State Bridge Mule Deer Herd Management Plan

Data Analysis Unit D-8

Game Management Units 15, 35, 36, 45, and 361

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

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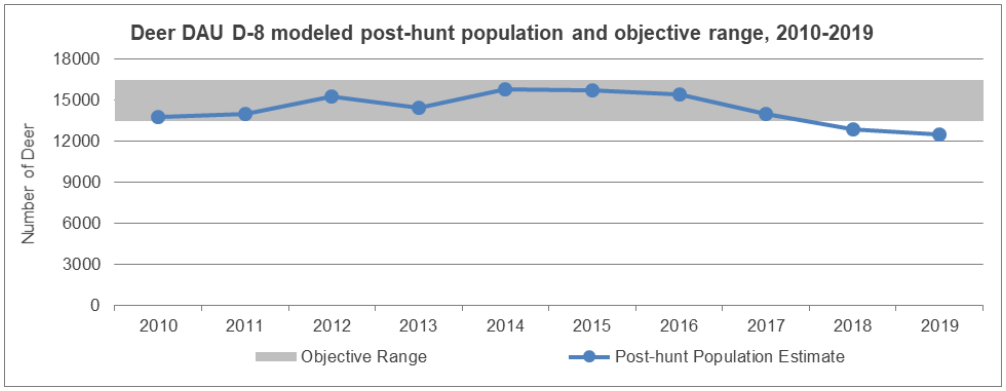
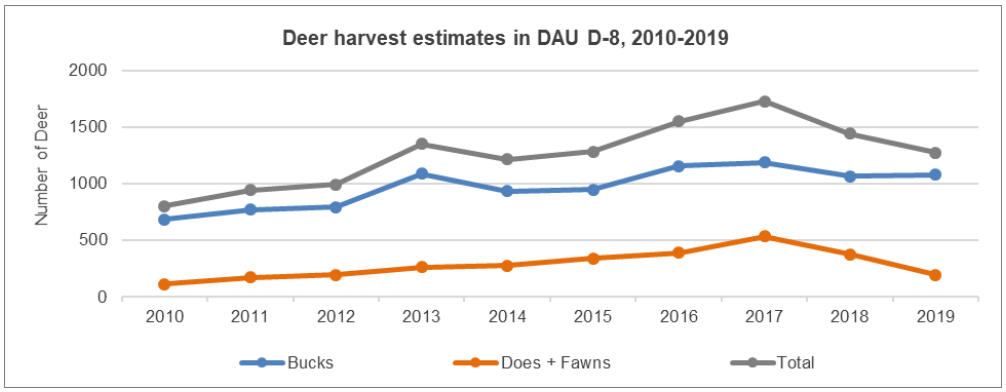
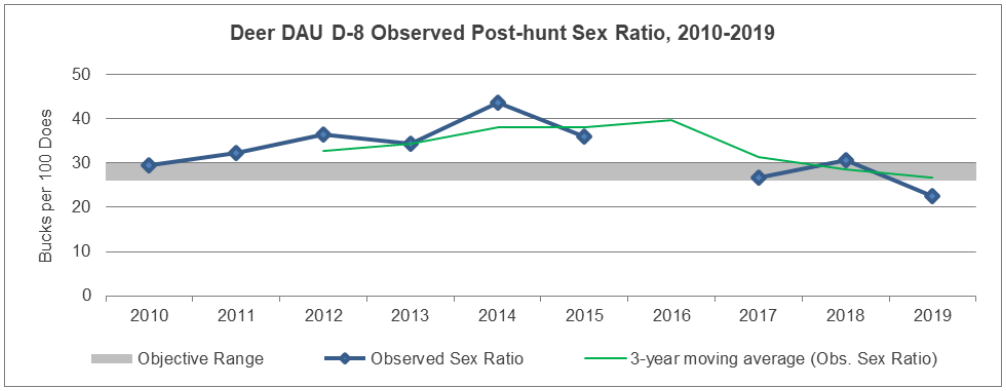
EXECUTIVE SUMMARY

State Bridge Deer Herd (DAU D-8)	GMUs: 15, 35, 36, 45, and 361
Post-hunt population:	
Previous (2009 plan) Population Objective:	13,500-16,500 deer
Post-hunt 2019 Population Estimate:	12,476 deer
Current Population Objective	**10,000-14,000 deer (slightly below carrying capacity)**
Post-hunt Sex Ratio (Bucks:100 Does):	
Previous (2009 plan) Sex Ratio Objective:	26-30 bucks per 100 does
Most Recent 3-year Average of Observed Sex Ratio:	27 bucks per 100 does
Current Sex Ratio Objective:	**26-30 bucks per 100 does (status quo)**







Background

The State Bridge DAU (D-8) is located in northwest Colorado and consists of GMUs 15, 35, 36, 45, and 361. D-8 contains parts of the Eagle, Colorado, and Yampa River watersheds. Counties included in the DAU are Routt, Grand, Eagle, and Pitkin. The towns of Vail, Minturn, Avon, Edwards, Eagle, and Gypsum lie along Interstate-70, which cuts through the central-southern portion of the DAU. D-8 covers a land area of 3,765 sq. km (1,453 sq. miles), approximately 80% of which is public lands.

In the 2009 herd management plan, CPW lowered D-8's population objective to account for the changing landscape and set an objective range of 13,500-16,500 deer. Over the past 10 years of managing for this population objective, the population has fluctuated within the objective range, both almost exceeding and later dropping below the range. We have adjusted license quotas widely in both directions to attempt to stabilize the population within objective range. D-8's most recent population estimate in 2019 is 12,476 deer, which is below the current objective range.

The herd's sex ratio objective was set in the 2009 DAU plan at a range of 26-30 bucks:100 does. Due to conservative harvest management during the first several years, the buck ratio increased well beyond the objective range. As CPW restored buck license quotas incrementally over the past 10 years, the buck ratio finally appears to have dropped down to within the current objective range in the past few years. The current 3-year (2017-2019) average is 27 bucks:100 does.

D-8's herd management plan is now just over 10 years old and is due for renewal. This revision will involve a review of the herd's objectives, current status, and a consideration of changes in the objectives for the next 10 years.

Significant Issues

D-8 is one of the larger deer herds in the state, but as with many herds in western Colorado, the cumulative impacts of decades of human population growth and the direct and indirect impacts of human activities have continued to diminish both the quality and quantity of habitat and its carrying capacity for deer. Land development, fragmentation by roads and trails, increased human activity on public lands, and suppression of large-scale wildfires have long-term and perhaps even irreversible effects on the landscape. The proliferation of all forms of outdoor recreation on public lands has continued since the 2009 herd management plan. Continued conversion of habitat on private lands into residential housing developments is expected over the next decade or so, especially in the units near Interstate-70, leading to further loss of mule deer winter and summer range habitat. Vehicle traffic also continues to increase as the region's human population grows, and wildlife-vehicle collisions continue to be a concern.

Management Objective Recommendations

CPW recommends a new population objective range of 10,000-14,000 deer (Alternative 2). This alternative would lower and widen the objective range to ±2,000 deer around a midpoint of 12,000 deer. The current (2009 Plan) objective of 13,500-16,500 deer is likely set too close to the habitat carrying capacity and is also too narrow of a range, making a stable equilibrium population difficult to achieve. Over the past decade, the population swung between both the bottom and top ends of the current objective range, requiring CPW to increase and then drastically decrease license quotas. The proposed wider, reduced objective range of 10,000-14,000 deer would manage for a population level slightly below habitat carrying capacity and would give CPW more latitude in maintaining license quotas at a more consistent level, giving D-8 hunters more predictability from year to year when applying for licenses. CPW would still adjust quotas depending on the trajectory of the population size and where it sits relative to the objective range, but the adjustments may not be as drastic under a wider, lower population objective range compared to the current objective range.

CPW recommends maintaining the current sex ratio objective of 26-30 bucks:100 does that was set in the 2009 D-8 Plan. This range is a moderate sex 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 the recent few years' quotas to keep the observed sex ratio within the objective. We expect that by managing for this moderate sex ratio, chronic wasting disease (CWD) prevalence rate in bucks in D-8 will remain below 5%. However if the

CWD prevalence rate reaches 5% or higher, then other measures including a revision of the sex ratio objective downward may be needed to suppress CWD in the herd.

Strategies to Address Issues and Management Concerns and to Achieve Herd Management 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 discourage the spread and prevalence of chronic wasting disease. CWD prevalence will continue to be monitored through periodic mandatory testing and through voluntary sample submissions.

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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 1). Big game populations are managed to achieve population objective ranges and sex ratio ranges established for Data Analysis Units (DAUs).

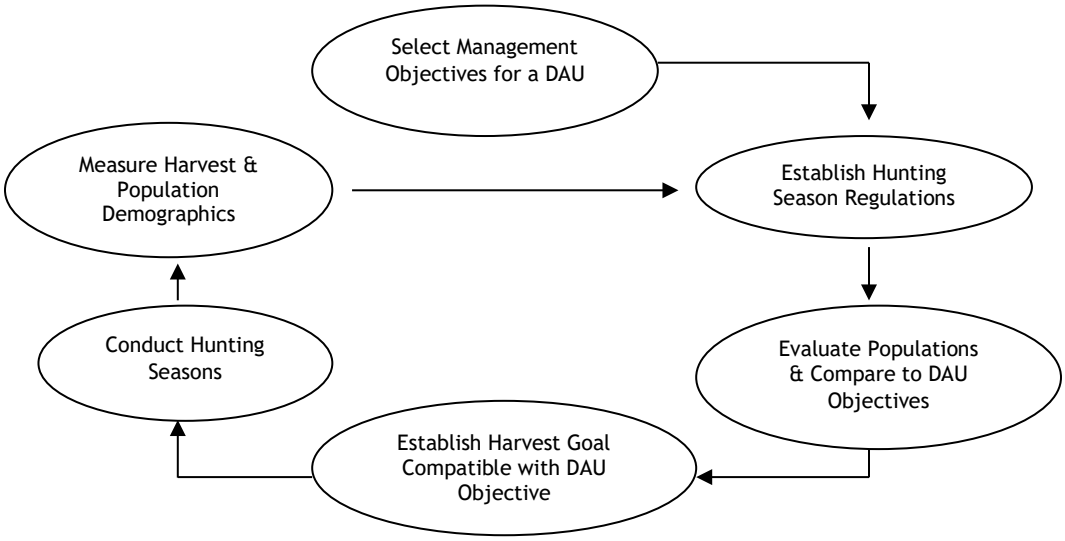


Figure 1. "Management by objectives" process used by CPW to manage big game populations on a DAU basis.

The purpose of a herd management plan is to provide a system or process which will integrate the plans and intentions of Colorado Parks and Wildlife 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, the Bureau of Land Management, 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 Data Analysis Unit or 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 are how many animals should exist in the DAU and what is the desired sex ratio for that population of big game animals e.g., the number of males per 100 females. 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.

Population Dynamics, Maximum Sustained Yield, and Density Dependence

Numerous studies of biological populations, including 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 2). There are three distinct phases to this cycle. The first phase occurs while the population level is still very low and is characterized by a slow growth rate and a high mortality rate. This occurs because the populations may have too few animals and the loss of even a few of them to predation or accidents can significantly affect population growth.

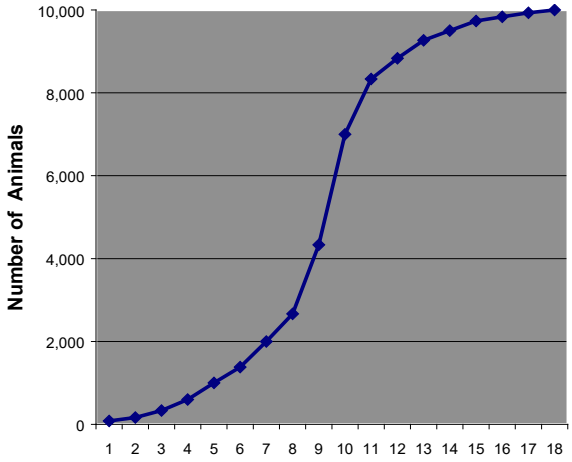


Figure 2. Sigmoid growth curve.

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 limiting factors. 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 the crowding and lack of food. The first to die during these situations are fawns, then bucks, followed by adult does. Severe winters affect the future buck to doe ratios by favoring more does and fewer bucks in the population. Also, because the quality of a buck's antlers is somewhat dependent upon the quantity and quality of his diet, 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 3). 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.

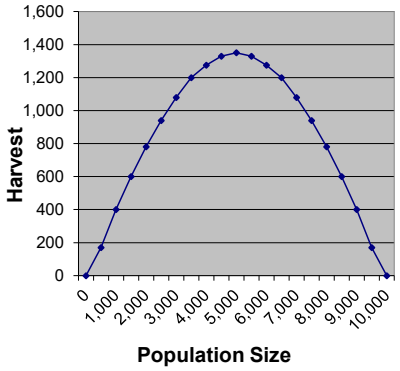


Figure 3. Maximum sustained yield (MSY) occurs at a moderate population size due to density-dependent population growth rate processes.

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.

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 DATA ANALYSIS UNIT

Location

The State Bridge DAU (D-8) is located in northwest Colorado and consists of GMUs 15, 35, 36, 45, and 361[1] (Figure 4). It is bounded on the north by U.S. Highway 40, on the east by the Gore Mountain Range and Muddy Creek, on the south by the Continental Divide, and on the west by the Sawatch Range, East Lake Creek, Eagle River, Colorado River, and Colorado State Highway 131. Counties included in the DAU are Routt, Grand, Eagle, and Pitkin.

D-8 covers 3,765 km^2 (1,453 mi^2) in area. It contains parts of the Eagle River Watershed, Colorado River Watershed, and Yampa Watershed. Parts of Eagles Nest and Holy Cross Wilderness areas, plus all of the Sarvis Creek Wilderness, Castle Peak Wilderness Study Area, Bull Gulch Wilderness Study Area, and Radium State Wildlife Area are in the DAU. Interstate-70, Colorado State Highway 131, Colorado River Road, and U.S. Highway 24 are the major access routes in the DAU. The towns of Vail, Minturn, Avon, Edwards, Eagle, and Gypsum lie along the I-70 corridor, which cuts through the central-southern portion of the DAU. The town of Steamboat Springs is located 4 miles outside of the DAU to the north.

