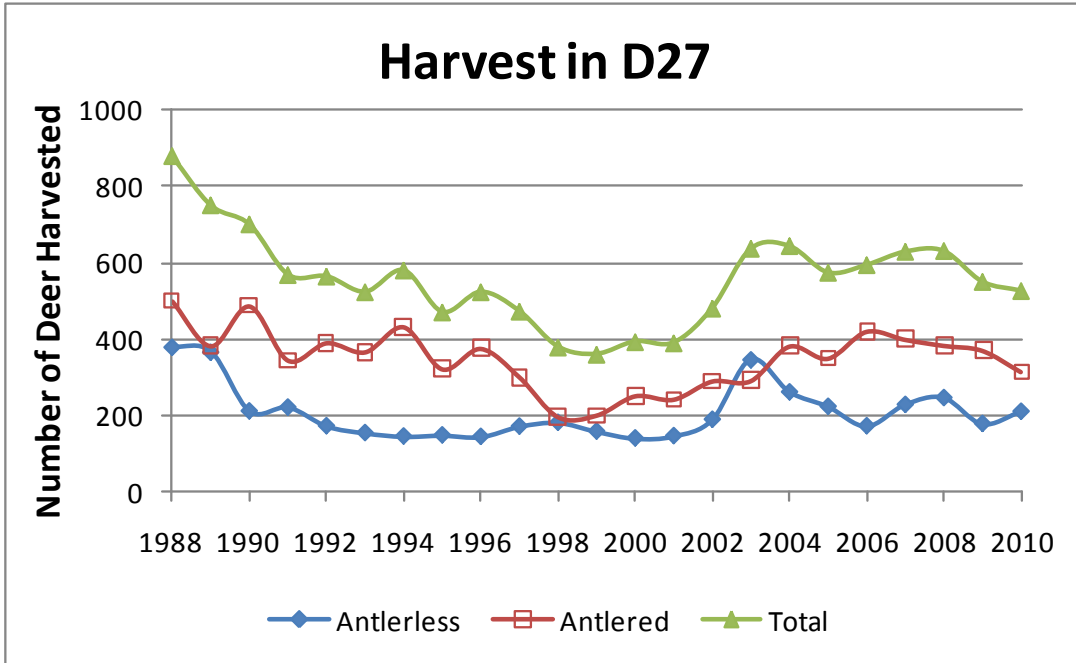


Figure 11: Total, antlered and antlerless deer harvest in DAU D-27 from 1988 to 2010.

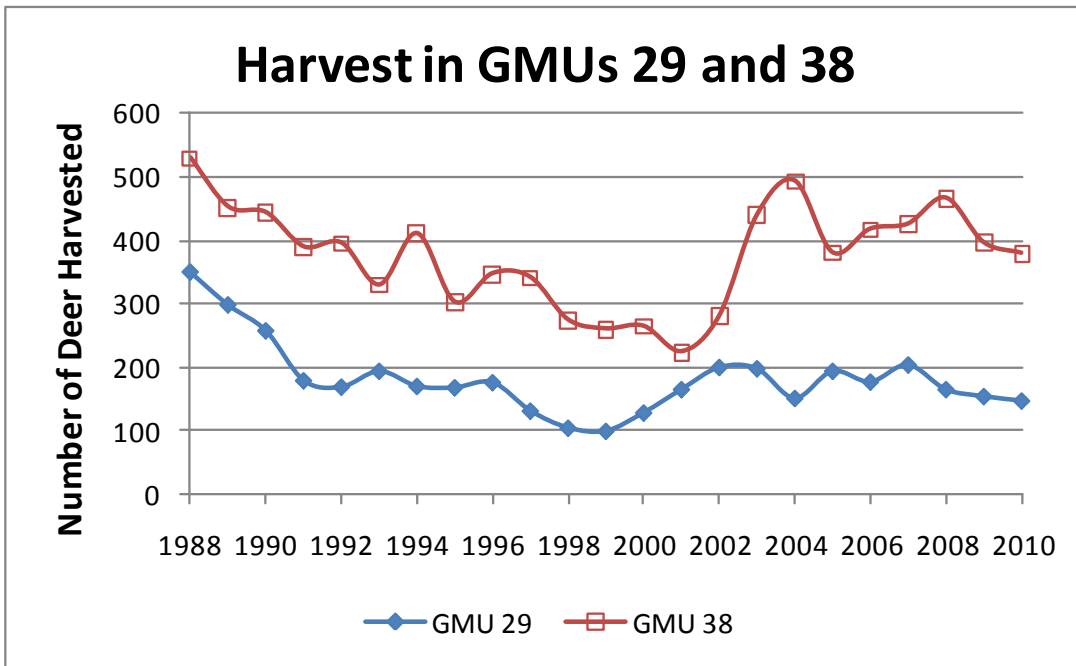


Figure 12: Deer harvest in GMUs 29 and 38 from 1988 to 2010.

Success Rates

Success rates, calculated as harvest divided by the number of hunters, vary annually (Figure 13). The 23 year average success rate is 33% with a high of 39% in 2003 and a low of 26% in 2010. Success rates in 2002 and 2003 were higher due to the double antlerless carcass tags. Taking the double carcass tags into consideration, the general

decrease in success from 2000 to 2010 is likely the result of the decrease in population size during that same period or due to the decrease in lands open to hunting.

