MIDDLE PARK DEER HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT D-9

GAME MANAGEMENT UNITS 18, 27, 28, 37, 181, and 371

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Approved November 19, 2020 by the Colorado Parks and Wildlife Commission

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EXECUTIVE SUMMARY

Middle Park Deer Herd (DAU D-9)	Game Management Units (GMUs): 18, 27, 28, 37, 181, and 371
Post-hunt Population: Previous Objective: 10,500-12,500 deer; Estimate for 2019: 16,668 **Current Population Objective: 10,500-14,000**	
Post-hunt Sex Ratio (Bucks:100 Does): Previous Objective: 30-35. Post-hunt (3-year average) 40 **Current Sex Ratio Objective: 30-35 Bucks:100 Does**	

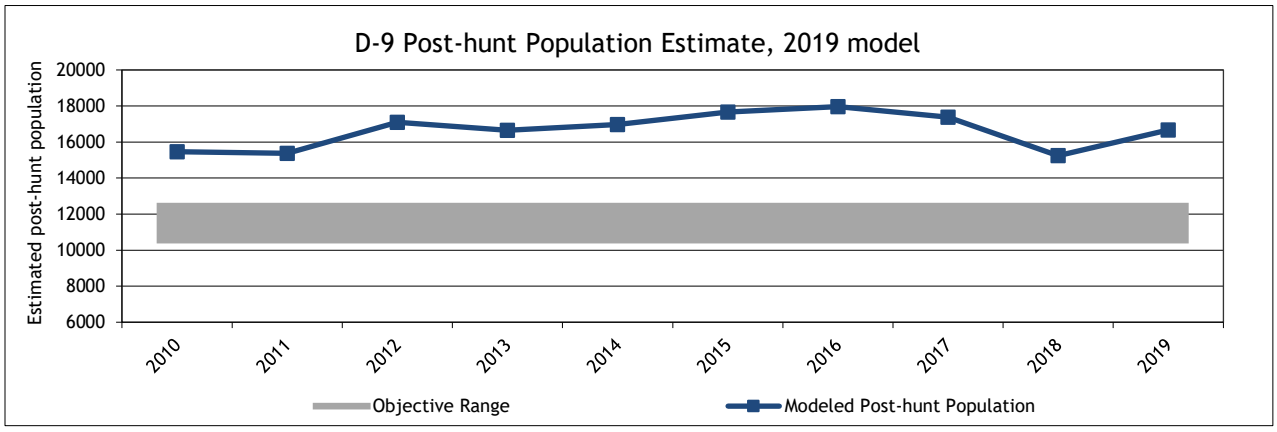

Figure 1. D-9 Post-hunt population estimate and objective 2010-2019.

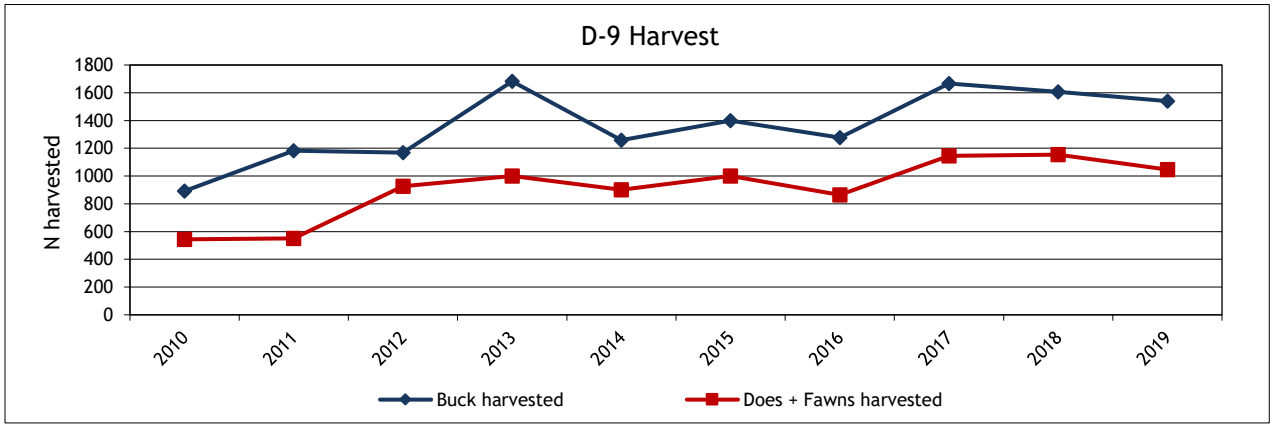

Figure 2. D-9 buck and antlerless estimated harvest 2010-2019.

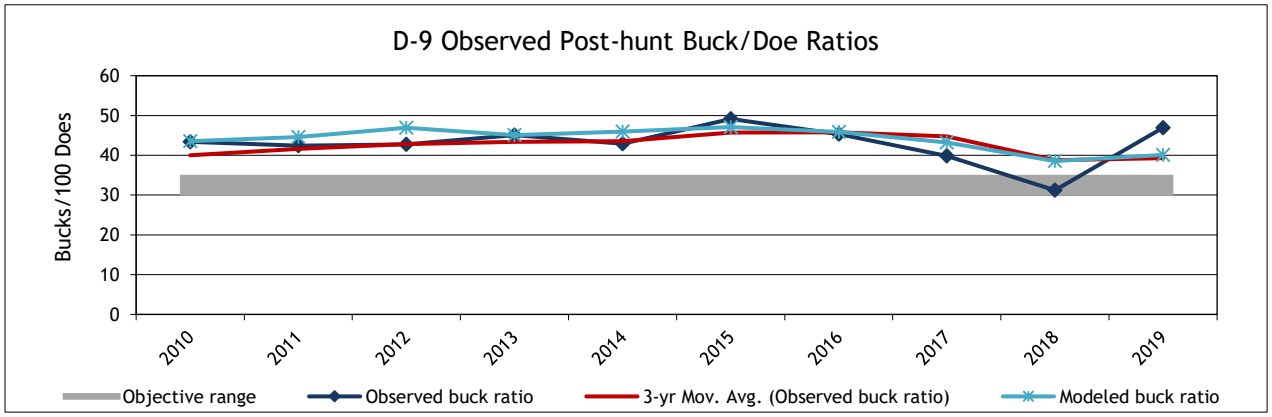

Figure 3. D-9 observed and modeled post-hunt sex ratio (bucks:100 does), and objective 2010-2019.

BACKGROUND

The Middle Park Deer Data Analysis Unit (DAU) D-9 is located primarily in Grand and Summit Counties in north-central Colorado. The DAU is approximately 2,387 square miles, and land ownership is 25% Private, 9% BLM, 56% USFS, 6% NPS, 3% State Land Board, and <1% CPW.

From 1989-2009, the population objective for D-9 was 10,500 animals. The deer population was relatively high in D-9 during the early 1980's through the early 1990's. Since that time, the herd slightly declined, rebounded, and for the last ten years has remained above the current objective range of 10,500-12,500 which was established in 2009. The current model estimates the deer population at 16,668 animals. Although trends of many mule deer populations have been declining throughout Colorado and the Western U.S, the D-9 DAU has remained productive.

The Colorado Parks and Wildlife (CPW) has conducted aerial sex and age composition surveys in D-9 since the late 1960's. Although the sex ratio was below objective until the late-1990s, these ratios have generally increased and have remained above objective since (in large part due to totally limited male licenses implemented in 1998). For the last 40 years, the sex ratio in the DAU averaged 32.2 bucks:100 does. Post-hunt classifications in 2019 estimated 46.9 bucks:100 does (most recent 3-yr average; 39.3 bucks:100 does). Fawn production in the DAU has been good over the years, generally ranging between a low of 40 fawns:100 does and a high of 90 fawns:100 does. For the last 40 years, the fawn ratio in the DAU has averaged 69 fawns:100 does (most recent 3-yr average; 70 fawns:100 does). Middle Park is one of five Intensive Mule Deer Monitoring Areas. In 1999, CPW instituted a juvenile (fawn) and doe survival study (in 2010, bucks were added to the study) to more closely monitor survival rates which allows for more precise modeling.

Deer harvest in DAU D-9 has fluctuated over time, primarily because of license allocation. The 40-year average for antlered and antlerless deer harvest is around 1,100 and 600, respectively. The three-year average for antlered and antlerless deer harvest is 1,600 and 1,100, respectively. The Middle Park deer herd has been managed with hunter opportunity in mind, and thus buck and doe license allocation has been liberal throughout the years.

Significant Issues

The proliferation of all forms of outdoor recreation on public lands, land development, fragmentation by roads and trails, and suppression of wildfires has the potential to impact habitat quality and quantity for the Middle Park deer herd. Although Middle Park has not been affected in some of these areas at the same rate as other deer herds in CO, the concern remains high that if not kept in check, loss of quality habitat could eventually negatively affect this herd. Although Chronic Wasting Disease (CWD) prevalence remains low in D-9, this disease continues to be a concern for managers.

Management Objective Recommendations

CPW recommends a new population objective range of 10,500-14,000. This alternative will keep the previous lower end of the objective, while widening the overall objective and increasing the upper end. CPW recommends maintaining the current sex ratio objective of 30-35 bucks:100 does.

Strategies for Addressing Management Issues and Achieving Objectives

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

To achieve the updated population objective and to maintain the current sex ratio objective, CPW will continue to set licenses annually to provide sufficient buck and doe hunting opportunity for the public, and to use hunting as a management tool to keep deer densities and buck ratios at moderate levels to encourage herd productivity and continue to keep CWD prevalence less than 5%.

Table of Contents

List of Figures

List of Tables

INTRODUCTION AND PURPOSE

Herd Management Plans

Colorado Parks and Wildlife (CPW) manages wildlife for the use, benefit and enjoyment of the people of the state in accordance with the CPW's Strategic Plan and mandates from the Parks and Wildlife Commission and the Colorado Legislature. Colorado's wildlife resources require careful and increasingly intensive management to accommodate the many and varied public demands and growing impacts from people. To manage the state's big game populations, the CPW incorporates a "management by objective" approach (Figure 4). Big game populations are managed to achieve population and sex ratio objective ranges established for Data Analysis Units (DAUs).

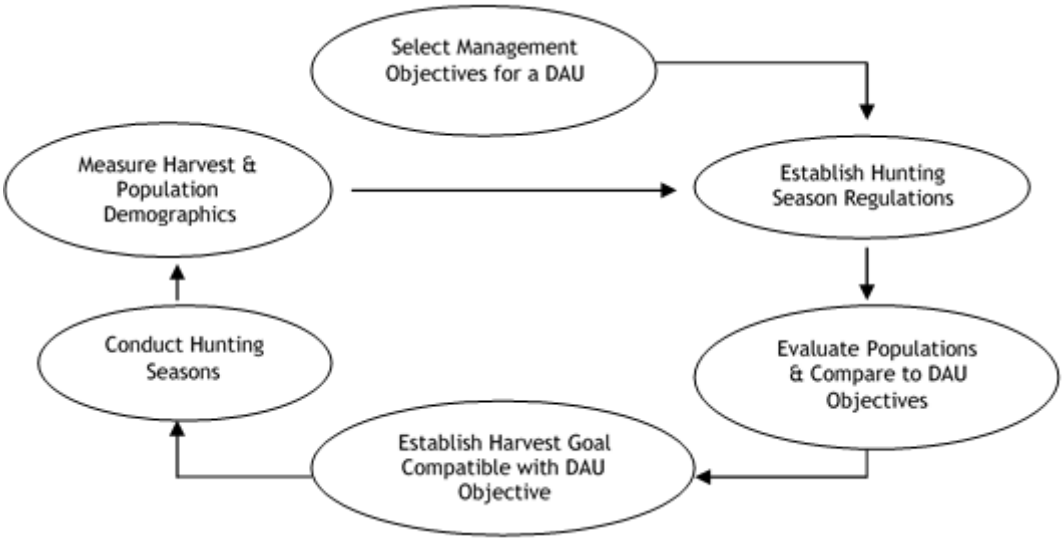

Figure 4. "Management by objectives" process used by CPW to manage big game populations on a DAU basis.

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

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

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

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

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

DESCRIPTION OF DAU AND HABITAT

Location

The Middle Park Deer DAU (D-9) is located in north-central Colorado and consists of GMUs 18, 27, 28, 37, 181 and 371. The DAU is bound on the east and south by the Continental Divide, the north by Hwy 40 and the Continental Divide, and on the west by the Gore Range and Eagles Nest Wilderness Divide (Figure 5).

This DAU takes in all of the geographical features known as Middle Park, and includes all of Summit County, most of Grand County, and a small portion of Routt and Jackson Counties. Major towns include Hot Sulphur Springs, Granby, Kremmling, Fraser, Grand Lake, Silverthorne, Frisco, Dillon and Breckenridge. U.S. Highway 40 from Berthoud Pass to Rabbit Ears Pass, and Interstate 70 from the Eisenhower Tunnel to Vail Pass transverse the DAU. The DAU includes the headwaters of the upper Colorado River. Other major drainages include the Fraser River, the Williams Fork River, Troublesome Creek, Muddy Creek, and the Blue River.

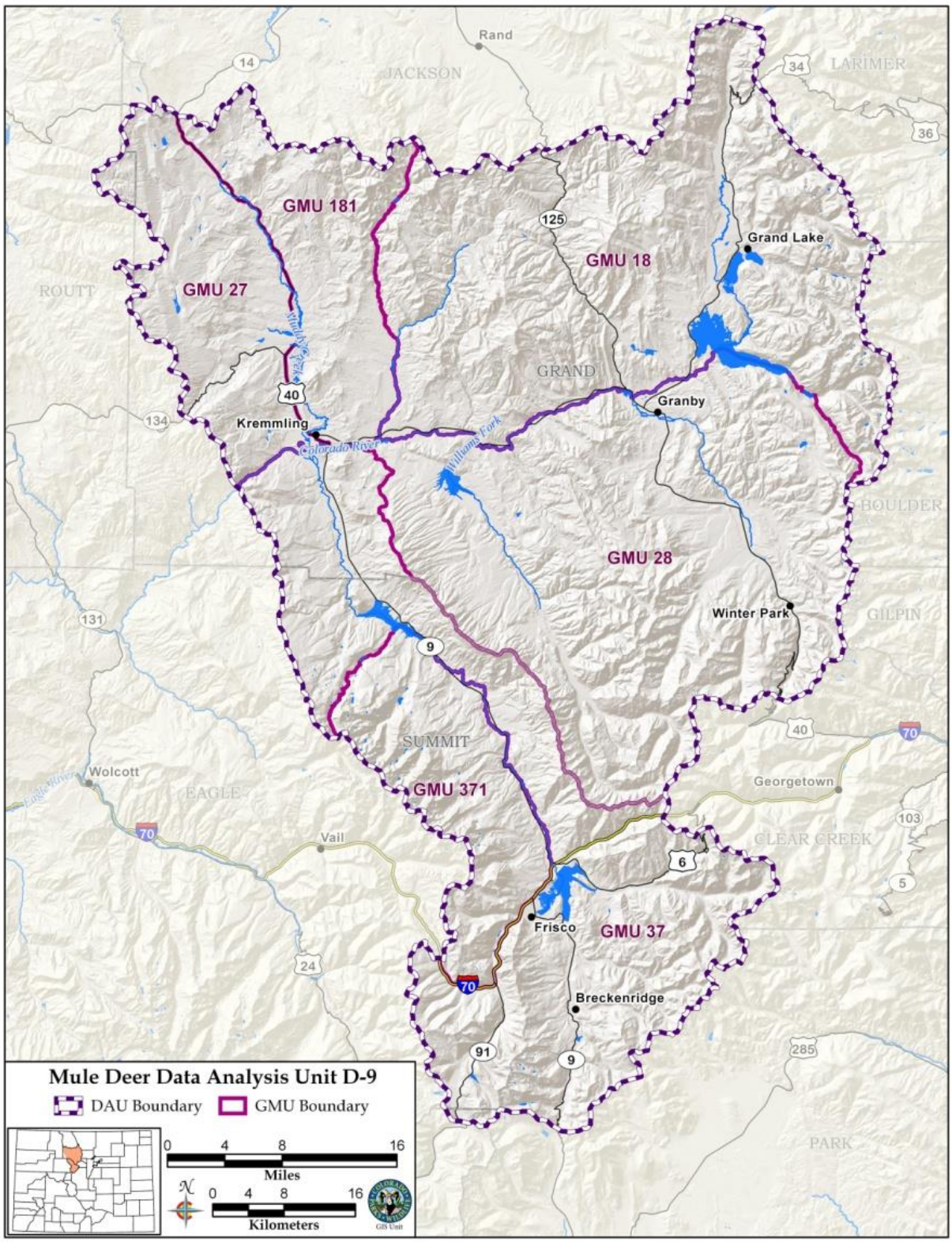

Figure 5. Location of D-9 Data Analysis Unit.

Physiography

Topography

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

Climate

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

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

Vegetation

Vegetation in Middle Park can be categorized into five broad types – cropland, wetland/riparian, rangeland, forestland, and alpine. The variety of vegetation types (Figure 6) scattered throughout Middle Park creates a highly desirable mosaic that is very beneficial to wildlife such as mule deer. However, plant communities at lower elevations have been extensively modified by agriculture and are increasingly being disturbed by intensive human use.

- Croplands consist of irrigated hay meadows and terraces that have been re-seeded to more desirable forage plants. Most hay ground is "native hay", consisting of Timothy and Smooth Broome, with some sedges and rushes. Some hay meadows have been seeded to alfalfa.

- Wetlands and Transition Riparian occur along the river bottoms and irrigated meadows. Some of the best riparian habitat is along the Colorado River between the towns of Granby and Kremmling. This area is dominated by narrow leaf cottonwood and willow. The riparian habitat is one of the least represented vegetative types in Middle Park, but it is extremely valuable as wildlife habitat. It supports the greatest abundance and diversity of wildlife.
- Rangelands consist of Sagebrush Steppe, Mountain Shrub and grassland communities. The sagebrush community is by far the most common rangeland in Middle Park at elevations up to 9,000 feet. It is found on drier non-agricultural areas on the valley floors and the lower hills. Mountain Shrub, consisting of big sagebrush mixed with serviceberry, chokecherry and antelope bitterbrush, is found on better soils at lower elevations. This plant community is not widely represented in Middle Park but provides important wildlife food and cover. Both Sagebrush Steppe and Mountain Shrub have grass and forb understories, making them suitable for rangeland. Bluebunch wheatgrass is prominent in these vegetative types under good range conditions. Native grasslands are found in two different sites. Mountain meadows, consisting of grasses, forbs and some shrubs, occur at higher elevations in association with lodgepole, aspen and spruce-fir forest types. Low elevation grasslands occur on windswept sites with poorly developed soils incapable of supporting sagebrush.
- Forestlands in Middle Park can be subdivided into four major types: pinyon-juniper, lodgepole pine, aspen and spruce-fir. Douglas-fir, ponderosa pine and limber pine forest types also occur in Middle Park, but to a lesser extent.
    1. Pinyon-juniper woodlands are found on the dry, lower elevation slopes such as Cedar Ridge, west of Williams Fork Reservoir. “P-J” provides important cover along with low quality forage for wintering deer.
    2. Lodgepole pine is the most widely distributed forest type. This species typically occurs in even-aged stands at elevations between 7,500 feet and 10,500 feet. Due to the dense over-story, this habitat type typically provides little forage for deer, but is important from the standpoint of cover.
    3. Aspen stands usually are found in areas with better soil moisture, or in areas of less severe exposure at elevations up to 10,500 feet. The understory in aspen typically consists of vigorous herbaceous growth, shrubbery and emerging conifers. This forest type is attractive to a variety of wildlife and provides important cover and forage for big game animals. On some sites aspen is the climax species; on other sites it is a transitional species that occurs for only a relatively short period of time after a disturbance such as fire.
    4. At higher elevations, Engelmann spruce and subalpine fir regularly occur in uneven-aged stands. This habitat provides excellent summer cover for deer and elk.

- As temperature and winds become more extreme with increasing altitude, Engelmann spruce and subalpine fir become stunted, eventually giving way to forbs, grasses and sedges. Low growing plants are typically nestled among lichen-covered rocks. This is the Alpine community, or tundra, which usually occur above 11,000 feet in elevation. In those protected areas blanketed by snow during the winter, and kept moist by melting snow banks during the summer, thickets of bog birch and willows can exist.

- Alpine sites can provide high quality deer forage from July through early September.