[1] The former GMU 36 was split into the current GMU 36 (Piney River) and GMU 361 (Sheephorn) in 2010. The purpose of the split was to address different late season cow elk hunts. It did not affect D-8 deer huntcodes; deer licenses valid in the former GMU 36 continue to be valid in both GMU 36 and 361.

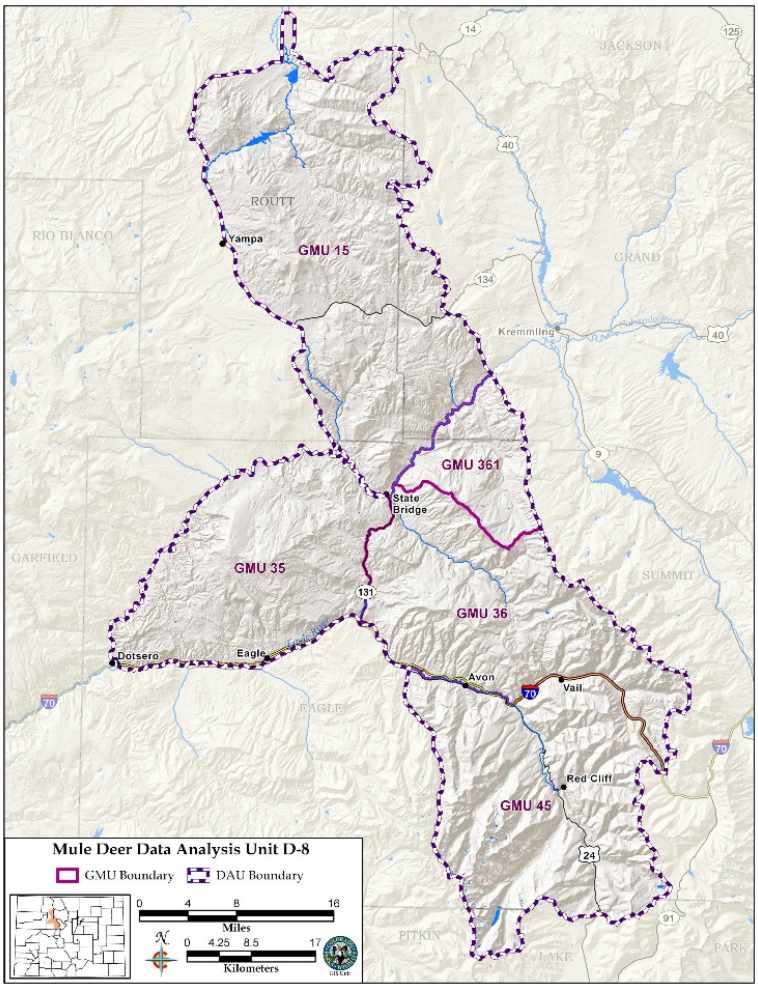


Figure 4. Location of mule deer DAU D-8.

Physiography

Topography

Topography in the DAU is highly varied. The Gore Range along the eastern boundary has elevations in excess of 13,000 ft. Lower elevation regions are found adjacent to the Colorado River with an average elevation of 6,500 ft. Steep rugged terrain characterizes the southern portions of the DAU. The northern portions of the DAU contain large hay meadows along the valley floors with steep slopes leading to the summer range. The highest peak in the DAU is the Mount of the Holy Cross (14,003 ft). The lowest point is Dotsero (6,157 ft).

Major rivers include the parts of the Colorado, Eagle, and Yampa River drainages. Stagecoach Reservoir and Lake Catamount are in the northern part of this DAU and Homestake Reservoir is in the southern part. The DAU contains Alkali Creek, Gore Creek, Sheephorn Creek, Piney River, Rock Creek, Cross Creek and Homestake Creek.

Climate

The climate varies with the altitude. Lower elevations are characterized by moderate winters and warm summers with low to moderate precipitation. The higher elevations are

characterized by long, cold winters and short mild summers with high precipitation. The higher elevations at Vail Pass receive over 25 in. of precipitation while the lower elevation around Dotsero average only 10 in. of moisture per year. Prevailing winds for this area are typically out of the northwest. Most of the annual precipitation comes from snowfall. Temperature can vary from a low of –40° F in the winter to a high of >100° F in the summer. The largest extremes occur in the lower elevations where the coldest air settles in the winter, the same areas where the temperatures can reach over >100° F in the summer. Deep snow forces deer and elk to winter in the lower elevation on south-facing or wind-blown slopes where less snow accumulates. GMU 35, the west half of GMU 36, and Radium Basin in GMUs 15 and 361 lie in the rain shadow of the Flat Top Mountains. This results in typically lower snowfall accumulation, making these lower elevations of the DAU optimal for mule deer wintering areas.

Vegetation

Vegetation types in D-8 (Table 1 and Figure 5) are described in more detail in the 2009 D-8 management plan (CDOW 2009). Topography plays a large role in determining vegetation type. For example, some higher elevation sites with a southern exposure are dominated by sagebrush while the lower elevation areas with a more northern exposure can support aspen and coniferous forests due to the high moisture retention of the soils. This variation of vegetation types scattered throughout the DAU creates a highly desirable mosaic, with a large beneficial "edge effect" that is very beneficial to wildlife such as mule deer.

Table 1. Vegetation types in deer DAU D-8.

	Winter Range			Summer Range			Total DAU		
Vegetation Type	Acres	Sq. Km.	%	Acres	Sq. Km.	%	Total Acres	Total Sq. Km.	Total %
Alpine	0	0	0%	3,068	12	0.5%	3,068	12	0.3%
Barren Land	4,696	19	2%	13,610	55	2%	18,306	74	2%
Cropland	1,223	5	0.4%	1,308	5	0.2%	2,531	10	0.3%
Development	253	1	0.1%	2,424	10	0.4%	2,677	11	0.3%
Evergreen Forest	111,061	449	40%	362,346	1,466	56%	473,407	1,916	51%
Grassland/ herbaceous	42,545	172	15%	84,629	342	13%	127,174	515	14%
Open Water	558	2	0.2%	1,979	8	0.3%	2,537	10	0.3%
Other Forest	33,586	136	12%	122,664	496	19%	156,250	632	17%
Pasture/hay	5,637	23	2%	11,551	47	2%	17,188	70	2%
Shrub	80,785	327	29%	45,993	186	7%	126,778	513	14%
Woody Wetland	0	0	0%	24	0.1	0.0%	24	0.1	0.0%

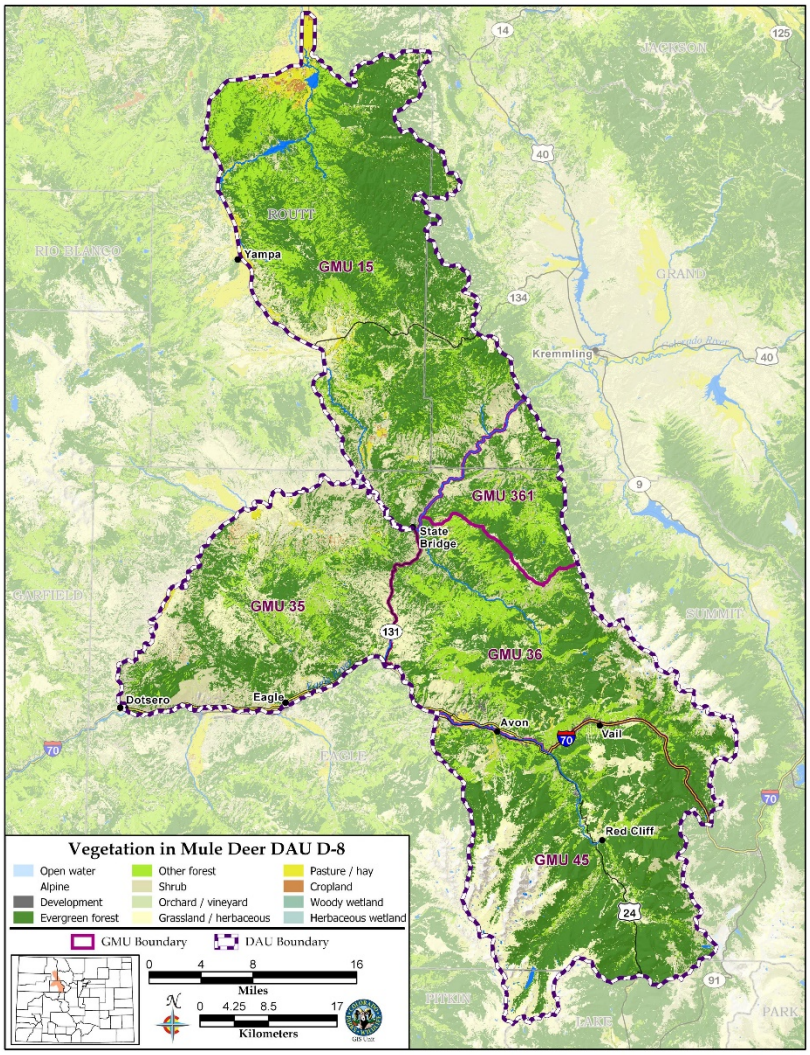


Figure 5. Vegetation types in deer DAU D-8.

Land Status

Land Ownership

The majority of State Bridge DAU D-8 is USFS lands (55%). Private lands (24%) and BLM (19%) comprise much of the lower elevations. CPW lands and other landowners (e.g., municipal, county, NGO, state land board) make up the remaining 2% of the DAU's land (Figure 6 and Table 2).

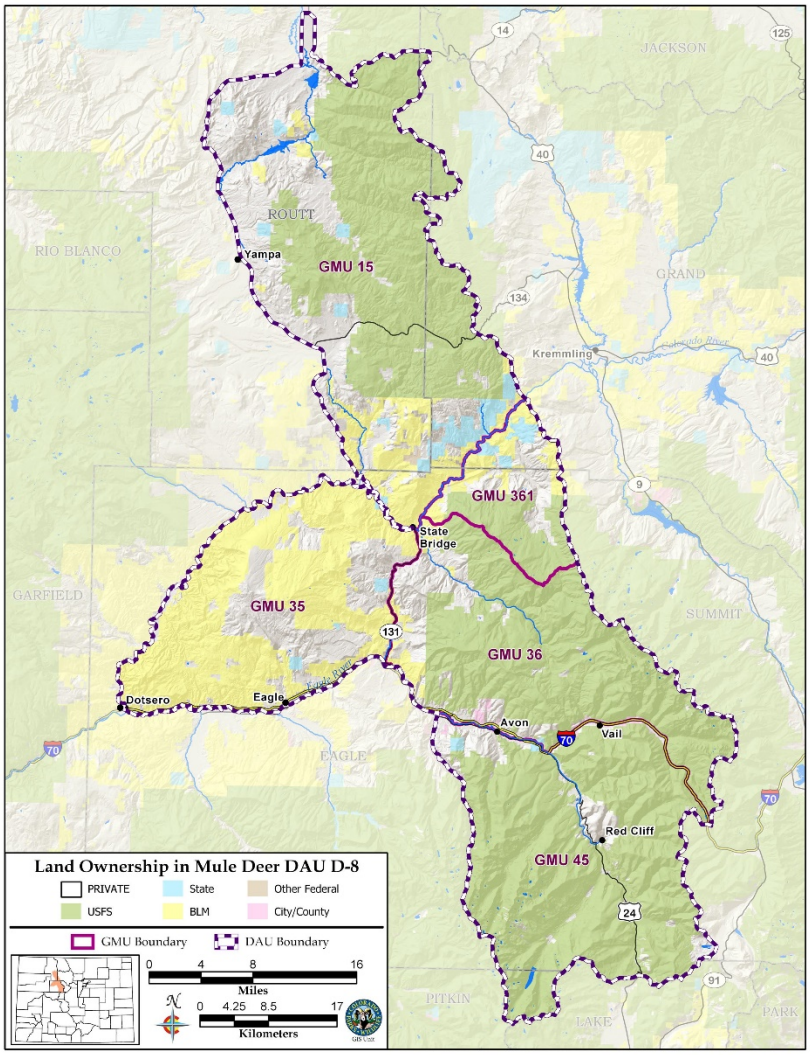


Figure 6. Land ownership in DAU D-8.

Table 2. Land ownership by Game Management Unit in DAU D-8.

	USFS		PRIVATE		BLM		CPW		OTHER		Total
GMU	Km^2	%	Km^2	%	Km^2	%	Km^2	%	Km^2	%	Km^2
15	654	51%	427	33%	132	10%	34	3%	27	2%	1,274
35		0%	200	29%	485	70%	0	0%	9	1%	694
36	555	78%	118	17%	28	4%		0%	12	2%	713
45	774	89%	88	10%		0%		0%	7	1%	869
361	93	43%	56	26%	52	24%	13	6%		0%	214
DAU D-8 total	**2,076**	**55%**	**889**	**24%**	**697**	**19%**	**48**	**1%**	**55**	**1%**	**3,765**

Land Use

Following a more than half-century-long trend that began with ski industry development in Vail starting in 1962, outdoor recreation and residential and commercial land development are now the major land uses in the DAU, particularly along the I-70 corridor. In the past 10 years, land development has primarily been in-fill of existing subdivisions, but there has been a rapid expansion of non-consumptive outdoor recreation activities, especially mountain biking and backcountry skiing, but also hiking, trail running, motorbiking, ATV/UTV riding, snowmobiling, and horseback riding; as well as the consumptive uses of hunting and fishing. Federal public lands also continue to support livestock grazing and timber harvest.

Ranching is still an important land use in the McCoy to Steamboat Springs area in GMU 15, the Burns area in GMU 35, Piney Creek area of GMU 36, and Sheephorn Creek in GMU 361. Individuals who are not heavily involved in the ranching business have purchased many of the traditional ranches in GMU 35 and 36. Some of these ranches now function more as wildlife habitat or wildlife refuges. Limited hunting in the Burns Hole Ranching for Wildlife Program occurs in GMU 35.