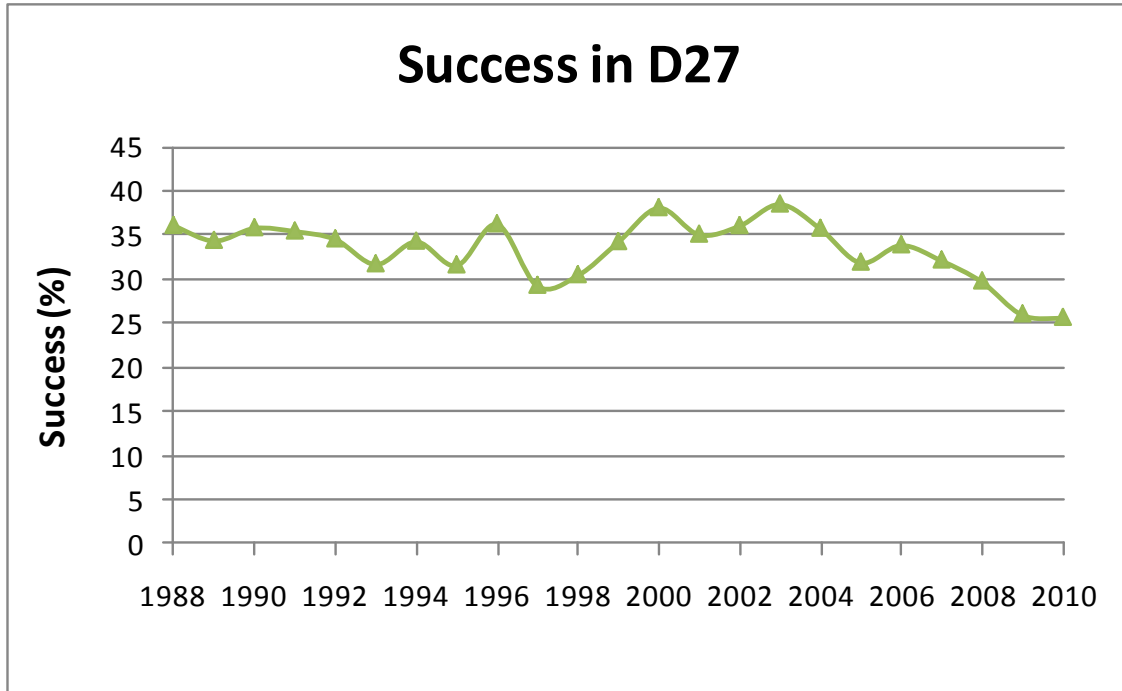


Figure 13: Overall hunter success rates in DAU D-27 from 1988 to 2010.

Chronic Wasting Disease

Chronic wasting disease (CWD), a transmissible spongiform encephalopathy (TSE), is a disease of native deer and elk. CWD is characterized by behavioral changes and progressive loss of body condition leading to death (Williams and Young 1992). There are no known treatments for CWD in deer.

Management attempts were made by CPW to reduce the prevalence and spread of this disease in D-27. Those efforts included culling deer in areas where CWD had been found to reduce deer densities and to better characterize the prevalence of CWD in those areas (Table 3). An analysis of 5 years of data (2000-2005) comparing winter range subherds that had experienced density reductions to subherds that did not experience density reductions failed to detect any significant change in CWD prevalence rates.

Table 3: Number of deer culled in D-27 for CWD management and monitoring.

Location	GMU	Year	Male	Female	Fawn	Total
Sugarloaf	29	2001	4	17	0	21
Ralston Butte	38	2002	2	20	14	36
Rocky Flats	38	2002	11	9	6	26
White ranch	38	2004	1	21	1	23
Total			18	67	21	106

Voluntary and mandatory CWD testing of harvested animals produced a greater abundance of data to detect differences between animals that tested positive for CWD and those in which CWD was not detected. One trend that emerged after a number of years of data collection was a higher prevalence of CWD in mature, male mule deer relative to female or young male age classes (Miller and Conner 2005). It may be that maintaining an age and sex composition in a herd that favors younger (and presumably smaller bodied and smaller antlered) males would contribute to a lower operating level of CWD in the population.

The table below, Table 4, shows the 3-year average CWD prevalence rates of hunter harvested deer from DAU D-27 from 2002 – 2009. Also shown are the associated 95% confidence intervals, number of samples and the state rank in CWD prevalence. Hunter concerns over CWD vary, but reductions in hunter participation in D-27 have not been observed. This is consistent with data reported from other CWD-positive states (Miller 2003, Gigliotti 2004, Holsman and Petchenik 2006).

