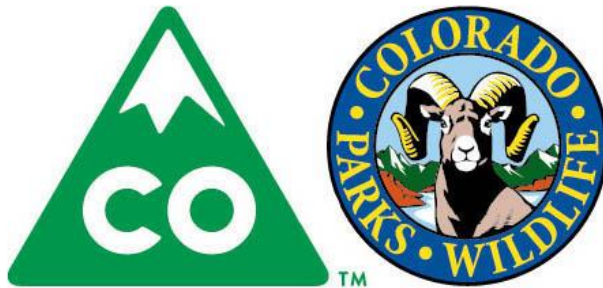


ARIKAREE DEER MANAGEMENT PLAN D-55

**Game Management Units
101 & 102**



January 2018

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HERD MANAGEMENT PLAN – D-55 (ARIKAREE) EXECUTIVE SUMMARY

GMU's: 101 and 102

Land Ownership: 99% Private, 1% State

Post-Season Population:

Current Objective – 1,900–2,100; 2015 Estimate – 2,356; Preferred Objective – 2,300–2,700

Post-Season Sex Ratio (Bucks/100 Does):

Current Objective – 35–40; 2015 Observed – 45; 2015 Modeled – 42; Preferred Objective – 35–40

Figure I. D-55 Post-Season Population Estimate

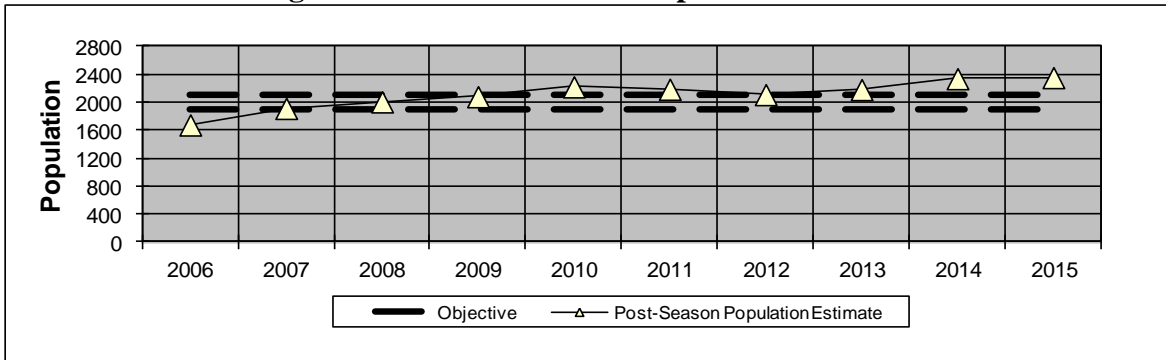


Figure II. D-55 Harvest

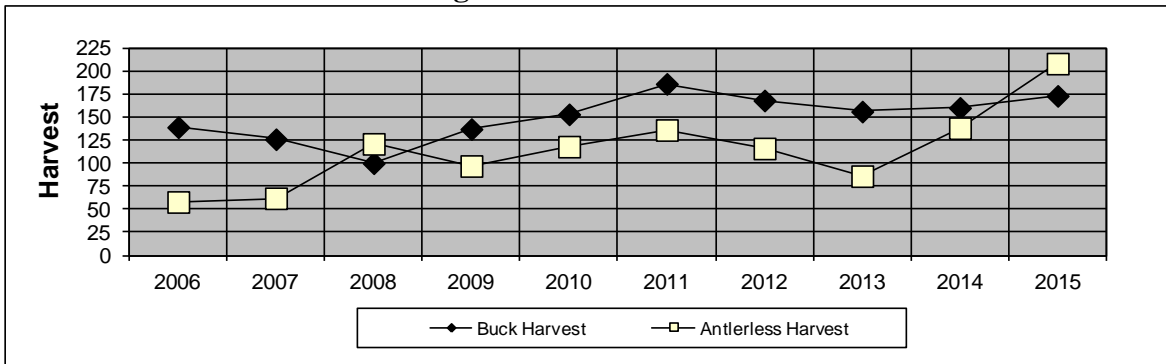
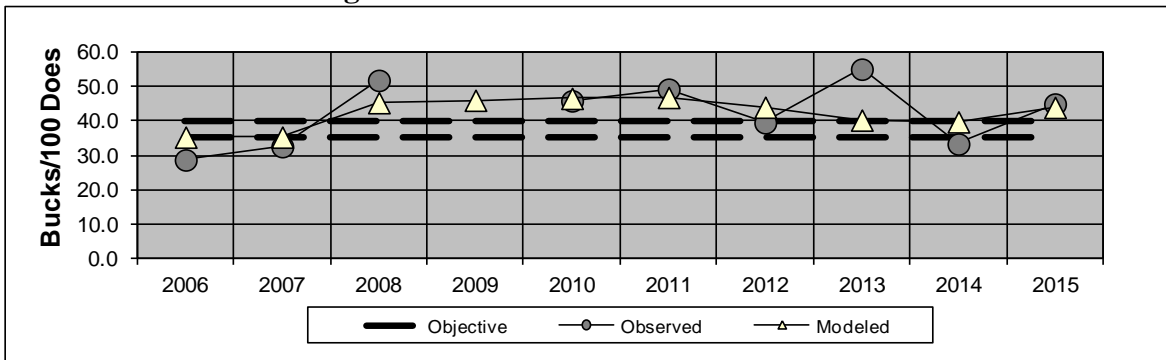


Figure III. D-55 Post-Season Sex Ratios



Background

The Arickaree deer management area was created in 2002. At that time, the Division established interim population and sex ratio objectives of 1,600 deer and 40 bucks/100 does, respectively. Over the past decade, the Arickaree has been managed under the current Herd Management Plan objectives of 1,900–2,100 deer and 35–40 bucks/100 does.

Much of the focus in D-55, the Arikaree deer herd, has been to provide quality recreational hunting opportunities by maintaining a high buck/doe ratio and a higher proportion of 3+ year-old bucks in the population. Since 2006, the buck/doe ratio has averaged 42 bucks/100 does ranging from 29 bucks/100 does observed in 2006 to 55 bucks/100 does observed in 2013. Estimated deer numbers for the Arikaree deer herd have increased over the last decade from a low of approximately 1,680 in 2006 to a high of 2,356 in 2015. The 5-year population estimate average for this deer herd is 2,160 deer. Observed fawn/doe ratios have varied from a low of 54 fawns/100 does in 2012 to a high of 76 fawns/100 does in 2014 and has averaged 65 fawns/100 does over the past decade.

Significant Issues

The Arikaree deer herd provides quality deer hunting opportunities. Public comments emphasized that this deer herd should continue to be managed for quality hunting opportunities and expressed an interest to increase the long-term population objective. Chronic Wasting Disease (CWD) was first discovered during the 2005 regular plains rifle season. Testing hunter harvested deer will continue to be used to monitor the disease in this deer herd.

Concerns have been raised about the impacts that the expanding white-tailed deer population may have on mule deer. To address these concerns, the Colorado Division of Parks and Wildlife (CPW) created a white-tailed deer only season in 2003. Today, season choice whitetail licenses are used to maintain relatively equal numbers of white-tailed deer and mule deer in the Arikaree deer herd. These whitetail licenses have been successful by providing additional hunter recreation without the risk of over harvesting mule deer.

Management Alternatives

CPW's preferred objectives for D-55 are to manage for a post-season population of 2,300–2,700 with an observed post-season herd composition 35–40 bucks/100 does. Public comments strongly supported increasing the deer population and continuing to manage the Arikaree deer herd for quality buck hunting opportunities. Discussions with landowners, hunters, and CPW field personnel indicate that habitat conditions in D-55 can support increased deer numbers. Under this alternative, hunters can expect a slight increase in hunting opportunities to maintain the population at objective. The 2015 post-season observed sex ratio was 45 bucks/100 does. Therefore, slight increases in buck licenses will be needed to maintain the preferred objective of 35–40 bucks/100 does. Other alternatives that were considered in this Herd Management Plan are: 1) reduce the population by 25% to 1,300–1,700 deer, 2) maintain the population at the current level of 1,900–2,100 deer, and 3) reduce the sex ratio objective to 25–30 bucks/100 does.

This Herd Management Plan was approved by the Colorado Wildlife Commission on January 10, 2018.