Hunting generates substantial economic revenue in the counties that overlap with DAU D-8 (Table 3). Hunters can pursue a variety of species including deer, elk, bighorn sheep, mountain goat, moose, bear, mountain lion, dusky grouse, ducks and geese.

Table 3. Economic contributions from hunting in counties overlapping with deer DAU D-8, adapted from Southwick Associates (2017).

County	Output ($ millions)	Labor Income ($ millions)	GDP Contribution ($ millions)	State/Local Taxes ($ millions)	Federal Taxes ($ millions)	Jobs
Eagle	$14.1	$5.8	$8.9	$1.0	$1.3	144
Routt	$13.3	$5.5	$8.2	$1.2	$1.3	219
Grand	$11.2	$4.1	$6.5	$1.2	$0.9	251
Pitkin	$3.8	$1.7	$2.5	$0.3	$0.3	40

HABITAT RESOURCE

Habitat Distribution

Deer spend the winter at the lower elevations of the DAU and they disperse in the summertime, generally to the higher elevations. Deer winter range comprises 30% of the DAU's total area (Figure 7). The bulk of the winter range occurs on BLM and private lands (Table 4).

Deer use winter ranges from about November 15 to May 15 in the Yampa River drainage and from December 1 to May 15 for the Colorado River drainage. Major wintering areas for deer include: GMU 15 – French, Blacktail, and Canyon Creek; GMU 35 – Big Alkali/Pisgah Mountain, Milk Creek and Greenhorn ridge; GMU 36 – Ute Creek to Cache Creek, and Piney River Valley; GMU 361 - Garden and McPhee Gulch. Very few deer, if any, winter in GMU 45 due to snow depths at higher elevations.

DAU D-8 contains 388 km^2 (95,789 acres) of severe winter range. Severe winter range is defined as the area of winter range where 90% of the deer will be confined during the worst two winters out of ten. There are 342 km^2 (84,402 acres) of winter concentration areas.

Winter concentration area densities were defined as having greater than a 100% increase in deer numbers compared to the surrounding winter range density.

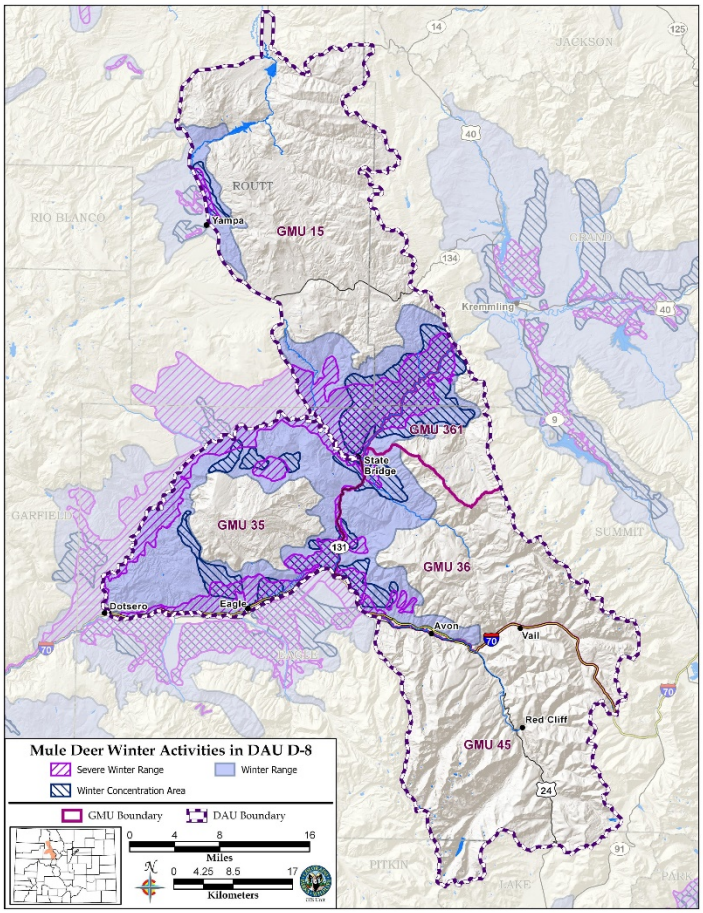


Figure 7. Mule deer winter range in DAU D-8.

Table 4. Distribution of mule deer seasonal ranges by land ownership in DAU D-8.

	Winter Range			Summer Range			Total		
Land Owner	**Acres**	**Sq. Km.**	**% of winter range**	**Acres**	**Sq. Km.**	**% of summer range**	**Total Acres**	**Total Sq. Km.**	**% of DAU**
USFS	34,426	139	12%	478,594	1,937	74%	513,020	2,076	55%
Private	92,703	375	33%	126,867	513	20%	219,570	889	24%
BLM	136,282	552	49%	36,041	146	6%	172,323	697	19%
Other	6,531	26	2%	6,963	28	1%	13,494	55	1%
CPW	10,515	43	4%	1,384	6	0.2%	11,899	48	1%
D-8 Total	**280,457**	**1,135**	**30%** (of DAU)	**649,848**	**2,630**	**70%** (of DAU)	**930,306**	**3,765**	**100%**

Habitat Condition and Capability

In a Land Health Assessment of the Burns to State Bridge watershed (BLM 2006), which is mostly in GMU 35, BLM's plant surveys showed evidence of sagebrush hedging and senescence due to prolonged, repeated browsing by ungulates, and also pinyon and juniper trees have encroached into sagebrush communities due to long-term fire suppression. On the whole, the vegetation at the landscape scale is "providing productive wildlife habitat. Good age class distribution among shrubs, good abundance and diversity of perennial grasses, and good forb diversity were prevalent in most areas" (BLM 2006). However, from a deer population management perspective, the maturation of sagebrush plants and succession of sagebrush communities to pinyon-juniper communities can lead to a decline in the habitat's carrying capacity for deer, meaning a reduction in forage quality and availability, body condition, and deer population growth rate.

Decades of land development particularly along the I-70 corridor, and the associated roads, fences, and powerlines have resulted in loss and fragmentation of winter range habitat (BLM 2006). Several long-standing but unresolved proposals to build reservoirs at Wolcott Divide in GMUs 35 and 36 and Whitney Creek and Bolts Lake, both in GMU 45, could result in the loss of thousands of acres of wetlands and big game winter and summer habitat.

Various habitat improvement projects, including prescribed burns, removal of pinyon-juniper encroachments, improvement of sagebrush and mountain shrub habitats, re-seeding, fertilization, aeration, and water developments, have been conducted or are on-going. Since 2009, BLM, USFS, and CPW's Habitat Partnership Program (HPP) and Auction & Raffle Program have worked together to fund and improve a total of 66 sq km. (16,406 acres) of D-8's habitat, primarily on deer winter range (Table 5). BLM is planning a set of water development projects to repair or replace old catchments and ponds, mow upland shrubs to enhance water run-off to the ponds, and install solar wells to improve water availability for wildlife and livestock (BLM 2019). These water projects help to mitigate the loss of movement routes for wildlife to access the Eagle River due to I-70's traffic and highway fencing. BLM also is planning additional pinyon-juniper removal, Zeedyk structures to restore wet meadows and riparian areas, and removal of old, unnecessary livestock fencing.

Table 5. Habitat improvement projects in deer DAU D-8 from 2009-2018.

Year(s)	Location	GMU(s)	Treatment Type	Sq. Km.	Acres
2009	Inspiration Point	361	Prescribed burn	1.5	368
2009	Radium SWA	361	Prescribed burn	1.5	373
2010	Blacktail Mountain	15	Prescribed burn	1.4	338
2010	Blacktail Mountain	15	Sagebrush manipulation	1.8	452
2010	Rancho del Rio	15	Pinyon-juniper removal	0.3	70
2010	Yarmony Mountain	15	Prescribed burn	4.0	995
2011	Deer Pen	35	Prescribed burn	2.3	562
2011	Radium SWA	15	Seeding/agricultural	0.1	20
2014	North Eby	35	Pinyon-juniper removal	0.1	29
2014-2016	Spruce Creek	361	Timber salvage	0.1	16
2016	Hartman Divide	361	Pinyon-juniper removal	6.0	1,485
2018	Dry Lake	35	Pinyon-juniper removal	0.7	182
2018	Four Mile Springs	35	Pinyon-juniper removal	0.4	91
2018	Piney River	36	Timber salvage clearcut	0.2	50
2009 & 2018	State Bridge	35	Pinyon-juniper removal	2.0	495
2009, 2010	Yarmony-Rancho del Rio	15	Pinyon-juniper removal	1.9	475
2009-2010	Yarmony Mountain	15	Pinon-Juniper removal	10.4	2,579
2009-2012	Radium SWA	15 & 361	Pinon-Juniper removal	1.1	270
2010 & 2013	Dry Gulch	15	Prescribed burn	4.1	1,012
2010, 2011, 2014-2016	Dry Gulch	361	Pinyon-juniper removal	3.2	799
2010-2011	Windy Point	35	Pinyon-juniper removal	1.3	333
2011-2012, 2016	Winter Ridge	35	Pinyon-juniper removal	6.2	1,528
2012 (approx.)	Winter Ridge/Deer Pen	35	Pinyon-juniper removal	1.4	358
2013, 2015-2016	Eby Creek	35	Pinyon-juniper removal	0.2	41
2013-2015	Wapiti Road	35	Pinyon-juniper removal	0.5	133
2014-2016	Deer Pen	35	Pinyon-juniper removal	7.5	1,865
2014-2016	Sheep Gulch	35	Prescribed burn	0.9	234
2015-2016	Sheep Gulch	35	Pinyon-juniper removal	1.1	279
2015-present	Piney River	36	Road decommissioning (3 miles)		
2015-present	Single Tree	36	Fence removal (1 mile)		
2017, 2018	Radium Valley	361	Pinyon-juniper removal	3.9	974
		TOTAL HABITAT PROJECT AREA:		**66**	**16,406**

Conservation easements on private lands help to protect habitat from future development. In D-8, 5% (57 sq. km.) of mule deer winter range and 4% (156 sq. km.) of the DAU's total land area are protected through conservation easements (Table 6 and Figure 8). Due to the loss of important deer winter range to date, the continued preservation and improvement of existing habitat is paramount.

Table 6. Conservation easements area in deer DAU D-8.

	Within Deer Winter Range		Within overall D-8	
GMUs	**Acres**	**Sq. Km.**	**Acres**	**Sq. Km.**
15	6,705	27	22,430	91
35	2,040	8	3,169	13
36	1,929	8	2,229	9
45			3,582	14
361	3,336	13	7,150	29
D-8 Total	**14,010**	**57**	**38,560**	**156**

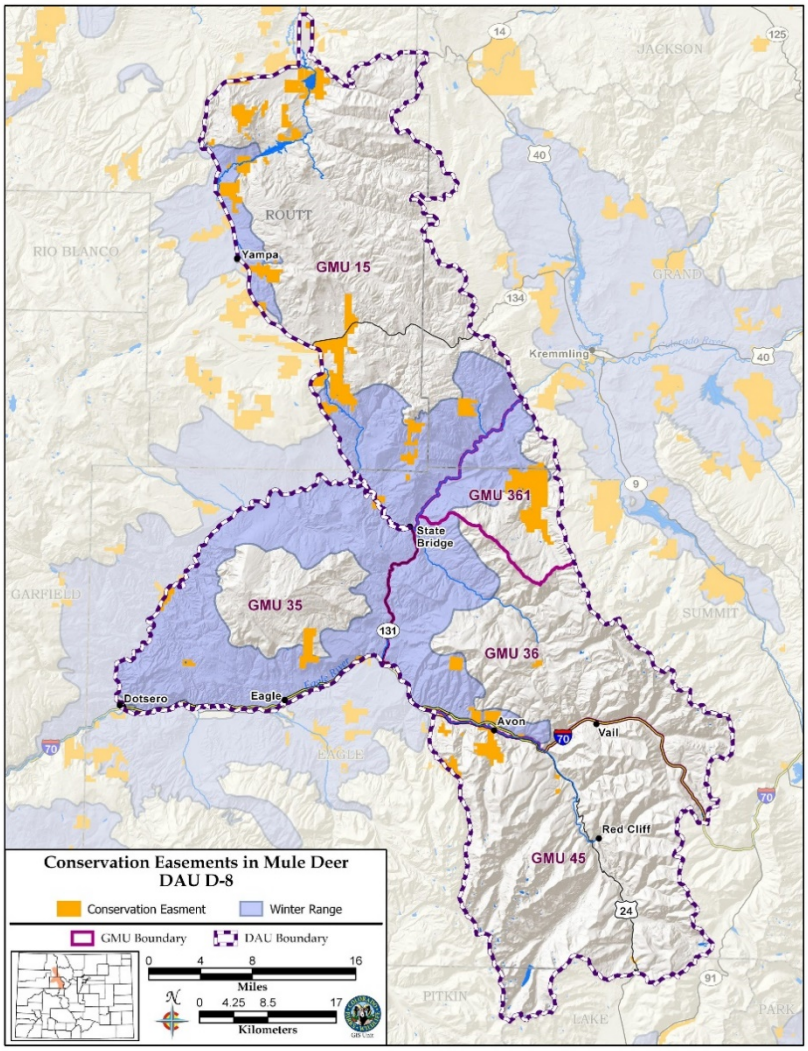


Figure 8. Conservation easements in deer DAU D-8.

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 30% 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 primarly purpose of these aerial surveys is to obtain post-hunt age and sex ratios.

We then incorporate 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

D-8 is one of the larger herds in the state, but as with many herds across Colorado, the habitat carrying capacity has declined over the decades, as both quantity and quality of habitat have diminished due to land development, fragmentation by roads and trails, increased human activity on public lands, and suppression of large-scale wildfires. The history of D-8's population in the earlier decades is discussed in more detail in the 2009 DAU Plan (CDOW 2009).

In 2009 (but not effective until license year 2010), CPW lowered D-8's population objective to account for the changing landscape and established an objective *range*, rather than a single-number objective. At that time, objective ranges were a relatively new approach, so the objective was set with a moderate range of ±10% around the midpoint (15,000 ±1,500 deer).