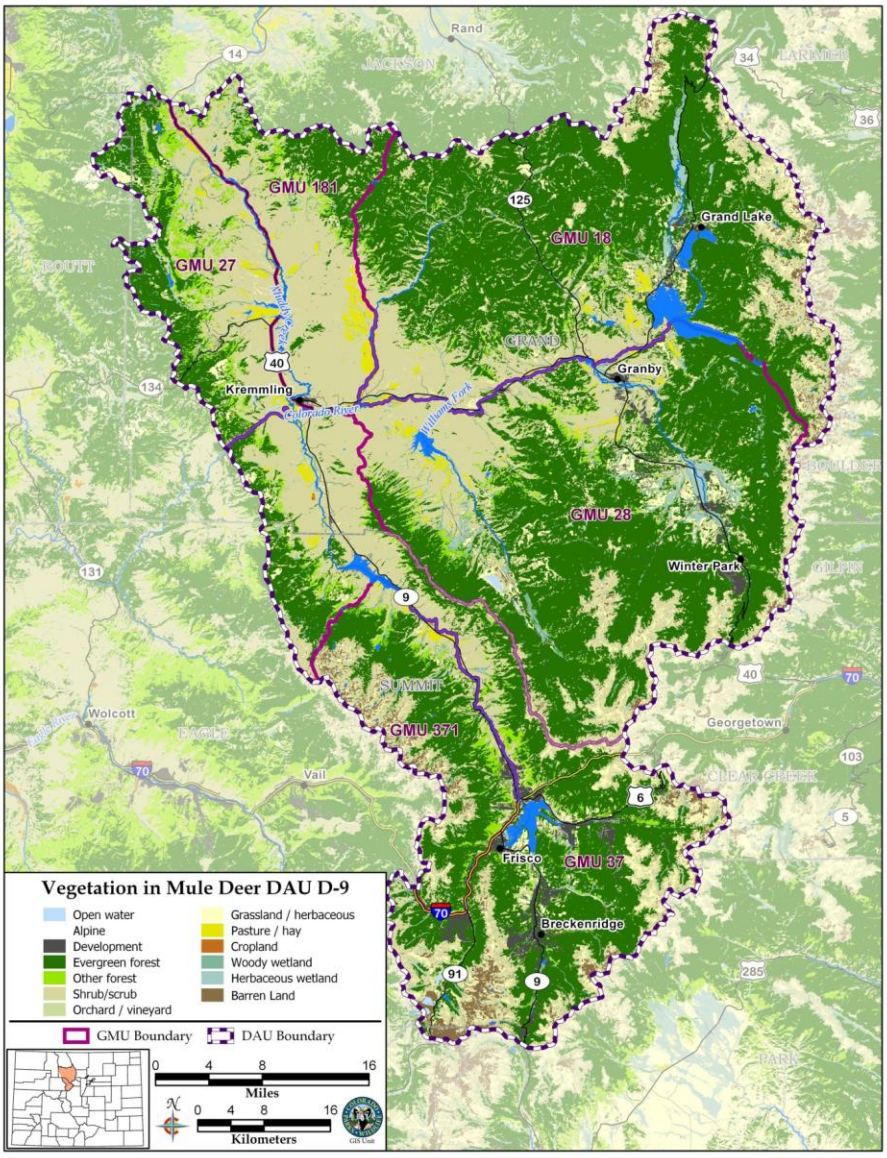

Figure 6. Vegetation types for D-9.

Land Status

Land Ownership

The DAU covers a total of 2,387 square miles (Figure 7). More than half of this area is administered by the USFS and one quarter of the land area is in private ownership. The BLM and the National Park Service (NPS) are responsible for managing most of the remaining land within the DAU. The State of Colorado (State Land Board and CPW) administers 3½ percent of the land area in the DAU (Table 1). The Junction Butte and Hot Sulphur Springs State Wildlife

Areas, along with portions of the Kemp-Breeze SWA, are managed to provide winter habitat for deer and elk.

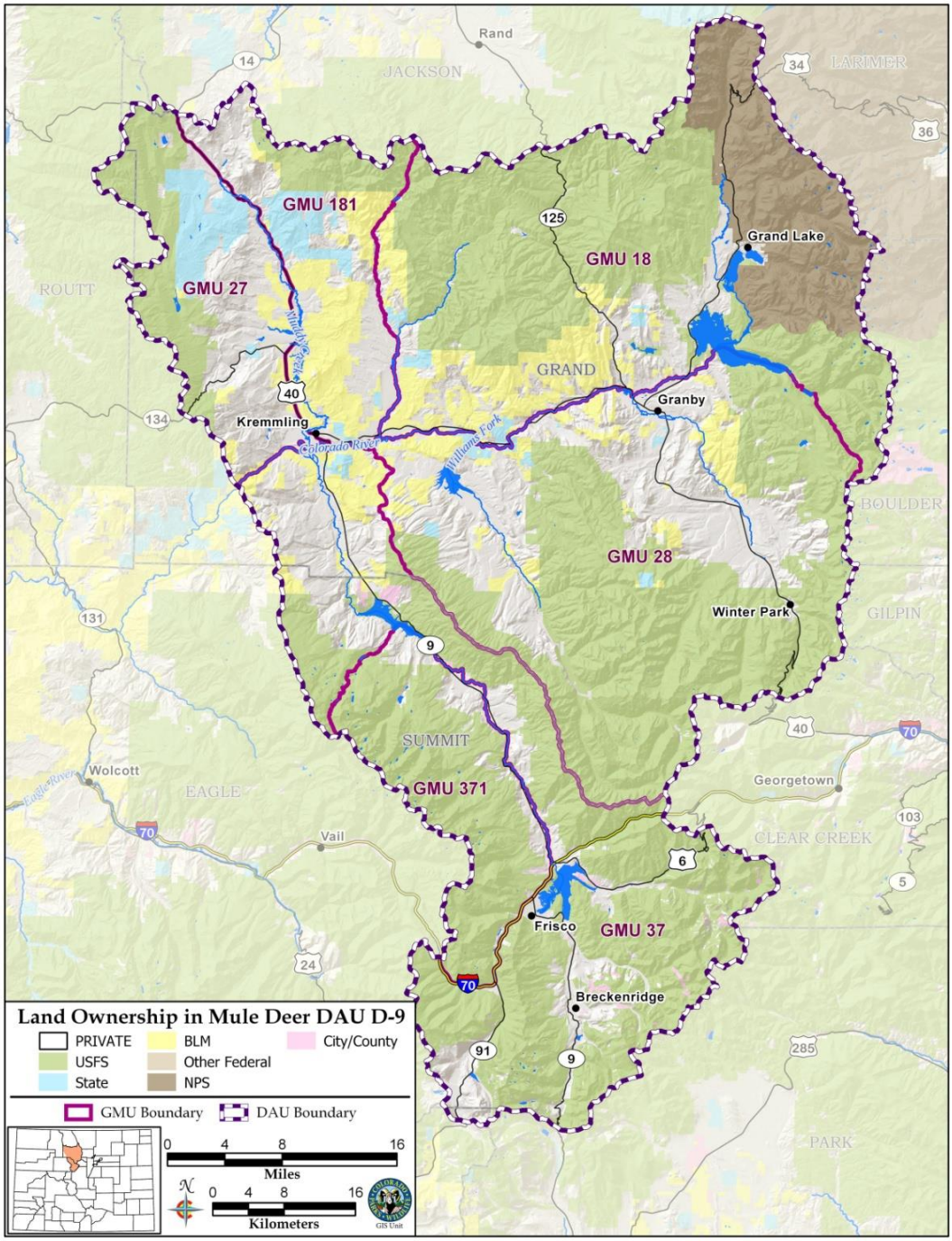

Figure 7. Land ownership for D-9.

Table 1. Land ownership by Game Management Unit in D-9.

GMU	USFS		PRIVATE		BLM		CPW		OTHER		TOTAL
	mi^2	%	mi^2	%	mi^2	%	mi^2	%	mi^2	%	mi^2
18	339	53	78	12	70	11	2	0.3	155	24	645
27	68	35	88	45	12	6	0.07	0.03	29	14	197
28	397	60	196	30	44	7	4	0.56	23	3	663
37	344	65	142	27	27	5	2	0.42	12	2	528
181	31	17	73	40	58	32	0	0.0	20	11	182
371	146	85	25	15	0	0	0.03	0.02	0.39	<1	172
DAU D-9 Total	1325	56	602	25	211	9	8	0.35	239	10	2387

Land Use

The main industries in the D-9 DAU geographic area are recreation and tourism, ranching, mining, and logging. Highly developed mountain communities occur in the areas surrounding Winter Park, Grand Lake, Breckenridge, and Dillon/Silverthorne. The Sulphur Ranger District of the Arapaho and Roosevelt National Forest (N.F.), the Parks Ranger District of the Medicine Bow/Routt N.F., the Dillon Ranger District of the White River N.F., the Kremmling Resource Area of the BLM, and Rocky Mountain National Park administer federal lands within the DAU. Recreation, livestock grazing and wildlife production are the predominant uses of USFS and BLM lands, with timber harvest occurring in areas where there are suitable forest products; other activities such as right-of-way administration, mineral production, watershed protection and cultural resource protection are common to the two agencies. The mission of the National Park Service is to preserve ecosystems and scenery, along with natural and historic objects for future generations.

Skiing and snowmobiling are both popular wintertime activities. There are five major downhill ski areas, along with one smaller resort. In addition, Devil's Thumb Ranch Resort and Snow Mountain Ranch (YMCA of the Rockies) cater to cross-country skiers. Major ski areas have large base developments associated with offsite condominiums, homes and commercial facilities. The town of Grand Lake strives to maintain a reputation of being the snowmobile capital of Colorado. Summit County ski areas are destination resorts which furnish year-round recreation opportunities including golfing, horseback riding, fishing, boating and hiking. Because of their proximity to Denver, the Grand Lake and Dillon areas, along with the Fraser Valley, have been developed with numerous recreational homes and cabins.

Grand and Summit counties are also popular destinations for summer recreationists, with numerous campgrounds, dude ranches, and other resorts. Rocky Mountain National Park receives more than 3,000,000 visitors per year. Reservoirs built to divert water to East Slope metropolitan areas provide good fishing, along with opportunities for recreational boating. The USFS administers the Arapaho National Recreation Area, which includes Lake Granby and Shadow Mountain Reservoir and associated developed recreation sites. Rafting companies offer trips down the Colorado River west of Kremmling, and local rivers also provide opportunities for kayaking. All, or portions, of Byers Peak, Eagle Nest, Ptarmigan Peak, Indian Peaks, Never Summer, and Vasquez Peak Wilderness Areas are located within the DAU. The Bowen Gulch Protection Area, administered by the USFS, is also within the DAU.

Hunters can take deer, elk, moose, bear, pronghorn, bighorn sheep, mountain goat, mountain lion, dusky grouse and sage grouse in Middle Park. Fishing opportunities are provided in several Gold Medal streams, seven large reservoirs and numerous high lakes. Hunters and anglers make substantial contributions to local economies. An economic impact statement completed in 2017 estimated that the total annual impact of all hunting and fishing in the DAU would be close to $18 million (Southwick Associates 2018). People who take trips to observe and photograph wildlife also buy gas, groceries and other supplies, substantially impacting both destination areas and retailers along travel routes.

Most of the molybdenum used in North America is produced in this part of Colorado. Climax Mine is operated north of Leadville. Ore mined in Clear Creek County is transported via underground conveyer belt to be processed at the Henderson Mill on the Williams Fork drainage.

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

Commercial logging has been recently rekindled due to the spreading pine beetle epidemic throughout much of the DAU. Salvage logging and logging for pellet plants are currently in the heaviest demand.

Habitat Resource

Habitat Capability and Condition

During the summer months, deer can be found throughout the entire DAU. Summer range (2,387 mi^2) is vast and overall healthy, in particular habitat at higher elevations. In the winter, deer move from productive summer range habitat to limited and lower quality winter range at lower elevations. While there are some relatively large contiguous blocks of suitable winter habitat, some of these areas are in poor condition due to senescence and succession of plant communities.

Deer winter range comprises 19% of the DAU's total area (Figure 8). The bulk of the winter range occurs on BLM and private lands (Table 2). Deer use winter ranges from about December 1 to May 15 for the Colorado and Blue River, and Muddy Creek drainages. Major wintering areas for deer include the southern end of GMU 18, GMU 27, and GMU 181; and the northern end of GMU 37 and GMU 28. There are 139 mi^2 (88,814 acres) of winter concentration areas (Figure 8). Winter concentration areas are defined as having greater than a 200% increase in deer numbers compared to the surrounding winter range density. Winters with average temperatures and snowfall, the D-9 herd typically sustains a population of 14,000-17,000 deer.

DAU D-9 contains 38 mi^2 (23,070 acres) of severe winter range (Figure 8). Severe winter range areas are defined as the area of winter range where 90% of the deer will be confined during the worst two winters out of ten. During severe winters (e.g., 1983-84, 1992-1993, and 2007-2008), due to sustained cold temperatures and snow loads, limited severe winter range, and a high density of deer (See Appendix B on density-dependent effects on deer herds), the D-9 population can drop to 9,500-12,500 deer due to low winter survival.

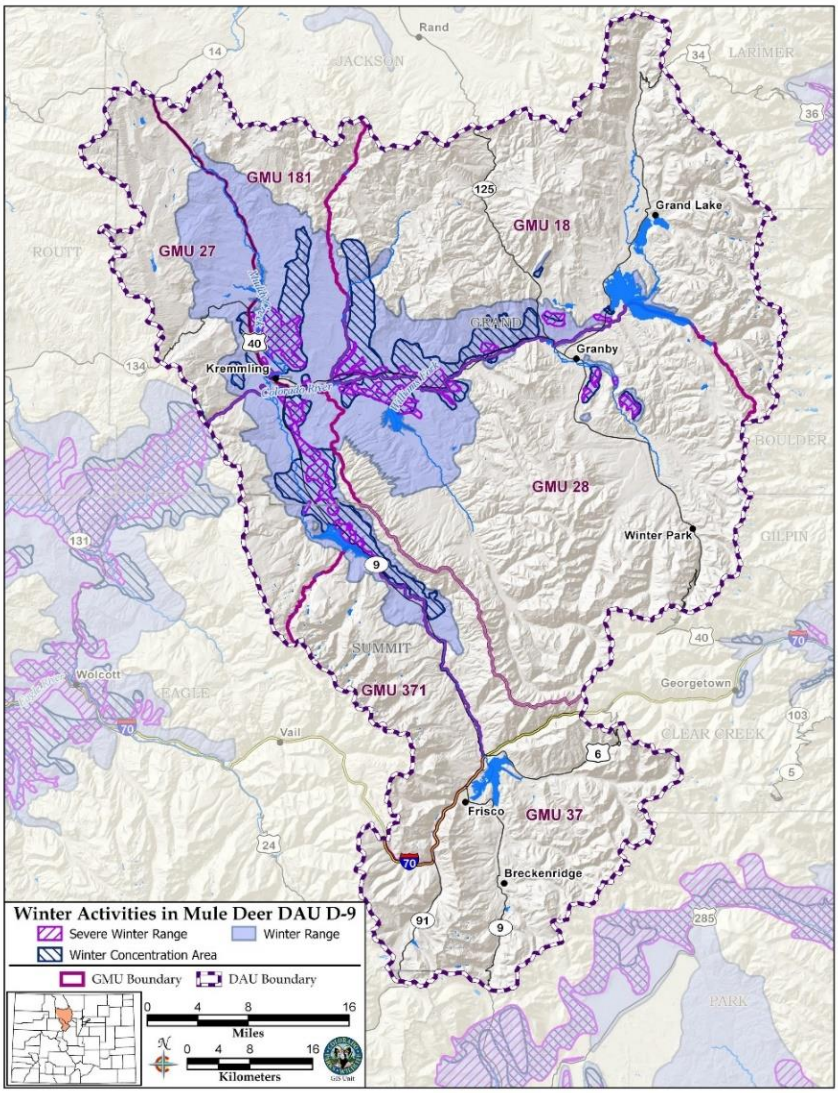

Figure 8. Mule deer winter range in DAU D-9.

Table 2. Distribution of mule deer seasonal ranges by land ownership in DAU D-9.

	Winter Range			Summer Range			Total		
Land Owner	**Acres**	**Sq. mi.**	**% of winter range**	**Acres**	**Sq. mi.**	**% of summer range**	**Total Acres**	**Total Sq. mi.**	**% of DAU**
USFS	20,299	32	7%	848,606	1,326	56%	848,606	1,326	56%
Private	154,051	241	53%	385,802	603	25%	385,802	603	25%
BLM	91,365	143	31%	134,666	210	9%	134,666	210	9%
Other	21,410	34	7%	153,417	240	10%	153,417	240	10%
CPW	5,311	8	2%	5,360	8	0.4%	5,360	8	0.4%
D-9 Total	**292,436**	**457**	**19%** (of DAU)	**1,527,852**	**2,387**	**100%** (of DAU)	**1,527,852**	**2,387**	**100%**

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

There have been numerous fertilization projects on mule deer winter range over the last 60 years in D-9. In the fall of 2019, a fertilization treatment occurred and a subsequent treatment is planned for the fall of 2020. These habitat treatments will benefit all of the previously mentioned species in core mule deer winter range. These fertilizations are intended to improve the quantity and quality of forage during the most critical times of the year for mule deer.

Public Lands

The USFS has a limited number of active grazing allotments occurring within DAU D-9. The period of utilization is variable, but primarily occurs from late June through September. Classes of livestock using these allotments include cattle and horses.

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

Wildlife/livestock Conflict Areas - Public Lands

Land use agencies were asked for input on areas where there may be conflicts between livestock and big game. Conflicts might be where wildlife had forced a change or delay in period of use on an allotment, or where forage utilization by wildlife had caused a reduction in AUMs of forage available for livestock.

Sulphur Ranger District, Parks Ranger District and the Kremmling Resource Area of the BLM have not identified any allotments where deer are causing conflicts with livestock. Dillon Ranger District is concerned that the year-round use by livestock and wildlife on allotments along Blue Ridge (GMU 37) could be having impacts on the vegetation.

Wildlife/livestock Conflict Areas - Private Lands

Conflicts caused by deer on private lands are very minor when compared to those caused by elk. Identification of specific areas where conflicts do occur, and resolution of any conflicts, will be best handled by the Middle Park Habitat Partnership Committee.

The main problems currently caused by deer occur in and around towns and other human habitations. Deer damage ornamental trees and shrubs, eat garden plants and ravage bird feeders. Around Kremmling, the increasing presence of deer may attract mountain lions.

HERD MANAGEMENT HISTORY

Overview of Procedures to Estimate Population Size

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

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

Post-hunt Population Size

The Middle Park deer herd has fluctuated in size since the 1950's and 1960's. The highest post-hunt population estimate derived from computer models was in 1961 when the population estimate exceeded 19,000 deer, while the lowest post-hunt population estimate was in 1970 at 6,440 deer.

CPW has had different population objectives for DAU D-9 over the years. During the 1970's, the population objective remained around 10,000 deer, and during most of the 1980's the objective was 14,000 deer. In 1987, the population objective was lowered to 12,300, and then lowered again in 1989 to 10,500 deer — it remained at 10,500 until an objective range of 10,500-12,500 was established in 2009. The post-hunt deer population average for the last forty years is around 14,000 deer (Figure 9).

CPW makes two independent estimates of the deer population in Middle Park. One estimate is derived from a quadrat census. This technique is based upon a stratified random sampling system where observers in a helicopter attempt to count all of the deer within selected one square mile sections or quadrats. Approximately 17% of the total deer winter range in Middle Park is surveyed, usually in late January. From 1968-80 the census was conducted every year. More recently, quadrat counts have been conducted sporadically. For best results, these flights are only conducted when snow conditions and all the deer are on mapped winter range. This usually results in flights every 2-3 years. The fact that it is not possible to count every individual deer is well documented. It is likely that only 80-90% of the deer on the Middle Park quadrats are counted. Population abundance flights are not flown during years when distribution is less than ideal, and all the deer are not on normal winter range, or when lack of early snows delays quadrat counts until after mid-January — these circumstances produce even greater underestimates of the population.

The second method used to estimate the deer population size in the DAU uses a computer modeling process. Starting in the early 1970s, CPW used a computer modeling program called ONE POP. In the early 1980s, CPW switched to a personal computer based program called POP II. Since 1999, CPW has used a computer spreadsheet model to predict population size. In 2001, these spreadsheet models were standardized statewide using modeling methods developed by White and Lubow (2002). For the D-9 model, the biological parameters (i.e., juvenile and adult survival, and wounding loss) for input were constrained to reflect values obtained from field measurements of deer populations in Middle Park from 1999-2018. All models work in basically the same manner based on harvest figures, estimates for mortality, initial population size, sex ratio at birth, and wounding loss. The best model is selected based on statistical fit to observed data.

CPW uses computer population models as the primary method for estimating population size for deer, elk and pronghorn — which informs managers when setting license numbers. The quadrat census technique described above is used mainly to inform and help align output from the population model.

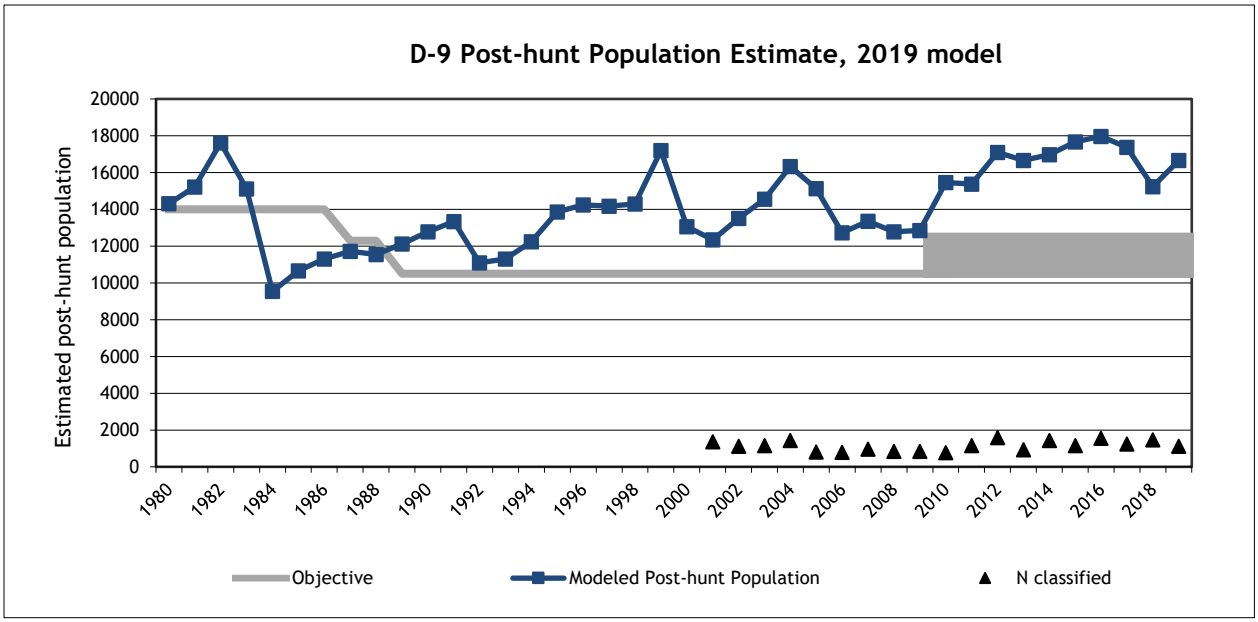

Figure 9. D-9 modeled post-hunt population estimate and objective from 1980-2019.