ARIKAREE DEER MANAGEMENT PLAN D-55 (GMUs 101 & 102)

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INTRODUCTION AND PURPOSE

Colorado Parks and Wildlife (CPW) manages big game for the use, benefit, and enjoyment of the people of the state in accordance with CPW's Strategic Plan and mandates from the 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. To manage the state's big game populations, CPW uses a "management by objective" approach (Figure 1).

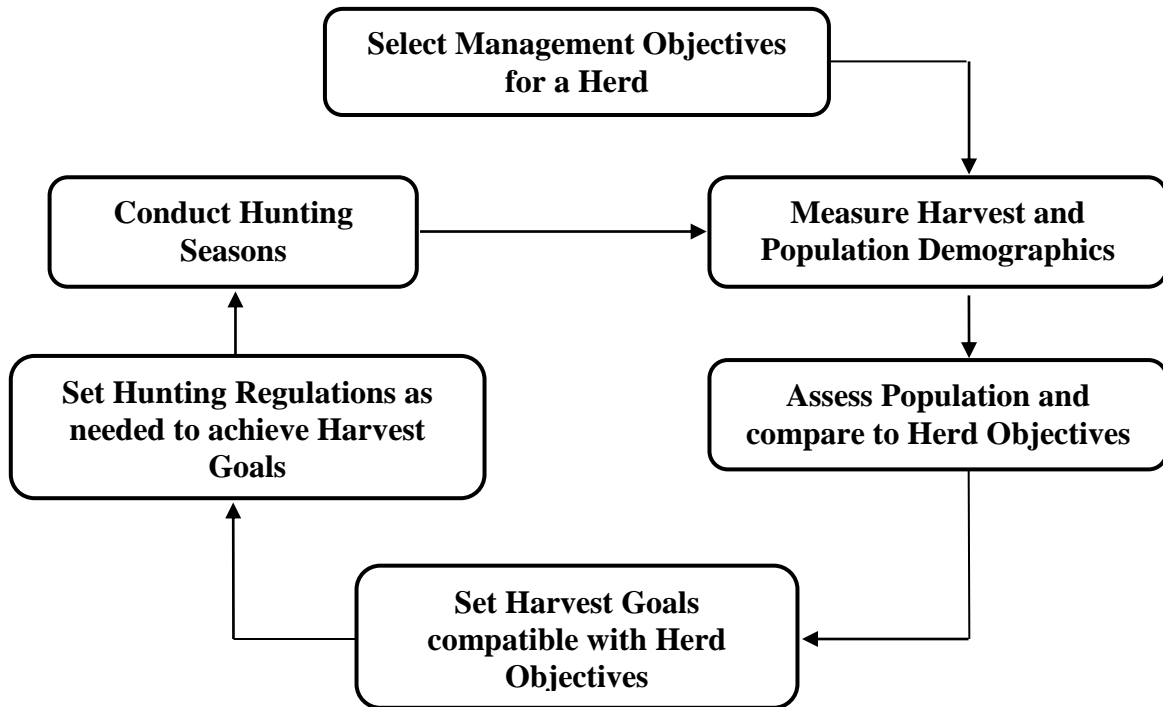


Figure 1. Management by Objective process used by Colorado Parks and Wildlife to manage big game populations by management areas.

Big game populations are managed to achieve population and sex ratio objectives established for a herd. A herd management area is the geographic area that represents the year-around range of a big game herd and includes the area where the majority of the animals in a herd are born, live, and die either as a result of hunter harvest or natural causes. Herd management area boundaries are delineated to minimize interchange of animals between adjacent herds. A herd management area may be divided into several Game Management Units (GMUs) to distribute hunters and harvest.

Management decisions within a herd are based on a Herd Management Plan. The purpose of a Herd Management Plan is to establish population and sex ratio (i.e., the number of males per 100 females) objectives for the herd. The Herd Management Plan also describes the strategies and techniques that will be used to reach these objectives. During the herd management planning process, public input is solicited and collected

through questionnaires, public meetings, and comments to the CPW staff and the Wildlife Commission. The intentions of CPW are integrated with the concerns and ideas of various land management agencies and interested publics in determining how a big game herd should be managed. In preparing a Herd Management Plan, agency personnel attempt to balance the biological capabilities of the herd and its habitat with the public's demand for wildlife recreational opportunities.

The Herd Management Plan 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. Based on these goals, specific removal strategies are made for the coming year to either maintain the population or move it towards the established objectives (e.g., license numbers and allocation are set). Hunting seasons are then conducted and evaluated and the annual management cycle begins again (Figure 1).

The purpose of this Herd Management Plan is to set population and sex ratio objectives for the South Tablelands deer herd. Herd Management Plans are approved by the Wildlife Commission and are reviewed and updated approximately every 10 years.

ARIKAREE DEER MANAGEMENT AREA DESCRIPTION

Location

The Arikaree deer management area encompasses approximately 1,424 mi² in Washington and Yuma Counties in northeast Colorado and includes GMUs 101 & 102 (Figure 2). This area is bounded on the north by US Highway 34; on the east by the Nebraska and Kansas borders; on the south by Colorado Highway 36; and on the west by Colorado Highway 61.

Habitat Composition

There are several habitat types within the Arikaree, including dry cropland, irrigated cropland, short-grass prairie, sandsage/mid-grass prairie, cottonwood-riparian bottoms, dry canyons, and Conservation Reserve Program (CRP) lands. Over 50% of the Arikaree is comprised of sandsage/mid-grass prairie sandhills. The sandsage/mid-grass prairie is part of the sandhill complex which runs through this area. The sandsage/mid-grass prairie has remained stable with little being broken out for farming or development. Deer habitat quality has increased across large portions of the area due to CRP lands, managed grazing systems within the sandsage rangelands, and changing cropping practices that emphasize dryland corn and domestic sunflowers as an alternative to a wheat-fallow system. There are 5 primary riparian systems within the Arikaree; the North Fork of the Republican River, Dry Willow Creek, Horse Creek, Black Wolf Creek, and the Arikaree River.

Climate

The climate in the Arikaree is characterized by hot, dry summers and recently, relatively mild winters. Annual precipitation ranges from 13-16 inches, which occurs primarily during intense summer thunderstorms. Snowfall can be variable in the area, but recent winters have been dry with moderate temperatures.