However, over the past decade of managing for this population objective range, we have found it to be too narrow to adequately encompass both sources of variability in population estimation. First, there is statistical error in fitting annual field data to a population model. Secondly, there is random variability in environmental conditions; for example, weather conditions influence deer survival as well as hunter success rates. Each year the D-8 model was updated and re-run with a new year of data, the model's results varied by up to approximately ±1,250 animals, meaning that statistical error in models already used up 83% of the 2009 Plan's objective range, leaving only 17% of the objective range to buffer for annual variability in environmental conditions.

As D-8's population climbed into objective range and then increased to the upper end of the objective range from 2010-2014, CPW raised license quotas for several years in response. However, soon after, the population declined in recent years down to the bottom end of the objective range and we cut license quotas the past 2 years. This unstable pattern suggests that the population objective range was set too close to the habitat's carrying capacity and/or too narrow to buffer for annual environmental variability. Fawn:doe ratios (see Post-Hunt Herd Composition section below), which are indicators of doe reproductive

fitness and fawn recruitment, have declined over the past 2 decades, which suggests a population at or just above its habitat carrying capacity. D-8's population estimate as of 2019 is 12,476 deer, which is below the objective range (Figure 9).

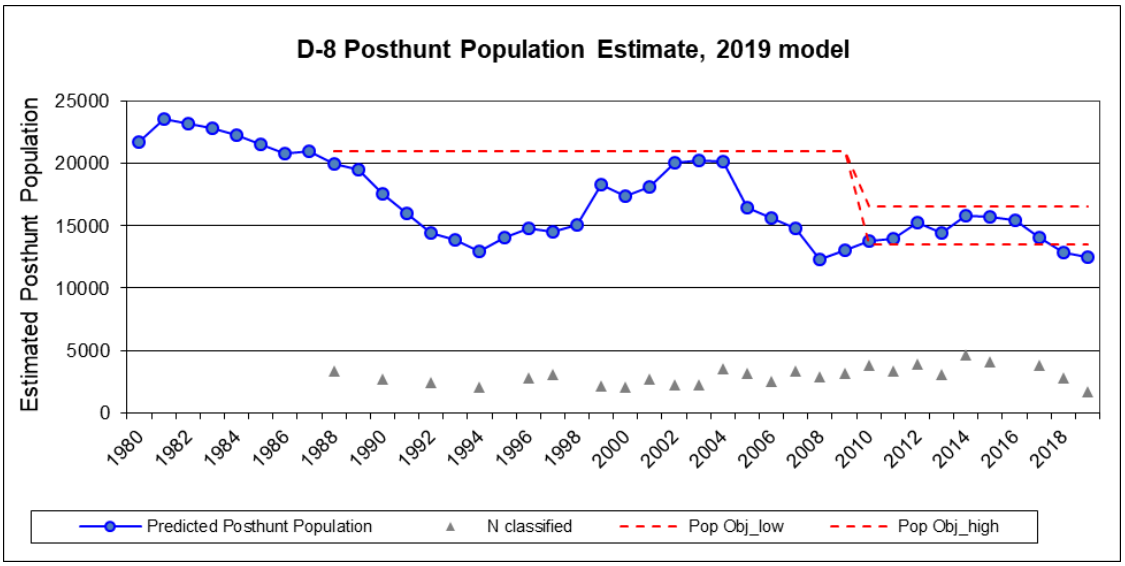


Figure 9. Post-hunt population estimates of deer in DAU D-8 from 1980-2019, based on the 2019 model.

Post-Hunt Herd Composition

Fawn Ratio (Age Ratio)

Post-hunt fawn:doe ratios in D-8 averaged 57 over the past 10 years, and 54 over the past 4 years. This trend continues a decades-long pattern of generally declining fawn ratios (Figure 10).

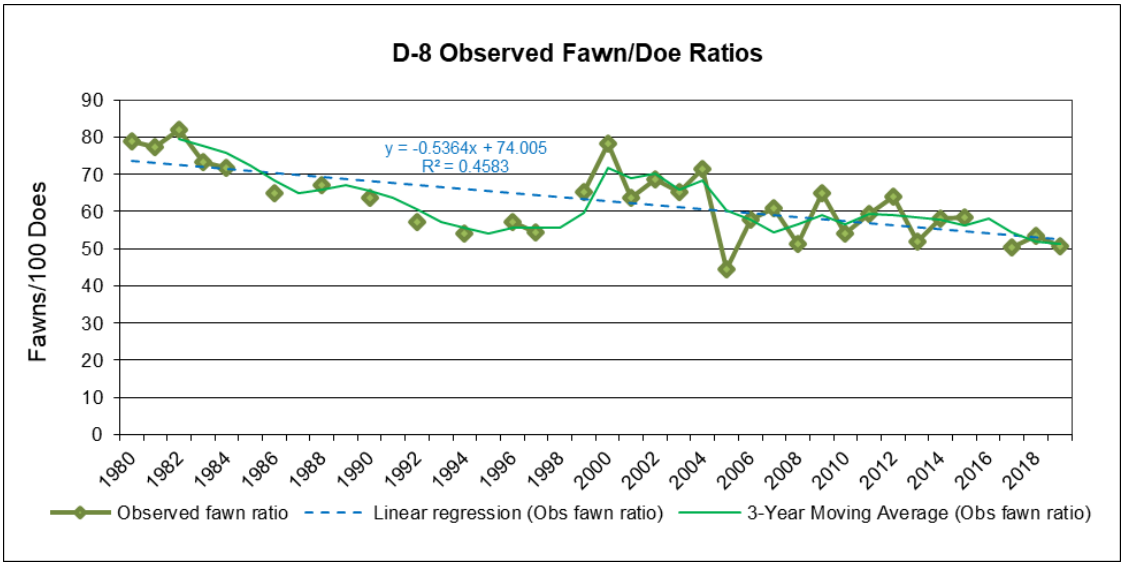


Figure 10. Observed fawn:doe ratios in DAU D-8 from 1980-2019.

Buck Ratio (Sex Ratio)

The post-hunt buck:doe ratio, in contrast to fawn:doe ratio, has generally been on an increasing trend, with periodic exceptions (Figure 11). Notably, after buck licenses became limited statewide in 1999, the buck:doe ratio increased dramatically. Similarly, after several years of conservative deer management following the severe winter of 2007/08, the buck:doe ratio increased well above objective. By 2011, the 3-year average buck ratio already reached the upper end of the sex ratio objective. Then through 2015, the buck ratio continued to climb beyond objective. As buck license quotas were increased incrementally over recent years, the buck ratio finally appears to have dropped down to within objective range in the past few years. The current 3-year (2017-2019) average is 27 bucks:100 does.

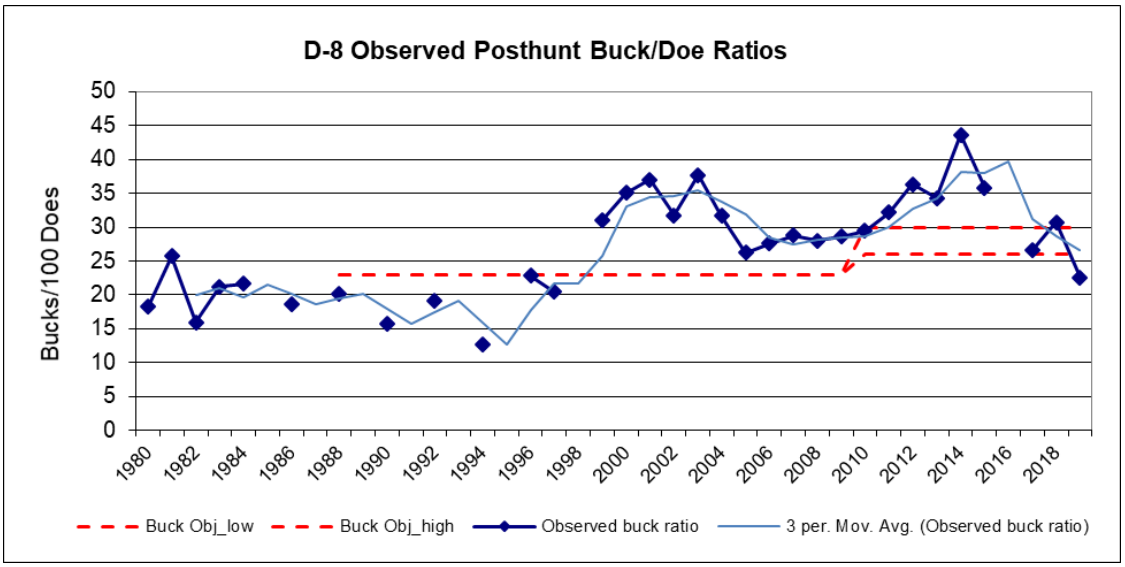


Figure 11. Observed buck:doe ratios in DAU D-8 from 1980-2019.

Hunting Licenses and Harvest Statistics

License Allocation

Hunting seasons and quotas in prior decades were described in detail in the 2009 DAU Plan (CDOW 2009). In the past decade, deer hunting seasons included archery, muzzleloader, early rifle, 2nd, 3rd, and 4th season licenses. All of these seasons had limited quotas. There are no antler-point restrictions on buck harvest. Doe and either-sex licenses and 2nd season buck licenses have not needed preference points to draw. 3rd season buck licenses have generally been available with 0 preference points, sometimes 1 point for non-residents. Early and 4th season buck licenses have required between 2-16 points, as of the 2019 draw (Table 7).

From 2010-2014, as D-8's population increased into the population objective range and reached the upper end of the objective range, we began to increase license quotas, starting with slight increases through 2012 and then larger increases from 2013-2017 (Figure 12). However, then the population began to drop during 2017 and 2018, which were drought years as well as higher harvest years. Doe license quotas were reduced substantially in 2018 and and again 2019. Despite these doe license cuts, the post-hunt 2019 population model estimated that D-8 had dropped below objective, which triggered further significant cuts in doe license quotas, down to 10 licenses per hunt code in 2020, as required by the CPW Leadership Team's guidelines on doe license quotas. In the three successive years of doe

license cuts, doe quotas were reduced by a total of 97% from the recent high of 1,210 doe licenses in 2017, down to a low of 40 doe licenses in 2020. Either-sex license quotas were also reduced in 2019 and 2020.

On the other hand, buck license quotas were gradually increased over the past decade (Figure 12) because D-8's buck ratio had been over objective for much of the past decade. These additional buck licenses also partially help to offset the recent cuts in doe and either-sex license hunting opportunity. Within the past few years, we have restored the total buck license quotas for the DAU back up to the levels before the major cuts in 2008, following a severe winter. However, by winter 2019-20, the 3-year average buck ratio has dropped toward the lower end of the sex ratio objective range, so buck licenses quotas were scaled back in 2020.

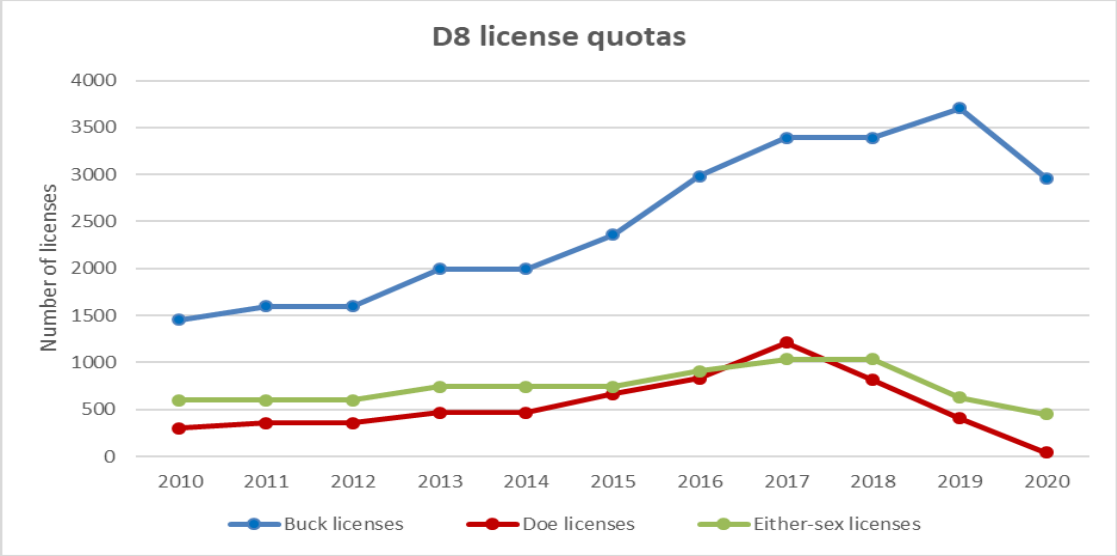


Figure 12. License quotas in DAU D-8, 2010-2020.

Table 7. Minimum preference points needed to draw rifle buck licenses in mule deer DAU D-8, 2005-2019.