Post-Hunt Herd Composition

Age Ratio

Post-hunt age (fawns:100 does) and sex ratios (bucks:100 does) are both measured during early winter classification flights. They give some indication of reproductive success but may not accurately reflect recruitment into the population (i.e., those animals surviving to one year of age), since significant mortality can occur between the time of the counts and May. Since 1967, CPW has been conducting aerial age and sex ratio classifications; the average age ratio since 1980 has been 69 fawns:100 does, with a range of 41 to 93. Over the last 10 years, post-hunt age ratios have averaged 73 fawns:100 does, with a range of 68 to 80. Compared to 1992-2009, age ratios over the last ten years (i.e., 2010-2019) have been fairly stable and show a positive trend for the Middle Park deer herd (Figure 10).

In Middle Park, managers are fortunate to have some of the most extensive inventory records for a deer herd in Colorado. This area was used as a mule deer research base during the 1960's and 1970's. Many of the present day inventory techniques were originally developed and refined in Middle Park. The first documented age and sex ratio data was collected after the hunting season in 1967.

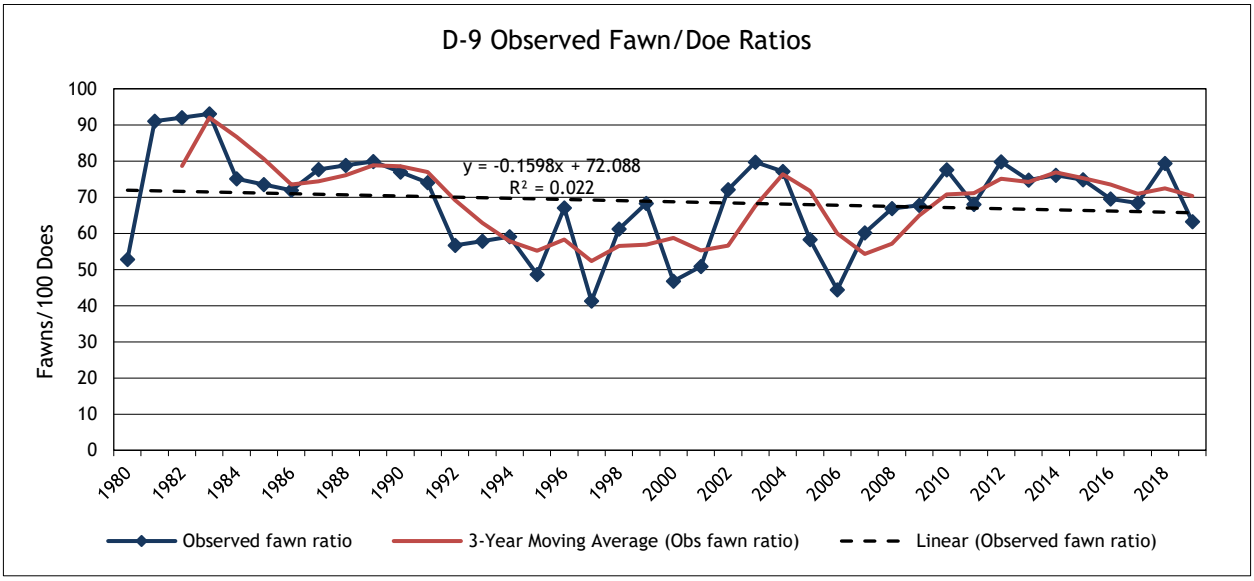

Figure 10. D-9 observed post-hunt age ratio (fawns:100 does) 1980-2019.

Sex Ratio

Between 1980 and 2000, a great deal of fluctuation in sex ratios (bucks:100 does) occurred (Figure 11). When the three combined season structure went into effect in 1986, the deer herd averaged slightly over 19 bucks:100 does, with a range of 14-30 bucks:100 does occurring in the mid-1990s. These low ratios occurred despite the antler point restrictions in effect from 1986-91, and the three-day buck season from 1992-94. Factors contributing to this decline are the long rifle deer seasons — at one point 26 days lasting until mid-November, when bucks are more susceptible to hunting pressure. Buck numbers showed moderate increases from the low point in 1989 to 1998, and then dramatically increased after totally limited buck hunting went into effect in 1999. This trend has continued with buck ratios from 1999-current averaging around 41 bucks:100 does (most recent 3-yr average 39 bucks:100 does). The observed buck to doe ratios are displayed in Figure 11 below.

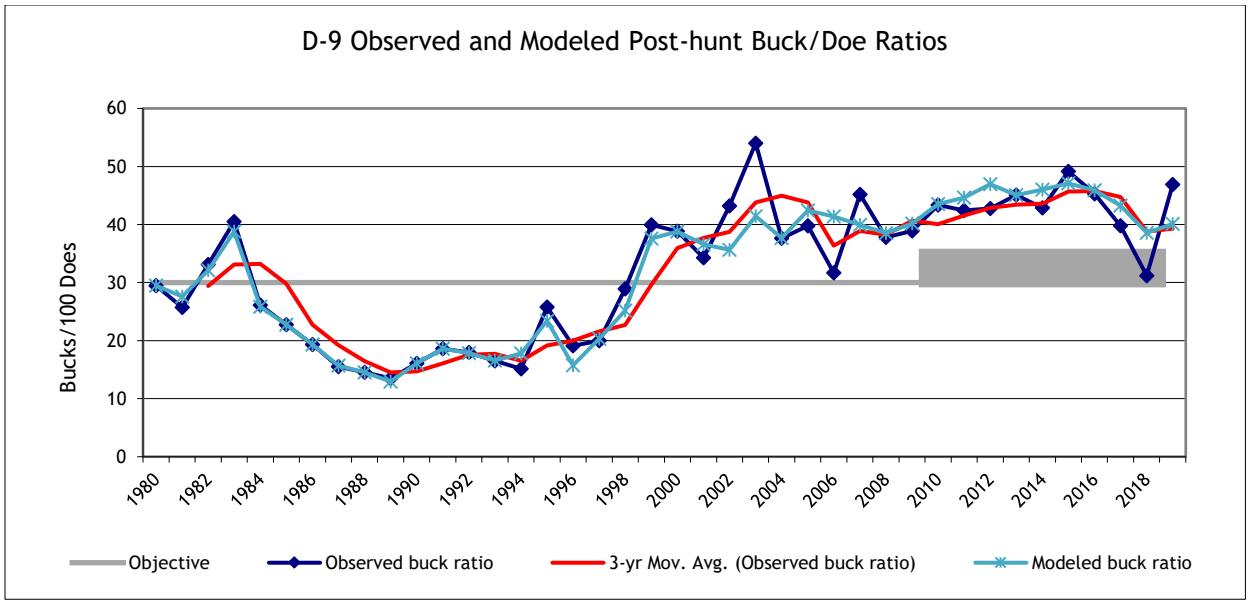

Figure 11. D-9 observed and modeled post-hunt sex ratio and objective 1980-2019.

Yearling Buck Ratios –

Biologists like to look at yearling buck ratio as an indication of recruitment to the population. Recruitment is the survival of fawn deer to the yearling age class. It is relatively easy to identify yearling buck deer during an age and sex classification survey by their distinctive antler size and configuration; they usually have small spikes or two-point antlers. Also, it is assumed that for every yearling buck, there is also a yearling doe deer.

Since 1980, yearling bucks have averaged 14 yearling bucks:100 does, ranging from 7 to 24. The dips that have occurred were probably directly related to severe winters the previous year. These years are most notable in 1984 and 1987, following the severe winters of 1983 and 1986. The last 10 and 20-year averages from 2009-2019 and 1999-2019, were 16 yearling bucks:100 does (Figure 12).

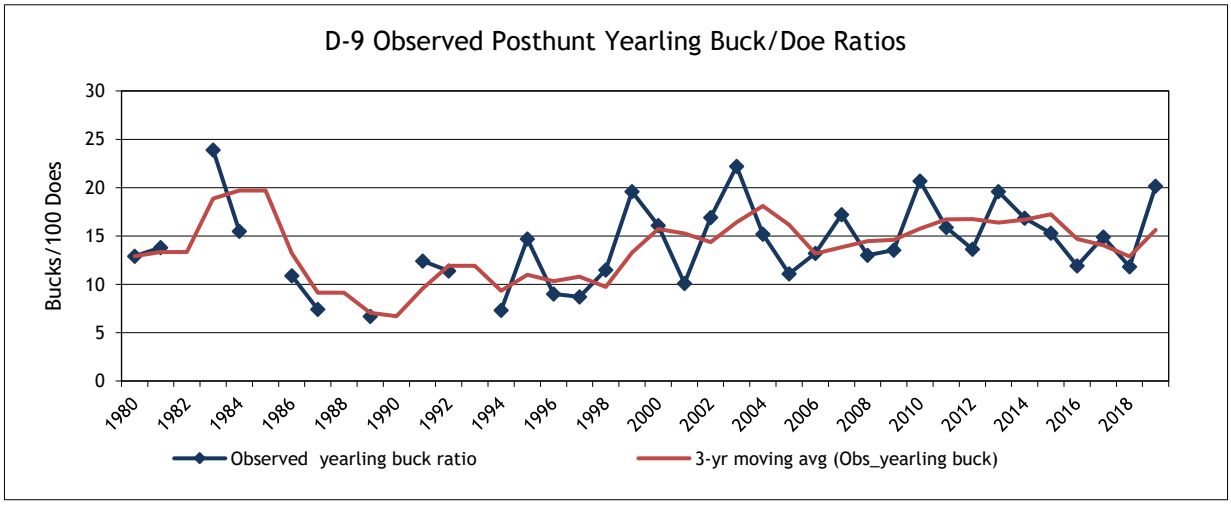

Figure 12. D-9 observed post-hunt yearling buck:doe ratio from 1980-2019.

Hunting Licenses and Harvest Statistics

Hunting Season History

From simple 30-day seasons to more complicated split deer, split elk and combined seasons have been used to manage deer through the years. In the early 1960s, a hunter could harvest two or more deer. From 1971 to 2002, hunters were limited to harvesting one deer. Since 2003, doe licenses have been List B, meaning hunters are allowed a 2nd deer license (specific units and private-land-only licenses). In 1986, the Wildlife Commission approved either-sex archery, limited muzzleloader and three combined unlimited buck and limited doe seasons as the general statewide season structure. The three combined rifle seasons were 5, 12 and 9 days in length, and were used as a method to spread increasing hunting pressure. While elk herds have generally been on the increase statewide since 1986, deer herds have generally been on the decline. Several variations of the three combined rifle seasons have been used by biologists to help improve the deer herds. In 1986, deer antler point restrictions (APR) were approved statewide, limiting harvest of bucks to those with three points or more on one antler. While APR worked well for elk, by delaying the kill one year, bucks did not show the same antler growth response as bull elk, and APR were abandoned over much of the state after the 1991 season. Yearling bucks tend to have small two-point antlers but occasionally they are even 3 – 4 point bucks. Consequently, many hunters made mistakes and shot deer that were not legal, and in some cases, the deer were even abandoned.

In 1992, out of a growing concern of a decline in mule deer populations, much of the state's deer hunting was restricted to a three-day buck hunt. This structure was very unpopular with hunters and was abandoned after 1994. In 1995, buck hunting was extended to the first five days of each of the three combined seasons. Buck licenses remained unlimited or over-the-counter until 1998.

Starting in 1999, all deer hunting in the state west of Interstate 25 (D-9 became limited in 1998) was changed to totally limited licenses (i.e., no over-the-counter licenses) for archery, muzzleloader, and regular rifle seasons. This was done mainly to improve the quantity and quality of the antlered deer hunts. Also, from 1999 – 2001, none of the leftover licenses from the computer drawing process were sold as leftover licenses.
In 2015, CPW began a new 5-year season structure that included:
1) A limited buck or either-sex archery season
2) A limited muzzleloader season for bucks and does
3) Two combined rifle seasons (second and third season) for limited bucks and antlerless deer
4) A very limited fourth season for buck deer

For a deer DAU to be eligible to offer doe deer licenses, the DAU needs to be within the population objective range. To qualify for the limited 4th season buck deer hunt, the DAU has to average more than 25 bucks:100 does for the previous three years and be within the long-term sex ratio objective range.

Licenses allocation

Starting in 1998, all D-9 licenses became limited (i.e., no over-the-counter). Since that time the total number of licenses issued has ranged from a low of 3,975 in 2007-2008 to a high of 12,866 in 2004. In 2004, the high number of licenses offered was an effort to reduce the population and buck/doe ratios closer to HMP management objectives. CWD was first discovered in D-9 in 2001, shortly before Miller and Conner (2005) determined bucks have

CWD prevalence twice that of does and mature bucks have CWD twice that of young bucks in Colorado. These factors lead CPW staff to intensify efforts to manage to HMP objectives. In 2007-2008, licenses were lowered to 3,975 because of a severe winter that resulted in high over-winter mortality. License numbers from 2013-current have remained fairly consistent with an average of 9,629 licenses (Figure 13).

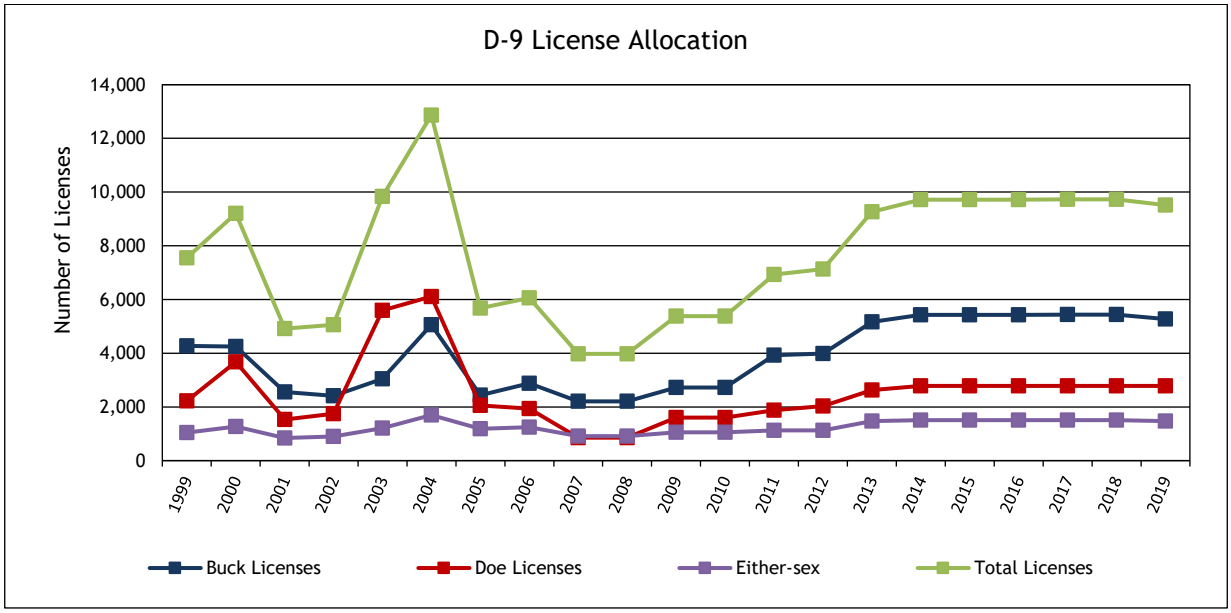

Figure 13. D-9 buck, doe, either sex and total licenses offered from 1999-2019.

Harvest

The total deer harvest (bucks, does, and fawns) is a crude estimation of population performance over time. Between 1953 and 2019, deer harvest in Middle Park has averaged approximately 2,100 deer per year, or 1,200 antlered (bucks) and 900 antlerless (does and fawns). During the 1950's and 1960's however, the total harvest averaged 3,700 deer. Beginning in the 1970's and continuing until 2008, the harvest dropped to an average of less than 1,500 deer per year, or less than 40% of the harvest in the 1950's and 1960's. Harvest over the last ten years has averaged 1,367 for bucks and 913 for antlerless. This positive trend of increased harvest over the last ten years can be attributed to an increase in licenses, a very productive herd, and several hunting seasons that provided excellent hunting conditions (i.e., early snow that pushed deer to lower elevations making them more susceptible to hunters). Harvest data from 1953-current is summarized in Figure 14.

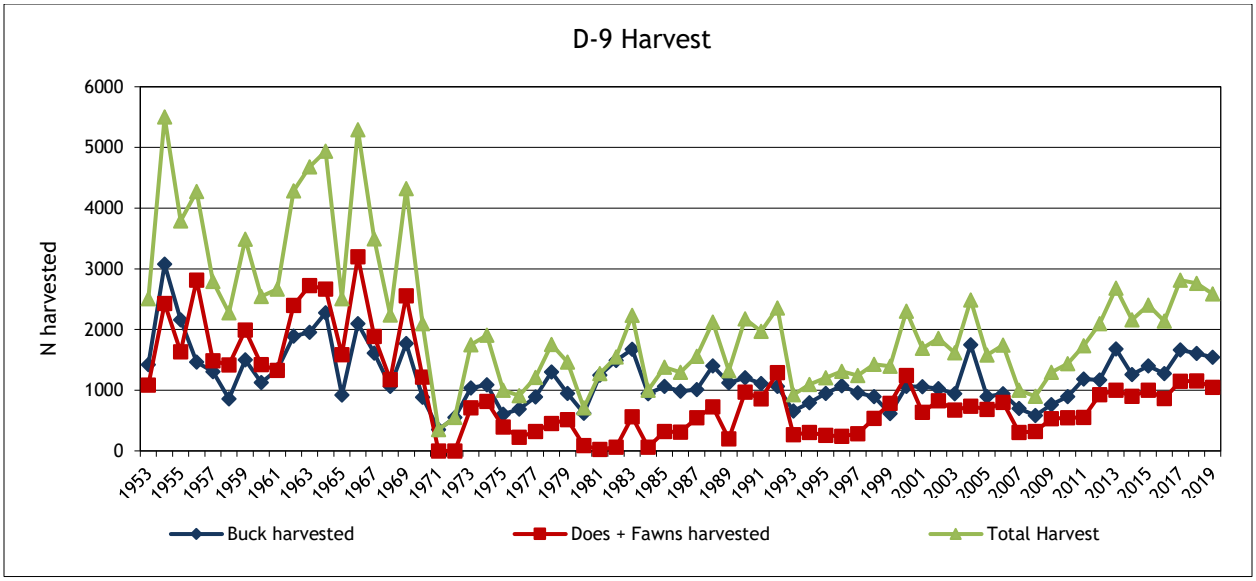

Figure 14. D-9 buck, antlerless (does and fawns), and total harvest from 1953-2019.

Hunter Numbers and Success Rates

Total hunting pressure has remained relatively stable in Middle Park since 1954. Between 1954 and 2019, the number of hunters averaged around 6,500. The lowest number was 1,686 in 1971 when the state was restricted to statewide buck only hunting. The highest number of hunters occurred in 1966 with 9,987 hunters. In the last ten years, the number of hunters averaged 8,551.

Since the 1950's and early 1960's, percent success has dropped with declines in deer numbers and harvest. The highest percent success was 78% in 1959 and the lowest was 13% in 1980. During the period 1954-2019 overall success averaged 33%. Hunter success averaged around 27% from 2010-2019 (Figure 15).

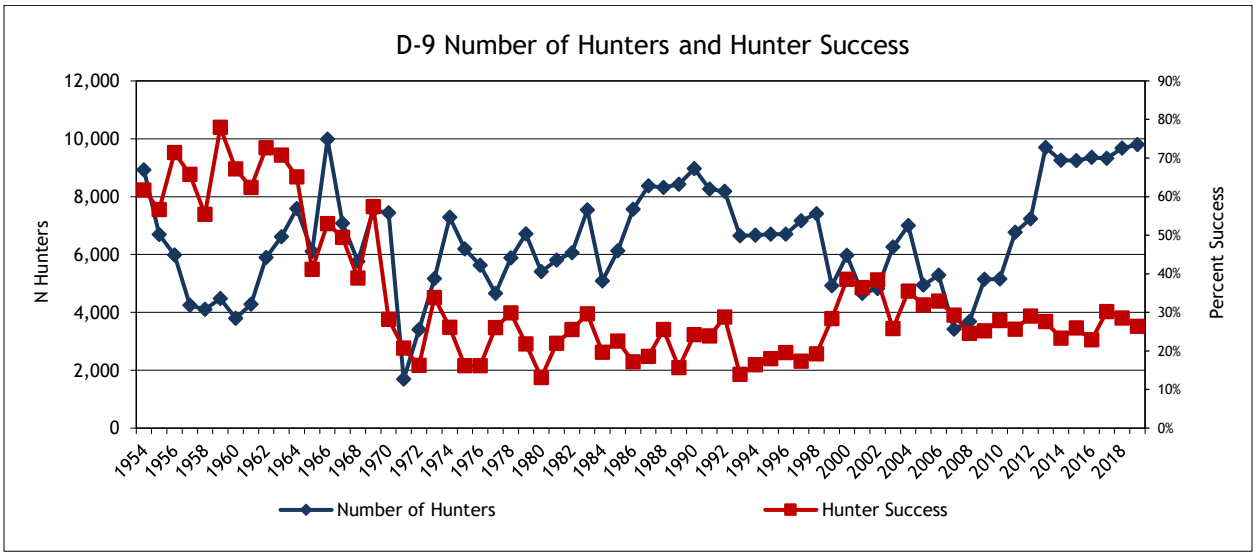

Figure 15. D-9 total number of hunters and percent success from 1954-2019.