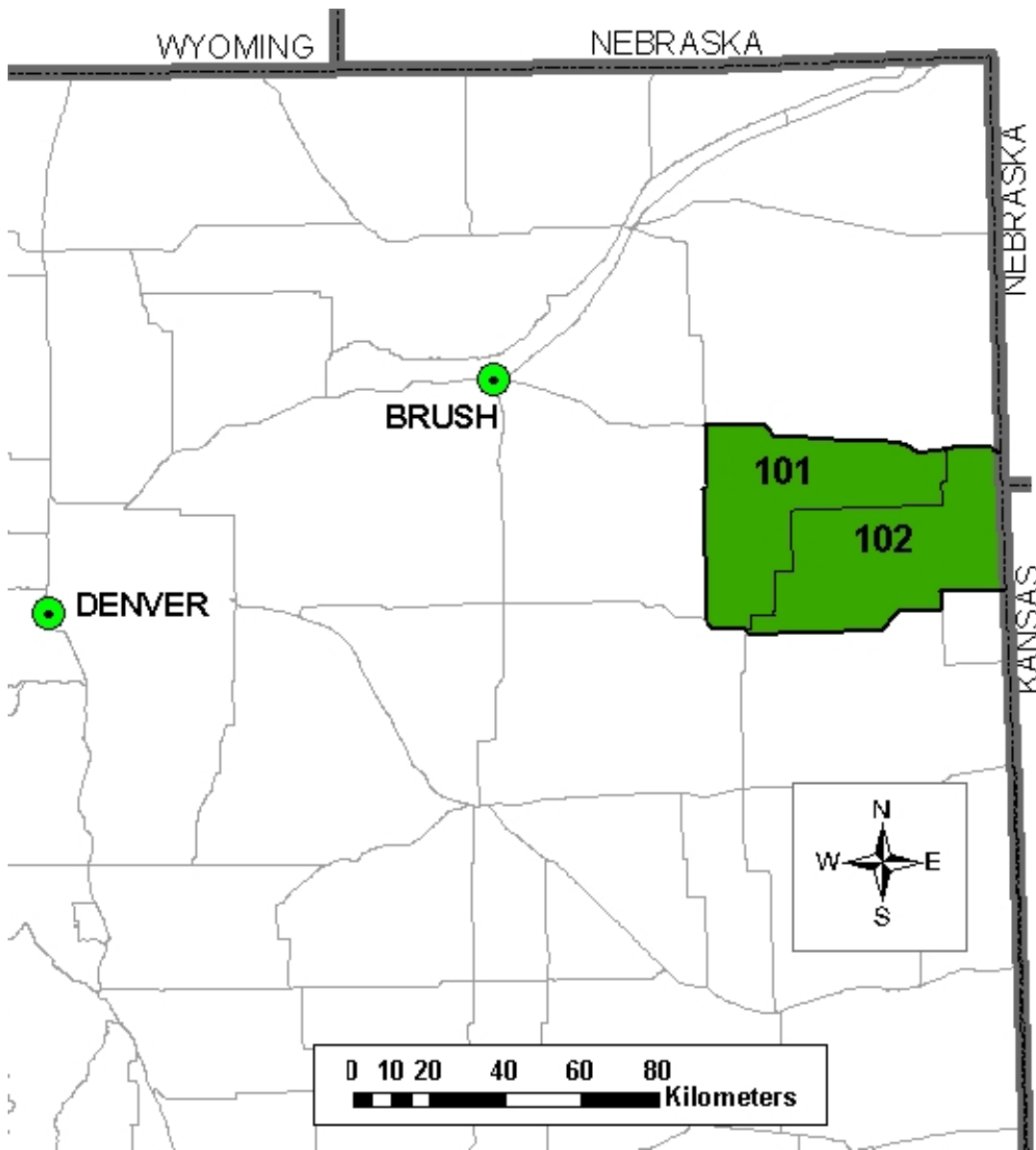


Figure 2. Geographic location of the Arikaree deer management area and its associated Game Management Units in northeast Colorado.

Land Use

Land ownership patterns within the Arikaree deer management area are typical of eastern Colorado with the majority of the area being in private ownership. Public lands comprise about 1% of this management area and are owned or managed by the CPW. Land use within the Arikaree is almost completely based on agricultural production. Grazing by livestock is the primary influence on short-grass and sandsage/mid-grass prairie condition. Center pivot irrigation occurs throughout the area with corn, wheat, and alfalfa being the primary irrigated crops.

Deer Distribution

Both mule deer and white-tailed deer live throughout the Arikaree. Mule deer are commonly found in all habitat types, although densities are highest in sandsage rangeland/irrigated cropland settings and within large complexes of CRP lands. White-tailed deer can also be found in any habitat type and concentrations are highest along the Arikaree River and its' tributaries and the North Fork of the Republican River.

HERD MANAGEMENT HISTORY

Previously, the Arikaree, D-55, D-54, and D-5 were managed as one deer management area, bisected by the South Platte River management area. In 2001, the GMUs north of the South Platte River were designated as D-5 and the units south of the South Platte River (93, 97, 98, 99, 100, 101, & 102) were designated as D-54, in an effort to better estimate and survey the deer populations. In 2002, D-54 was reduced in size by designating GMUs 101 and 102 as a separate deer management area, D-55, to improve data collection and computer modeling for both management areas. This Arikaree (D-55) Herd Management Plan addresses the deer herd within GMUs 101 and 102.

Post-Season Population Size

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 consistently count 100% of the animals. High-tech methods using infrared sensing have also met with limited success. CPW recognizes this as a serious challenge in our management efforts. CPW attempts to minimize this by using the latest technology and inventory methodology available. Most deer population estimates are derived using computer model simulations that involve estimates of mortality rates, hunter harvest, and annual production. These simulations are then adjusted to align on measured post-season age and sex ratio classification counts and, in some cases, population estimates derived from line transect and quadrat surveys.

CPW recognizes the limitation of the system and strives to do the best job with the resources available. As better information becomes available, such as new estimates of survival/mortality, wounding loss, sex ratios, density, or new modeling techniques and software, CPW will evaluate these new techniques and information and use them where appropriate. The use of new information may result in substantial changes in the population estimate or management strategies. Therefore, the population estimate presented in this document should be used as an index or as trend data and not as a completely accurate enumeration of the animals in this management area.

Estimated deer numbers for the Arikaree deer herd have increased over the last decade from a low of approximately 1,680 in 2006 to a high of 2,380 in 2014 (Figure 3). The deer herd has experienced normal population fluctuations associated with weather conditions, hunting pressure, and population dynamics. The 5 and 10-year population estimate averages are 2,285 and 2,160 deer, respectively.

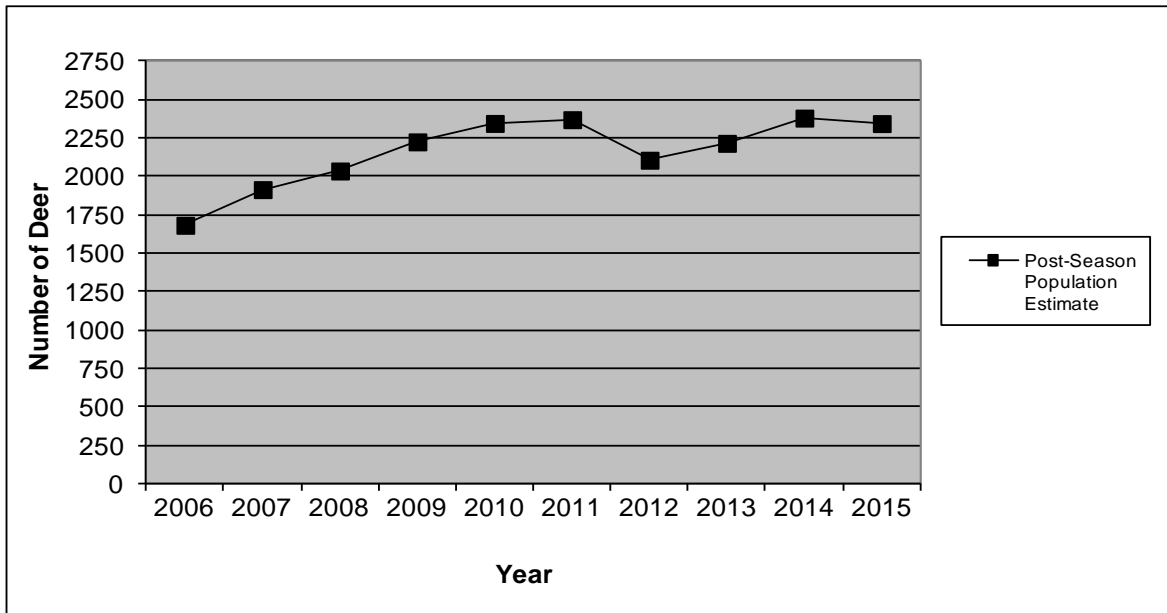


Figure 3. Post-season deer population estimates for the Arikaree deer herd, 2006–2015.

White-tailed Deer Management

Until the mid-1900s, Colorado’s eastern plains were almost exclusively populated by mule deer. White-tailed deer became established in eastern Colorado in the late 1950s and have continued to increase in numbers and distribution. During this time, while white-tailed deer numbers were increasing, hunters continued to prefer mule deer. Also, the preference for open habitat and the escape behavior of mule deer make them more vulnerable to harvest by hunters using high-powered rifles than white-tailed deer.

The disproportionate hunting pressure on mule deer and changes in habitat resulted in deer species composition shifting in favor of white-tailed deer. Commonly, white-tailed deer are observed miles from traditional whitetail habitat. Over the past decade, white-tailed deer have been managed to maintain a relatively equal proportion to mule deer in this deer herd. In 2015, the overall proportion of mule deer to white-tailed deer classified during aerial surveys was 58% mule deer and 42% white-tailed deer and the proportion by GMU was 64% mule deer and 36% white-tailed deer in GMU 101 and 57% mule deer and 43% white-tailed deer in GMU 102.

In an effort to address the expanding white-tailed deer population, CPW created a white-tailed deer only season in 2003. At that time, hunting for white-tailed deer was allowed in GMU 101 and GMUs 93 and 98 in D-54 to the north. The primary objective of the whitetail only season was to increase the harvest of white-tailed deer to minimize further expansion into traditional mule deer habitats. Since 2012, season choice white-tailed deer only licenses have been used that incorporates all seasons and methods of take. The season choice whitetail only licenses have been a success by providing additional whitetail harvest for managing white-tailed deer numbers in the Arikaree deer herd.