						Color key:		0-4 Pts		5-9 Pts		10-14 Pts		15-19 Pts	
Season	**Hunt code**	**Data**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Buck 2nd rifle, GMU 15	DM015O2R	Quota	575	250	250	250	270	270	360	360	425	565	650	650	715
		N 1st choice apps	361	348	313	270	275	308	325	344	353	354	334	304	324
		Res. Pref Pts	0	0	0	0	0	0	0	0	0	0	0	0	0
		NR Pref Pts	0	0	0	0	0	0	0	0	0	0	0	0	0
Buck 3rd rifle, GMU 15	DM015O3R	Quota	430	180	180	180	190	190	250	250	295	370	425	425	465
		N 1st choice apps	299	267	223	233	262	275	327	355	335	356	407	402	321
		Res. Pref Pts	0	0	0	0	0	0	0	0	0	0	0	0	0
		NR Pref Pts	0	0	0	0	0	0	0	0	0	0	0	0	0
Buck 4th rifle, GMU 15	DM015O4R	Quota	50	20	20	20	30	30	30	30	30	40	55	55	55
		N 1st choice apps	187	162	174	138	136	112	161	146	150	156	152	136	100
		Res. Pref Pts	2	3	3	3	3	3	4	3	3	3	3	2	2
		NR Pref Pts	2	4	3	5	5	4	5	7	8	9	8	9	3
Buck 2nd rifle, GMUs 35, 36, 361, 45	DM035O2R	Quota	1025	450	450	450	480	480	575	575	685	910	1045	1045	1145
		N 1st choice apps	522	472	517	473	561	618	607	705	715	768	712	658	675
		Res. Pref Pts	0	0	0	0	0	0	0	0	0	0	0	0	0
		NR Pref Pts	0	0	0	0	0	0	0	0	0	0	0	0	0
Buck 3rd rifle, GMUs 35, 36, 361, 45	DM035O3R	Quota	770	320	320	320	340	340	410	415	495	620	730	730	800
		N 1st choice apps	362	309	269	411	462	552	693	598	710	917	828	983	884
		Res. Pref Pts	0	0	0	0	0	0	0	0	0	0	0	0	0
		NR Pref Pts	0	0	0	0	0	0	1	1	0	1	0	0	0
Buck 4th rifle, GMUs 35, 36, 361, 45	DM035O4R	Quota	100	35	35	20	20	20	20	20	20	25	30	30	30
		N 1st choice apps	360	335	253	222	209	272	307	277	258	235	246	231	183
		Res. Pref Pts	2	2	3	4	5	5	6	7	7	9	9	8	7
		NR Pref Pts	2	3	3	6	6	9	11	14	15	14	15	15	16
Buck early rifle, Eagle's Nest Wilderness	DM036E1R	Quota	30	30	20	15	15	15	20	15	15	15	15	15	15
		N 1st choice apps	76	80	64	67	56	45	61	65	90	74	60	45	46
		Res. Pref Pts	2	2	1	2	2	2	2	3	3	5	3	4	2
		NR Pref Pts	2	2	2	3	3	3	4	4	9	4	6	4	3

Harvest and Success Rates

As license quotas were gradually increased over much of the past decade, buck harvest likewise generally increased (Figure 13). In 2018 and 2019, as doe quotas were reduced, doe harvest proportionally declined. The 3-year average buck harvest has been 1,113. The 3-year average antlerless (does + fawns) harvest has been 370. Fawns account for 7.3% of total antlerless harvest (past 10-year average).

Success rates are often highly influenced by the weather during hunting season. Snowfall can help to concentrate deer as they migrate to mid- and low elevations, and can help hunters track animals, resulting in higher success rates. Warm, dry autumns have the opposite effects and often have lower success rates. Hunter crowding, or indeed crowding by any type of recreation activity, can also negatively affect success rates.

Buck licences success rate increased in the earlier part of the past decade, but then as buck license quotas were more steeply increased in 2014 and after, buck license success rate has steadily declined, suggesting that we had reached a point of diminishing returns on harvest relative to license quotas (Figure 14). Buck harvest peaked in 2016-2017 (Figure 13), suggesting that buck quotas roughly 10-20% lower than the recent high quota levels in 2019 may be optimal for maximizing buck harvest while also maintaining success rates that are satisfactory to hunters.

Buck license success averaged 37% over the past decade and 29% in the past 3 years. Either-sex licenses averaged 25% over the past 10 years and 18% in the past 3 years. And doe license success averaged 40% for the 10-year and 39% for the 3-year average. 2016-2018 were particularly dry years, which may have contributed to the lower success rates in those years.

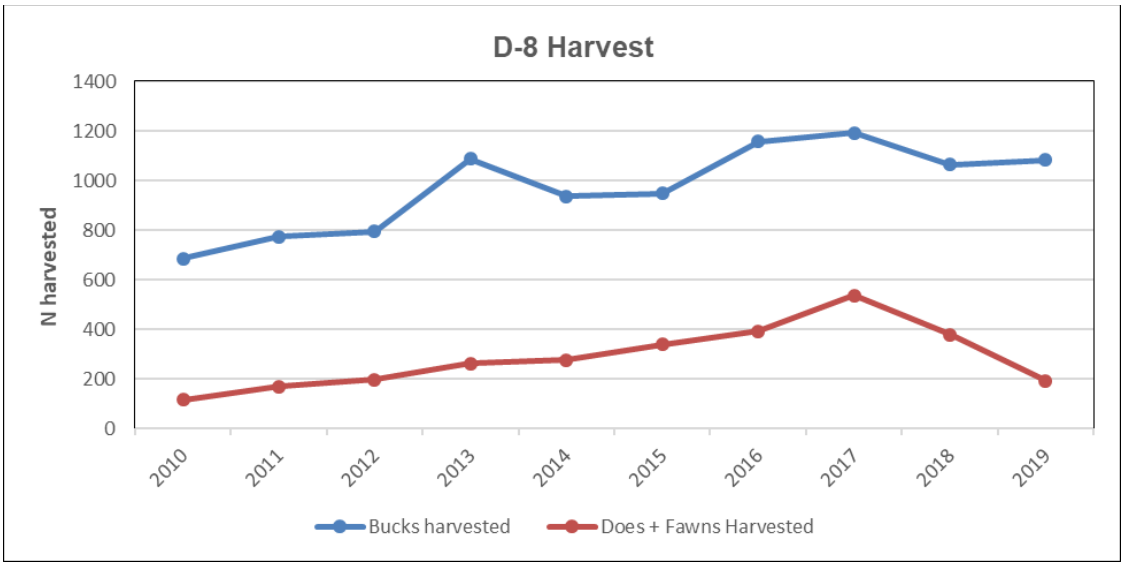


Figure 13. Harvest of deer in DAU D-8, 2010-2019.

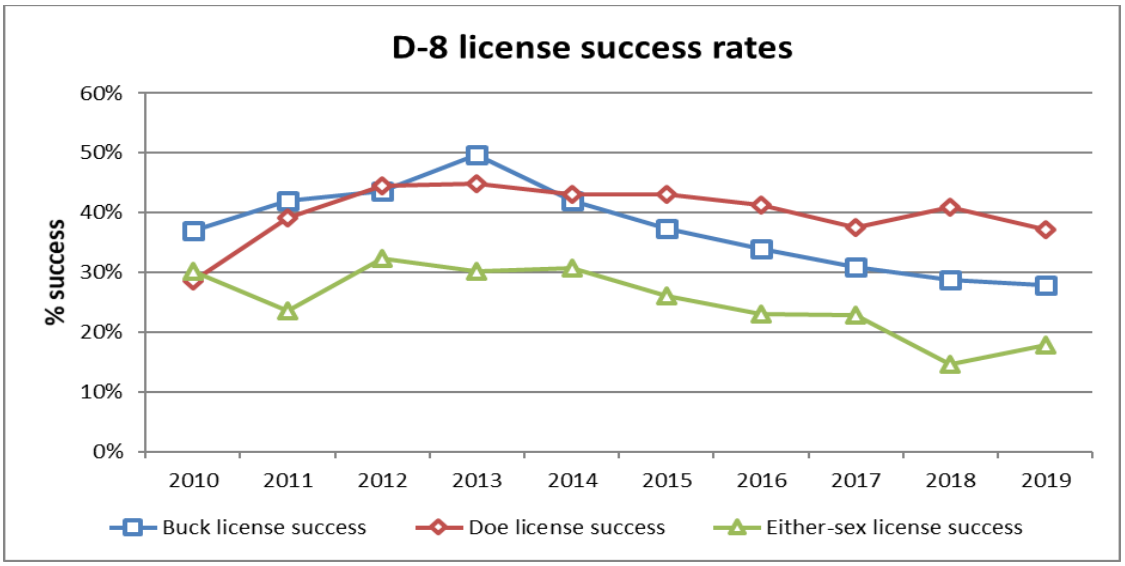


Figure 14. License success rates in DAU D-8, 2010-2019.

CURRENT MANAGEMENT STATUS

2009 D-8 Plan Objectives

Population Objective = 13,500-16,500 deer
Sex ratio Objective = 26-30 bucks/100 does

Current Management Strategies

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

Current Management Issues

1. Limited Winter Range

   Winter snow forces deer down and out of the higher elevations of the DAU to limited ranges above the Colorado River. This movement results in the use of a restricted and limited winter range and concentrates the deer in an area from approximately 6,500-9,000 ft. During light to normal winters, the winter mortality rates probably do not exceed 15 - 20% of the total deer herd. However, in 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. Winter range is considered the most limiting factor for deer in Colorado and this DAU.

2. Unfavorable Range Conditions

   Like much of mule deer habitat across the western US, range condition in D-8 is fair to poor. 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. Pinyon and juniper stands tend to be mature with a closed canopy that severely reduces understory vegetation. Pinyon and juniper woodlands have invaded sagebrush shrublands because of lack of natural large-scale wildfires and have converted them to less productive sites. Many of the mixed mountain shrublands also are over-mature, less productive, and can be unavailable for winter browse use. Land development such as along the I-70 corridor has limited the use of prescribed burns on the adjacent public lands due to the fear of private property damage. In addition, some land owners oppose mechanical treatments of pinyon and juniper encroachment because they find it unaesthetic. CPW, BLM, USFS, and private landowners continue to make efforts to conduct habitat improvement projects, such as pinyon-juniper thinning/removal and prescribed burns.

3. Direct Loss of Habitat due to Land Development

   Over the past 50-60 years there have been significant changes in the southern half of the DAU from the development of the ski industry and Interstate-70. Nearly

one-third of winter range is on private lands. Residential and commercial developments resulted in a rapid loss of big game winter range and migration corridors. From 1970 to 2010, 81% (423 sq. km.) of private land on D-8's winter range habitat and 77% of private land on D-8's overall range that was once undeveloped (0 housing units per sq. km) have been developed to varying degrees (Figure 15 and Figure 16). Relating housing density to mule deer population trends, Johnson et al. (2017) found that as residential housing development in Colorado increased, mule deer recruitment rates declined.

In the next 10 years, there may be additional residential development on Horse Mountain Estates in GMU 35, Berlaimont Estates and East Vail in GMU 36, and the Battle Mountain Resort and Eagle Mine Superfund site in GMU 45.

(a)

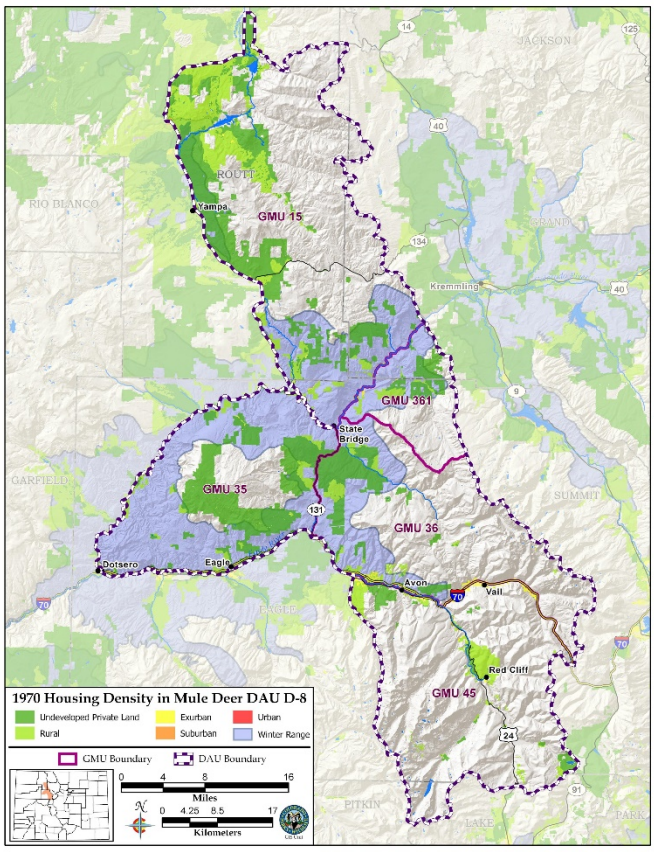
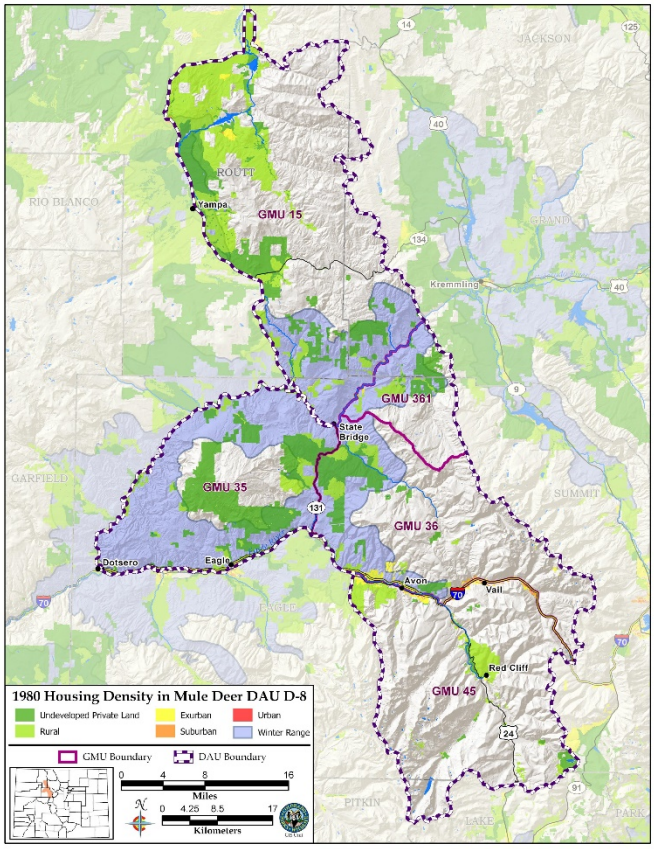
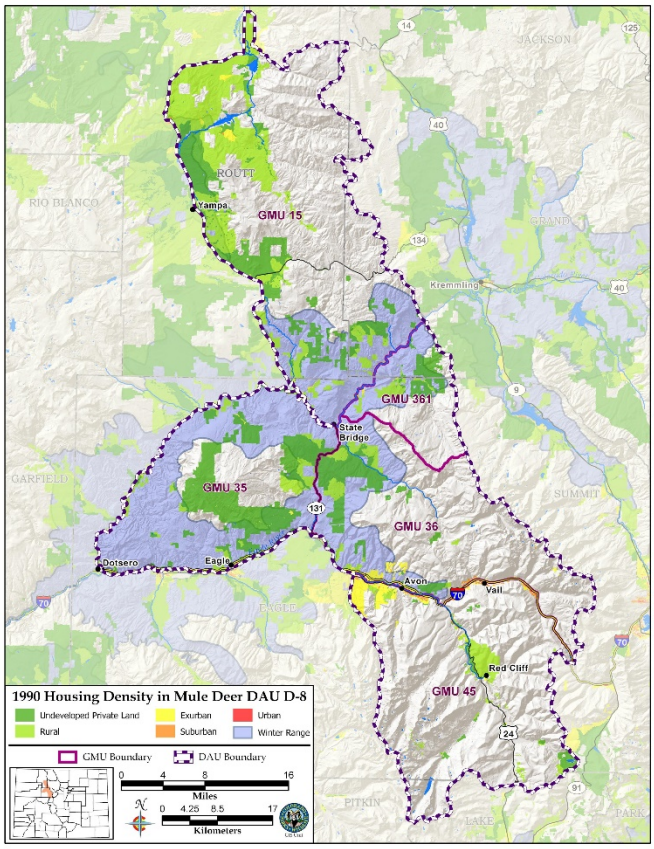


Figure 15 (a-e). Housing densities on private lands in deer DAU D-8 from 1970 to 2010.