Demand and Preference Points Required

The D-9 DAU can be characterized as a hunting "opportunity" DAU that provides ample, and relatively easy limited licenses to draw. In 2019, 4th season buck licenses for the 018 hunt code required 2 preference points and 4th season buck licenses for the 027 hunt code required 1 preference point (both sold out with 1st choice applicants). The remainder of hunt codes sold out as 2nd choice (either-sex archery and 3rd season buck rifle for the 018 and 027 hunt codes), 3rd choice (muzzleloader bucks), or as leftovers (muzzleloader doe, all rifle doe, either-sex private land rifle, and all other rifle buck excluding the previously mentioned).

Other Management Activities in DAU D-9

Middle Park Mule Deer Survival Study

In 1998, the D-9 DAU was selected as the third study site for intensive herd monitoring in the state. In November of that year, 50 fawns and 40 does were radio-collared. Starting in 2010, bucks were added to the study. Currently a sample of 60 fawns, 90 bucks and 90 does are maintained each year. Bucks and does are monitored from mid-December to mid-December of the following year, and fawns are collared at 6 months (mid- December) and are monitored until mid-June. Radio collars are equipped with mortality sensors that change the signal pulse rate when no movement has occurred for eight hours. These radio-collared animals are being monitored throughout the year to assess survival rates and whenever possible to determine cause of mortality. Fasteners made of surgical tubing on fawn collars deteriorate in ultraviolet light, ensuring that the collars will drop off in the summer before they become too constrictive and allowing them to be reused.

The survival study serves three main purposes: 1. to allow managers to more accurately determine survival rates for both the juvenile and adult segment of the Middle Park deer herd, and 2. to allow managers to examine cause-specific mortality factors within the Middle Park deer herd, and 3. to closely examine movement patterns of the herd.

Doe Survival

Over the past twenty years of the study, the doe survival estimate has fluctuated between a low of 74% survival (2017) to a high of 94% survival (2018). The 20-year average doe survival in the D-9 herd was 85% (Figure 16).

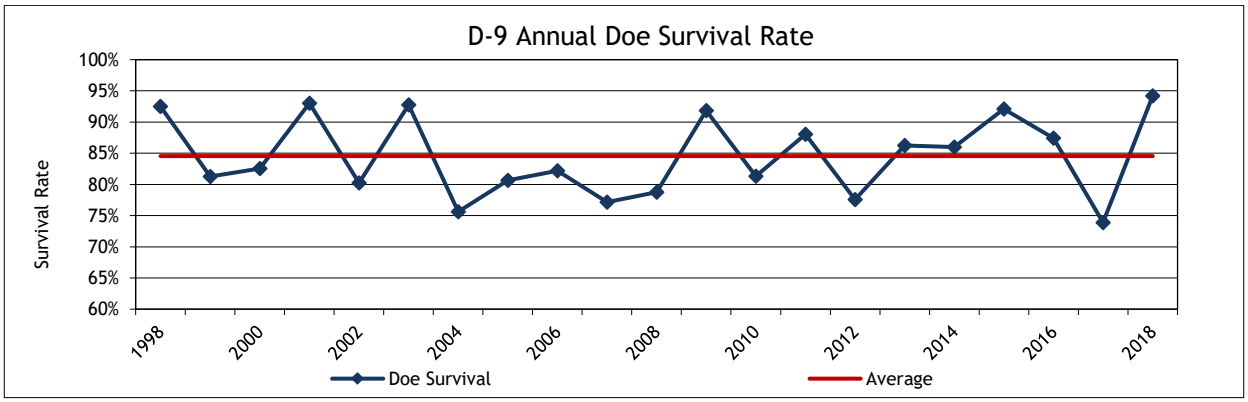

Figure 16. Observed adult doe survival estimates in the Middle Park Deer herd via radio-collared survival study from 1998-2018 (biological year).

Juvenile (Fawn) Survival

Juvenile survival varies much more considerably with the severity of the winter, along with other factors. The lowest fawn survival measured was 33% (2007), while the highest was 88% (2003). The 20-year average fawn survival was 70% (Figure 17).

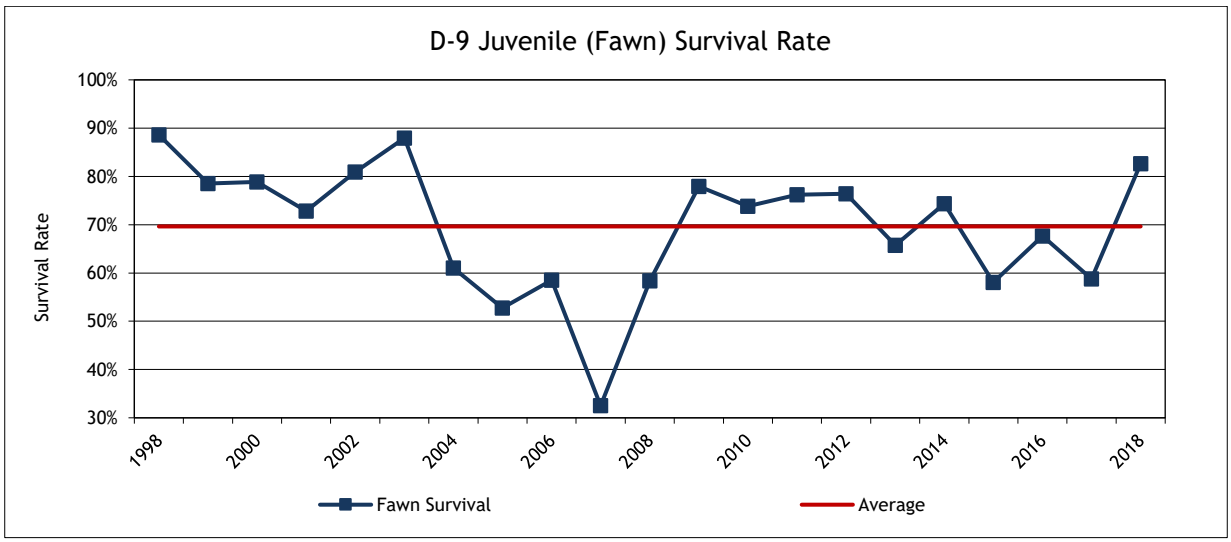

Figure 17. Observed juvenile deer survival estimates in the Middle Park Deer herd via radio-collared survival study from 1998-2018 (biological year).

Buck Survival

Since CPW began monitoring buck survival in 2010, the estimate has fluctuated between a low of 72% survival (2013) to a high of 89% survival (2012). The average buck survival during this time in the D-9 herd was 82% (Figure 18).

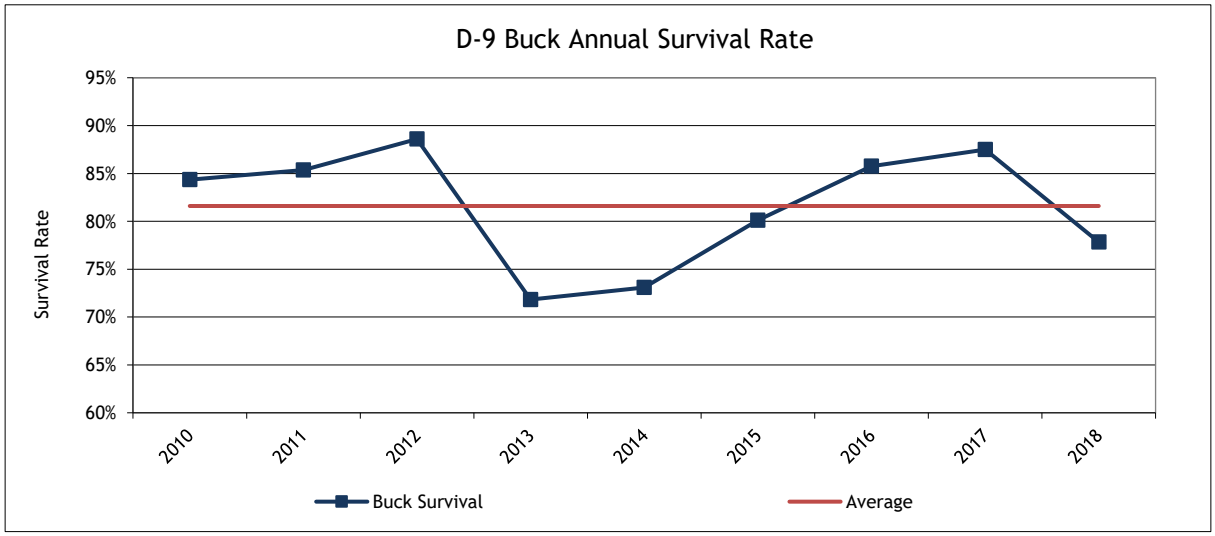

Figure 18. Observed adult buck survival estimates in the Middle Park Deer herd via radio-collared survival study from 2010-2018 (biological year).

Adult Doe Cause-Specific Mortality

A benefit to the Middle Park Deer Survival Study is that, with timely inspection, different mortality factors can be distinguished, giving managers an accurate picture of influential factors on the population as a whole. Up until the summer of 2007, there were two adult deer with working radio collars that were put on during the first year of the study. The oldest recorded age of a doe was 14+ years, from one of the two aforementioned deer. Hunting harvest is typically not included in the cause-specific mortality because it can be influenced by license number fluctuations set every year. Figure 19 below shows the percentage breakdown of adult doe deer mortality factors over the span of the survival study. Note that "Undetermined" accounts for the largest percent of adult mortalities. This is due to the fact that some of the collared does in the study die in the summer (Figure 23) and decompose more quickly than during the winter. The two leading causes of know mortality for adult doe deer in Middle Park are road kills and coyotes. It is important to note that throughout the study, 88% of all collared deer have survived until the radio collar has stopped working.

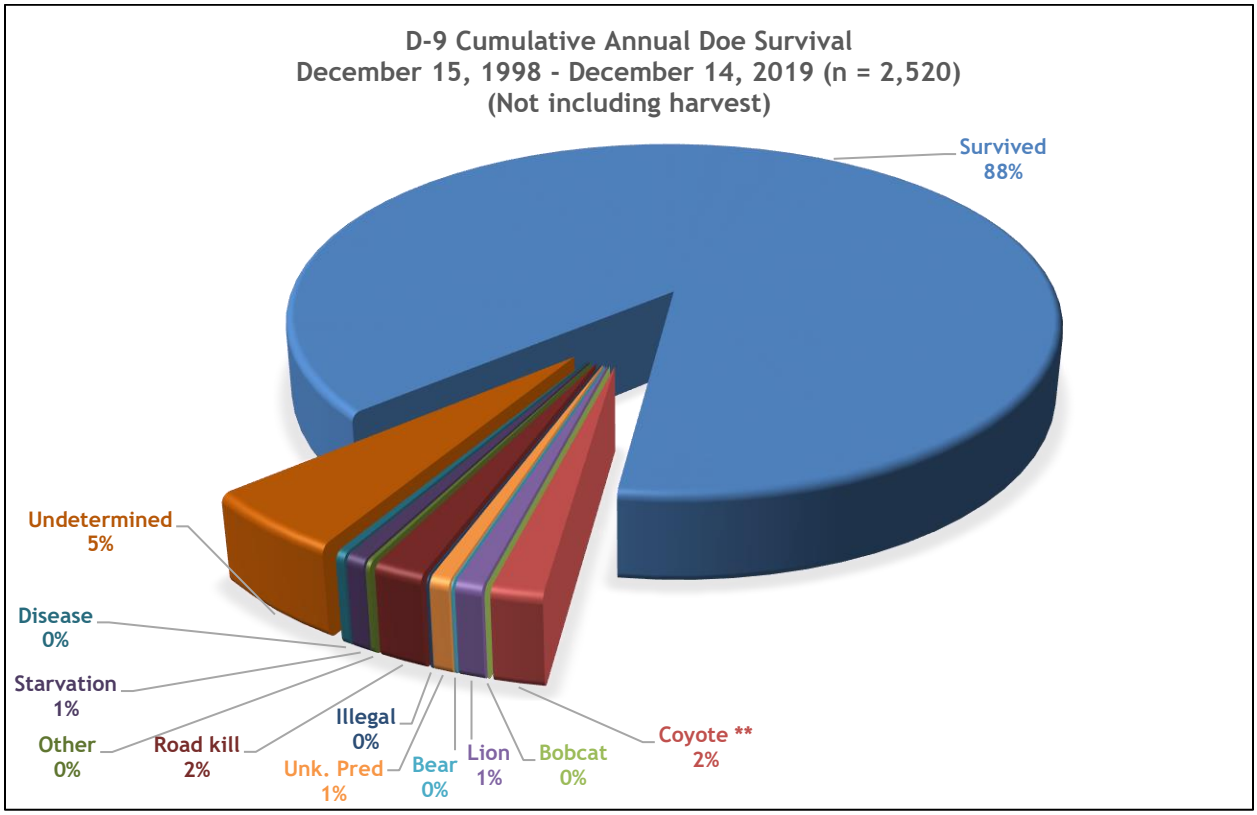

Figure 19. Percentage breakdown of mortality causes in adult doe deer for D-9, 1998-2019. **Includes suspected, probable, and confirmed coyote mortalities.

Juvenile Cause-Specific Mortality

Like the adult segment of the population, juvenile (fawn) mule deer are collared on an annual basis. Juvenile survival is measured from December 15th–June 14th. This is due to the fact that juveniles must be fitted with special drop-off radio collars so as not to interfere

with growth, and previous studies have shown a drastic decrease in mortality rates once deer reach 1 year of age. Figure 20 shows the percentage breakdown of juvenile mortality factors in D-9. Coyote predation accounts for 12% of all measured juvenile mortality in Middle Park. It is worthwhile to note, as in coyote predation on does, that this included all suspected, probable, and confirmed cases. From previous research done in Axial Basin, a suspected case is noted when just the radio-collar is found with no other evidence in the area. A probable coyote mortality is noted when coyote sign is present, as well as indications of a struggle. A confirmed coyote case is noted when there is sufficient evidence: this can include factors such as neck hemorrhaging, a kill trail with hair and blood, or other indisputable evidence. Almost 5% of the fawn mortality is recorded as undetermined due to decomposition or insufficient evidence to classify the kill. Starvation, road kill, lion predation, and other predation are the other leading causes of fawn mortality. It is important to note that 72% of the collared D-9 fawns survive until the radio-collar drops off.

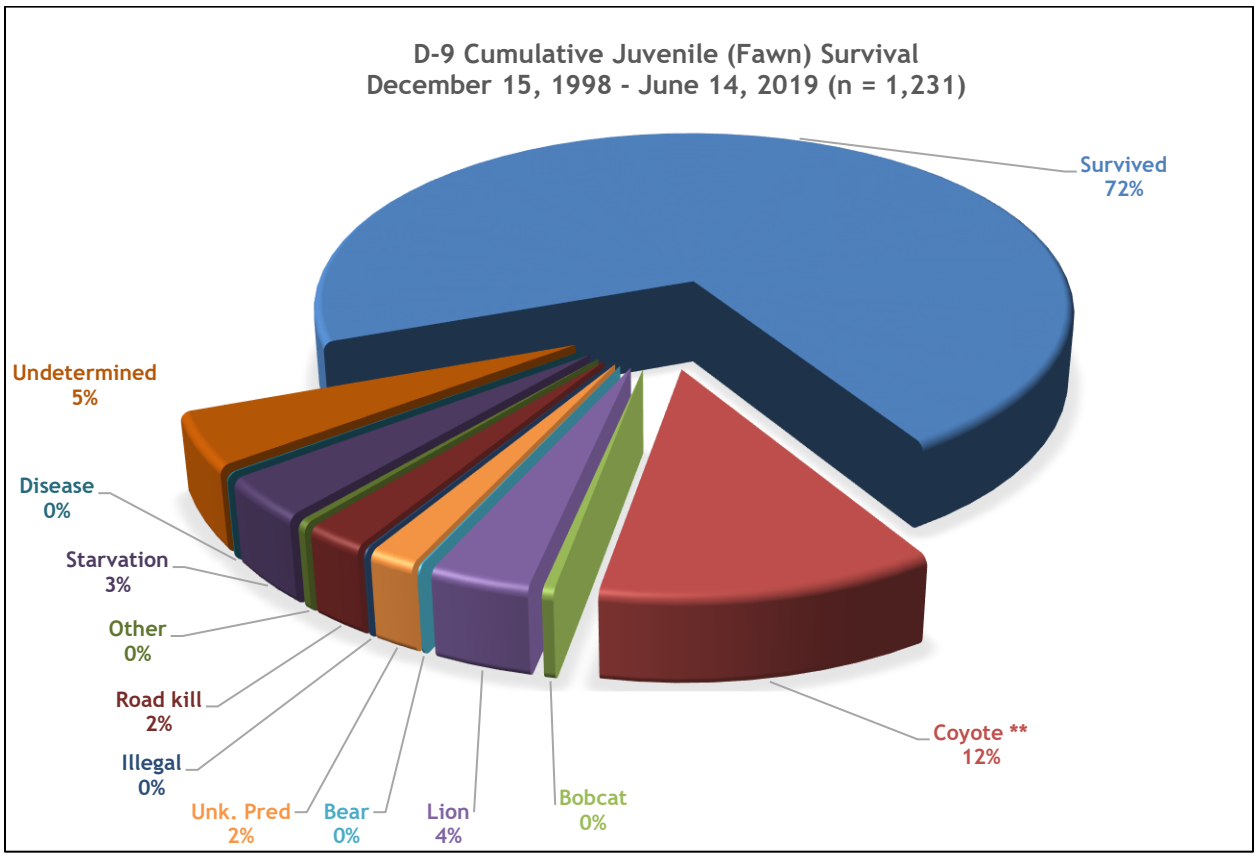

Figure 20. Percentage breakdown of mortality causes in juvenile deer for D-9, 1998-2019. **Includes suspected, probable, and confirmed coyote mortalities.

Adult Buck Cause-Specific Mortality

Similar to fawns and does, cause specific mortality is determined for collared bucks. Figure 21 and Figure 22 below shows the percentage breakdown of adult buck deer mortality factors (not including harvest and including harvest, respectively) from 2010-2019. Note that "Undetermined" accounts for the largest percent of adult mortalities. Similar to does, this is due to the fact that some collared bucks die during the summer (Figure 23) and decompose

before biologists are able to determine a cause. The three leading causes of known mortality for adult buck deer in Middle Park are road kills, lions and coyotes. It is important to note that throughout the study, 82% of all collared deer have survived until the radio collar has stopped working.

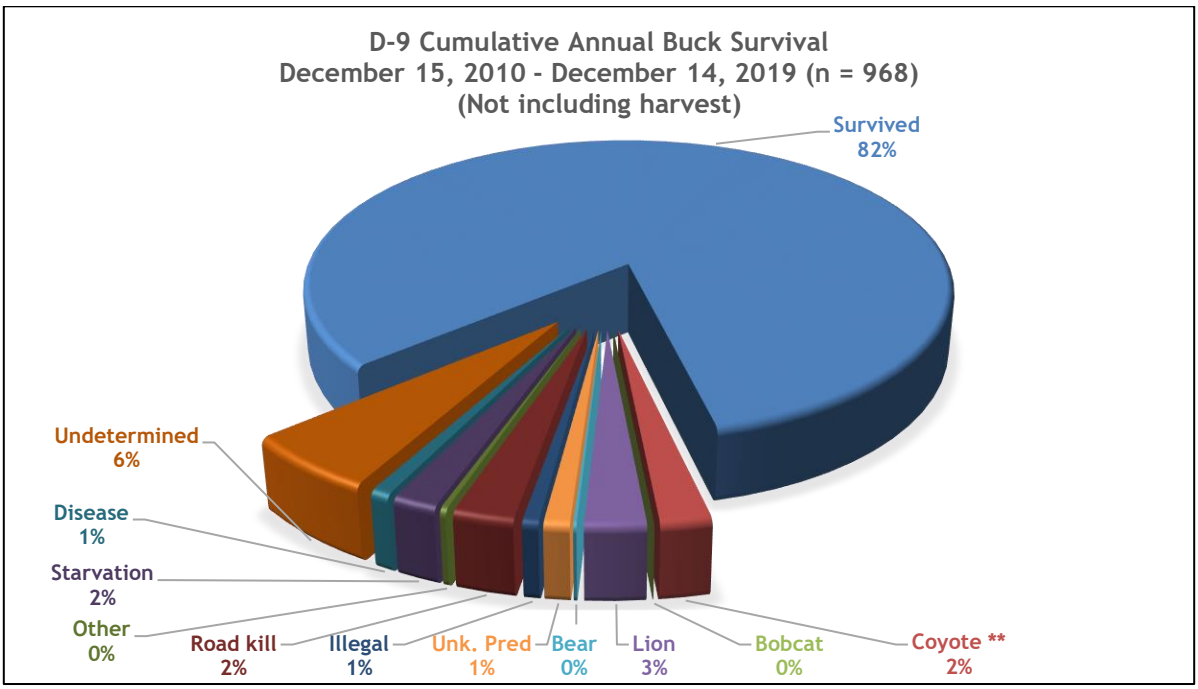

Figure 21. Percentage breakdown of mortality causes (no harvest included) in adult buck deer for D-9, 2010-2019. **Includes suspected, probable, and confirmed coyote mortalities.