Post-Season Herd Composition

Sex ratios, expressed as bucks per 100 does, and age ratios, expressed as fawns per 100 does, have been estimated by classifying deer with ground and aerial surveys. Aerial surveys are the preferred method, because more animals can be classified across a large area in a shorter amount of time reducing bias often associated with ground counts, however higher costs do not allow their use every year. In some years, surveys are conducted by district wildlife managers and biologists on the ground during a specified time frame. Observed sex and age ratios, along with harvest estimates are used in computer simulation models to estimate population, determine license allocation, predict population changes, and assess impacts of reported harvest.

Much of the focus in this deer herd has been to provide quality recreational hunting opportunities by maintaining a high buck/doe ratio and a higher proportion of 3+ year-old bucks in the population. The current post-season management objective is to maintain this deer herd at a sex ratio objective of 35–40 bucks/100 does. Since 2006, the buck/doe ratio has averaged 42 bucks/100 does ranging from 29 bucks/100 does observed in 2006 to 55 bucks/100 does observed in 2013 (Figure 4).

Over the past 10 years, CPW has conducted seven aerial surveys along the Arikaree River and nearby tributaries, as well as, the North Fork of the Republican River. Since 2006, the number of deer classified from aerial surveys has varied from 608 deer in 2007 to 1,162 deer in 2011, depending on the amount of snow cover. Observed fawn/doe ratios have varied from a low of 54 fawns/100 does in 2012 to a high of 81 fawns/100 does in 2014 and has averaged 65 fawns/100 does over the past decade (Figure 4).

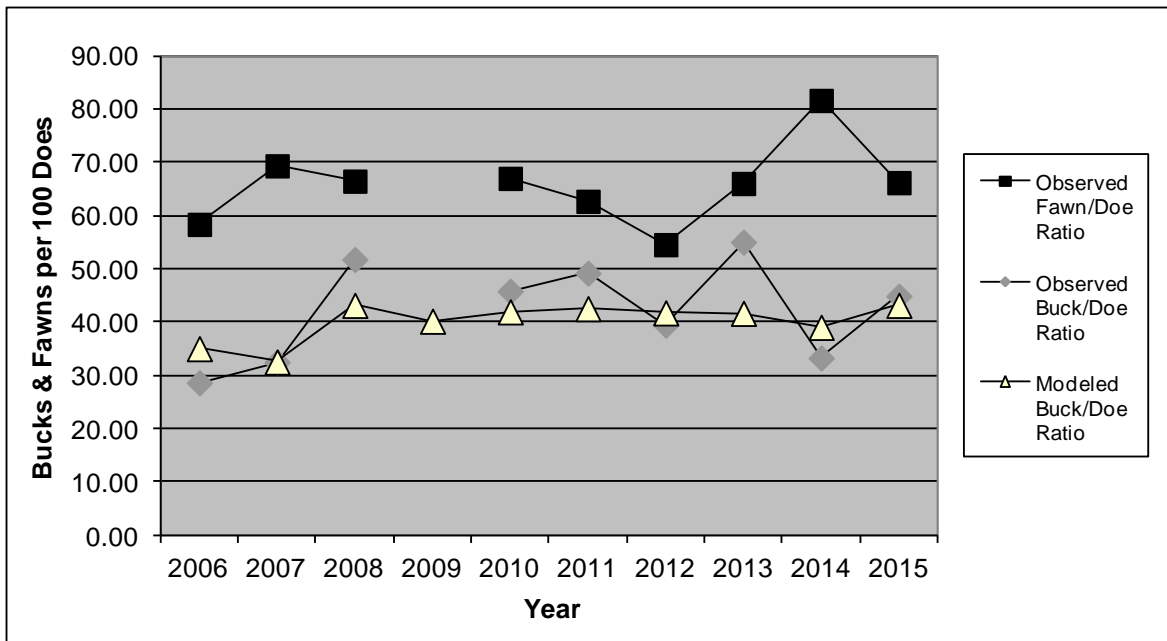


Figure 4. Observed post-season fawn/doe ratios and observed and modeled buck/doe ratio estimates for the Arikaree deer herd, 2006–2015.

Harvest

Over the last 10 years, deer harvest has ranged from a high of 381 animals in 2015 to a low of 188 in 2007 (Figure 5). Average harvest for the past 10 years is 264 animals.

Antlered harvest ranged from a low of 100 bucks in 2008 to a high of 186 in 2011.

Average buck harvest for the past 10 years is 150 animals. Doe harvest has ranged from a high of 208 does in 2015 to a low of 58 in 2006. Average doe harvest for the past 10 years is 114 animals. The two rifle seasons account for the majority of the deer harvest in this deer herd, with archery and muzzleloader seasons contributing significant opportunity (14%), but less harvest (11%). In most years, deer are accessible to hunters and harvest objectives are achieved. However, in some years, corn harvest is delayed resulting in large acreages of standing corn during the regular rifle plains deer season. Delayed corn harvest reduces access to deer resulting in lower deer harvest. In contrast, the late-plains rifle season consistently produces good deer harvest, as well as, increased opportunities for hunters to take large, mature bucks. Most if not all crops have been removed from fields by this time, which makes the late-plains season very popular with hunters and landowners.

In 2003, hunters harvested a total of 15 white-tailed deer in D-55 in the first year of the special whitetail only season. Over the past 10 years, hunters on average have harvested 108 white-tailed deer in this deer herd. Overall, the season choice whitetail license has provided additional hunter recreation without the risk of over harvesting mule deer.

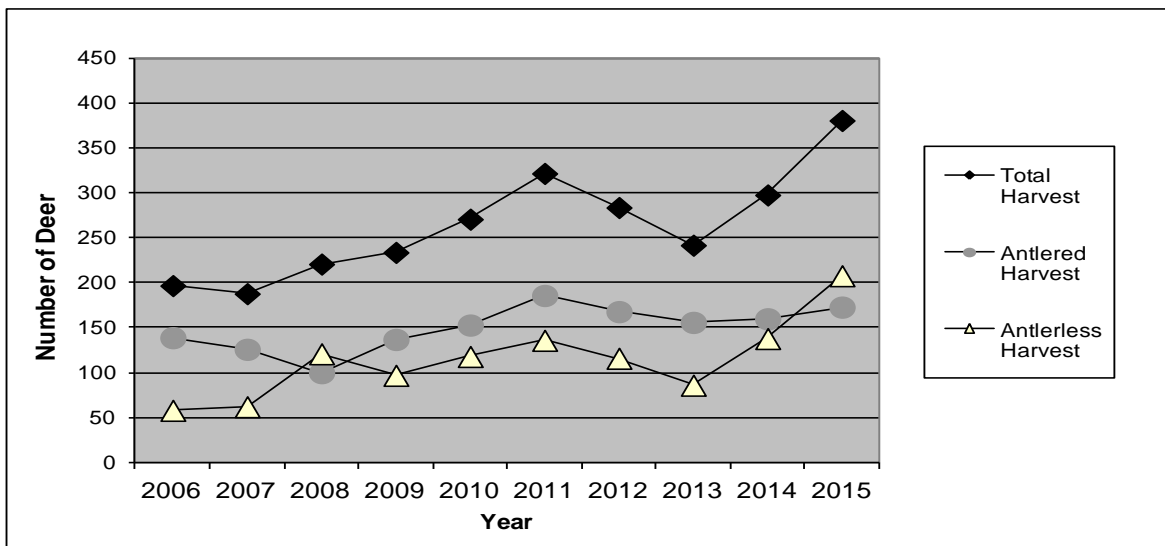


Figure 5. Total harvest and number of antlered and antlerless deer harvested in the Arikaree deer herd, 2006–2015.

Hunters

The Arikaree deer herd has been managed to provide quality buck hunting opportunities by maintaining a high buck/doe ratio and a higher proportion of 3+ year-old bucks in the population. In 2015, late season rifle buck licenses required 3 preference points to draw, while regular season rifle buck licenses required 2 points (Figure 6). Doe licenses for either season are frequently drawn with zero points. Archery and muzzleloader licenses are less difficult to draw than buck rifle licenses, taking 0 and 1 point, respectively.

Landowner preference licenses for bucks are over-subscribed in both units, but landowner applicants for doe tags are usually under-subscribed.