Table 4: Three-year average CWD prevalence rates in hunter harvested deer from DAU D-27 from 2002 – 2009 along with the associated 95% confidence intervals, number of samples and the state rank of D-27

Years	2003-2005	2004-2006	2005-2007	2006-2008	2007 - 2009
Prevalence	2.0	2.6	2.8	4.7	4.3
Confidence Interval	0.9 - 3.1	1.0 - 4.2	1.1 – 4.4	2.4 - 7.0	1.9- 6.7
No. of Samples	639	380	364	320	279
State Rank	8	5	5	5	

Table Mesa Study

The City of Boulder and CPW conducted a study in southwest Boulder from 2005 – 2007 in order to begin understanding the implications of CWD epidemics for native ecosystems and food webs. In this study, adult mule deer were captured and a tonsil biopsy was taken in order to determine if they were infected with CWD. The deer were marked with ear tags and radio collars and then released. Prevalence among the 46 adult male deer sampled (41%; 95% binomial CI 27–57%) was about twice the prevalence among the 69 adult females (20%; 95% binomial CI 12–32%). This observed prevalence was much higher compared to that in the DAU as a whole as well as previously reported in mule deer populations elsewhere. The annual survival in this study of CWD-infected adult deer (0.53, 95% binomial CI 0.39–0.66; n =57) was markedly lower than survival of uninfected deer (0.82, 95% binomial CI 0.70–0.91; n =57). Estimated average life expectancy for infected deer was only an additional 1.6 years, compared to an additional 5.2 years for uninfected deer (Miller et al. 2008).

CURRENT HERD MANAGEMENT

The previous population objective was 6,800 animals. The previous sex ratio objective was 35 bucks:100 does. The herd has been above both of these objectives for nearly 2 decades. The current post-hunt population estimate is approximately 7,600 animals and the sex ratio is approximately 45 bucks:100 does. In the last decade, the harvest strategy has been tailored towards reducing both the population and the sex ratio, which has resulted in a downward trend in both. It is unlikely that the sex ratio objective can be achieved under the current management strategy and the opportunity to harvest deer on public land has declined markedly during the effort to achieve this objective on a DAU wide scale. It is likely that the continuation of the current harvest strategy will continue to compromise the quality of public land hunting, while not achieving the sex ratio objective throughout the herd.

Current Management Issues and Strategies

Achieving and maintaining desired deer distribution is challenging due to the fact that most areas with high deer densities, in the eastern portion of the DAU, are not accessible to hunting. On lands where hunting is allowed, hunters have expressed concerns of low deer densities and difficulties in finding deer to harvest. We will continue to use Private Land Only (PLO) licenses and the late seasons to focus harvest on high density areas, while exploring opportunities to open more low elevation lands to hunting. Game damage complaints related to deer are infrequent in both GMUs.

High deer densities at low elevations in and around urban areas and county and city parks and open space raise several management concerns. First, deer in southwest Boulder have been shown to have the highest prevalence of CWD ever recorded in Colorado. Second, there is concern expressed by some members of the public that the high numbers of deer present within the city, amongst houses are attracting predators and creating a risk to human and pet safety. Third, the high numbers of deer in the city also lead to a variety of other conflicts including property damage, deer-vehicle collisions, etc. Reducing deer densities within urban areas would be expected to help manage CWD and reduce the frequency of conflicts between people, predators and deer. Currently, there is very little land open to hunting in those areas and deer densities cannot be reduced via hunting.

A petition to create a hunting closure in the Sugarloaf Subdivision of Boulder County was submitted to the Wildlife Commission in 2009. There has been a long history of discussion and litigation between advocates for the closure, Sugarloaf residents that continue to support hunting, CPW staff, Boulder County Commissioners, Boulder County Sheriff's Office and the USFS concerning hunting in this area. The Sugarloaf Subdivision is located approximately five miles west of the city center of Boulder, Colorado. Sugarloaf is centrally located within GMU 29. The Sugarloaf site contains prime deer habitat and is populated throughout the year with mule deer. The area contains small, private parcels averaging less than five acres interspersed with fragmented pieces of USFS and BLM lands. In addition to residential use, Sugarloaf's proximity to Boulder results in frequent use by hikers and mountain bikers on the area's numerous trails. Primary concerns about hunting voiced by local residents focus on: deer hunting by the public on USFS lands, whether safe hunting can occur on relatively small

parcels with ill-defined boundaries, and hunters use of public roads to access public lands. There are also residents in this area that continue to support and advocate for continued hunting in and around the Sugarloaf Community. With regard to wildlife management, continued hunting in the Sugarloaf area is the most effective and least costly method of managing wildlife within CPW's established goals. This is hampered, however, by Boulder County Resolution 80-52 which prohibits the discharge of firearms within a portion of the Sugarloaf subdivision.

PUBLIC INVOLVEMENT

Public input on the management of the Boulder deer herd was solicited through a survey. The public was notified that input was being accepted via postcards sent to everyone who had applied for a deer hunting license in the DAU in the previous 3 years (approximately 4000 postcards were sent out). A press release was sent to local papers, DOW Insider subscribers, the Nature Net Listserve, and the Golden Newsletter Listserve. In addition, an announcement was placed on the CPW website, there was an article in the Boulder Daily Camera, and individuals and groups known to be interested were personally notified.

The public was informed that they could complete the survey (Appendix A) online or contact the terrestrial biologist to have a hard copy of the survey sent to them. They were also informed that background information on the herd could be found on the CPW website. Twenty-one people requested and were sent hard copies of the survey, of which 8 were completed and returned. Eight people commented via an email directly to the terrestrial biologist and 315 people completed the online survey.

Public input was then incorporated into a draft management plan that was posted on the CPW website and sent to local governments and land management agencies for review. Individuals, land management agencies and local governments were invited to submit comments on this draft herd management plan during a 30-day comment period which was held during the month of May, 2012. Five private citizens provided comments on the draft plan. No government or nongovernment organizations provided comments on the draft plan.