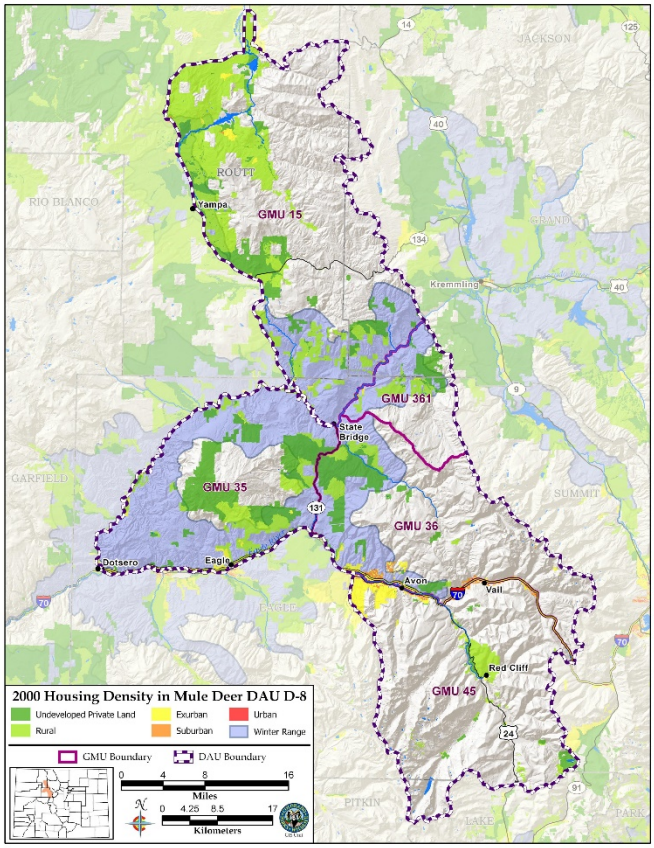
(b)


1980 Housing Density in Mule Deer DAU D-8
Undeveloped Private Land
Rural
Exurban
Suburban
Urban
Winter Range
GMU Boundary
DAU Boundary
Miles
Kilometers
GMU 15
GMU 361
GMU 35
GMU 36
GMU 45
Yampa
State Bridge
Dotsero
Eagle
Avon
Vail
Red Cliff
ROUTT
RIO BLANCO
GARFIELD
EAGLE
PITKIN
LAKE
SUMMIT
JACKSON
GRAND
Kremmling

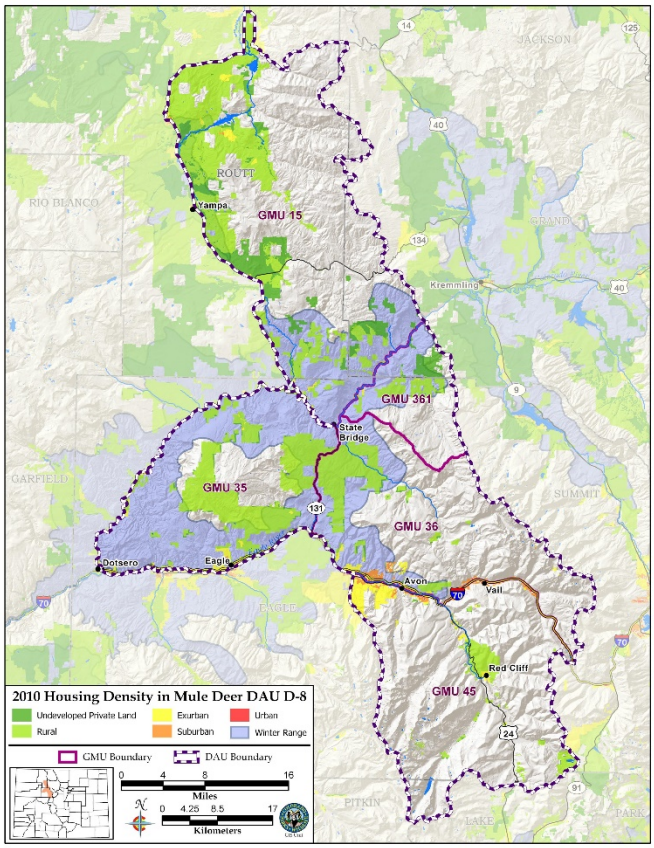
(c)


1990 Housing Density in Mule Deer DAU D-8
Undeveloped Private Land
Rural
Exurban
Suburban
Urban
Winter Range
GMU Boundary
DAU Boundary
Miles
Kilometers
GMU 15
GMU 361
GMU 35
GMU 36
GMU 45
Yampa
State Bridge
Dotsero
Eagle
Avon
Vail
Red Cliff
ROUTT
RIO BLANCO
GARFIELD
EAGLE
PITKIN
LAKE
SUMMIT
JACKSON
GRAND
Kremmling

(d)


2000 Housing Density in Mule Deer DAU D-8
Undeveloped Private Land
Rural
Exurban
Suburban
Urban
Winter Range
GMU Boundary
DAU Boundary
Miles
Kilometers
GMU 15
GMU 361
GMU 35
GMU 36
GMU 45
Yampa
State Bridge
Dotsero
Eagle
Avon
Vail
Red Cliff
Kremmling
ROUTT
RIO BLANCO
GARFIELD
EAGLE
SUMMIT
PITKIN
LAKE
JACKSON
GRAND

(e)


2010 Housing Density in Mule Deer DAU D-8
Undeveloped Private Land
Rural
Exurban
Suburban
Urban
Winter Range
GMU Boundary
DAU Boundary
Miles
Kilometers
GMU 15
GMU 361
GMU 35
GMU 36
GMU 45
Yampa
State Bridge
Dotsero
Eagle
Avon
Vail
Red Cliff
Kremmling
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RIO BLANCO
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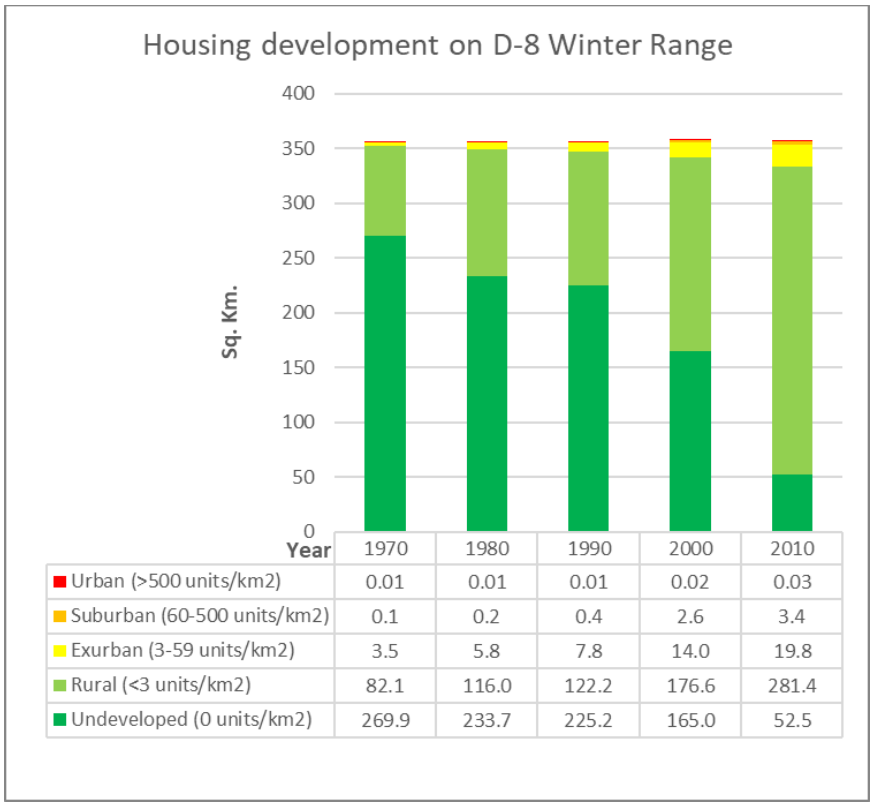
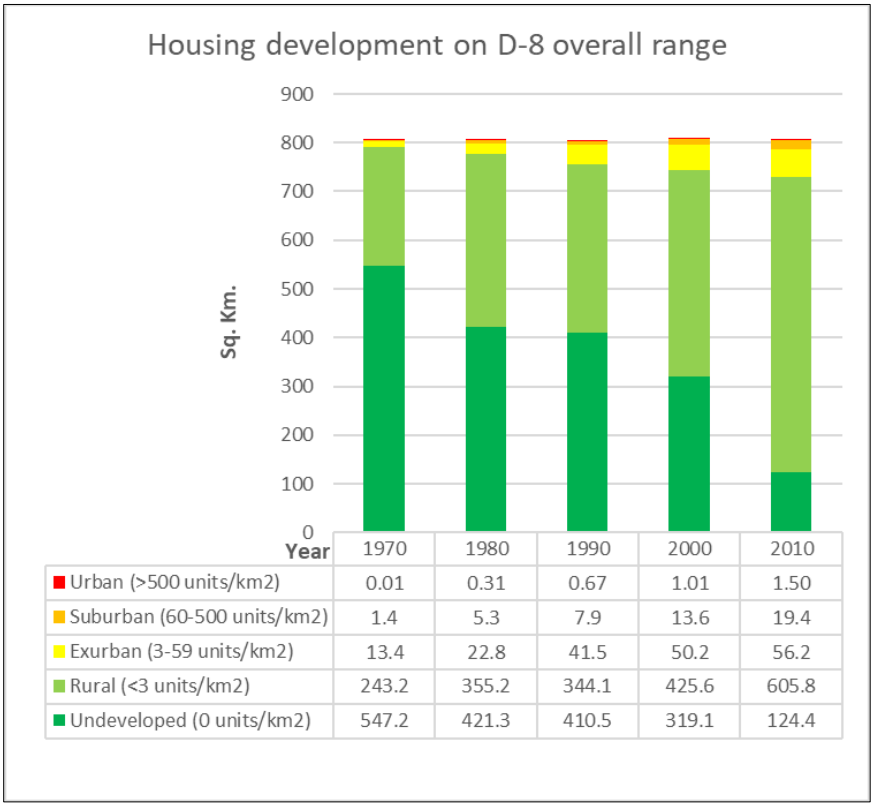
PITKIN
LAKE
JACKSON
GRAND

(a)



Year	1970	1980	1990	2000	2010
Urban (>500 units/km2)	0.01	0.01	0.01	0.02	0.03
Suburban (60-500 units/km2)	0.1	0.2	0.4	2.6	3.4
Exurban (3-59 units/km2)	3.5	5.8	7.8	14.0	19.8
Rural (<3 units/km2)	82.1	116.0	122.2	176.6	281.4
Undeveloped (0 units/km2)	269.9	233.7	225.2	165.0	52.5

(b)



Year	1970	1980	1990	2000	2010
Urban (>500 units/km2)	0.01	0.31	0.67	1.01	1.50
Suburban (60-500 units/km2)	1.4	5.3	7.9	13.6	19.4
Exurban (3-59 units/km2)	13.4	22.8	41.5	50.2	56.2
Rural (<3 units/km2)	243.2	355.2	344.1	425.6	605.8
Undeveloped (0 units/km2)	547.2	421.3	410.5	319.1	124.4

Figure 16 (a & b). Housing development (sq. km.) on private lands in deer DAU D-8 from 1970 to 2010 on (a) deer winter range and (b) overall range.

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. The road and trail system allows extensive access into many areas of D-8, particularly the central and southern portions of the DAU (Figure 17). 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. BLM designated Bocco Mountain and Gypsum Hills, both in GMU 35, as Extensive Recreation Management Areas (ERMAs) in their current Resource Management Plan (BLM 2015). ERMAs are designated to be managed primarily for recreation.

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. There are two wilderness areas in D-8 on USFS lands (Eagles Nest in GMUs 36, 361, and 37, and Sarvis Creek in GMU 15) and also two wilderness study areas on BLM lands (Castle Peak and Bull Gulch in GMU 35). 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. Radium State Wildlife Area (in GMUs 15 and 361) also limits motorized and mechanized travel to the county roads, so the remainder of the State Wildlife Area is less-disturbed, more functional wildlife habitat. In particular, Radium SWA is a key wintering area for deer in D-8.

Seasonal closures help to reduce human activity on some areas of mule deer winter range and transitional range during critical times of the year. BLM lands from Eby Creek to Bocco Mountain and from Burns to State Bridge, all in GMU 35, are seasonally closed to motorized and mechanized travel from December 1 through April 15 (BLM 2015). Other BLM lands in the east half of Gypsum Hills and Horse Mountain in GMU 35 and a small area at the bottom of Muddy Creek in GMU 36 have seasonal closures to motorized and mechanized use from January 16 to April 15 (BLM 2015). There is also a variety of seasonal trail closures during winter and early summer on the USFS Holy Cross Ranger District (USFS 2018) and on the West and East Avon Preserves (Town of Avon 2016). 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.