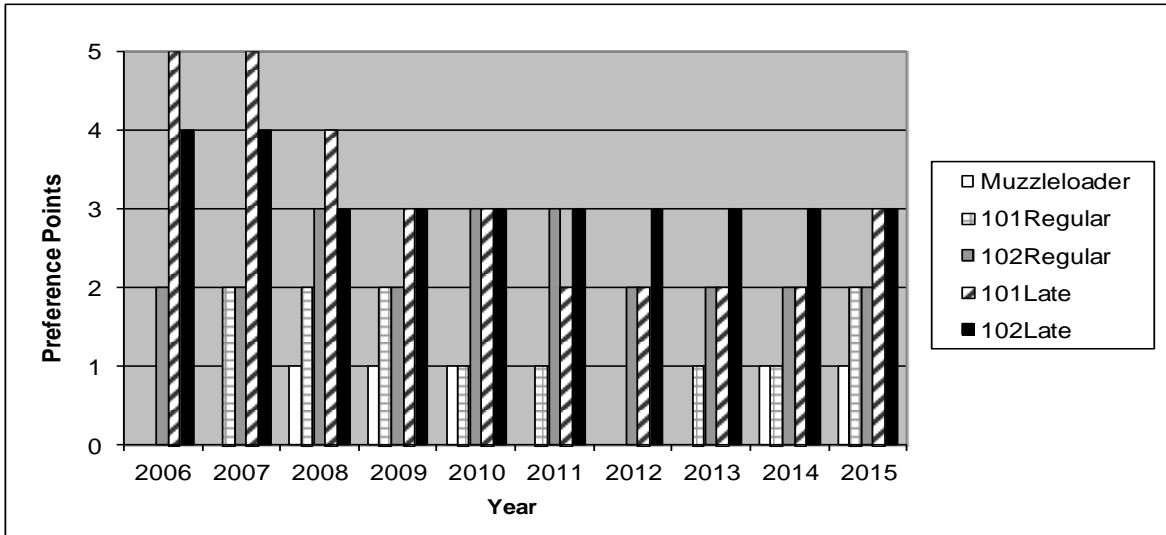


Figure 6. Number of preference points needed to draw a buck license for muzzleloader and rifle seasons in the Arikaree, 2006–2015.

The number of hunters has varied from 322 in 2007 to 609 in 2011 depending on the number of limited licenses available (Figure 7). The number of buck licenses since 2006 has varied from a high of 310 buck licenses in 2011 to a low of 165 buck licenses in 2008 (Figure 7). The number of doe licenses ranged from a high of 315 licenses in 2011 to a low of 150 licenses in 2006 and 2007 (Figure 7).

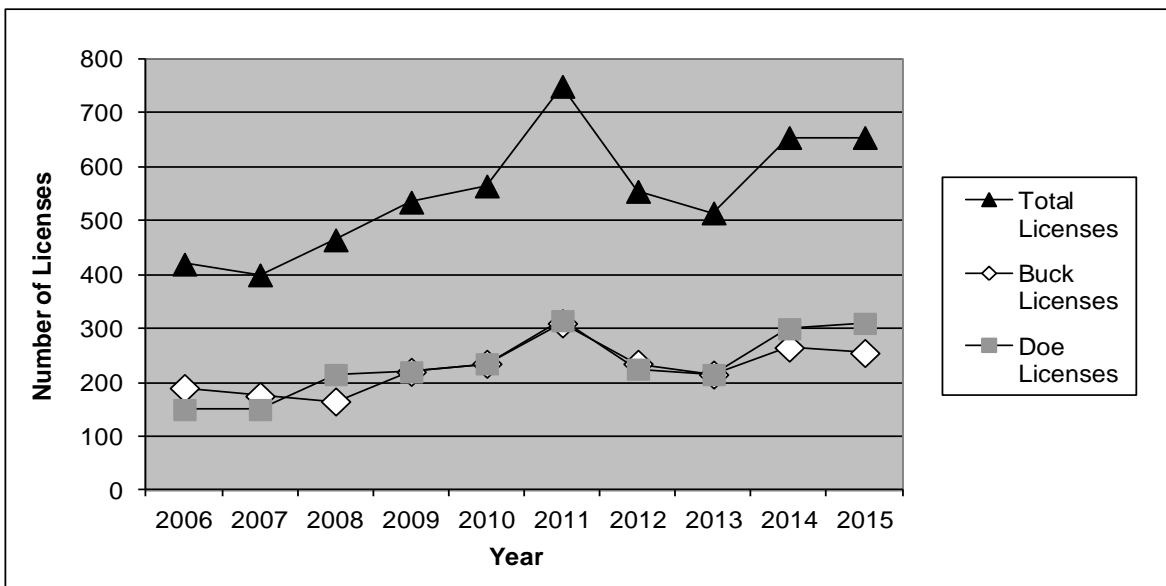


Figure 7. Total number of licenses and number of buck and doe licenses allocated for the Arikaree deer herd, 2006–2015.

Success rates across all methods of take generally approach the 55% mark (Figure 8), but success varies with weather conditions and progression of crop harvest. Success rates for rifle hunting have ranged from a high of 53% in 2007 and 2012 to a low of 43% in 2011. The 5 and 10-year average harvest success rates for antlered deer are 55% and 56%, respectively. The 5 and 10-year average harvest success rates for antlerless deer are 41% and 42%, respectively.

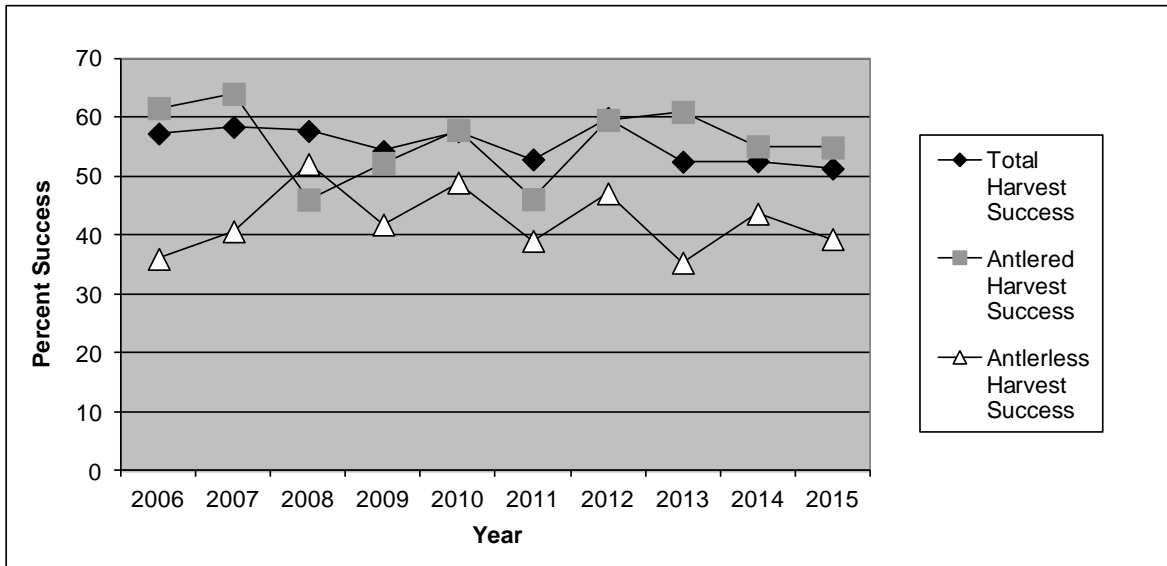


Figure 8. Total, antlered, and antlerless deer harvest success (%) in the Arikaree deer herd, 2006–2015.

Past Management Strategies

A limited number of licenses have been issued for the regular rifle season since 1985 and late-plains rifle seasons since 1993. Over-the-counter archery and muzzleloader licenses were still available until 1996. Since 1996, all deer hunting licenses for all methods of take have been limited in number in GMU 102, while GMU 101 continued to offer over-the-counter archery and muzzleloader licenses until 1999. Since 1999, all deer hunting licenses for the Arikaree deer herd have been limited in number and available only through the drawing. In 2003, whitetail only licenses were issued in GMU 101 to increase the harvest of white-tailed deer and to manage whitetail deer numbers to maintain a balance with mule deer numbers in this deer herd. Since 2006, whitetail only licenses have been issued throughout the Arikaree.