Summary of Public Input

Fifty one percent of respondents reported that they lived within the DAU, 45% lived outside the DAU but in Colorado, 4% reported living in another state. Sixty-two percent of respondents had hunted within the DAU; 45% of the respondents that live within the DAU also reported hunting in the DAU; 38% of those who hunt in the DAU also lived in the DAU. In analyzing the results of the survey, respondents were placed into 4 categories, Residents of the DAU that hunted in the DAU (resident hunters – 23% of respondents), residents of the DAU that did not hunt in the DAU (resident non-hunters – 29% of respondents), non-residents that hunted in the DAU (non-resident hunters – 39% of respondents), and non-residents that did not hunt in the DAU (non-resident non-hunters – 9% of respondents).

More people responded that they would like the population to increase than responded that they would like the population to stay the same or decrease. Of the 4 categories of respondents, only the resident non-hunters preferred a decreasing population (Table 5).

Of the people that responded that they would like to see an increase in the deer population the reasons given were that they: 1) didn't see any or many deer while hunting in the unit, 2) would like more hunting and viewing opportunity, or 3) are seeing far fewer deer in the unit than in the past. The reasons given by those who preferred a stable population were that the deer population appeared to be stable and sustainable and provide adequate hunting and viewing opportunity with a manageable amount of conflicts. Respondents who preferred to reduce the population gave the following reasons: 1) the deer cause too many conflicts with people (e.g., damage to landscaping, traffic hazards, are aggressive towards people, attract predators into town), 2) a need to reduce CWD prevalence, 3) an overabundance of deer leading to reduced health of the herd.

Table 5: Percentage of respondents that preferred to increase, maintain or decrease the deer population in D-27. Shaded cells indicate highest response rate.

	Increase Population	Maintain Population	Decrease Population	Don't know/ No opinion
All	44	25	23	8
Hunters	56	25	12	7
Resident	48	34	11	7
Non-resident	61	20	12	7
Non-hunters	24	24	42	9
Resident	22	26	46	7
Non-resident	33	19	30	19
Residents	33	30	30	7
Hunters	48	34	11	7
Non-hunters	22	26	46	7
Non-residents	56	19	15	9
Hunters	61	20	12	7
Non-hunters	33	19	30	19

Fifty-five percent of respondents indicated that they would like the distribution of the deer herd to change (Table 6), the reasons given were: 1) deer densities are too high in urban areas and too low in areas where they are hunted; 2) reduce densities in high CWD prevalence areas. Of the people that responded that they would not like to see a distribution change in the deer population, most people commented that the deer herd should be left to distribute itself.

D-27 Boulder Creek Deer Herd Management Plan

Table 6: Percentage of respondents that would like to see the distribution of the deer population in D-27 change. Shaded cells indicate highest response rate.

	Yes	No
All	55	45
Hunters	53	47
Resident	62	38
Non-resident	48	52
Non-hunters	58	42
Resident	60	40
Non-resident	52	48
Residents	61	39
Hunters	62	38
Non-hunters	60	40
Non-residents	49	51
Hunters	48	52
Non-hunters	52	48

Slightly more people responded that they would like the buck:doe ratio to decrease than responded that they would like the buck:doe ratio to stay the same; far fewer people responded that they would like the ratio to increase. Residents showed a slight preference for the buck:doe ratio to stay the same, while non-residents preferred a decrease (Table 7).

Table 7: Percentage of respondents that preferred to increase, maintain or decrease the buck:doe ratio in D-27. Shaded cells indicate highest response rate.

	Increase Buck: Doe	Maintain Buck: Doe	Decrease Buck: Doe	Not Sure/ No opinion
All	15	31	37	17
Hunters	20	32	39	9
Resident	22	38	34	5
Non-resident	19	29	42	11
Non-hunters	9	27	34	30
Resident	8	33	29	31
Non-resident	12	12	48	27
Residents	14	35	31	20
Hunters	22	38	34	5
Non-hunters	8	33	29	31
Non-residents	17	25	43	15
Hunters	19	29	42	11
Non-hunters	12	12	48	27

The survey asked respondents to indicate which of the following approaches to managing CWD they preferred: reducing the number of bucks in the population, lowering the average age of deer in the population, decreasing the deer population, monitoring CWD but taking no management actions, CWD should not be considered in managing the herd. Shaded cells indicate highest response rate. More than one option could be chosen. The strategy that received the most responses was to monitor CWD but take no management

actions. Non-hunters showed a clear preference for decreasing the overall deer population, while hunters showed a clear preference for monitoring only (Table 8).

Table 8: Percentage of respondents that preferred the following Chronic Wasting Disease (CWD) management strategies: reducing the number of bucks in the population, lowering the average age of deer in the population, decreasing the deer population, monitoring CWD but taking no management actions, CWD should not be considered in managing the herd. The shaded cells indicate highest response rate. Respondents were allowed to select more than one strategy.