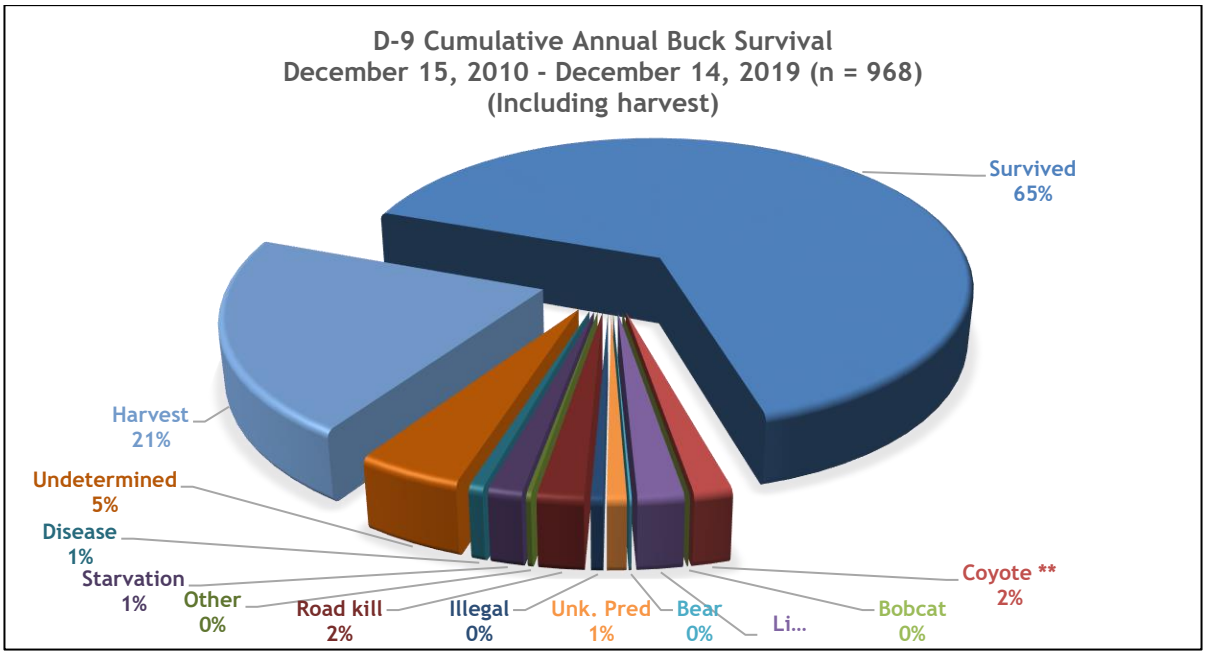

Figure 22. Percentage breakdown of mortality causes (harvest included) in adult buck deer for D-9, 2010-2019. **Includes suspected, probable, and confirmed coyote mortalities.

Timing of Mortalities

Along with survival estimates and cause-specific mortality, the survival study has allowed managers to collect other pertinent data such as the timing of adult and juvenile mortalities. Figure 23 shows this data depicted graphically, not including harvest mortality. Doe deer tend to die more frequently during the late winter months (March-May). Fawn mortality occurs more often in the early winter months (January-March) perhaps due to inexperience with surviving Middle Park winters. It is important to note that once a fawn reaches 1 year of age (June 15 for survival study purposes), it is then classified as an adult until the fawn collar drops off. This explains why there is no juvenile mortality data for the Middle Park Study from June 15 through December 15. Similar to fawns, bucks tend to die at a higher rate during the early winter months (Jan-March); this occurs because during the rut (just before the onset of winter) bucks reduce foraging, invest crucial resources (i.e., body fat), and may become injured while battling, increasing their susceptibility to mortality.

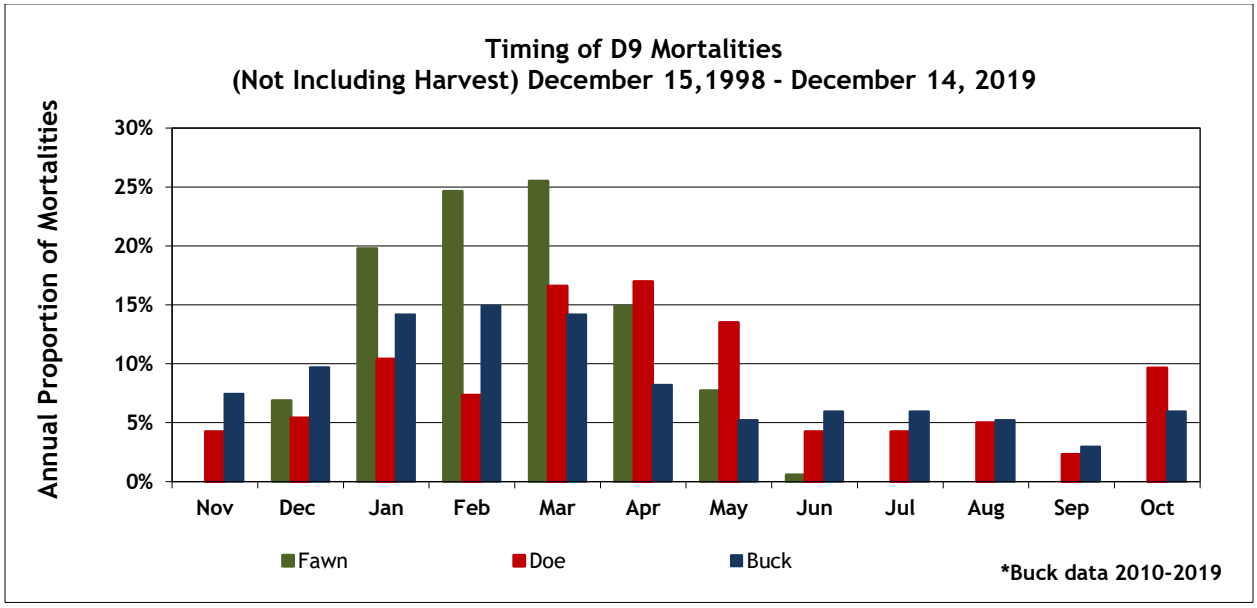

Figure 23. Timing of all D-9 collared deer mortalities (n=742) from December 15, 1998 to December 14, 2019.

CURRENT MANAGEMENT STATUS

2009 D-9 Plan Objectives
Population Objective = 10,500-12,500
Sex ratio Objective = 30-35 bucks/100 does

Current Management Strategies

The D-9 DAU is managed through totally limited licenses for both antlered and antlerless harvest for all manners of take. Archery, muzzleloader, and 2nd, 3rd, and 4th season rifle licenses are available for the D-9 DAU. The 2nd and 3rd season either-sex license quotas may be adjusted to ensure a quality buck hunt for the 4th rifle season. Private land licenses provide hunting opportunity on private lands and help to disperse deer. While the D-9 herd

has been slightly above population and sex ratio objectives during the life (2010-2019) of the previous HMP, the management strategy during this time has been very effective at providing a healthy (low CWD prevalence) and productive herd that offers excellent hunting opportunity. Continuing with a similar management strategy into the future will continue to provide a desired outcome for the majority of the hunting community and managers alike.

Current Management Issues

1. Limited Winter Range

   Winter snow forces deer down and out of the higher elevations of the DAU to limited ranges adjacent to the Colorado and Blue Rivers, and Muddy Creek. This movement results in the use of a restricted and limited winter range and concentrates the deer in an area from approximately 7,000-9,000 ft. During average winters, the winter mortality rates probably do not exceed 15-20% of the total deer herd. However, during severe winters the deer can be concentrated in the valley floors on very limited south-facing or wind-swept slopes. Competition for food is acute and this results in high winter mortality, especially for fawns and bucks. Winter range is considered the most limiting factor for deer in Colorado and this DAU.

2. Unfavorable Range Conditions

   Although much of mule deer habitat across the western US is in fair to poor condition, Middle Park habitat tends to be in better shape due to the considerable moisture it receives in the winter and consistent doe harvest has prevented over-browsing. However, suppression of large-scale wildfire has resulted in plant successional movement towards later seral stage or climax communities. Browse plants are generally mature to over-mature and often decadent. Browse seedlings and young plants are sparse and in some areas, the grass and forb understory is sparse and lacks diversity. Many of the mixed mountain shrublands also are over-mature, less productive, and can be unavailable for winter browse use. CPW, BLM, USFS, and private landowners continue to make efforts to conduct habitat improvement projects, such as prescribed burns, fertilization treatments, and pinyon-juniper thinning/removal.

3. Direct Loss of Habitat due to Land Development

   Over the past 50-60 years, there have been changes in the eastern and southern portions of the DAU from the development of the ski industry. Residential and commercial developments have resulted in a rapid loss of big game habitat, habitat being fragmented and increased barriers to animal movement. This trend is expected to continue over the next 10 years. From 1970 to 2010, there was a 61% increase in developed areas in the D-9 DAU (Sushinsky et al. 2014).

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

   The proliferation of all forms of outdoor recreation on public lands has continued since the 2009 DAU Plan was created. Human activity in the form of recreation has been widely shown to have negative impacts on wildlife species

(reviewed in Larson et al. 2016). Deer react to the presence and activity of humans either by fleeing or by being vigilant, both of which detract from the animal's ability to feed and rest. These disturbances on the scale of individual encounters between an animal and a human recreationist may seem minor in isolation, but when translated to the lifetime of the animal or even to the scale of the whole deer population, the cumulative effects of year-round disturbance will lead to lower recruitment of fawns, higher mortality, and overall decline in population size over time. Disturbance from human activity can make what would otherwise be suitable habitat from a forage standpoint into poor quality habitat from a behavioral standpoint.

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

Wilderness areas and otherwise restricted-travel areas have prohibitions on motorized and mechanized uses. These areas function as summer habitat for deer and provide some relief to wildlife from motorized and mechanized recreation, although the wilderness areas do have significant summer use by hikers and backpackers.

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

5. Road kills

Traffic has continued to increase over the past decade as the region's human population has grown, and wildlife-vehicle collisions continue to be a concern. Highways 9 and 40 bisect winter range and are the primary routes for visitors and residents traveling from I-70 to Steamboat Springs. Starting in 2015, wildlife exclusion fencing and overpass/underpass structures were installed along a section of Hwy 9 to reduce wildlife-vehicle collisions. However, many other portions of Hwy 9 and Hwy 40 continue to result in many deer mortalities. As shown above, roadkill accounts for 2% mortality in Middle Park radio-collared deer for does, fawns, and bucks.

6. Chronic Wasting Disease

Chronic Wasting Disease (CWD) is an infectious prion disease that affects cervids including mule deer. CWD is always fatal and deer infected with CWD die within 2 years of infection (Miller et al. 2012) and compared to uninfected deer, CWD-positive deer have both an overall higher mortality rate as well as a higher rate of being preyed upon by mountain lions (Miller et al. 2008). In herds that have a high prevalence rate of CWD, mortality due to CWD will eventually cause population

declines (Miller and Fischer 2016). In addition, although there has not been evidence so far of transmission to humans, Miller and Fischer (2016) recommend a cautious approach of not consuming meat from CWD-positive animals. The CWD infection rate in mule deer bucks is about twice that of does (Miller and Conner 2005), so herds with high buck-to-doe ratios have a higher CWD prevalence. Moreover, mature bucks have the highest prevalence, generally twice that of younger bucks.

CPW has developed a Chronic Wasting Disease Response Plan with specific management guidelines to keep CWD prevalence in mule deer herds to <5% (CPW 2018). The CWD Response Plan outlines a 15-year monitoring plan in which certain selected herds will have mandatory testing of harvested bucks every 5 years. D-9 was included in 2018 among the selected units for mandatory CWD testing of all harvested bucks. Based on a sample of 1047 mule deer bucks submitted, the prevalence rate was 3.2% (95% CI 2.3-4.5%). This is under the management threshold of 5% prevalence rate. For adult mule deer does, CWD testing has been voluntary; based on a small sample of 125 mule deer does submitted, no CWD positive does were detected (Table 3). CWD was first confirmed in the DAU in 2001 (2002 and 2003 prevalence rate ~1%), and prevalence has remained low over the past 20 years.

Table 3. CWD prevalence estimates for harvested deer in DAU D-9.

	ADULT BUCKS (2018 mandatory)				ADULT DOES (2018 voluntary)			
Species	Sample Size	Prevalence	LCI	UCI	Sample Size	Prevalence	LCI	UCI
Mule Deer	1047	3.2%	2.3%	4.5%	125	0%	0%	2.9%
Whitetail Deer	7	0%	0%	41%	1	0%	0%	97.5%

If a herd's CWD prevalence reaches or exceeds 5%, the CWD Response Plan recommends the following harvest management actions (CPW 2018). CPW herd managers may take *any* or *all* of these actions in order to reduce CWD prevalence to below the 5% management threshold:

1. Reduce the population to the lower end of the objective range (increase overall harvest)
2. Reduce the buck:doe ratio to the lower end of the objective range (increase buck harvest)
3. Reduce the age structure (shift timing of buck harvest to later seasons to target older-age bucks)
4. Focus harvest in CWD hotspot locations

In addition, regardless of the CWD prevalence level within a herd, these routine practices should be followed (CPW 2018):

1. Avoid artificially concentrating deer via agricultural feed, salt, or mineral blocks
2. Use proper carcass disposal procedures to avoid spreading CWD via exposed carcasses

If these CWD management actions fail to reduce CWD prevalence in a herd to below the management threshold (5% prevalence) within 60 months (5 years), the Herd Management Plan update should be revised to lower the population and sex ratio

objectives in order to reduce CWD prevalence to below 5% (CPW 2018). Furthermore, if CWD prevalence exceeds 10%, then a Herd Management Plan revision should be done within 12-18 months (CPW 2018).

7. **Competition with Elk**

Elk numbers in Middle Park gradually increased from very low numbers at the turn of the last century to peak numbers in the last 20 years. Today, CPW believes the elk population has declined in some parts of the state, but post-hunt elk estimates in Middle Park continue to be high. During this population increase, elk have expanded their historic winter ranges, moving to lower elevations where they compete with deer on the limited winter ranges. Elk are stronger and more aggressive than deer, and have more diverse food habits. They are also more mobile than deer during the winter and search widely for food. In all likelihood, the increase in elk has probably impacted the deer herd. Some conversion of sagebrush habitat to grasslands has also occurred, and this would tend to favor elk.

Public Input Process

In March 2020, we contacted 1,000 hunters who had drawn D-9 licenses during the 2018 hunting season. We mailed postcards to these individuals requesting that they complete an online survey on D-9 deer management. We received responses from 237 people (24% response rate). Complete survey results are available in Appendix A.

Key highlights of the hunter survey results:

- 95% (n=224) of respondents had hunted deer in D-9 within the past 3 years.
- The average age of respondent was 50 years old. The range was 19-81.
- 57% of hunters were either very satisfied (17%) or somewhat satisfied (41%) with their deer hunting experience. 30% were somewhat dissatisfied (21%) or very dissatisfied (9%).
- The top reasons for wanting to hunt deer in D-9 (% rated "very important"):
    1. To spend time in nature (67%)
    2. To spend time with family/friends (61%)
    3. To obtain wild game meat (57%)
    4. To contribute to wildlife management (44%)
- The top concerns about potential issues between deer and human activities/properties (% rated as "very or moderately concerned"):
    1. Loss of deer habitat due to human population growth and land development (44% and 29 %, respectively)
    2. Disturbance to deer from human outdoor recreation activities (23% and 40%, respectively)
    3. Decline in deer habitat due to suppression of natural wildfires (28% and 32%, respectively)
- The top concerns about chronic wasting disease (CWD) in D-9 were (% rated as "very or moderately concerned"):
    1. Potential for CWD to reduce deer hunting opportunity (40% and 38%, respectively)
    2. Future generations' ability to enjoy hunting deer because of CWD (44% and 38%, respectively)

3. Health of this deer herd (42% and 36%, respectively)
4. Not having enough healthy deer to hunt (42% and 34%, respectively)

- The population objective alternatives proposed in this draft plan differ slightly from the alternatives initially explored at the time of the online hunter survey, so the responses to the survey are not directly interpretable in the context of the proposed alternatives. However, among three population objective ranges initially considered, 59% of respondents preferred status quo of 10,500-12,500 deer. 17% preferred a higher population objective of 11,500 – 14,000 deer. 11% preferred reducing the population objective to 8,500-10,500 deer. The preferred alternative (#3, 10,500-14,000) presented here in this plan encompasses a mix of status quo and a higher upper end.
- Most respondents (57%) preferred keeping the current sex ratio objective of 30-35 bucks:100 does. 22% were in favor of increasing the sex ratio objective to 35-40. 12% were in favor of reducing the sex ratio objective to 25-30.

To gather additional input from all stakeholders who have an interest in D-9 deer management, the draft plan was available for review during a 30-day comment period. Only one comment was received during this time and can be found at the end of Appendix A. We also solicited input from county commissioners, federal land management agencies, and Habitat Partnership Program committees. Comments from these stakeholders can be found in Appendices C-E.

MANAGEMENT ALTERNATIVES and PREFERRED OBJECTIVES

Alternatives for Population Objective

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

The 2019 post-hunt D-9 population estimate is 16,668 deer and the current population objective is 10,500-12,500 deer. The alternatives that we considered would aim to either lower, maintain, or widen and increase the population objective. The ranges within each alternative allow for some annual variation in the estimated population size due to factors such as weather patterns influencing deer survival rates and statistical population modeling methods being inexact (see Overview of Procedures to Estimate Population Size section above).

Table 4. Proposed alternatives for the D-9 population objective range.

Proposed Alternatives for Population Objective	
Alternative 1:	8,500-10,500 (well below carrying capacity)
Alternative 2:	10,500-12,500 (status quo; severe winter carrying capacity)
Alternative 3 (selected):	**10,500-14,000 (below carrying capacity)**
2009 DAU plan population objective	10,500-12,500
Post-hunt 2019 population estimate	16,668

Alternative 1: 8,500-10,500 deer:

This alternative would set the objective lower at 8,500-10,500 deer (midpoint 9,500). Under this alternative, the population would be managed well below the habitat carrying

capacity during an average winter. The herd's productivity and survival rates should be higher than under the other two alternatives, and likewise, its resilience to severe weather events, predation, and other sources of mortality. At a lower population density, the spread of chronic wasting disease would be slower and the prevalence rate should decline or at least be contained. Doe and buck licenses would be maintained at higher quotas due to the herd's higher productivity. Major hunter crowding issues would occur trying to reach this objective.

Alternative 2: 10,500-12,500 deer:

This alternative would maintain the current population objective range of 10,500-12,500 deer (midpoint 11,500) established in the 2000 D-9 Plan. As described in the "Post-hunt Population" section, in the early 1980's the population objective was 14,000 and dropped to 10,500 by 1989 due to a drop in population size in the mid-1980's. Since 1989 the population objective remained at 10,500 until 2000 when a range was established of 10,500-12,500. Through research and the experience of several severe winters, biologists determined that on severe winters the habitat carrying capacity of the D-9 herd was near 10,500. As a result, the objective has remained with a lower end at 10,500 and an upper end of 12,500 to be closer to the population on more average weather years. This objective has been very effective at: keeping the D-9 herd very productive, reducing the density of deer — which in turn allows for better habitat conditions, providing hunters with a great deal of opportunity to get both doe and buck licenses every year, keeping CWD prevalence rates low, and reducing the need to fluctuate license quotas annually (making it easier for hunters to predict). The only negative of this objective range is that over the last 20 years, population estimates have rarely fallen within the objective, despite biologists efforts to reach it by issuing many licenses — in some years this lead to hunter crowding.

Alternative 3: 10,500-14,000 deer:

This alternative would maintain the lower end (10,500) of the current 2009 Plan objective, while widening the overall objective and increasing the upper end (14,000). The strategy with this objective is to maintain a lower end that considers the habitat carrying capacity on severe winters, while trying to provide a range that can more closely capture recent trends of modeled population estimates. This alternative will keep many of the positive aspects of the 2009 Plan objective by: keeping the D-9 herd very productive, reducing the density of deer — which in turn allows for better habitat conditions, providing hunters with a great deal of opportunity to get both doe and buck licenses every year, and keeping CWD prevalence rates low. If population estimates do decrease closer to the lower end of this objective, then some of these positive aspects will be influenced. In particular, there would be a need to reduce doe licenses, and there may be increased fluctuations in license quotas annually. However, repeatedly this herd has showed resiliency and typically bounces back within several years.

Alternatives for Sex Ratio Objective

The sex ratio objective determines the target number of bucks per 100 does. This metric is an index of the relative "quality" of bucks or age composition of bucks in the herd. CPW manages for the sex ratio by adjusting the number of buck licenses issued. The sex ratio objective can have implications on:

(a) availability of buck licenses,
(b) maturity of the bucks in the herd,
(c) potential for competition among bucks, does, and fawns for forage (see "Competing Herd Management Objectives" section above), and

(d) prevalence of Chronic Wasting Disease (CWD) which is twice as likely to occur in bucks than does (see CWD section above).