The late-plains rifle season was established in 1993 to more effectively achieve harvest objectives and reduce crowding especially on public lands. Prior to 1993, achieving adequate harvest was largely dependant upon the progress of corn harvest. Years in which the corn harvest was delayed resulted in lower hunter success and reduced deer harvest, as well as, an increase in conflicts between landowners and hunters. Licenses have been allocated between the regular and late-plains deer seasons to meet harvest objectives, reduce conflicts with agricultural producers, and provide quality hunting opportunities.

CURRENT HERD MANAGEMENT, ISSUES, and STRATEGIES

Population and Sex Ratio Objectives

The 2015 post-season estimate was 2,356 deer. The current population objective for the Arikaree deer herd is 1,900–2,100 deer and the sex ratio objective is set at 35-40 bucks/100 does. The current sex ratio for this herd is estimated to be 45 bucks/100 does.

Current Management Strategies

The management strategy for this deer herd is based on providing quality buck hunting opportunities. Licenses have been allocated to maintain a high buck/doe ratio and a higher proportion of 3+ year-old bucks in the population. Also, strategies have been implemented to harvest white-tailed deer at a level that maintains a relatively even proportion of mule deer to white-tailed deer across this management area.

Current Management Concerns

Most of the habitat changes that have occurred in this area have been beneficial to deer, as in the case of CRP and changing cropping practices. Habitat manipulations beneficial to deer will continue to occur as a result of agricultural cropping systems that emphasize dryland corn as an alternative to a wheat-fallow system. Some Federal Farm Bill programs may also create additional deer habitat, by creating winter and security cover in the form of CRP grasslands and tree establishment projects including field windbreaks and riparian buffers. Deer damage is not an issue with only one deer damage claim being filed in the past 22 years. If habitats continue to improve, the Division will need to closely monitor population responses and adjust license allocations accordingly.

Prior to 1960, Colorado's eastern plains were almost exclusively populated by mule deer. White-tailed deer have progressively established themselves in more traditional mule deer habitats. In the 2015 post-season aerial surveys, 42% of the deer observed were white-tailed deer and 58% were mule deer. The Division created white-tailed deer only licenses and a special white-tailed deer only season in 2003 to put more hunting pressure on the white-tailed deer in the Arikaree deer herd. Currently, season choice whitetail only licenses are issued to obtain sufficient harvest on whitetails to maintain an equal proportion of both species within the Arikaree deer herd.

Chronic Wasting Disease

In 2005, CWD was detected in D-55. A mule deer harvested during the 2005 regular plains rifle season tested positive for CWD. This was the first known case of CWD in this area. Since 2006, two additional mule deer have tested positive for CWD, both from GMU 101, with the most recent being in 2011. Testing hunter harvested deer will continue to be used to determine the extent of the disease in this deer herd.

PUBLIC INVOLVEMENT

The primary purpose of the herd management planning process is to determine objectives for the size and structure of the post-season population. Input for this deer

management planning process has been solicited through a public survey. All first-choice deer license applicants from 2013–2015 for D-55 were notified via postcards and encouraged to complete an online survey (Appendix A). Furthermore, a draft of this deer Management plan was made available at the Brush CPW office and on the CPW website, and copies were distributed to the Republican River HPP committee for review and comments.

Public comments emphasized a continued desire to manage for quality deer hunting in this deer herd by maintaining the current sex ratio (Appendix A). Likewise, public input indicated a desire to increase the deer population above current population numbers. The largest issue in D-55 will likely be an increase in hunting popularity because of the quality buck hunting opportunities that currently exist.

HERD MANAGEMENT ALTERNATIVES

Post-Season Population Objectives

The population objective is selected independently from the herd composition objective. CPW acknowledges that estimating wildlife populations is an inexact science and habitat conditions and carrying capacity vary with fluctuations in weather and trends in agriculture; therefore, the long-term population objective will be expressed as a range rather than a specific number.

Alternative 1: 1,300–1,700.

Reduce the long-term post-season population objective by 25% (1,300–1,700) from the current objective. Initially, this alternative would result in an increase in deer hunting licenses, but once deer numbers are reduced to objective, hunting opportunity would decline. This strategy could substantially decrease hunting opportunities for both bucks and does in the long-term unless there was a strong density dependent response resulting in increased fawn production and survival. Reducing the deer population to this objective would require substantial increases in antlerless licenses over the next 2–3 years. The strategy necessary to achieve adequate harvest may require designating, at least a portion of, the antlerless tags as additional licenses and/or lengthening the seasons. There would likely be long-term negative fiscal impact to individuals and businesses relying on recreational hunting. Deer damage complaints would remain negligible.

Alternative 2: 1,900–2,100.

Maintain the post-season population at the current target objective of 2,000 animals. Under this alternative, an increase in antlerless licenses will be needed to reduce the population to this objective. The demand for buck licenses will continue to be greater than the supply and the number of preference points needed to draw a license should remain at current levels. The current hunting opportunities are expected to continue with no fiscal impacts to individuals or businesses. Damage complaints are expected to remain negligible.

Alternative 3: 2,300–2,700.

Increase the long-term post-season deer population objective by 25% to 2,300–2,700 deer. This objective will provide more buck hunting opportunities that are obviously in demand. Increases in the number of antlerless licenses will also be necessary to stabilize the population, which is currently within this objective range. Likewise, habitat conditions are favorable for supporting more deer and damage complaints have been virtually nonexistent in this area, thus far. However, with this long-term increase in deer numbers, the potential for damage may also increase. Damage by deer would need to be closely monitored as the population is managed at this objective. There would most likely be an increase in revenue for individuals and businesses involved with hunting recreation.

Post-Season Herd Composition Objectives

The following 2 sex ratio objectives are presented.

Alternative 1: 35–40 bucks/100 does.

Maintain the sex ratio at 35–40 bucks/100 does. This objective will continue to provide quality buck hunting opportunities.

Alternative 2: 25–30 bucks/100 does.

Reduce the sex ratio objective to 25–30 bucks/100 does which is a 10–15 bucks/100 does reduction from the current sex ratio. This would result in fewer bucks and a considerable reduction in the number of mature bucks in the population.

PREFERRED OBJECTIVES

The CPW's preferred objectives for D-55 are to manage for a post-season population of 2,300–2,700 (**Alternative 3**) with an observed post-season herd composition objective of 35–40 bucks/100 does (**Alternative 1**).

The majority of public comments support increasing the deer population in the Arikaree deer herd. Discussions with landowners, hunters, and CPW field personnel indicate that habitat conditions in D-55 can support increased deer numbers. Game damage complaints have not been an issue thus far, and are not expected to significantly increase under this alternative. The population is currently estimated to be within the range of this objective. Thus, hunting opportunities would continue at or above the current level.

Public comments strongly supported managing the Arikaree deer herd for quality buck hunting opportunities. The 2015 post-season observed sex ratio was 45 bucks/100 does. Therefore, slight increases in buck licenses will be needed to maintain the preferred objective range of 35–40 bucks/100 does. Quality buck hunting opportunities will continue at the current rate and may increase when coupled with the preferred population objective. The Arikaree deer herd is valued as a quality deer hunting destination and hunters, local communities, and businesses have encouraged the Division to continue to manage D-55 for quality hunting opportunities.

APPENDIX A PUBLIC SURVEY

Wildlife managers at Colorado Parks and Wildlife (CPW) are updating the deer management plan that covers the Arikaree River area in Yuma County. This area includes deer GMUs 101 and 102.

CPW is seeking public input on the future management of deer in this area. *As an individual who has shown interest in hunting deer in this area we are requesting your participation.* We are gathering public input through a short online survey. The survey is available at: <https://www.research.net/r/D55DAUsurvey>

To access the survey, please type the entire web address directly into your browser's address bar instead of a search engine, such as Google or Yahoo. If you prefer to provide input using a paper survey or do not have internet access, please call 970-842-6314 to leave a message with your name and address and one will be mailed to you.