	Fewer Bucks	Lower Ave Age	Decrease Population	Monitor only	CWD not Considered
All	14	24	29	39	7
Hunters	15	25	19	45	6
Resident	15	24	23	45	5
Non-resident	15	25	17	45	6
Non-hunters	13	23	45	29	9
Resident	13	23	48	28	8
Non-resident	14	25	39	32	14
Residents	13	23	37	35	6
Hunters	15	24	23	45	5
Non-hunters	13	23	48	28	8
Non-residents	15	25	21	42	7
Hunters	15	25	17	45	6
Non-hunters	14	25	39	32	14

In addition to the survey summarized above, there were several additional comments provided on the Boulder Creek deer herd (including the draft comment period). Common themes were:

- There are an overabundance of deer on private lands and city and county parks and open space and not enough deer on public lands where hunting is allowed.
- More private and open space areas need to be open to hunting in order to reduce densities in town and manage CWD.
- Hunting should not be allowed in populated areas due to safety concerns.
- The number of large bucks has decreased in recent years.
- Something needs to be done to control CWD.
- Let nature manage the herd instead of trying to redistribute deer or manage CWD.
- There has been a decline in the deer population of Boulder County and all hunting in the area needs to be stopped.
- The CPW should manage the deer based on data and professional judgment and stop asking for public input.
- Thank you for asking for input on deer management.
- There are a lot of ATV, hikers and bikers out there during hunting season making it difficult to hunt on some areas where hunting is allowed.
- Deer are a public safety risk because they attract predators.

MANAGEMENT ALTERNATIVES AND NEW OBJECTIVES

Population Objective

The previous population objective was expressed as a point objective (6,800 deer). Population objectives are now given as ranges in recognition of the difficulties of precisely estimating and managing populations and the variation inherent in range capacity due to changes in climate patterns, land management and habitat (e.g., fires, winter weather events, droughts). The intention is to manage for the midpoint of the selected objective range during most years. For the past decade, this population has been managed to bring the population down towards the previous population objective. As a result, the number of licenses available has been high relative to demand (there are leftover licenses for almost all hunts in this DAU). Under all of the alternatives below, when the population objective is reached, lower harvest will be required to maintain the population, so license numbers for both bucks and does will need to be decreased.

Alternative 1: 5,000 – 6,000 deer post season

The midpoint of this alternative (5,500) is approximately 20% lower than the previous population objective. A 28% reduction in deer numbers would be required to reach this midpoint. Given the current land management mosaic in the DAU, it is doubtful that a reduction of this magnitude could be achieved through hunting alone. Under the current land management situation, increased hunting is expected to significantly reduce deer densities on public lands where hunting is allowed, while only slightly reducing densities on lands where hunting is not allowed. A reduction of this magnitude in deer numbers may lead to a decrease in human / deer conflicts. However, the resulting low deer numbers on huntable lands would result in a large decrease in satisfaction for hunters and wildlife viewers outside of refuges. If this alternative is selected there will be a need to expand hunting opportunities into refuge areas to balance harvest with deer densities. In addition, license sales could be increased by offering more List B and List C licenses in both GMUs.

Alternative 2: 6,000 – 7,500 deer post season

This alternative is roughly equivalent to the previous population objective and, therefore, represents no significant change. The current deer population is slightly above the upper end of this range, so this alternative would result in a decrease in current deer numbers down to the midpoint of the range (a 10% reduction). It is expected that this alternative can be achieved through hunting without additional efforts to change deer distributions within the unit. However, changes to deer distribution would still be desirable to reduce human/deer conflicts in and around refuge areas and to increase hunting and viewing satisfaction outside of refuges.

Alternative 3: 7,000 – 9,000 deer post season

The midpoint of this alternative is approximately 20% higher than the previous objective and 5% higher than the current population estimate. Allowing the herd to increase slightly would provide more deer for hunters to harvest and, therefore, increase hunter satisfaction; however, an increase in deer numbers is expected to increase deer related human conflicts slightly.

Herd Composition - Sex Ratios

The previous sex ratio objective was expressed as a point objective (35 bucks:100 does). Sex ratio objectives are now given as ranges in recognition of the difficulties of precisely estimating and managing populations. The intention is to manage for the midpoint of the selected objective range during most years, while allowing some flexibility to respond to changes in habitat, land ownership, etc. All three alternatives, below, allow more than enough bucks for breeding purposes. For the past decade, this population has been managed to bring the sex ratio down towards objective. As a result, the number of buck licenses issued has been high relative to demand (there are leftover licenses for almost all hunts in this DAU). Under all of the alternatives, when the population objective is reached, lower harvest will be required to maintain the population, so buck license numbers will need to be decreased. One consideration in selecting a sex ratio objective is CWD. Mature male mule deer have a higher prevalence of CWD than female and young male age classes (Miller and Conner 2005).

Alternative 1: 20 – 25 Bucks:100 Does

This alternative would result in a population with fewer bucks and younger, smaller antlered bucks than the other 2 options. It would also allow for the most opportunity for antlered hunting and least opportunity for buck viewing. Hunters would experience more hunters afield and probably see fewer bucks compared to Alternatives 2 and 3.

This alternative is lower than the previous sex ratio objective and lower than the current estimated sex ratio. This alternative would require a 20-25 bucks:100 does reduction from the current sex ratio. Currently, much of the buck population is located in areas where hunting is prohibited; it is, therefore, very unlikely that a sex ratio of 20-25 bucks:100 does could be achieved through hunting on a DAU-wide scale unless hunters are granted access to areas currently closed to hunting.

Based on current knowledge, this alternative is expected to result in a lower proportion of herd infected with CWD due to a younger male age structure and lower proportion of bucks in the herd.

Alternative 2: 25 – 30 Bucks:100 Does

This alternative is slightly lower than the previous objective and 15-20 buck:100 does lower than the current sex ratio estimate. This alternative would require an increase in buck hunting opportunity as more bucks would need to be harvested to achieve it. Compared to the other 2 alternatives, this alternative would result in an intermediate level of buck hunting opportunity, buck viewing opportunity, buck age structure and proportion of the population infected with CWD.