The 3-year average sex ratio in D-9 is 39 bucks per 100 does, which is slightly above the 2009 Plan's objective range of 30-35 bucks per 100 does. The alternatives under consideration would be to either decrease, maintain, or increase the sex ratio objective range.

Table 5. Proposed alternatives for D-9 sex ratio objective.

Proposed Sex Ratio Objective Alternatives	
Alternative 1 (Decrease)	25-30
Alternative 2 (Selected)	**30-35**
Alternative 3 (Increase)	35-40
2009 DAU plan sex ratio objective	30-35
3-year (2017-2019) average sex ratio	39

Alternative 1: 25-30 bucks:100 does:

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

Alternative 2: 30-35 bucks:100 does:

This alternative would maintain the current sex ratio objective range that was established in the 2009 D-9 Plan. This range is a moderate ratio at which the herd is still managed primarily for ample buck hunting opportunity. The maturity of available bucks would be about the same as it currently is. Buck license quotas would likely remain similar to levels seen over the last decade. This alternative has done well at keeping CWD prevalence rates low. The advantages and disadvantages of Alternative 2 would be intermediate to those of Alternatives 1 and 3.

Alternative 3: 35-40 bucks:100 does

This alternative would manage the herd for a higher sex ratio range. The advantages of Alternative 3 would be that there may be relatively more mature bucks in the herd. The disadvantages are that it would be more difficult to draw a buck license; the population growth rate may decline as bucks compete with does and fawns for forage; and CWD prevalence may increase as the relative number of bucks increases. If CWD prevalence in bucks exceeds the 5% threshold, then according to recommendations of the state's CWD response Plan (CPW 2018), it may be necessary to reduce the CWD prevalence rate by managing to the lower end of the sex ratio objective range.

New Population and Sex Ratio Objectives

Selected post-hunt population objective range = 10,500-14,000. The upper end of this range is likely below the DAU's current habitat carrying capacity on average winters and the lower end is near the habitat carrying capacity during severe winters. This alternative allows CPW to continue to provide excellent hunting opportunity and maintain a very productive herd.

Selected post-hunt sex ratio objective range = 30-35 bucks:100 does. This objective has been satisfactory to most D-9 hunters and maintains a moderate sex ratio that will help keep chronic wasting disease (CWD) prevalence in check while providing ample buck hunting opportunity.

STRATEGIES TO ADDRESS ISSUES AND MANAGEMENT CONCERNS

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

STRATEGIES TO ACHIEVE HERD MANAGEMENT OBJECTIVES

To achieve the updated population objective and to maintain the current sex ratio objective, CPW will continue to set licenses annually to provide sufficient buck and doe hunting opportunity for the public and to use hunting as a management tool to keep deer densities and buck ratios at moderate levels to discourage the spread and prevalence of chronic wasting disease.

ACKNOWLEDGEMENTS

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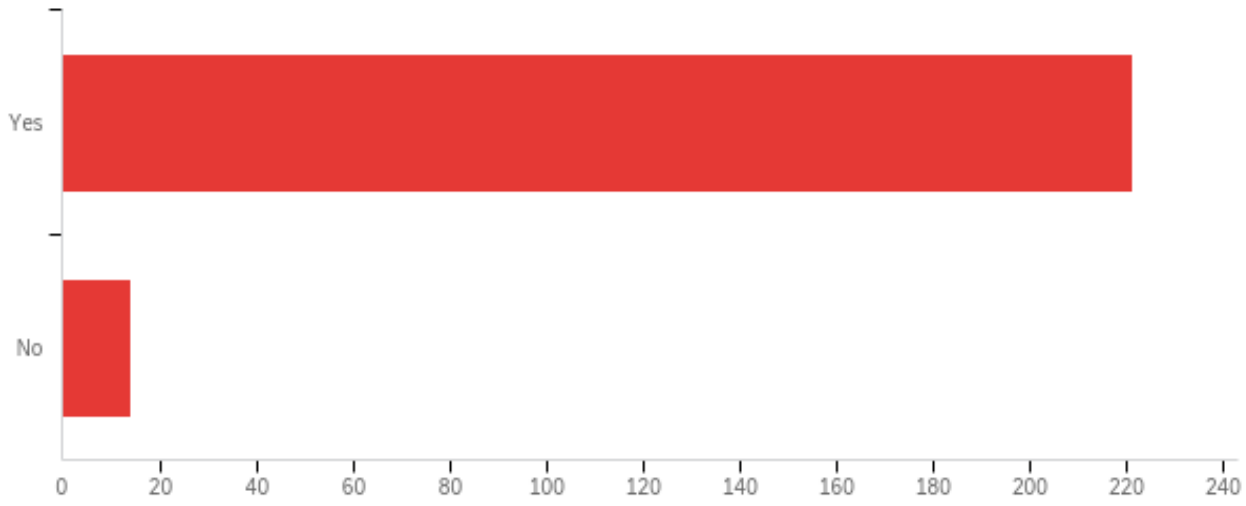
Appendix A: Results of D-9 Hunter Questionnaire, March 2020

D-9 hunter survey March 2020_Results

D-9 hunter questionnaire 2020-January_BL

May 11th 2020, 4:20 pm MDT

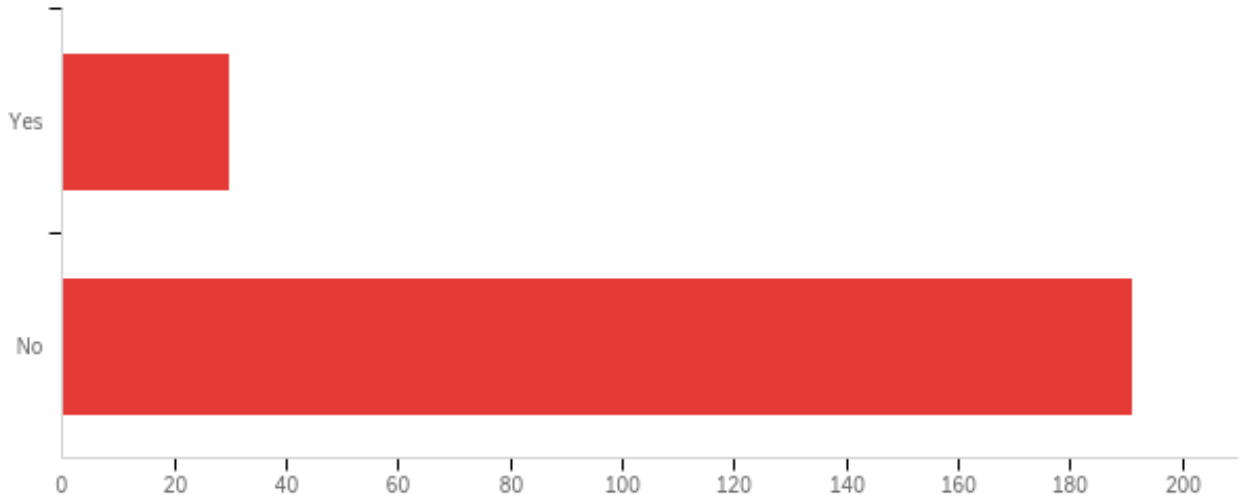
Q1 - Are you a resident of Colorado?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Are you a resident of Colorado?	1.00	2.00	1.06	0.24	0.06	235

#	Answer	%	Count
1	Yes	94.04%	221
2	No	5.96%	14
	Total	100%	235

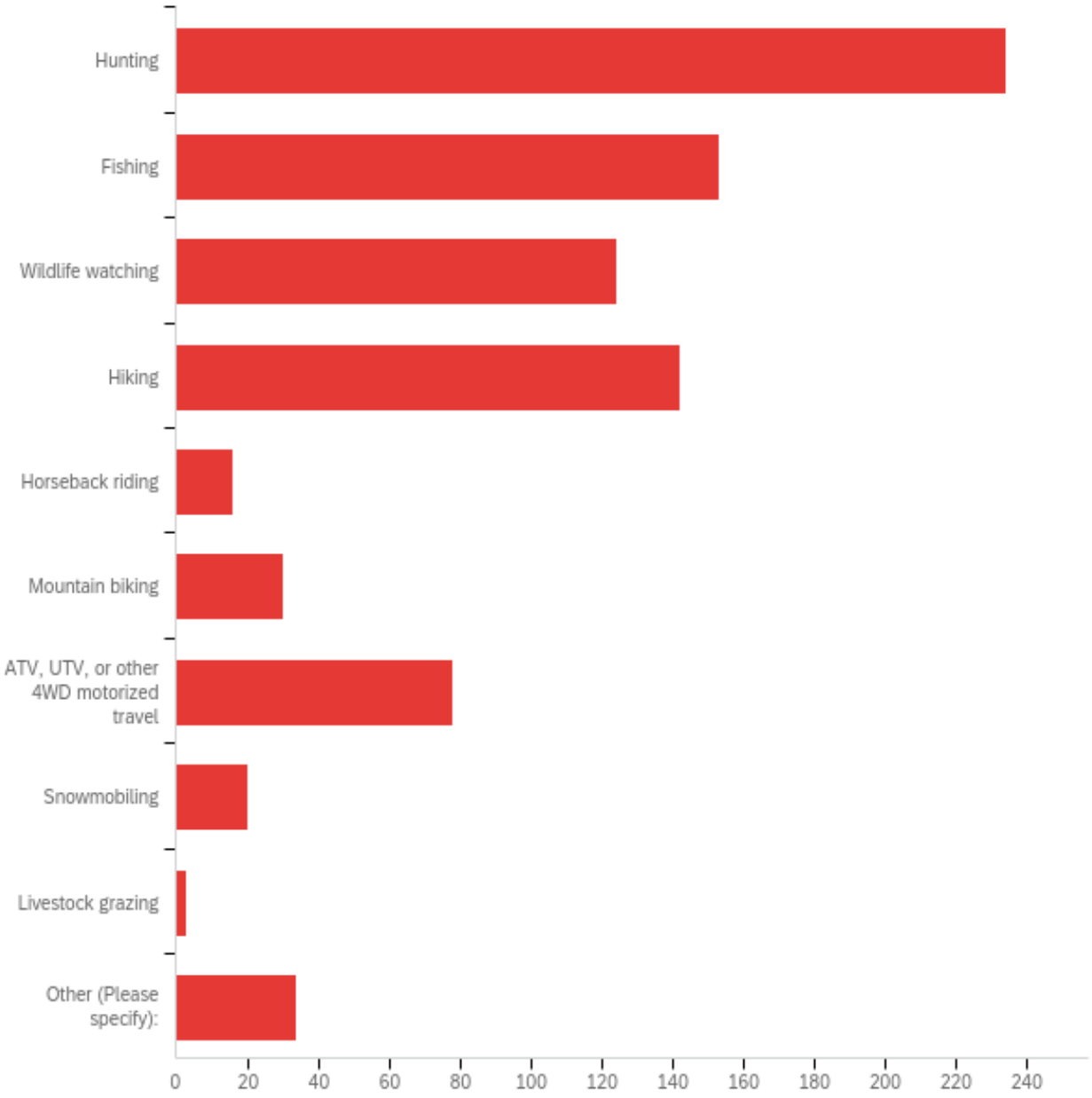
Q2 - Do you currently live in GMUs 18, 27, 28, 37, 181, or 371?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Do you currently live in GMUs 18, 27, 28, 37, 181, or 371?	23.00	24.00	23.86	0.34	0.12	221

#	Answer	%	Count
23	Yes	13.57%	30
24	No	86.43%	191
	Total	100%	221

Q3 - Which of the following outdoor activities do you enjoy in GMUs 18, 27, 28, 37, 181, and/or 371? (Please check all that apply.)



#		Answer	%	Count
1		Hunting	28.06%	234
2		Fishing	18.35%	153

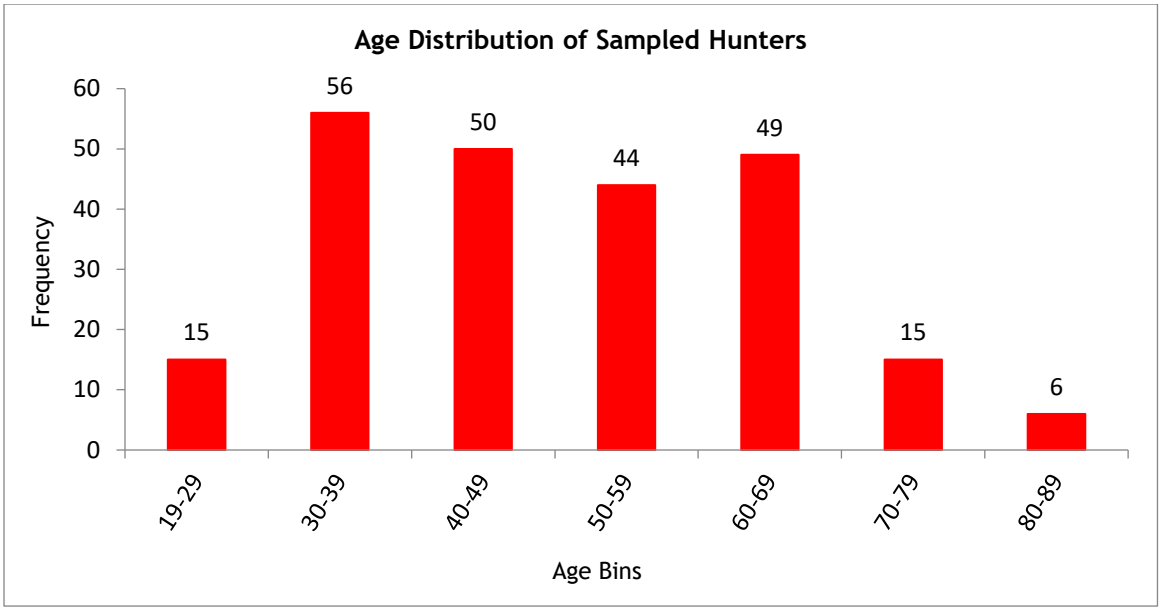
3	Wildlife watching	14.87%	124
4	Hiking	17.03%	142
5	Horseback riding	1.92%	16
6	Mountain biking	3.60%	30
7	ATV, UTV, or other 4WD motorized travel	9.35%	78
8	Snowmobiling	2.40%	20
9	Livestock grazing	0.36%	3
10	Other (Please specify):	4.08%	34
	Total	100%	834

Q3_10_TEXT - Other (Please specify):

Other (Please specify): - Text
Camping
Lake
backcountry skiing, snowshoeing
Trapping
Camping
I hunted in these areas in 2018 not 2019.
Backpacking
camping
Trail Running
Mushroom Hunting
Skiing
camping
Camping
camping
X country skiing

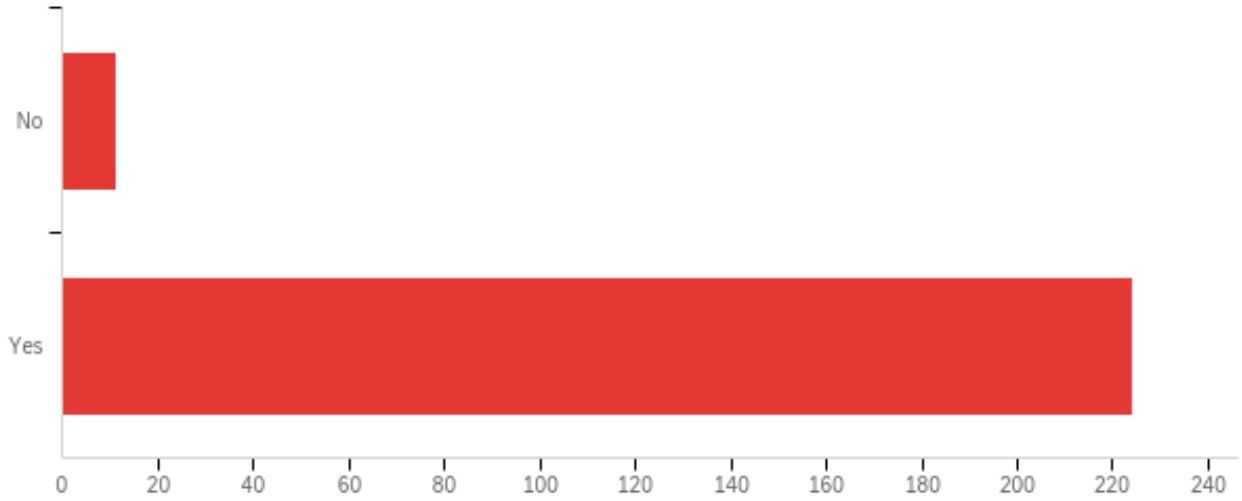
Shed Hunting
motorcycle riding
shooting sports
competitive shooting
backpacking & camping
Skiing
Camping
Camping, skiing
Skiing
Camping
camping
Camping
Camping
Skiing, gold panning
live in this part of colorado for the wildlife
Camping
camping

Q4- How old are you? (Please write in your response)



Mean	Min	Max	SD
50	19	81	14.5

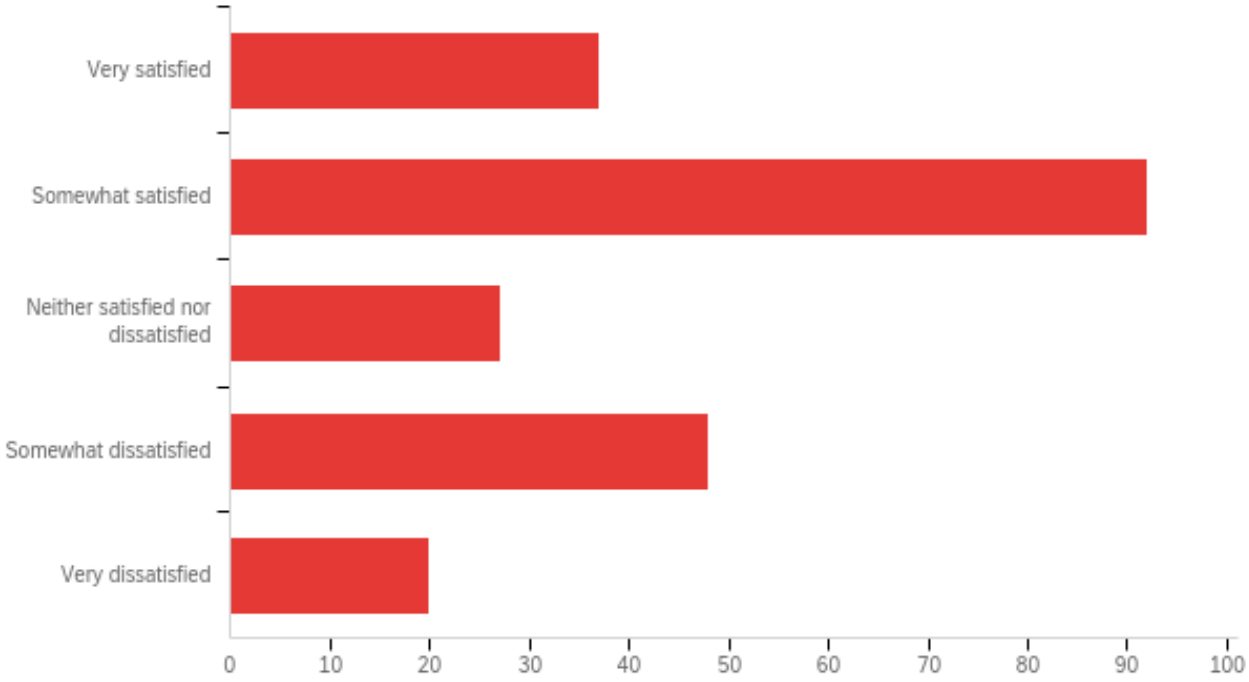
Q5 - Did you hunt deer in GMUs 18, 27, 28, 37, 181, and/or 371 any time during the previous three years (see map above)? (Please check one.)



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Did you hunt deer in GMUs 18, 27, 28, 37, 181, and/or 371 any time during the previous three years (see map above)? (Please check one.)	1.00	2.00	1.95	0.21	0.04	235

#	Answer	%	Count
1	No	4.68%	11
2	Yes	95.32%	224
	Total	100%	235

Q6 - Overall, how satisfied were you with your DEER hunting experience(s) in GMUs 18, 27, 28, 37, 181 and/or 371 during the previous three years? (Please check one.)