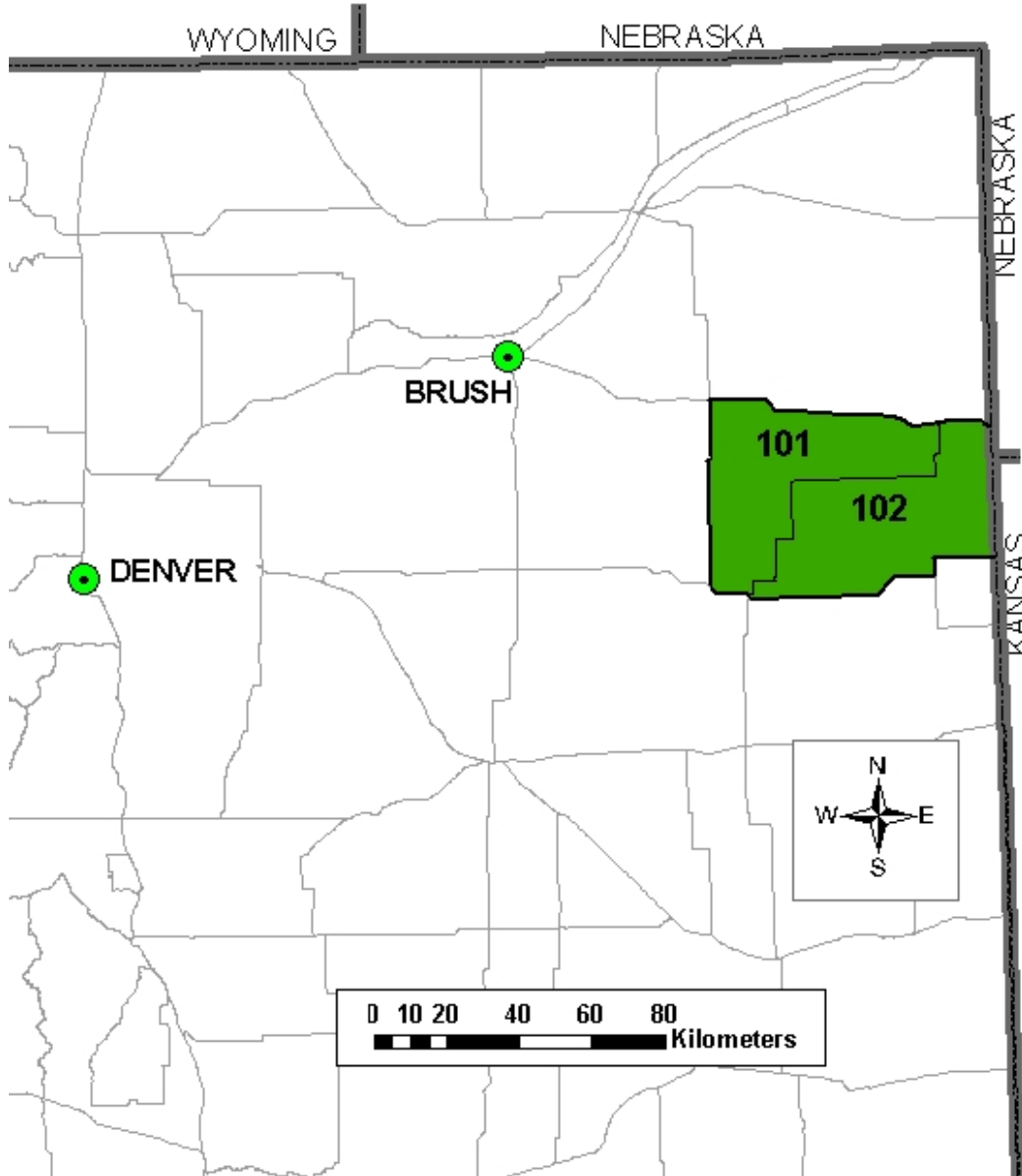
Surveys must be completed by October 31, 2015.

Dear Interested Citizen:

Colorado Parks and Wildlife (CPW) is interested in your input on the management of the Arikaree Deer Herd, which inhabits Game Management Units (GMUs) 101 and 102. In Colorado, deer populations are managed within specific geographic areas based on objectives set within a management plan. This geographic area is referred to as Deer Management Area, D-55. The management plan describes trends in deer numbers and actions CPW has and will take to manage the population for the next 10-year period. CPW is interested in incorporating the concerns and desires of the public with the biological characteristics of the Arikaree herd during the development of this plan. Public input is, therefore, a very important part of the planning process. CPW manages this deer herd to provide the public with hunting and viewing opportunities while minimizing conflicts and habitat damage. In order to do this, a balance is needed in both the total number of deer and the proportion of bucks in the herd. This Deer Management Plan will therefore, define 1) a population objective and 2) a buck to doe ratio objective. Please help us to learn what you think about deer in the Arikaree herd. The information you provide will help CPW develop objectives and management actions for this deer herd. If you would rather complete a paper survey or have any questions about this deer herd or its management, please contact Marty Stratman, Wildlife Biologist in Brush, at 970-842-6314 or marty.stratman@state.co.us.

Sincerely,
Marty Stratman
Terrestrial Biologist
Brush, CO

Arikaree Deer Management Area



1. Are you a resident of Colorado? (143 Responses)

Yes – 85.3%

No – 14.7%

2. Do you live within the Arikaree Deer Herd area? See map. (143 Responses)

Yes – 22.4%

No – 77.6%

3. Do you own or lease land in the Arikaree Deer Herd area? (143 Responses)

Yes – **21%**

No – **79%**

4. How many acres of land do you own or lease in the Arikaree Deer Herd area? (30 Responses)

Less than 80 acres – **16.7%**

80-159 acres – **13.3%**

160-319 acres – **3.3%**

320-639 acres – **16.7%**

640-999 acres – **10%**

More than 1000 acres – **40%**

5. Are you enrolled in the Priority Landowner Preference Program or have you received landowner vouchers through this program? (29 Responses)

Yes – **51.7%**

No – **48.3%**

6. Which of the following best represents your interest in the Arikaree Deer Herd? (142 Responses)

Rancher or farmer – **7%**

Landowner – **4.2%**

Hunter or sportsperson – **85.9%**

Business owner – **0%**

Guide or outfitter – **0.7%**

Work for government agency – **0%**

Other (please specify) – **2.1%**

1. Family of landowner

2. Born and raised in 102, still have family farming there

3. Mentoring youth in hunting

7. In which GMU are you most interested in deer management? (140 Responses)

GMU 101 – **33.6%**

GMU 102 – **66.4%**

8. Have you ever hunted deer in Colorado? (143 Responses)

Yes – **98.6%**

No – **1.4%**

9. Have you ever hunted deer in GMUs 101 or 102? See the map. (140 Responses)

Yes – **95%**

No – **5%**

10. Overall, how satisfied were you with your deer hunting experience in GMU 101 or 102? (134 Responses)

Very satisfied – **42.5%**

Somewhat satisfied – **37.3%**

Neither satisfied, nor dissatisfied – **6.7%**

Somewhat dissatisfied – **9%**

Very dissatisfied – **3.7%**

I am not sure. – **0.8%**

11. Overall, how would you characterize the quality of your hunting experience in GMU 101 and 102 over the last 10 years? (Please check all that apply.) (130 Responses)

Quality has not changed. – **33.1%**

Quality of bucks has increased. – **10%**

Quality of bucks has decreased. – **18.5%**

Overcrowding among hunters has increased. – **14.6%**

Overcrowding among hunters has decreased. – **0%**

Other (please specify) – **23.9%**

1. Only hunted once, cannot responsibly answer. (10)
2. A lot of mulies in normal area where whitetails are normally found. Not enough muley tags.
3. Not enough experience there to comment. (4)
4. I only hunted there once and the experience was excellent in the above categories.
5. Only hunted once, impressed with buck size.
6. Unit 102 has an excellent deer population (like it used to be when I grew up). Unit 101 has been over hunted and has a very reduced population.
7. The change to "season choice licenses for whitetail deer was a big mistake. It just created more rifle hunter tags and the archery hunters lost.
8. I have drawn 2 tags, but have only hunted (unsuccessfully) a single private property but I didn't see any deer on their 4 sections, though I did see them on the neighbors place.
9. Have only hunted it 3 times.
10. Lack of deer sittings.
11. Quality of bucks decreased because of too many tags allowed.
12. Not enough Whitetails.
13. Quality of bucks has decreased; number of quality bucks has decreased.
14. Need more permits for exact areas, need better landowner cooperation.
15. Quality of bucks decreased somewhat.
16. Quality hasn't changed much although I think the numbers have dropped. Due to too many tags?? Not sure exactly why.
17. Whitetails are on private land and can't get permission.
18. More crowded and fewer bucks.
19. Whitetail deer have overtaken the mule deer and need to be reduced in number.