Alternative 3: 35 – 40 Bucks:100 Does

This alternative represents the highest buck:doe ratio of the three alternatives, and would result in more older, large-antlered bucks than other 2 alternatives. It would also allow for the least opportunity for antlered hunting and most opportunity for buck viewing at a given population size. Hunters could expect to see more bucks and fewer hunters while afield as compared to the other 2 alternatives.

This alternative has the previous objective as the lower end of the range and thus represents a slight increase in the objective. The population is currently over this objective at an estimated 45 bucks per 100 does. This alternative would, therefore, require a 5 - 10 buck:100 doe decrease.

Based on current knowledge, this alternative is expected to result in a higher proportion of the herd infected with CWD due to the older male age structure of the herd and the higher proportion of bucks in the herd.

New Objectives

Population Alternative 2: 6,000-7,500

Herd Composition Alternative 2: 25-30 bucks:100 does

The new alternatives, *approved by the Colorado Parks and Wildlife Commission on December 7th, 2012*, are near current population and sex ratio objectives, however, both represent some level of decrease from recent post-hunt estimates. The new population objective will result in a small reduction (~10%) from the 2010 post-hunt estimate, whereas, the new herd composition alternative represents a significant reduction from the 2010 post-hunt estimate. These alternatives were selected in an effort to find a balance between hunting, wildlife viewing opportunities and CWD management. The new objectives are obtainable on public and private lands where hunting is allowed, however they may not be completely met in refuge areas.

Monitoring and Managing Herd Composition

To monitor progress towards the new herd composition objective, the observed number of bucks:100 does will be measured collectively for the entire DAU and also monitored for 2-3 land ownership/management strata to compare hunted public and private lands with non-hunted refuge areas. In an effort to shift deer distribution away from areas experiencing deer-related conflicts to public land outside of refuges, observed sex ratios on hunted lands should not be driven below the objective range in an effort to compensate for high buck:doe ratios on refuge lands. This strategy is supported by public comments that there is an overabundance of deer in areas closed to hunting, but lower deer densities and fewer bucks in the western portion of the DAU where most hunting recreation occurs.

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APPENDIX A: PUBLIC INPUT SURVEY



Dear Interested Citizen:

The Colorado Division of Wildlife (DOW) is interested in your input on the management of the Boulder Deer Herd, which inhabit Game Management Units (GMUs) 29 and 38. In Colorado, deer populations are managed for specific geographic areas with a deer management plan. Deer management plans describe deer populations and management histories, population objectives and management strategies. DOW is interested in incorporating the concerns and desires of the public with the biological characteristics of the Boulder deer herd in the deer management plan it is developing for the next 10 years. Public input is, therefore, a very important part of the DAU planning process.

Please take a few minutes to fill out this short survey. The information you provide will help DOW develop objectives and management strategies for the deer in parts of Clear Creek, Jefferson, Gilpin, and Boulder counties.

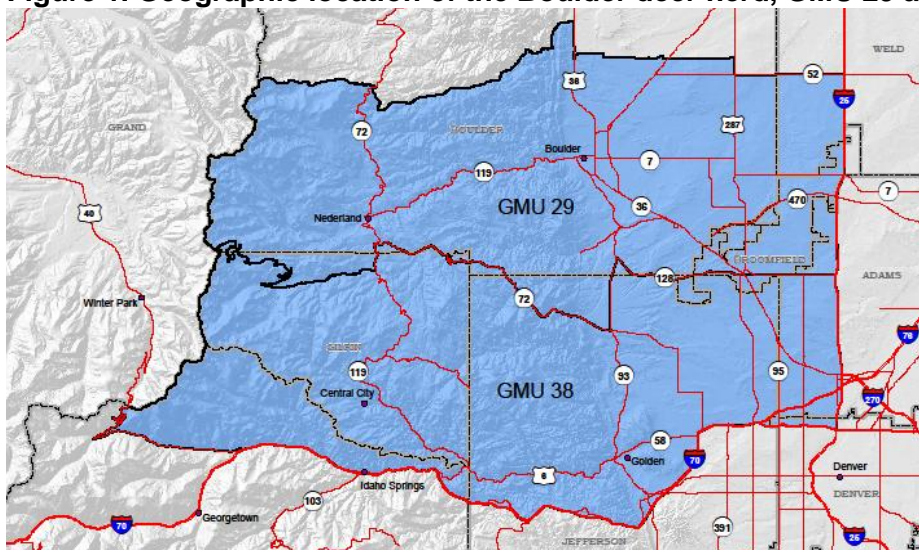
Thank you for your participation.

Sincerely,

Sherry Huwer
Terrestrial Biologist
Colorado Division of Wildlife
6060 Broadway
Denver, CO 80216
Telephone: (303) 291-7368
sherry.huwer@state.co.us

The Boulder deer herd is located in central Colorado in portions of Clear Creek, Jefferson, Gilpin, and Boulder counties. The herd occupies GMUs 29 and 38 (Figure 1). The herd area is bounded by I 70 and US 40 on the south; the Continental Divide on the west; the Brainard Lake Road and Left hand Canyon on the north; and I-25 on the east. Municipalities include Denver, Boulder, Golden, Nederland, Central City, Black Hawk, Idaho Springs, and Jamestown. Much of the central portion of the herd area covers unincorporated subdivisions.