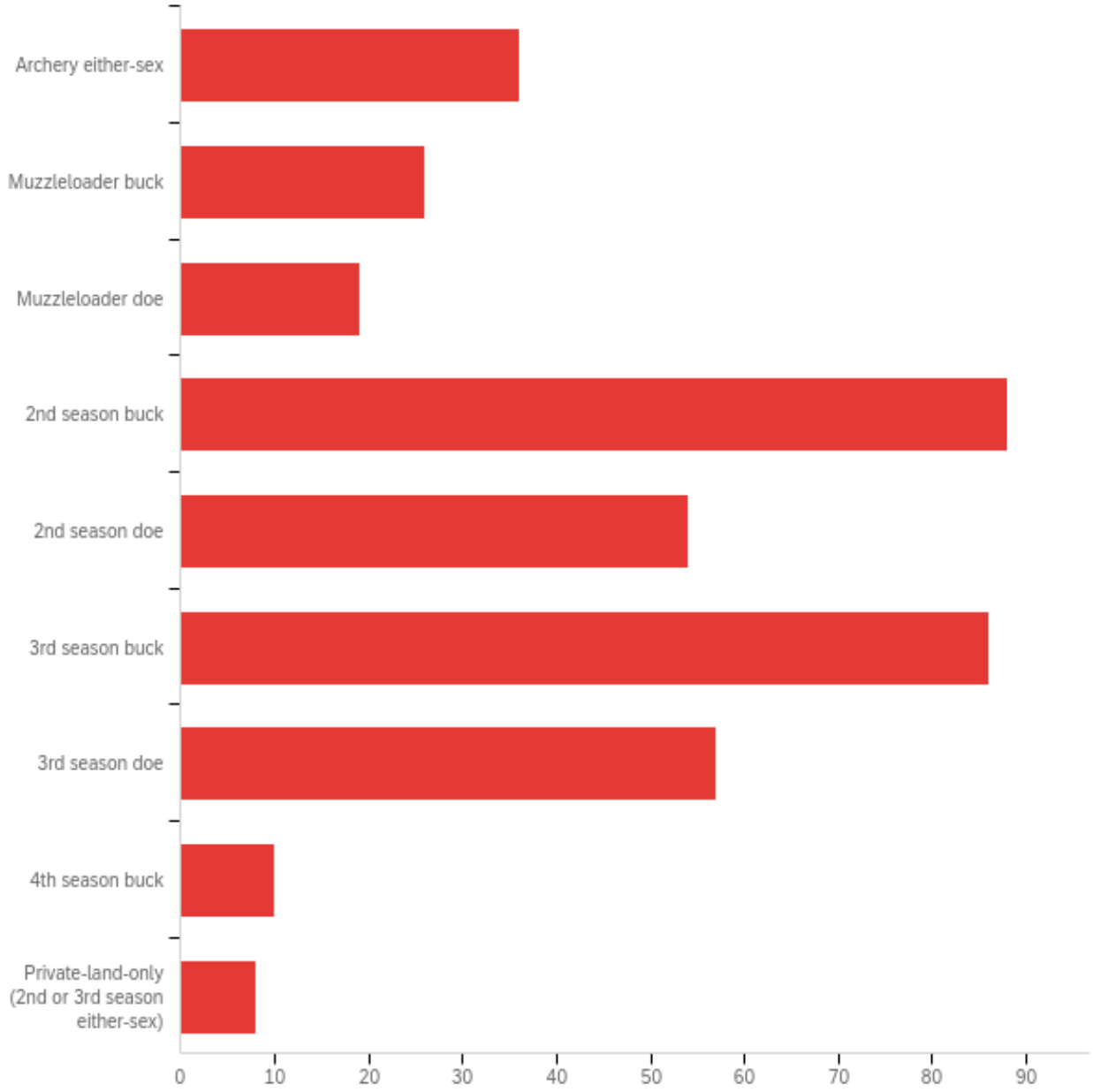


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Overall, how satisfied were you with your DEER hunting experience(s) in GMUs 18, 27, 28, 37, 181 and/or 371 during the previous three years? (Please check one.)	1.00	5.00	2.65	1.23	1.52	224

#	Answer	%	Count
1	Very satisfied	16.52%	37
2	Somewhat satisfied	41.07%	92
3	Neither satisfied nor dissatisfied	12.05%	27

4	Somewhat dissatisfied	21.43%	48
5	Very dissatisfied	8.93%	20
	Total	100%	224

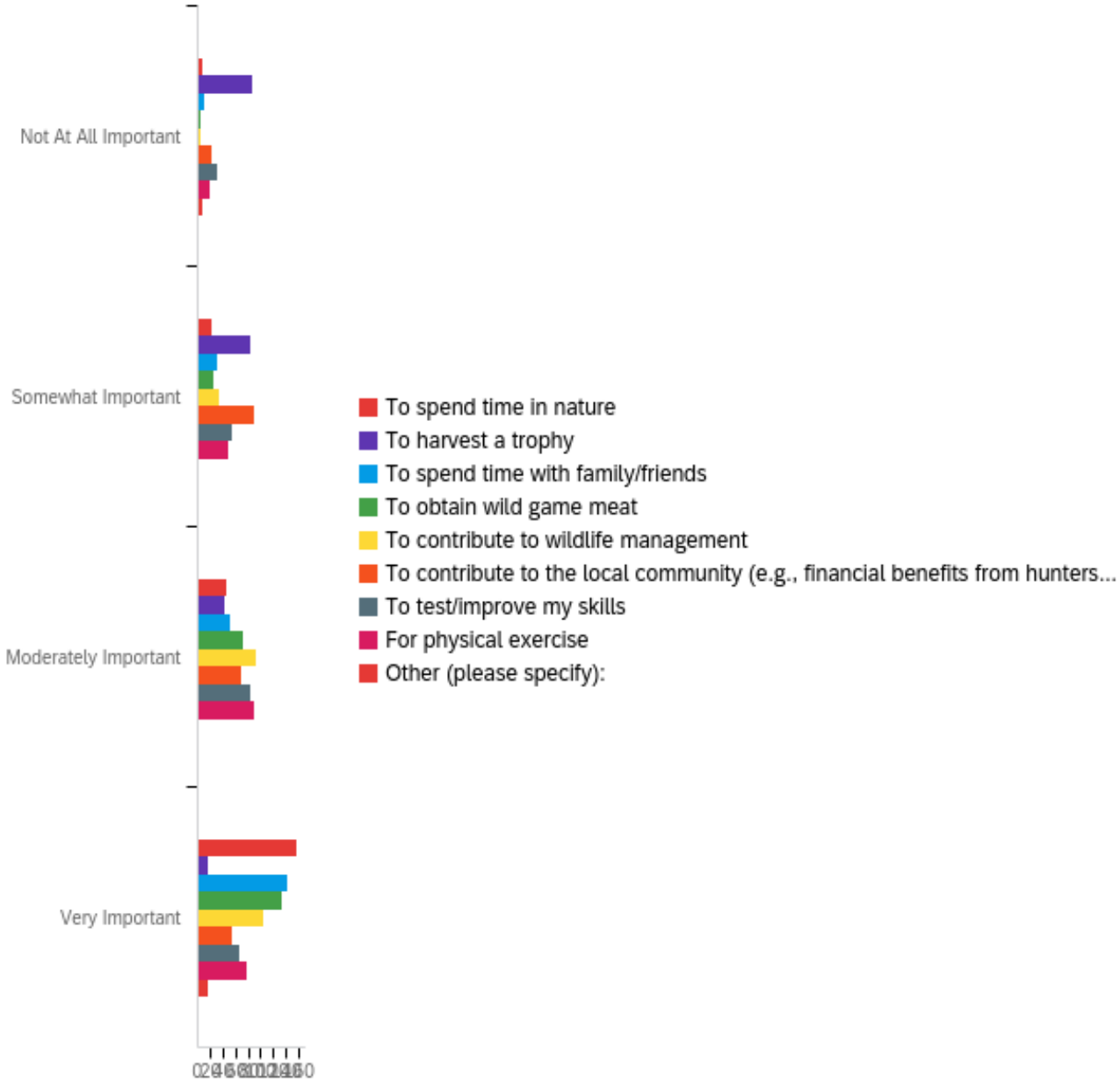
Q7 - During which of the following seasons have you hunted deer in GMUs 18, 27, 28, 37, 181, and/or 371 in the previous three years? (Please check all that apply.)



#		Answer	%	Count
1		Archery either-sex	9.38%	36

2	Muzzleloader buck	6.77%	26
3	Muzzleloader doe	4.95%	19
4	2nd season buck	22.92%	88
5	2nd season doe	14.06%	54
6	3rd season buck	22.40%	86
7	3rd season doe	14.84%	57
8	4th season buck	2.60%	10
9	Private-land-only (2nd or 3rd season either-sex)	2.08%	8
	Total	100%	384

Q8 - How important to you is each of the following reasons to hunt deer in GMUs 18, 27, 28, 37, 181, and/or 371? (Please check one response for each statement.)



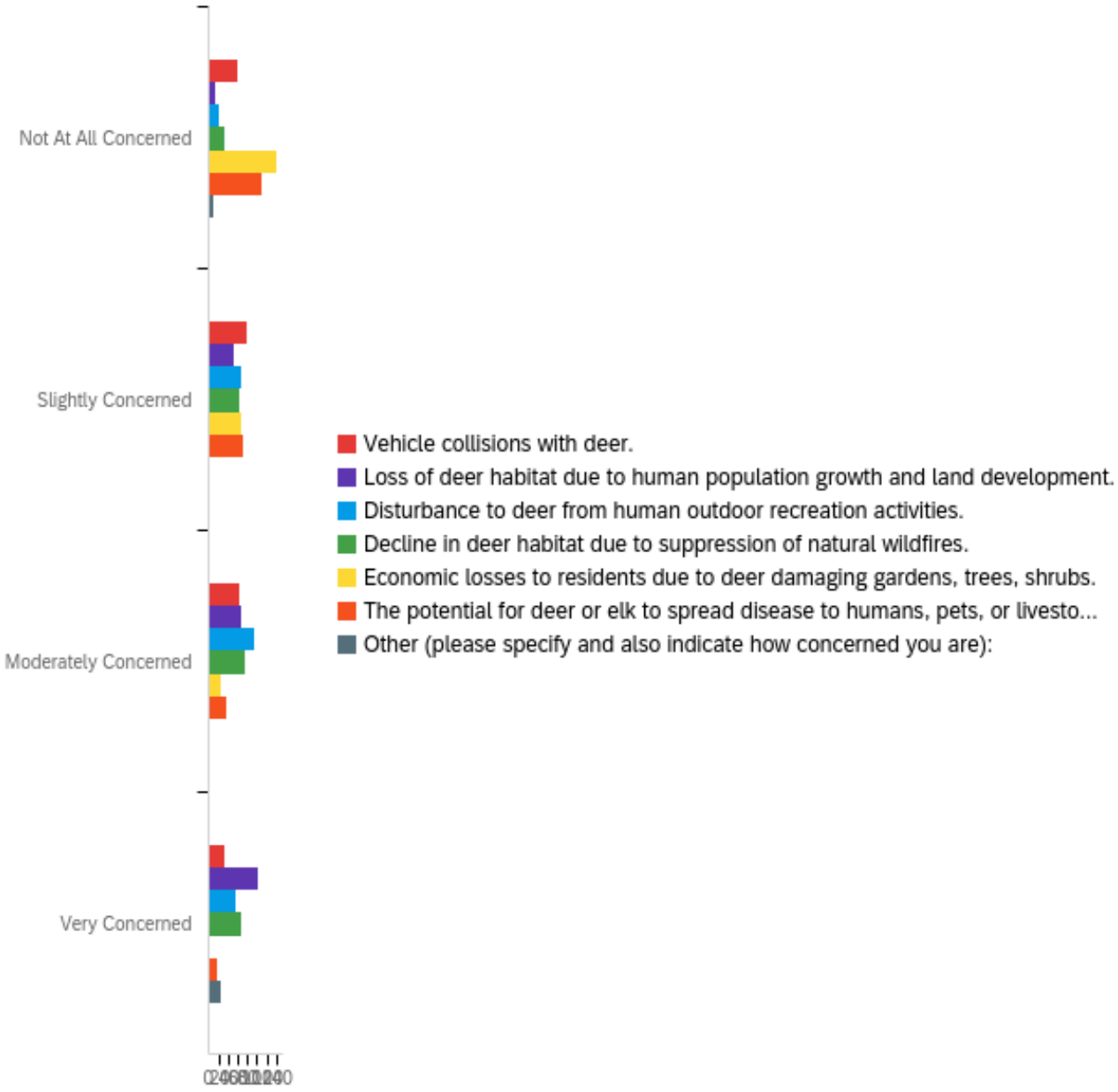
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	To spend time in nature	1.00	4.00	3.51	0.80	0.64	233

2	To harvest a trophy	1.00	4.00	1.95	0.92	0.84	233
3	To spend time with family/friends	1.00	4.00	3.40	0.87	0.75	234
4	To obtain wild game meat	1.00	4.00	3.43	0.76	0.58	234
5	To contribute to wildlife management	1.00	4.00	3.26	0.78	0.60	234
6	To contribute to the local community (e.g., financial benefits from hunters)	1.00	4.00	2.68	0.93	0.87	234
7	To test/improve my skills	1.00	4.00	2.80	0.99	0.99	234
8	For physical exercise	1.00	4.00	2.97	0.92	0.84	235
9	Other (please specify):	1.00	4.00	2.92	1.36	1.84	26

#	Question	Not At All Important		Somewhat Important		Moderately Important		Very Important		Total
1	To spend time in nature	3.43%	8	9.44%	22	20.17%	47	66.95%	156	233
2	To harvest a trophy	37.77%	88	36.48%	85	18.88%	44	6.87%	16	233
3	To spend time with family/friends	4.27%	10	12.82%	30	21.79%	51	61.11%	143	234
4	To obtain wild game meat	2.14%	5	10.26%	24	30.34%	71	57.26%	134	234
5	To contribute to wildlife management	2.14%	5	14.10%	33	39.32%	92	44.44%	104	234
6	To contribute to the local community (e.g., financial benefits from hunters)	8.97%	21	38.03%	89	29.49%	69	23.50%	55	234
7	To test/improve my skills	12.82%	30	23.08%	54	35.47%	83	28.63%	67	234
8	For physical exercise	7.66%	18	20.85%	49	38.72%	91	32.77%	77	235
9	Other (please specify):	30.77%	8	3.85%	1	7.69%	2	57.69%	15	26

Other (please specify): - Text
I grew hunting there
to pass skills, knowlage to grandkids
To help conservation, to keep a good healthy population of healthy beautiful animals
Hunting Mule Deer is a passion
To have a place to pass on hunting to my child.
The grouse :)
Hunt an area high success ratios
to be off trail in nature
explore new areas and enjoy the outdoors
To enjoy friendships
The ability to get away from the general public.
just quality time w friend
To accompany my father in law
Quite time
I would never hunt these unit again no deer seen at all and I do not hunt from the road I go way back in. Very displeased
not pestered by other hunters
It's important to identify myself and family as part of the hunting community
To learn more about the wildlife.
Fun, and to hunt elk
To promote responsible and non-intrusive recreation
to get out there chase mule deer. Go hunting
See new places
heritage, involve my grandchildren

Q9 - Potential Concerns About the Middle Park Deer Herd Please indicate how concerned you are about each of the following in Middle Park deer herd GMUs 18, 27, 28, 37, 181, and/or 371? (Please check one response for each item.)



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Vehicle collisions with deer.	1.00	4.00	2.29	1.00	1.00	235
2	Loss of deer habitat due to human population growth and land development.	1.00	4.00	3.11	0.93	0.86	235
3	Disturbance to deer from human outdoor recreation activities.	1.00	4.00	2.77	0.91	0.82	235
4	Decline in deer habitat due to suppression of natural wildfires.	1.00	4.00	2.75	1.01	1.01	235
5	Economic losses to residents due to deer damaging gardens, trees, shrubs.	1.00	4.00	1.53	0.73	0.53	235
6	The potential for deer or elk to spread disease to humans, pets, or livestock.	1.00	4.00	1.83	0.93	0.87	234
7	Other (please specify and also indicate how concerned you are):	1.00	4.00	3.21	1.26	1.59	38

#	Question	Not At All Concerned		Slightly Concerned		Moderately Concerned		Very Concerned		Total
1	Vehicle collisions with deer.	25.53%	60	34.04%	80	26.38%	62	14.04%	33	235
2	Loss of deer habitat due to human population growth and land development.	5.53%	13	21.70%	51	28.94%	68	43.83%	103	235
3	Disturbance to deer from human outdoor recreation activities.	8.94%	21	28.09%	66	39.57%	93	23.40%	55	235
4	Decline in deer habitat due to suppression of natural wildfires.	13.19%	31	26.38%	62	32.34%	76	28.09%	66	235

5	Economic losses to residents due to deer damaging gardens, trees, shrubs.	59.57%	140	28.94%	68	10.21%	24	1.28%	3	235
6	The potential for deer or elk to spread disease to humans, pets, or livestock.	46.58%	109	30.77%	72	15.81%	37	6.84%	16	234
7	Other (please specify and also indicate how concerned you are):	23.68%	9	0.00%	0	7.89%	3	68.42%	26	38

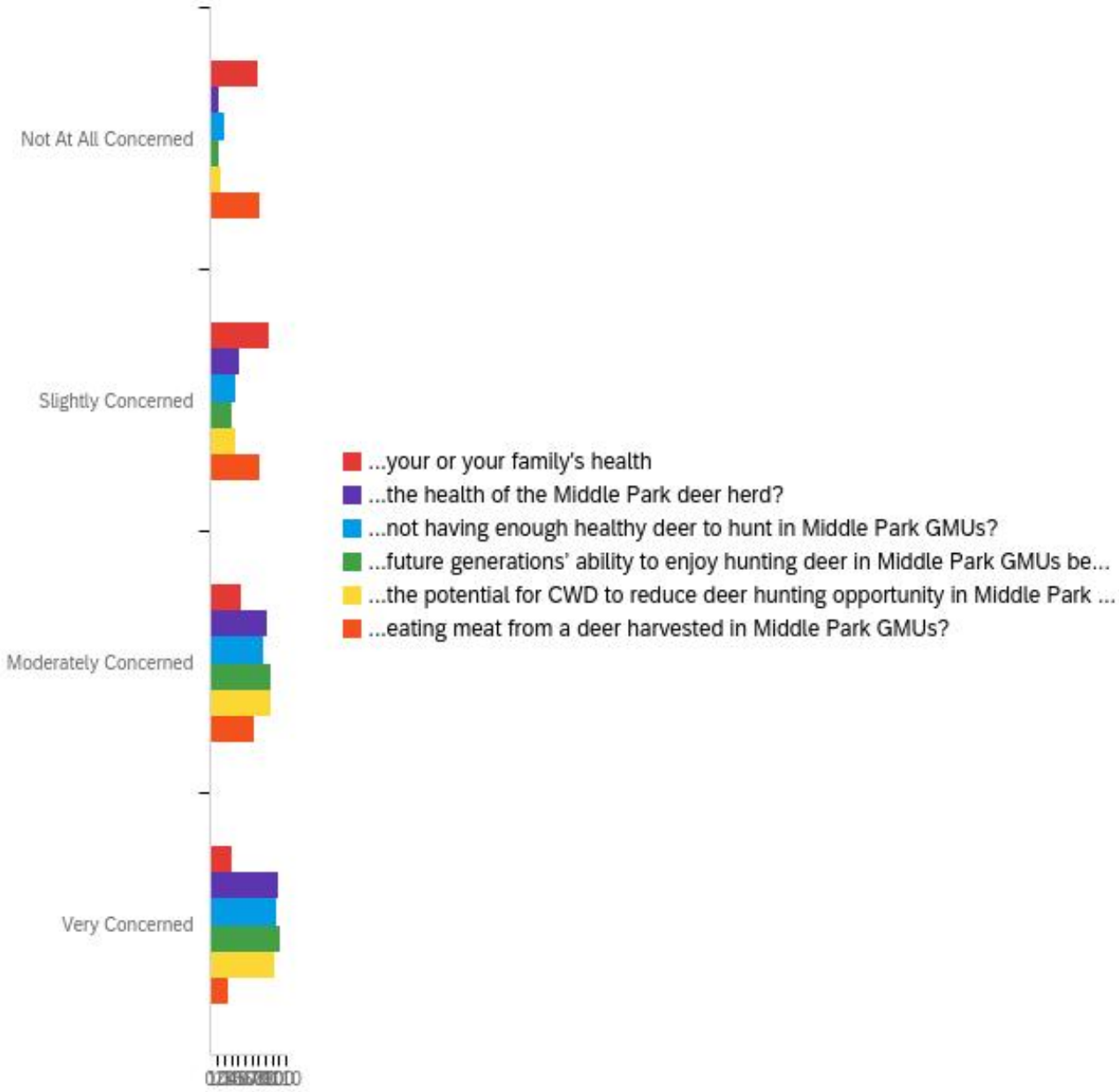
Other (please specify and also indicate how concerned you are): - Text
The number of deer significantly decreased in the 2019 hunt
drop in deer population
using license fees for non-hunter activities
Over abundance of large predators
not enough public access
there aren't many deer or elk there
Mountain lion killing excess amounts of deer.
Myself and many friends and family members are very concerned about the potential reintroduction of Wolfs. Why is this not an option on your survey? Does CPW have any information on the facts behind this issue. There are a lot of anti hunting groups in Denver and Boulder pushing for the introduction of Wolfs. I have'nt seen anything from CPW on this issue. If you look at states like Wyoming and Montana their biologists report that the Wolfs have destroyed their deer and elk populations.
Not
Access to private ground.
Access to public land off a public road to Lake Agnes is not made apparent, in my opinion there should be a parking area.

to many hunters
there may be too many hunters some years
Too many out of state hunters
xxxxx
Too many ATVs driving too fast
Overgrazing in Sheriff creek and surrounding area
providing public access on existing roads and keeping wild places wild
very
Concerned about how many out of state hunters Colorado is allowing
potential loss of public land for hunting
CW Desease in herds
not concerned
CWD
N
Cwd
Very concerned about the amount of roads that go through the mountains to take away from the habitat of deer and elk and other animals they need to be shut down during periods of time or even altogether. that includes ATV's and snowmobilers.
kjgiu;l
Chronic wasting disease in the herd
Na
over grazing of BLM and National Forest land BLM land and Nati
poor management of CWD
Hunter Pressure from too many tags
froest management - do some logging
cwd
no other
future hunting gererations
hunter pressure

people who rent atv's and side by sides with no respect to the environment

afdf

Q10 - Potential Concerns About Chronic Wasting Disease (CWD) Because of CWD in deer, how concerned are you about each of the following in Middle Park deer herd GMUs 18, 27, 28, 37, 181, and/or 371? (Please check one response for each statement.)