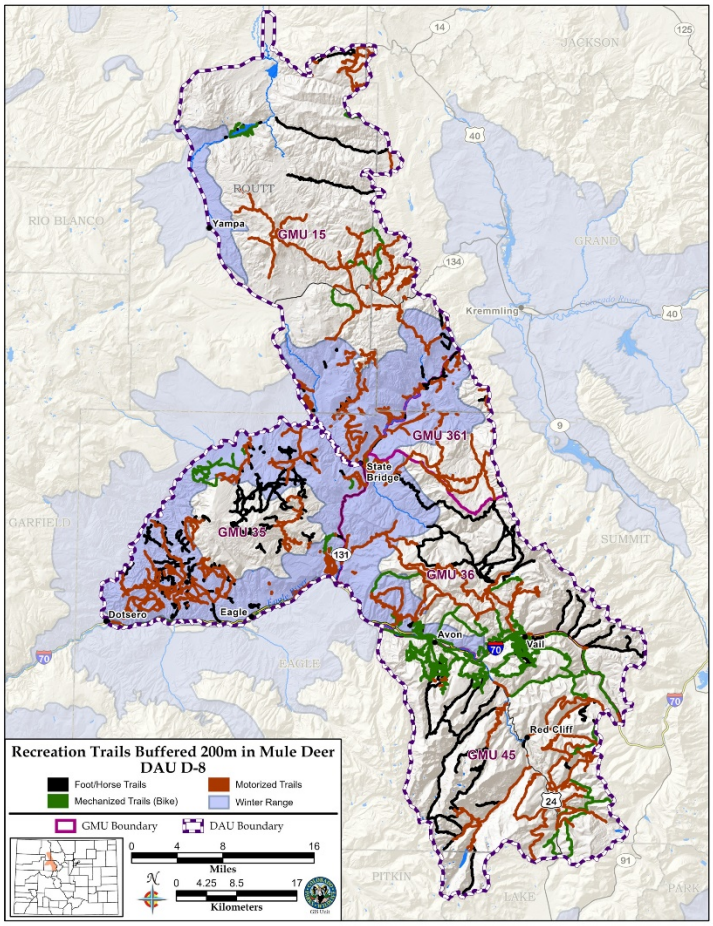


Figure 17. Recreation trails and roads in mule deer DAU D-8, depicted with a 200-meter buffer zone of human disturbance. When deer are 200 m from a trail, there is an estimated 50% chance that the deer will flee if they encounter a hiker or biker (Taylor and Knight 2003). In addition, trails and roads divide once-continuous wildlife habitat into smaller, disconnected fragments.

5. Roadkills

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. Wildlife exclusion fencing to reduce wildlife-vehicle collisions was installed starting about a decade ago along most of I-70 in this DAU from Dotsero to Minturn. However, at times deer find gaps in the fence or access the interstate at diamond interchanges and become trapped on the interstate. There are several spanning bridges that cross the Eagle River and other drainages allowing deer to cross I-70, and there is one major wildlife underpass at Dowd Junction that allow deer to funnel under the interstate. Consultants for Eagle County recently completed an analysis of major highways in the county to identify areas with high wildlife-vehicle collisions and prioritize sections of highway for future potential highway crossings projects (Kintsch and Singer 2018). They highlighted Highway 131 between Wolcott and State Bridge as the highest

priority section within the county to install wildlife exclusion fencing and wildlife crossing structures.

6. Chronic Wasting Disease

Chronic Wasting Disease (CWD) is an infectious prion disease that affects cervids including mule deer. Deer infected with CWD usually 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 are more likely to have a higher CWD prevalance.

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-8 was included in 2018 among the selected units for mandatory CWD testing of all harvested bucks. Based on a sample of 534 bucks submitted, the prevalence rate was 4% (95% CI 2-6%). This is just under the management threshold of 5% prevalence rate. For adult does, CWD testing has been voluntary; based on a small sample of 26 does submitted from 2014-2018, no CWD positive does were detected (Table 8).

Table 8. CWD prevalence estimates for harvested deer in DAU D-8.

	ADULT BUCKS (2018 mandatory)				ADULT DOES (2014-2018 voluntary)			
Species	Sample Size	Prevalance	LCI	UCI	Sample Size	Prevalance	LCI	UCI
Mule Deer	534	4%	2%	6%	26	0%	0%	13%
Whitetail Deer								
MD+WTD	534	4%	2%	6%	26	0%	0%	13%

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):

5. Avoid artificially concentrating deer via agricultural feed, salt, or mineral blocks
6. 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. Competing Herd Management Objectives

When managing simultaneously for population size and buck ratio, there can be tradeoffs. For example, deer populations managed for high buck ratios have been correlated with lower fawn ratios (Bergman et al. 2011). Adult bucks can outcompete fawns for forage and space, leading to lower fawn recruitment. In D-8, this issue has not been a major concern because the buck ratio objective was set moderately low in the 2009 Plan and fawn ratios are mid-range compared to other deer herds in northwest Colorado and higher than other herds in the Glenwood Springs area. However, even in D-8, there is an inverse correlation between generally increasing buck ratios and declining fawn ratios over the past several decades (Figure 10 and Figure 11). When deciding among alternatives for the population and buck ratio objectives, the potential for competition among age/sex classes within a herd should be taken into consideration.

Public Input Process

Preliminary scoping

Hunter outreach:

In September-October 2019, we contacted 1,000 hunters who had drawn D-8 licences during the 2018 hunting season. We mailed postcards to these individuals requesting that they complete an online survey on D-8 deer management. We received responses from 164 people (16% response rate). Links to the complete survey results are available in Appendix B.

Key highlights of the hunter survey results:

- 98% (n=160) of respondents had hunted deer in D-8 within the past 3 years.
- Most of these hunters were satisfied with (47%) or neutral about (21%) their deer hunting experience. 32% were dissatisfied.
- The top reasons for wanting to hunt deer in D-8 (% rated "very important"):
    1. To spend time in nature (81%)
    2. To spend time with family/friends (79%)
    3. To obtain wild game meat (71%)
    4. To contribute to wildlife management (63%)
- The top concerns about potential issues between deer and human activities/properties (% rated as "very concerned"):
    1. Loss of deer habitat due to human population growth and land development (71%)
    2. Disturbance to deer from human outdoor recreation activities (51%)
    3. Decline in deer habitat due to suppression of natural wildfires (43%)
- The top concerns about chronic wasting disease (CWD) in D-8 were:
    1. Potential for CWD to reduce deer hunting opportunity (84%)
    2. Future generations' ability to enjoy hunting deer because of CWD (78%)
    3. Health of this deer herd (76%)
    4. Not having enough healthy deer to hunt (75%)
- *Note: The population objective alternatives proposed in this draft plan differ 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, 44% of respondents preferred a wider range of 12,500-16,500 deer. 22% preferred keeping the current population objective of 13,500 – 16,500 deer. 16% preferred reducing the population objective to 11,500-14,500 deer.
- Most respondents (55%) preferred keeping the current sex ratio objective of 26-30 bucks:100 does.

Routt Recreation Roundtable:

In November 2019, AWM Kris Middledorf met with the Routt Recreation Roundtable to discuss D-8 management issues. The Roundtable's meeting notes (available at https://drive.google.com/drive/folders/1c8RYqerdxVPXQx5tSpZn_WB0KjW8vA9U) listed the following concerns and comments:

- Concern that there is pressure is to lower the objectives – which over time possibly decreases herd size so that it's too small to survive.
- Hard to control all of the issues (e.g. roadkill). What we can to is to keep habitat from being degraded, and improve habitat where we can
- Ag use on public lands should balance between those that produce monetary gain (e.g. BLM grazing permits) and need for wildlife to have effective habitat/food on public lands

Public comment period

During the 30-day public comment period in June/July 2020, we conducted the following public outreach efforts to inform the public of the draft plan and to gather specific input on the draft plan and the proposed herd management objectives:

- The draft plan document was posted on the CPW website for the public to review. An online survey was also publicized on the CPW website and through the meetings and other outreach described below. We received only 6 survey responses (see links to the complete survey results in Appendix C).
- We held a public meeting on June 3, 2020, announced through a press release and on the CPW website. Due to the coronavirus pandemic, we held this meeting through an online live video presentation format followed by a question-and-answer session. Nine individuals from the public attended the online meeting. The Q-and-A session mainly involved discussion and clarification of deer management issues.
- We solicited input from the local BLM and USFS staff. We also held online meetings with the Grand and Eagle County Commissioners.
- We gave online presentations to 3 Habitat Partnership Program (HPP) Committees: Middle Park, Lower Colorado River, and Upper Yampa River. The HPP committees submitted a joint comment letter (Appendix D).
- We also gave an online presentation to the Eagle County Community Wildlife Roundtable. This roundtable then submitted a comment letter (Appendix C).

There was a wide variety of viewpoints represented among the comments we received. The majority of opinions supported CPW staff recommendations on the preferred alternatives for the herd management objectives, described in the next section.

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 post-hunt 2019 D-8 population estimate was 12,476 deer and the previous (2009 DAU Plan) population objective is 13,500-16,500 deer. The alternatives that we considered would aim to either maintain, lower and widen, or further lower the population objective (Table 9). 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 9. Proposed alternatives for D-8 population objective range.

Proposed Alternatives for Population Objective	Deer population size
Alternative 1:	13,500-16,500 (status quo; at/around carrying capacity)
Alternative 2 (selected):	**10,000-14,000 deer (below carrying capacity)**
Alternative 3:	8,000-11,000 deer (further below carrying capacity)
2009 DAU plan population objective	13,500-16,500
Post-hunt 2019 population estimate	12,476

Alternative 1: 13,500-16,500 deer:

This alternative would maintain the current population objective range of 13,500-16,500 deer (midpoint 15,000 ±10%) established in the 2009 D-8 Plan. As described in the "Post-hunt Population" section, over the past 10 years, D-8's population climbed into the objective range, reached the upper end, and then declined again to the bottom end and dropped below objective. A population that is unstable within its objective range could indicate that (a) it may be too close to its habitat carrying capacity, and/or (b) the objective range is too narrow to account for natural fluctuations in population size.

CPW's efforts to maintain D-8's population size within objective by adjusting license quotas resulted in either raising or cutting quotas, sometimes by significant margins in certain years (see "License Allocation" section). Under CPW's current statewide deer management direction, if a population declines below its objective range, then doe quotas need to be cut to 10 licenses per huntcode. These drastic doe license quota cuts are set to occur for the 2020 hunting season in D-8 because the post-hunt 2019 population estimate had dropped below the population objective range.

Making large changes in quotas every year or few years makes it difficult to retain hunters who may wish to hunt in D-8 annually. Hunters who simply want to harvest a doe to fill their freezer may not be able to hunt every year, or if they switch to applying for buck licenses, this would increase the demand for buck tags. Doe licenses for youth hunters will be extremely difficult to obtain because of the required extreme license cuts.

When a severe winter occurs, a population that is too close to its habitat carrying capacity would see poor survival and could drop well below its population objective range. It could take many years for a herd with low productivity to grow back up to the objective range. Additionally, if human impacts (e.g., land development and disturbance through

recreation and other activities) continue to increase over the next 10 years, the effective habitat carrying capacity may decline further on a long-term or even permanent basis. This could mean years of severely reduced license allocations under this alternative.

Alternative 2: 10,000-14,000 deer:

This alternative would lower and widen the population objective range to 10,000-14,000 deer (midpoint 12,000 ±17%) with the intent to manage the population slightly below its habitat carrying capacity and to increase its productivity. Under this alternative, we would hopefully see an increase in the fawn ratio, which would indicate higher fawn recruitment rates and a higher population growth rate. With a more productive herd, D-8 would be able to offer ample hunting opportunity and more consistency in quotas over the years, giving hunters more predictability from year to year when applying for licenses. A lower density herd should be more resilient to naturally occurring stressors like periodically severe winters or drought conditions.

If human impacts from land development and changes in land-use continue to reduce the effective habitat carrying capacity over the next 10 years, then the herd might not achieve the desired improvement in fawn ratios. Nevertheless, a reduction in population objective would still be appropriate if we wish to manage below habitat carrying capacity and to continue to manage for sufficient hunting opportunity for those who want to hunt in D-8 every year.

For comparison, the adjacent deer herd in Middle Park (DAU D-9) has a lower population objective of 10,500-12,500 and has about the same acreage of winter range and almost double the amount of summer range as D-8. By keeping the herd size below carrying capacity, D-9's fawn ratios are averaging in the 70s, compared to D-8's average in the 50s. D-9's population, like D-8's, has fluctuated over the past decade; but being a more productive herd (i.e., higher fawn ratios), D-9 has been able to offer both higher numbers of licenses and more consistent quotas over many years compared to D-8. As of 2019, D-9 offers 40% more buck licenses, 687% more doe licenses, and 234% more either-sex licenses compared to D-8. After the severe winter of 2007/08, D-9 was able to restore quotas back to pre-2008 levels within 3 years. In contrast, it took nearly an entire decade for D-8 to restore buck quotas, and doe quotas in recent years remain well below the pre-2008 quotas. In fact, by 2020, D-8's buck quotas had to be reduced and doe quotas were even more severely reduced because the population had dropped below the current (2009 Plan) population objective range.

Alternative 3: 8,000-11,000 deer:

This alternative would set the objective further lower at 8,000-11,000 deer (midpoint 9,500 ±16%). Under this alternative, the population would be managed well below the habitat carrying capacity. The herd's productivity and survival rates should be higher than under 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 licenses would be maintained at higher quotas than in recent years due to the herd's higher productivity. However, there could be fewer buck licenses compared to recent years because the overall population would be lower.

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 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 sex ratio in D-8 averaged 27 bucks per 100 does (3-year average, 2017-2019) which is within the 2009 Plan's objective range of 26-30 bucks per 100 does (Table 10). The alternatives that we considered were to either increase, maintain, or decrease the sex ratio objective range.

Table 10. Proposed alternatives for D-8 sex ratio objective.