Figure 1. Geographic location of the Boulder deer herd, GMU 29 and 38



1. What is your association with this herd? (Check all that apply.)

- Live full time in the area of the Boulder deer herd
 - Live part time in the area of the Boulder deer herd
 - Vacation in the area of the Boulder deer herd
 - Hunt in the area of the Boulder deer herd
 - Participate in non-hunting recreation in the area of the Boulder deer herd
- Other (please specify) _____

2. What is your zip code? _____

3. How would you describe the area where you live?

- Rural area on the plains
- Rural area in the foothills/mountains
- Within a small town in the foothills/mountains (Pop. less than 25,000)
- Within a small town on the plains (Pop. less than 25,000)
- Suburban area on the edge of a town or city
- Within an urban area (Pop. more than 25,000)

The Division of Wildlife manages deer herds to provide the public with hunting and viewing opportunities while minimizing conflicts and damage caused by the herd. In order to do this, a balance is needed in both the total number of deer and the proportion of bucks in the herd. Deer management plans (DAU plans), therefore, define 1) a population objective and 2) a buck to doe ratio objective (see below).

Population objectives: The Division strives to manage deer populations within both the biological and social carrying capacity of the herd. The biological carrying capacity is the number of animals that can be supported by the available habitat. The social carrying capacity is the number that will be tolerated by the people who are impacted by the herd when deer populations are at optimal levels, people can enjoy viewing, photographing and hunting deer while deer/human conflicts are minimized. If deer numbers are too low, it is difficult for viewers and hunters to find deer. If deer numbers are too high conflicts arise between deer and people due to, deer/vehicle collisions, impacts to gardens or yards, damage to agriculture, encounters between people/pets and aggressive deer, etc.

4. How would you like the deer herd to change in size? Check one.

- Increase greatly
- Increase
- Stay the same
- Decrease
- Decrease greatly
- Don't Know/No opinion

Why?

5. Would you like the distribution of deer to change? (e.g., less deer in certain areas, more deer in other areas.)

- Yes
- No

Where? Why?

Buck to Doe Ratio Objective: Deer herds can be managed to maximize hunting opportunity or to maximize the body/antler size of bucks available for harvest. If the herd is managed to maximize hunting opportunity, more buck-only harvest permits are made available to hunters and hunters will be able to draw a buck-only permit in more years. However, this system also increases the harvest of bucks, resulting in fewer bucks and fewer large/old bucks in the herd. If a herd is managed to maximize the antler/body size of the bucks, fewer buck licenses are issued each year. As a result, the average body/antler size of bucks harvested will be larger, but, hunters may not be able to draw a buck tag in the area every year. There is a tradeoff between the number of licenses available to hunters and the body/antler size of bucks available for hunters. Currently, GMUs 29 and 38 are managed for moderate levels of both opportunity and buck size.

6. How do you feel GMUs 29 and 38 should be managed?

- No change. Maintain moderate levels of opportunity and quality.
- Increase buck body/antler size.
- Increase hunting opportunity.
- I am not sure.
- I have no opinion.

Chronic Wasting Disease: Chronic wasting disease (CWD) is a disease of deer and elk that causes behavioral changes and progressive loss of body condition, leading to death. There are no known treatments for CWD in deer, or proven management strategies for controlling the disease.

Currently 4-5% of the deer in the Boulder deer herd are infected with CWD. In a study in southwest Boulder, 41% of adult male and 20% of adult female deer were infected with CWD. This is the highest CWD infection rate yet recorded in Colorado. This study also showed a decrease in the survival and life expectancy of CWD-positive deer

CWD surveillance over the last decade has shown that mature male deer have higher CWD rates than female or younger deer. It may be that maintaining a younger herd with fewer males would result in lower CWD rates.

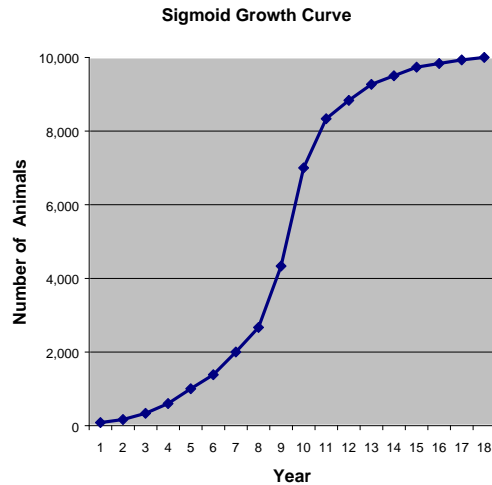
7. Should CWD be considered when determining the population and sex ratio objectives for this herd?

- Yes, the number of bucks should be maintained at a lower level because bucks have higher rates of CWD than does.
 - Yes, the population should be managed for a lower average age because older deer have higher rates of CWD than younger deer.
 - Yes, the population should be reduced to minimize the number of infected deer.
 - No, but CWD should continue to be monitored, though it should not affect management.
 - No, CWD should not be considered when managing this herd.
- Other (please specify)

8. Please provide additional comments on the future management of the Boulder deer herd below (please attach page if necessary).