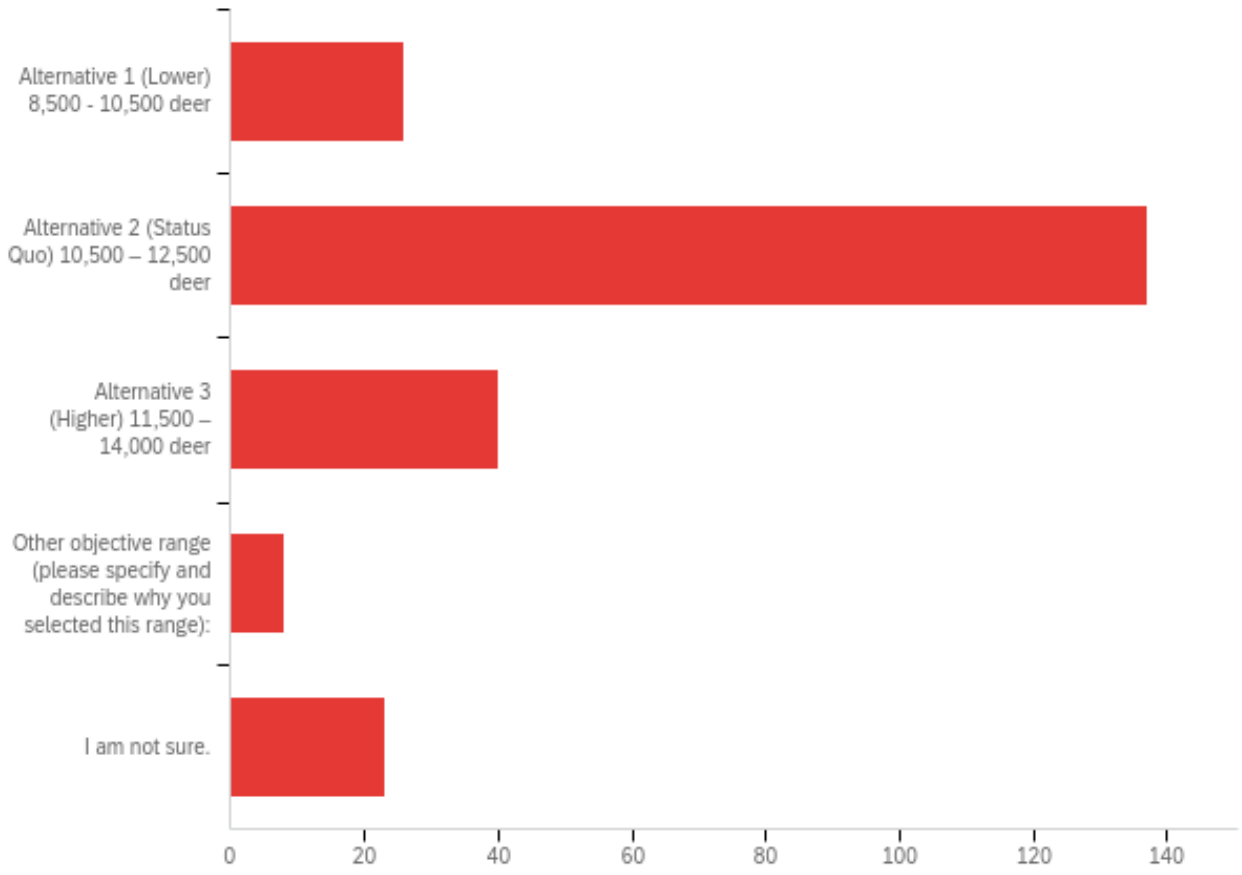


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	...your or your family's health	1.00	4.00	2.17	1.01	1.01	233
2	...the health of the Middle Park deer herd?	1.00	4.00	3.15	0.87	0.76	233
3	...not having enough healthy deer to hunt in Middle Park GMUs?	1.00	4.00	3.09	0.95	0.90	232
4	...future generations' ability to enjoy hunting deer in Middle Park GMUs because of CWD?	1.00	4.00	3.22	0.85	0.71	232
5	...the potential for CWD to reduce deer hunting opportunity in Middle Park GMUs?	1.00	4.00	3.12	0.89	0.79	231
6	...eating meat from a deer harvested in Middle Park GMUs?	1.00	4.00	2.19	0.99	0.98	232

#	Question	Not At All Concerned		Slightly Concerned		Moderately Concerned		Very Concerned		Total
1	...your or your family's health	30.04%	70	36.91%	86	19.31%	45	13.73%	32	233
2	...the health of the Middle Park deer herd?	4.72%	11	17.60%	41	35.62%	83	42.06%	98	233
3	...not having enough healthy deer to hunt in Middle Park GMUs?	8.19%	19	16.38%	38	33.62%	78	41.81%	97	232
4	...future generations' ability to enjoy hunting deer in Middle Park GMUs because of CWD?	4.74%	11	12.93%	30	37.93%	88	44.40%	103	232
5	...the potential for CWD to reduce deer hunting opportunity in Middle Park GMUs?	6.06%	14	16.02%	37	37.66%	87	40.26%	93	231

6	...eating meat from a deer harvested in Middle Park GMUs?	30.60%	71	31.03%	72	27.59%	64	10.78%	25	232

Q11 - Which of the three population objective alternatives do you prefer for the Middle Park mule deer herd for the next 10 years. (Please check one.)



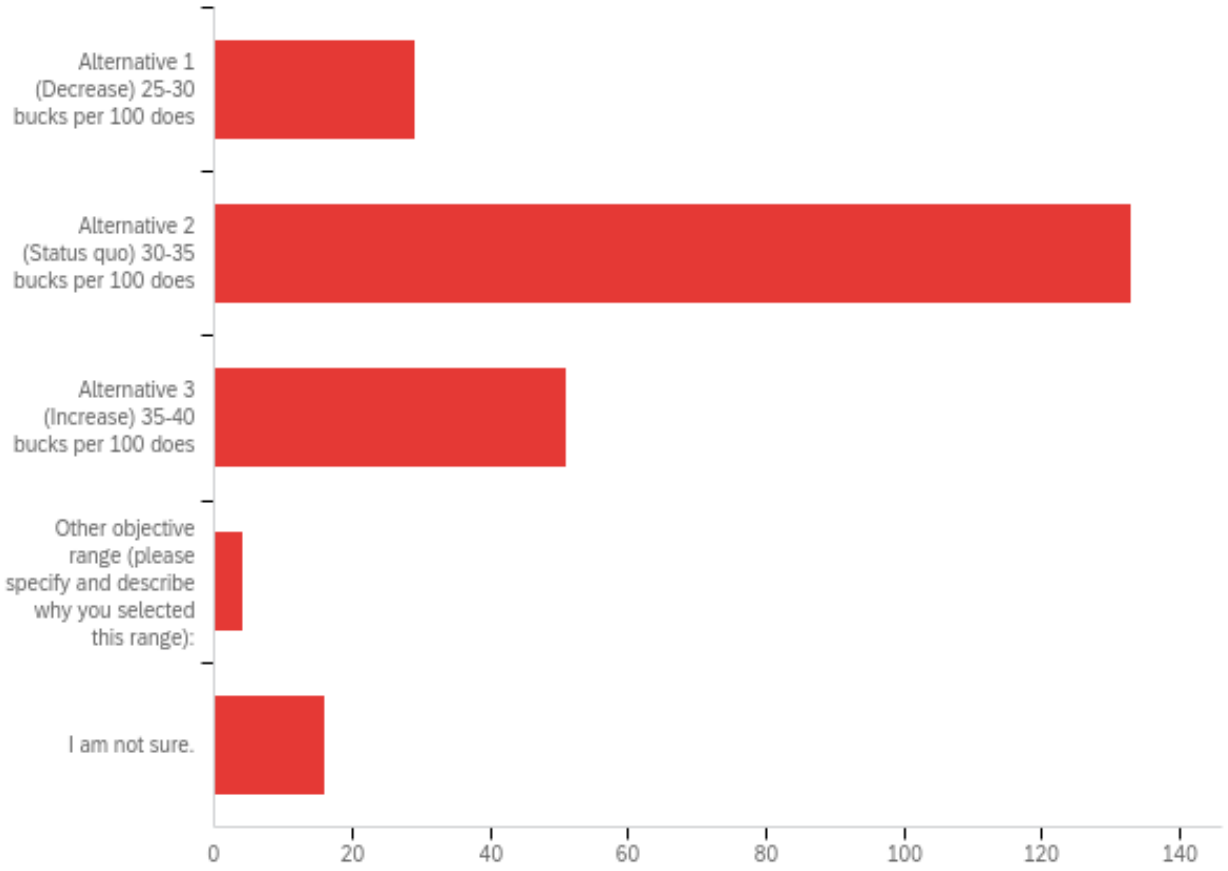
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Which of the three population objective alternatives do you prefer for the Middle Park mule deer herd for the next 10 years. (Please check one.) - Selected Choice	1.00	5.00	2.42	1.06	1.12	234

#	Answer	%	Count
1	Alternative 1 (Lower) 8,500 - 10,500 deer	11.11%	26
2	Alternative 2 (Status Quo) 10,500 – 12,500 deer	58.55%	137
3	Alternative 3 (Higher) 11,500 – 14,000 deer	17.09%	40
4	Other objective range (please specify and describe why you selected this range):	3.42%	8
5	I am not sure.	9.83%	23
	Total	100%	234

Q11_4_TEXT - Other objective range (please specify and describe why you selected this ra...

Other objective range (please specify and describe why you selected this range): - Text
managing a healthy herd is going to be tough with urban sprawl it will be difficult to grow the population unless other activities such as grazing live stock and ATV/motorcycles/snowmobiles running constantly. Need to have seasons for this. not during birthing seasons and the difficult winter time.
I don't know where they hide except in town and the rifle range
I would like to have more deer in middle park. I remember the 70's and 80's and we did have to many deer.On the bad snow years it did kill alot of deer ,but there were enough to recover quickly in the easy years. Also it seems to me there were many more cows on the range , especially in Summit. It seems to me the range is in better shape going into fall now than when we had those large herds of deer before. I think the real issue in middle park is the over abundance of lions. I have trapped and hunted for 40 years here and lions are just about everywhere, reduce them and the deer population will increase and that is what I would like to see happen.
Lower numbers to help with CWD if that is an issue with deer herd size
habitat changed due to beetle tree kill
These are figures and numbers and do not account always for winter loss, roadkill or CWD. These numbers definitely needs to be higher accounted for on population growth
I prefer the either sex license availability
We have hunted a lot in the area for deer in the past 3 to 4 years only but have never been overwhelmed by deer numbers. they seem quite low

Q12 - Please indicate which alternative for sex ratio objective you would prefer for the Middle Park mule deer herd for the next 10 years. (Please check one.)



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please indicate which alternative for sex ratio objective you would prefer for the Middle Park mule deer herd for the next 10 years. (Please check one.) - Selected Choice	1.00	5.00	2.33	0.96	0.92	233

#	Answer	%	Count
1	Alternative 1 (Decrease) 25-30 bucks per 100 does	12.45%	29
2	Alternative 2 (Status quo) 30-35 bucks per 100 does	57.08%	133
3	Alternative 3 (Increase) 35-40 bucks per 100 does	21.89%	51
4	Other objective range (please specify and describe why you selected this range):	1.72%	4
5	I am not sure.	6.87%	16
	Total	100%	233

Q12_4_TEXT - Other objective range (please specify and describe why you selected this ra...

Other objective range (please specify and describe why you selected this range): - Text
Get rid of elk and the ratios will get better
I want to say alternative 3 but want to explain.It seems to me what CPW has done is kill does to bring their numbers down enough to get the desired buck to doe ratio. I would like tosee the does protected , for a while , and the buck tags reduced to raise the numbers of deer overall. I believe middle park can sustain more deer than we have now, and I would rather get a buck tag every other year and have a chance to kill a mature one. Right now there are not many large mature bucks out there.
40-45 bucks per 100 does. Your ‘aggressive’ management approach has not been working for a decade!
We especially see few bucks around

Comment from 30-day HMP Comment Period:

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

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

Numerous studies of animal populations, including such species as bacteria, mice, rabbits, and white-tailed deer have shown that the populations grow in a mathematical relationship referred to as the "sigmoid growth curve" (Figure 24). There are three distinct phases to this cycle. The first phase occurs while the population level is still very low and is characterized by a slow growth rate and a high mortality rate. This occurs because the populations may have too few animals and the loss of even a few of them to predation or accidents can significantly affect population growth.

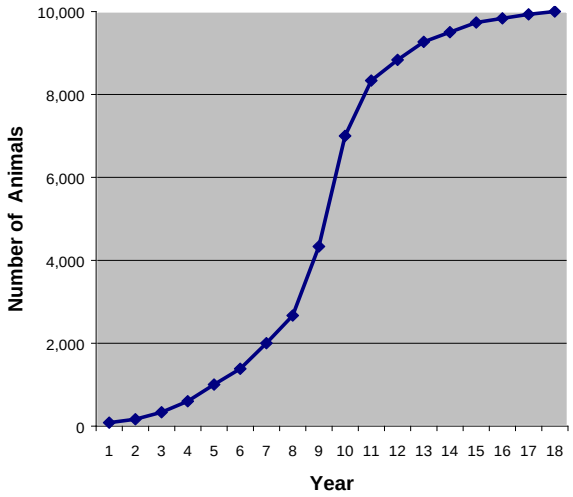


Figure 24. Sigmoid growth curve.

The second phase occurs when the population number is at a moderate level. This phase is characterized by high reproductive and survival rates. During this phase, food, cover, water and space are not a limiting factor. During this phase, for example, animals' body condition is usually excellent, age of first reproduction may occur earlier, and litter sizes can be higher. Survival rates of all sex and age classes are also at maximum rates during this phase.

The final or third phase occurs when the habitat becomes too crowded or habitat conditions become less favorable. During this phase the quantity and quality of food, water, cover and space become scarce due to the competition with other members of the population. These types of factors that increasingly limit productivity and survival at higher population densities are known as density-dependent effects. During this phase, for example, adult mule deer does may only produce one fawn rather than twins, and survival of all age-sex classes of deer (bucks, does and fawns) will decrease. During severe winters, large die-offs can occur due to crowding and lack of food. The first to die during these situations are fawns, then bucks, followed by adult does. Severe winters affect the future buck to doe ratios by favoring more does and fewer bucks in the population. Also, because the quality of a buck's antlers is somewhat dependent upon the quantity and quality of his diet, antler development is diminished. If the population continues to grow it will eventually reach a point called "K" or the maximum carrying capacity. At this point, the population reaches an "equilibrium" with the habitat. The number of births each year equal the number of deaths, therefore, to maintain the population at this level would not allow for any "huntable surplus." The animals in the population would be in relatively poor body condition, habitat condition would be degraded from over-use, and when a severe winter or other catastrophic event occurs, a large die-off is inevitable.

What does all this mean to the management of Colorado's big game herds? It means that if we attempt to manage for healthy big game herds that are being limited by density-dependent effects, we should attempt to hold the populations more towards the middle of the "sigmoid growth curve." Biologists call this point of inflection of the sigmoid growth curve the point of "MSY" or "maximum sustained yield." In the example below, MSY, which is approximately half the maximum population size or "K", would be 5,000 animals. At this level,

the population should provide the maximum production, survival, and available surplus animals for hunter harvest. Also, at this level, range habitat condition should be good to excellent and range trend should be stable to improving. Game damage problems should be lower and economic return to the local and state economy should be higher. This population level should produce a "win - win" situation to balance sportsmen and private landowner concerns.

A graph of a hypothetical deer population showing sustained yield (harvest) potential vs. population size is shown (Figure 25). Notice that as the population increases from 0 to 5,000 deer, the harvest also increases. However, as the population exceeds MSY (in this example, at 5,000 deer), food, water and cover becomes scarcer and the harvest potential decreases. Finally, when the population reaches the maximum carrying capacity or "K" (10,000 deer in this example), the harvest potential will be reduced to zero. Also, notice that it is possible to harvest exactly the same number of deer each year with 3,000 or 7,000 deer in the population. This phenomenon occurs because the population of 3,000 deer has a much higher survival and reproductive rate compared to the population of 7,000 deer. However, at the 3,000 deer level, there will be less game damage and resource degradation but fewer watchable wildlife opportunities.

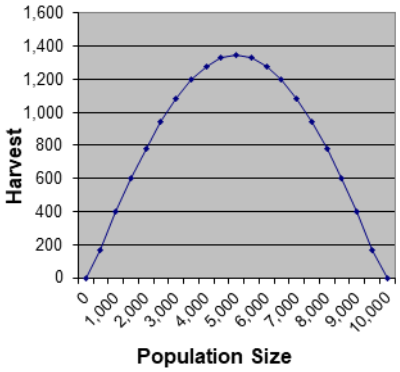


Figure 25. Maximum sustained yield (MSY) occurs at a moderate population size due to density-dependent population growth rate processes.

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

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

and recruitment of fawns. Increased fawn recruitment allows for more buck hunting opportunity and a more resilient population.

Appendix C: HPP Committee Comments

June 10, 2020

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

RE: Middle Park Habitat Partnership Program (MPHPP) Comments - Deer HMP D-9

Dear Bryan:

One of the initial reasons for creating the Habitat Partnership Program was to provide local landowners and other interests an opportunity to provide input into big game management in their areas. The diverse makeup of local HPP committees (3 livestock growers, a Forest Service, BLM, CPW and sportsperson representative) provide a good cross section of local interests to review HMP proposals and respond accordingly for CPW consideration.

HPP has two purposes; to resolve big game wildlife (deer, elk, pronghorn, moose) conflicts with agricultural landowners and to assist CPW to meet game management objectives for those same species. From those perspectives, the MPHPP committee has discussed your presentation, reviewed the draft alternatives and offer these comments for consideration.

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

The MPHPP committee supports the draft alternative 3, to keep the lower end of the current population objective, while widening the overall objective and increasing the upper end. We believe this alternative responsibly balances local range and habitat conditions with sportsmen desires and landowner concerns. We have not heard of any concerns about the current population or any desires to increase the local herd size and so we believe the current levels are where they should be. Any issues we have are more likely related to distribution of the herds in the area and not the overall population size.

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

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

Sincerely,

Chuck Alexander

Chuck Alexander, Co-Chair
Middle Park HPP Committee

Appendix D: Federal Agency Comments

United States Department of the Interior

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

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

June 29, 2020

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

Dear Mr Sidener,

I am writing in support of Hot Sulphur Springs Colorado Parks and Wildlife recommended objectives for the Middle Park Mule Deer Management Plan, data analysis unit D-9. We do not intend to offer additional comments regarding scoping for the increase in the Population Objective for D-9.

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

Sincerely,

William Mills
Field Manager

USDA United States Department of Agriculture Forest Service Dillon Ranger District
680 Blue River Parkway
P.O. Box 620SilverthorneCO80498-0620
970-468-5400970-468-7735

File Code: 2600
Date: August 17, 2020

Jeromy Huntington - Area Wildlife Manager
Colorado Parks and Wildlife
346 Grand County Rd 362
Hot Sulphur Springs, CO 80451

Dear Jeromy,

I am writing in support of Colorado Parks and Wildlife's recommended objectives for the Middle Park Mule Deer Management Plan, data analysis unit D-9.

Wildlife Biologist Ashley Nettles can be reached at ashley.nettles@usda.gov if you need additional comments of support for this project.

Thank you for the opportunity to comment on an important project for the Middle Park mule deer herd.

Sincerely,

SHELLY GRAIL BRAUDIS

Digitally signed by SHELLY GRAIL BRAUDIS
Date: 2020.08.17 15:06:47 -06'00'

SHELLY GRAIL
Acting District Ranger

cc: Ashley Nettles

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

File Code: 2610
Date: August 19, 2020

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

Dear Jeromy,

This letter is in response to Colorado Parks and Wildlife's (CPW) request for comments on the Draft Mule Deer Management Plans for Data Analysis Unit D-9 (Middle Park Herd).

As very few changes are proposed, we support this revision and do not have any comments on the new population objectives, or CPW's management of it, presented in the plan.

Thank you for the opportunity to comment on the Draft Pronghorn Management Plans for D-9. If you have any question, please contact Aurelia DeNasha, South Zone Wildlife Biologist, at aurelia.e.denasha@usda.gov.

Sincerely,

SHOSHANA M. COOPER
District Ranger

CC: Kevin McLaughlin, Aurelia DeNasha

Appendix E: County Commissioners Comments

SUMMIT COUNTY
COLORADO

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

July 24, 2020

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

Dear Ms. Sralla,

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

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

Thank you for including us in your outreach efforts.

Sincerely,

The Summit County Board of Commissioners

Karn Stiegelmeier
Commissioner

Thomas Davidson
Commissioner

Elisabeth Lawrence
Commissioner

GRAND COUNTY BOARD OF COMMISSIONERS

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

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

July 21, 2020

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

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

RE: Support of D-9 Deer Herd Management Plan

Dear Mr. Lamont,

The Grand County Board of County Commissioners wishes to express their support for the Middle Park Deer Herd Management Plan for Unit D-9. In addition, we support Colorado Parks and Wildlife (CPW) Strategic Plan and their effort to manage wildlife for the use, benefit and enjoyment of the people of the state and Grand County. We understand that Colorado's wildlife resources require careful and increasingly intensive management to accommodate the many and varied public demands and growing impacts from people. Therefore, we appreciate the work done and the time to share these findings.

With sincere appreciation and support,

Kristen Manguso	Merrit Linke	Richard Cimino
Commissioner Chair	Commissioner	Commissioner