12. Please rank the following 4 items to reflect which is most important to the quality of your deer hunting experience in the Arikaree area. Give a 1 to the most important item and a 4 to the least important item. There are 2 ways to do this: 1) drag and drop the items into the order you would like it with the most important item first, or 2) select a number from the dropdown menu and the test will automatically be reordered according to the number you selected. **(133 Responses)**

Seeing large antlered bucks –	1) 30.7% ; 2) 18.6% ; 3) 22.6% ; 4) 28.2%
Seeing many deer of all sizes and ages –	1) 22.5% ; 2) 37.2% ; 3) 26.4% ; 4) 13.9%
Being outdoors –	1) 18.1% ; 2) 26.8% ; 3) 21.3% ; 4) 33.9%
Hunting with family and friends –	1) 32.1% ; 2) 17.6% ; 3) 27.5% ; 4) 22.9%

Population Objectives: The Division strives to manage big game populations within both the biological and social carrying capacity of the herd. CPW has been managing the Arikaree deer herd with a population target of 2000 deer and the population is estimated to be above objective at 2350 deer. 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 controlled at levels below both the biological and social carrying capacity, people enjoy viewing, photographing and hunting deer while deer/human conflicts are minimized. As the number of deer in an area increases, conflicts with people may also increase. These conflicts can be auto/animal collisions, impacts to gardens or yards, damage to agriculture, etc. To control herd numbers to meet population objectives the CPW will either increase or decrease the number of doe licenses available.

13. How would you like to see the population of the Arikaree Deer Herd managed in the next 10 years? **(143 Responses)**

Increase greatly – **11.2%**
Increase somewhat – **50.3%**
Stay the same – **30.1%**
Decrease somewhat – **4.2%**
Decrease greatly – **0.7%**
I am not sure. – **3.5%**

Male:Female Ratio Objective: Deer herds can be managed to maximize either the opportunity to hunt bucks or to maximize the quality of buck hunting experience. If a herd is managed to maximize quality, there will be more mature/large bucks, a higher buck:doe ratio and fewer hunters in the field. If a herd is managed to maximize hunting opportunity, more buck licenses are made available and buck hunters are able to hunt more frequently, but there will be fewer bucks in the herd (lower buck:doe ratio) and fewer mature/large bucks. Typically, there is a trade-off between the number of licenses (opportunity) and the size and maturity of bucks available to hunters. Currently, the Arikaree deer herd is managed to provide a relatively high number of mature/large bucks and some licenses

require 3 or more years to draw a buck license. However, in D-55 most of the deer that make up the herd are found on private property. It is important to recognize that private landowners play an important role in management of deer in this DAU. Access to animals on private property can influence both hunter opportunity and buck:doe ratios. Increasing licenses may not increase opportunity if hunters cannot access deer on private property within the area.

14. How would you like to see the number of buck licenses managed in the Arikaree Deer Herd in the next 10 years? (**142 Responses**)

Manage for moderate levels of opportunity and high quality of bucks. (This is the current management strategy.) – **72.5%**

Decrease the number of buck licenses to increase the number of bucks and antler size in the herd. This would result in less frequent ability to hunt bucks. – **15.5%**

Increase the number of buck licenses to increase hunting opportunity and allow more hunters to hunt more often with less regard for number of bucks or antler size. – **6.3%**

I am not sure. – **5.6%**

Appendix B

HPP Support Letter

April 5, 2017



Colorado Parks and Wildlife,

The Republican River HPP Committee is writing this letter in support of the DAU plan for D55 . The committee members have all reviewed the plan as it was presented by Marty Strautman and unanimously voted to support the plan. We feel that the deer numbers presented in the plan are acceptable and fit within the objectives of the HPP committee.

Our goals are: to increase the quality of hunts, as well as, managing the herd population, and the buck to doe ratio. The preferred objectives in the draft plan are to manage for a post harvest population of 2,300–2,700 head with a sex ratio of 35 – 40 bucks per 100 does. We as a committee support the recommendations put forth in the plan and agree that the DAU can support a deer population as proposed with no detrimental impacts to the habitat in this DAU. The committee felt like landowners would be acceptable of the numbers in this plan but didn't think we could go much higher. Likewise, we support the proposed sex ratio at 35–40 bucks per 100 does. We feel this will provide the quality hunting that we would like to see in this area.

Therefore, the RRHPP committee supports this plan and the preferred alternatives proposed by the Parks and Wildlife staff and recommends to the Colorado Parks and Wildlife Commission that the proposed management plan the Arikaree deer herd (D-55) be adopted.

Please feel free to contact any of our committee members if you have questions.

Sincerely,

Dustin Wise
Sportsman's Representative
Republican Rivers HPP Council

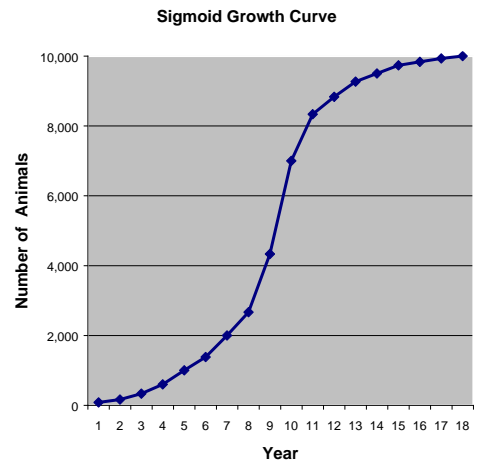
APPENDIX C

Population Dynamics, Maximum Sustained Yield, and Density Dependence

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

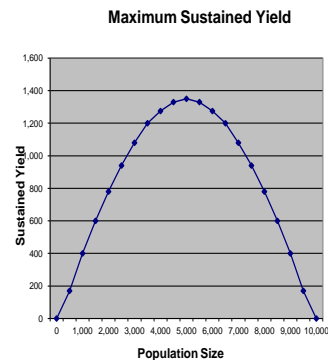
The second phase occurs when the population number is at a moderate level. This phase is characterized by high reproductive and survival rates. During this phase, food, cover, water and space are not a limiting factor. During this phase, for example, animals such as white-tailed deer have been known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

The final or third phase occurs when the habitat becomes too crowded or habitat conditions become less favorable. During this phase the quantity and quality of food, water, cover and space become scarce due to the competition with other members of the population. These types of factors that increasingly limit productivity and survival at higher population densities are known as density-dependent effects. During this phase, for example, white-tailed deer fawns can no longer find enough food to grow to achieve a critical minimum weight that allows them to reproduce; adult does will usually only produce 1-3 fawns; and survival of all deer (bucks, does and fawns) will decrease. During severe winters, large die-offs can occur due to the crowding and lack of food. The first to die during these situations are fawns, then bucks, followed by adult does. Severe winters affect the future buck to doe ratios by favoring more does and fewer bucks in the population. Also, because the quality of a buck's antlers is somewhat dependent upon the quantity and quality of his diet, antlers development is diminished. If the population continues to grow, it will eventually reach a point called “K” or the maximum carrying capacity. At this point, the population reaches “equilibrium” with the habitat. The number of births each year equals the number of deaths, therefore, to maintain the population at this level would not allow for any “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 are minimized because harvest reduces recruitment to older age classes. However, the concept of MSY is useful for understanding how reducing densities and pushing asymptotic populations towards the inflection point can stimulate productivity and increase harvest yields. Knowing the exact point of MSY is not necessary if the goal is to conservatively reduce population size to increase yield. Long-term harvest data can be used to gauge the effectiveness of reduced population size on harvest yield.

Research in several studies in Colorado has shown that density-dependent winter fawn survival is the mechanism that limits mule deer population size because winter forage is limiting (Bartmann et al. 1992, Bishop et al. 2009). Adult doe survival and reproduction

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

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

Literature Cited

- Bartmann, R.M., G.C. White, L.H. Carpenter. 1992. Compensatory mortality in a Colorado mule deer population. *Wildlife Monographs* No. 121. 39 pp.
- Bishop, C.J., G.C. White, D.J. Freddy, B.E. Watkins, and T.R. Stephenson. 2009. Effect of enhanced nutrition on mule deer population rate of change. *Wildlife Monographs* No. 172. 28 pp.