APPENDIX B: POPULATION DYNAMICS, MAXIMUM SUSTAINED YIELD, AND DENSITY DEPENDENCE

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



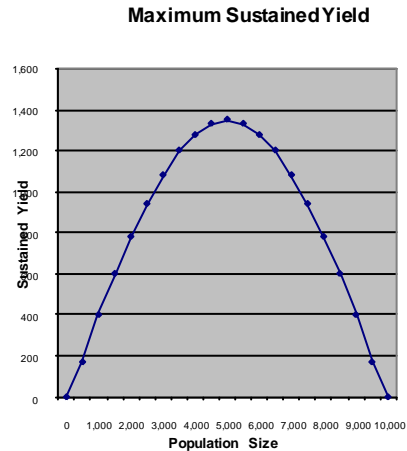
The second phase occurs when the population number is at a moderate level. This phase is characterized by high reproductive and survival rates. During this phase, food, cover, water and space are not a limiting factor. During this phase animals such as white-tailed deer have been known to successfully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

The final or third phase occurs when the habitat becomes too crowded or habitat conditions become less favorable. During this phase the quantity and quality of food, water, cover and space become scarce due to the competition with other members of the population. These types of factors that increasingly limit productivity and survival at higher population densities are known as density-dependent effects. During this phase, for example, white-tailed deer fawns can no longer find enough food to grow to achieve a critical minimum weight that allows them to reproduce; adult does will usually only produce 1-3 fawns; and survival of all deer (bucks, does and fawns) will decrease. During severe winters, large die-offs can occur due to the crowding and lack of food. The first to die during these situations are fawns, then bucks, followed by adult does. Severe winters affect future buck:doe ratios by favoring more does and fewer bucks in the population. Also, because the quality of a buck's antlers is somewhat dependent upon the quantity and quality of his diet, antlers development is diminished. If the population continues to grow it will eventually reach a point called "K" or the maximum carrying capacity. At this point, the population reaches an "equilibrium" with the habitat. The number of births each year equal the number of deaths, therefore, to maintain the population at this level would not allow for any "hunnable surplus." The animals in the population would be in relatively poor body condition, habitat condition would be

degraded from over-use, and when a severe winter or other catastrophic event occurs, a large die-off is inevitable.

What does all this mean to the management of Colorado's big game herds? It means that if we attempt to manage for healthy big game herds that are being limited by density-dependent effects, we should attempt to hold the populations more towards the middle of the "sigmoid growth curve." Biologists call this point of inflection of the sigmoid growth curve the point of "MSY" or "maximum sustained yield." In the example below, MSY, which is approximately half the maximum population size or "K", would be 5,000 animals. At this level, the population should provide the maximum production, survival, and available surplus animals for hunter harvest. Also, at this level, range habitat condition should be good to excellent and range trend should be stable to improving. Game damage problems should be lower and economic return to the local and state economy should be higher. This population level should produce a "win - win" situation to balance sportsmen and private landowner concerns.

A graph of a hypothetical deer population showing sustained yield (harvest) potential vs. population size is shown (right). Notice that as the population increases from 0 to 5,000 deer, the harvest also increases. However, when the population reaches 5,000 or "MSY", food, water and cover becomes scarce and the harvest potential decreases. Finally, when the population reaches the maximum carrying capacity or "K" (10,000 deer in this example), the harvest potential will be reduced to zero. Also, notice that it is possible to harvest exactly the same number of deer each year with 3,000 or 7,000 deer in the population. This phenomenon occurs because the population of 3,000 deer has a much higher survival and reproductive rate compared to the population of 7,000 deer. However, at the 3,000 deer level, there will be less game damage and resource degradation but lower watchable wildlife values.



Actually managing deer and elk populations for MSY on a DAU basis is difficult if not impossible due to the amount of detailed biological information about habitat and population size required. Additionally, carrying capacity is not static, the complex and dynamic nature of the environment cause carrying capacity to vary seasonally, annually, and trend over time. In most cases we would not desire true MSY management even if possible because of the potential for overharvest and the number of mature of bulls and bucks is minimized because harvest reduces recruitment to older age classes. However, the concept of MSY is useful for understanding how reducing densities and pushing asymptotic populations towards the inflection point can stimulate productivity and increase harvest yields. Knowing the exact point of MSY is not necessary if the goal is to conservatively reduce population size to increase yield. Long-term harvest data can be used to gauge the effectiveness of reduced population size on harvest yield.

Research in several studies in Colorado has shown that density-dependent winter fawn survival is the mechanism that limits mule deer population size because winter forage is limiting (Bartmann et al. 1992, Bishop et al. 2009). Adult doe survival and reproduction remain high but winter fawn survival is lower at higher population sizes relative to what the winter habitat can support. The intuition to restrict, or even eliminate, female harvest in populations where productivity is low and when populations are below DAU plan objectives is counterproductive and creates a management paradox. In that, for populations limited by density dependent processes, this “hands-off” type of management simply exacerbates and perpetuates the problem of the population being resource limited, and countermands the goals and objectives of the DAU plan. As Bartmann et al. (1992) suggest, because of density-dependent processes, it would be counterproductive to reduce female harvest when juvenile survival is low and increase harvest when survival is high. Instead, a moderate level of female harvest helps to maintain the population below habitat carrying capacity and should result in improved survival and recruitment of fawns. Increased fawn recruitment allows for more buck hunting opportunity and a more resilient population.

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

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