Proposed Sex Ratio Objective Alternatives	Bucks per 100 Does
Alternative 1	30-34 (Increase)
Alternative 2 (Selected)	**26-30 (Status quo)**
Alternative 3	22-26 (Decrease)
2009 DAU plan sex ratio objective	26-30
3-year (2017-2019) average sex ratio	27

***Alternative 1**: 30-34 bucks:100 does:*

This alternative would manage the herd for a higher sex ratio range, similar to what was actually observed in D-8 over much of the past decade. Buck license quotas, which had been gradually increased over the past 10 years, would need to be cut back by about 25%-50%. The advantages of this alternative would be that there would be relatively more mature bucks in the herd and that license holders would have fewer other buck hunters with whom to compete. 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 override a DAU's sex ratio objective in favor of reducing the CWD prevalence rate by managing to a lower sex ratio.

Alternative 2: 26-30 bucks:100 does:

This alternative would maintain the current sex ratio objective range that was established in the 2009 D-8 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 the recent few years' quotas. CWD prevalence rate might remain stable if buck harvest remains similar to current levels. The advantages and disadvantages of Alternative 2 would be intermediate to those of Alternatives 1 and 3.

*Alternative 3: **22-26 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.

New Population and Sex Ratio Objectives

Selected post-hunt population objective range = 10,000-14,000 deer.

As addressed above, this objective range is likely just slightly below the DAU's current habitat carrying capacity. Managing the population below carrying capacity will allow CPW to allocate an adequate and relatively stable number of deer licenses on a more consistent basis from year to year.

Selected post-hunt sex ratio objective range = 26-30 bucks:100 does.

This objective range has been satisfactory to most D-8 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 wholly 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. CPW will also continue to monitor this herd for CWD prevalence.

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. CWD prevalence will continue to be monitored through periodic mandatory testing and through voluntary sample submissions.

ACKNOWLEDGEMENTS

Thanks to Michelle Flenner (GIS specialist, CPW) for conducting spatial analyses and preparing the maps for this document.

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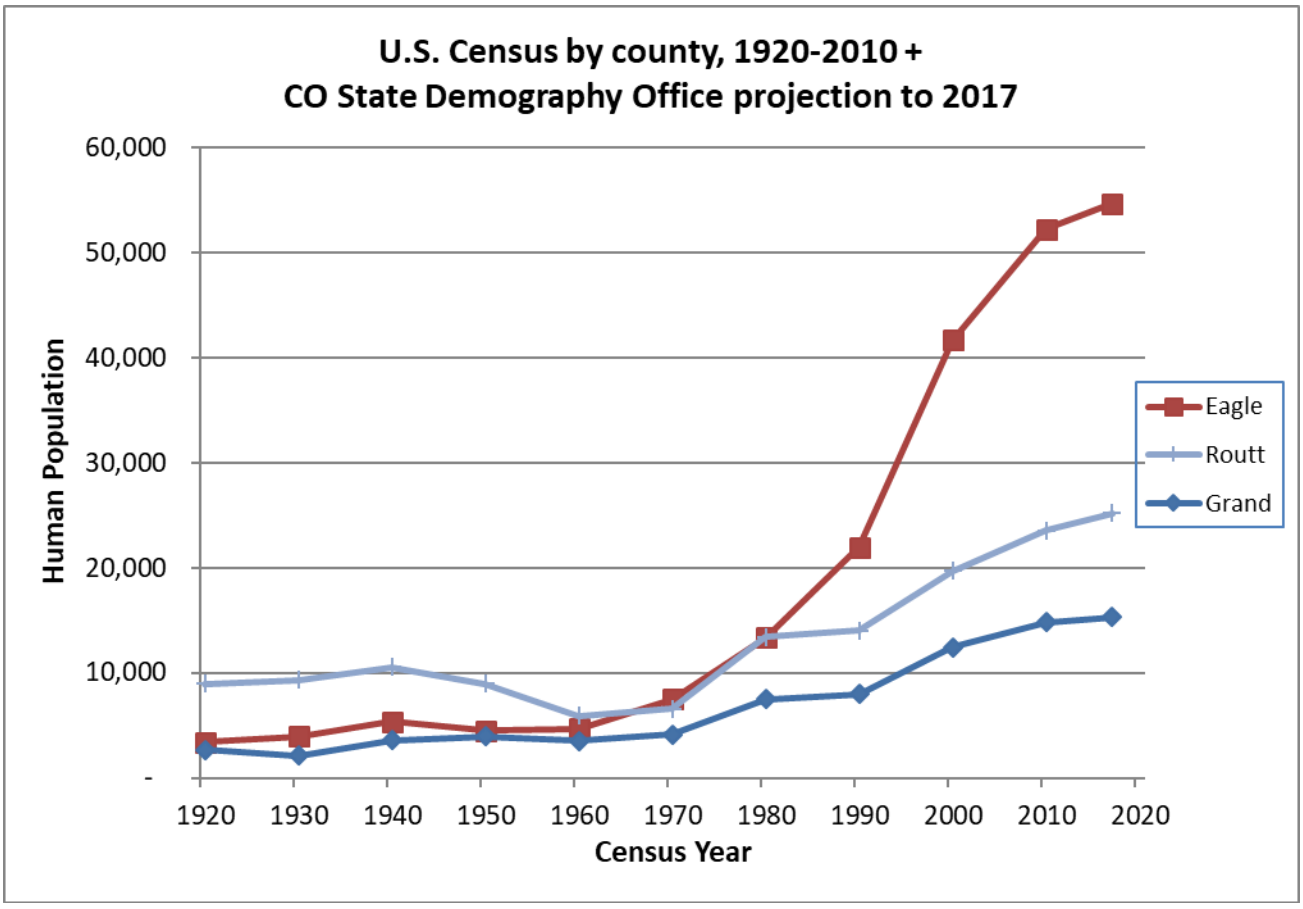
APPENDICES

Appendix A: Human population estimates in counties overlapping with mule deer DAU D-8, 1920-2017.



Appendix B: Results of Hunter Questionnaire, September-October 2019

To view the complete results of the D-8 hunter survey, go to the following website link:
https://drive.google.com/file/d/19_FRLFlWZs1fSRvhtKMmr4PoZv7rnnlQ/view

or use the following shortened URL:
https://tinyurl.com/D8huntersurveyresults2019Oct

Appendix C: Comments from Public Comment Period,June-July 2020

To view the complete results of the D-8 public comment period online survey, go to the following website link:
https://drive.google.com/file/d/1Sh3BJp8DM3wgu1EQ8l-MldM_XW_XYOtd/view

or use the following shortened URL:
https://tinyurl.com/D8publiccomment2020June

Appendix D: HPP Committee Comments

July 13, 2020

Julie Mao
Colorado Parks and Wildlife
0088 Wildlife Way
Glenwood Springs, CO 81601

RE: Middle Park (MP), Lower Colorado River (LCR), and Upper Yampa River (UYR) Habitat Partnership Program Comments - Deer HMP D-8

Dear Julie:

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, and moose) conflicts with agricultural landowners and to assist CPW to meet game management objectives for those same species. From those perspectives, the MP, LCR, and UYR HPP committees have discussed your presentation, reviewed the draft alternatives and offer these comments for consideration.

The three HPP committees, with the one exception noted below, are in agreement with the following comments pertaining to proposals for the population range and sex ratio objectives for the above HMP plan.

The MP, LCR, and UYR HPP committees support the draft alternative 2, to decrease the population objective to reflect the current population within this DAU and within our committee areas. The committee members have heard from landowners and land managers about poor range conditions on both public and private lands. While many factors play into these conditions, keeping the number of big game animals at current levels is one step that would help to improve range conditions and forage resources.

The three HPP committees 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.

Minority Opinion: There was a dissenting opinion expressed by a sportsperson's representative who is not supportive of the preferred alternatives. He believes range and habitat conditions can support a larger population than what is currently recommended. He also believes the proposed sex ratio could be increased. Both increases would provide more hunting opportunity to sportspersons.

As stated above, HPP is also directed by statute to assist the Division to meet game management objectives. The MP, LCR, and UYR HPP committees have worked with both public land managers and private landowners to improve the quality and quantity of the habitat in D-8. Adequate habitat is critical to meeting game management objectives and we remain committed to maintaining and improving habitat in this area.

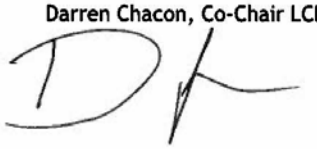
Our committees are concerned about CPW being able to achieve the proposed objectives over the long term due to:

-Residential growth continues to occur in winter range, resulting not only in a loss of critical habitat but also habitat fragmentation and increased disturbances.
-Public land recreation demands continue to increase throughout the year for both motorized and non-motorized user with similar effects.
-The belief that predation is having a larger impact on deer recruitment than is what is being accounted for in the plans.

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

On behalf of the Middle Park, Upper Yampa and Lower Colorado River HPP Committees

Darren Chacon, Co-Chair LCR HPP



Appendix E: Eagle County Community Wildlife Roundtable comments

Colorado Parks and Wildlife
Attn: Julie Mao
0088 Wildlife Way
Glenwood Springs, CO 81601

August 1st, 2020

Subject: State Bridge Mule Deer Herd Management Plan

Dear Ms. Mao:

The purpose of the Eagle County Community Wildlife Roundtable (ECCWR) is to gather a group of diverse stakeholders in the valley to understand and address issues facing wildlife populations. Together the ECCWR will identify a shared vision and realistic actions that the community can rally around to support wildlife. Diverse values, creativity, and resources will be leveraged to move to positive action. The goals of the ECCWR focus on maintaining healthy populations of wildlife, species of local concern, protecting from fragmentation, and enhancing important habitats such as reproduction areas, movement corridors, seasonal feeding areas, and riparian wetland areas. We also emphasize conservation and coexistence with species involved in human/wildlife conflicts.

The purpose of this letter is to express comments on the proposed State Bridge Mule Deer Herd Management Plan on behalf of the ECCWR. The main objective of the proposed project is to integrate CPW's plan and the concerns and ideas of land management agencies and interested public entities, in determining how the herd should be managed.

ECCWR recognizes CPW for their thoughtful approach in drafting the State Bridge Mule Deer Management Plan and very much appreciates their efforts. ECCWR supports these specific goals for the project:

1. Habitat conservation methods including safe passages and habitat connectivity, conservation easements, and others
2. Maintaining recommended sex ratio of 26-30 bucks per 100 does
3. Seasonal trail closures

However, the ECCWR requests CPW to manage the herd toward the top end of the population range of Alternative 2. In the future, the ECCWR asks CPW to consider revising the population objective, if healthy habitat conditions allow, and raise the objective population range of Alternative 2 to incorporate the existing top of the range at 16,500. The 2019 population estimate of 12,476 is just below the current objective and the ECCWR proposes lending our support and partnership to achieve strategies outlined in the executive summary to mitigate the population decline through protecting and enhancing mule deer habitat. The ECCWR will take part in the public comment period of hunting licensing, and be an engaged partner of CPW in the decision making process. The CPW management plan lists several strategies that align with ECCWR priorities including conservation easements, land acquisitions, and maintaining landscape connectivity and movement corridors. The common interest we all share is a healthy ecosystem

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that supports abundant wildlife, and working together, we can mitigate further decline and achieve a higher threshold for sustainable mule deer population.

ECCWR also encourages CPW to expand their holistic approach where possible, recognizing data sources may include partner organizations. Incorporating the following data would further articulate possible reasons for decline and enable a targeted approach to address areas of opportunity:

1. Recreation impacts: include data specific to the impacts of increased recreation
2. Consider a systemic approach that incorporates keystone species and the inter-relationship of the ecosystem as a whole as a part of the management plan
3. Include roadkill data to assess impacts

ECCWR commends CPW's action to require licensing of all SWA users including hikers, wildlife watchers, and others, as appropriate. In the future, we encourage CPW to issue them a separate license that accommodates recreational users - for example, a Conservation, CPW Friends of Wildlife, or similarly named pass. This would allow the agency to gather valuable contact data on size, composition, & financial impact of this block of users. Additionally, it is requested that CPW engage with a variety of constituent groups in addition to hunters when determining annual license targets. A broad group of stakeholders would be beneficial to ensure varied interests are represented. As the ECCWR works with CPW to enhance wildlife habitat and mitigate species population decline, it may be possible to attain a higher deer population which would impact CPW's population objective and subsequent licenses issued.

The ECCWR offers their assistance and resources in:

1. Habitat area prioritization and connectivity focused on preserving critical habitat and ensuring corridors for safe passage
2. Outreach and helping community groups advocate for land use regulations consistent with ECCWR wildlife objectives
3. Coordinate with Outdoor Stewardship Coalition to develop wildlife-friendly recreation guidelines and establish support to prioritize wildlife when considering recreational activities
4. Human-wildlife management support including education and outreach to mitigate conflicts
5. Identify potential funding streams to further support wildlife and healthy ecosystems

In summary, the ECCWR supports Alternative 2 with a proposed increase to 16,500 at the top of the population objective range if conditions allow. The ECCWR is hopeful that our actions as a coalition will increase carrying capacity through improved habitat and decreased disturbances, thereby increasing sustainable population. Additionally, it is recommended that local considerations be factored into license limits and increases in carrying capacity be considered during this management plan period as well as future population objective ranges. The ECCWR appreciates the opportunity to be involved in the planning process for the State Bridge Mule Deer Herd Management Plan and thanks CPW for their comprehensive report.

Sincerely,

Eagle County Community Wildlife Roundtable

Appendix F: Federal Agency Comments

USDA United States Department of Agriculture | Forest Service | White River National Forest | 900 Grand Ave Glenwood Springs, CO 81601-3602

File Code: 2600
Date: August 20, 2020

Matt Yamashita
Area 8 Wildlife Manager
Colorado Parks and Wildlife
0088 Wildlife Way
Glenwood Springs, CO 81601

Dear Matt

On behalf of the White River National Forest, I would like to provide my support for the State Bridge Mule Deer Herd Management Plan. I understand that the population objective would be lowered from 13,500 – 16,500 to 10,000 – 14,000 deer to better meet the current herd estimate.

The plan identifies fragmentation and human activities, principally recreation, as one of the causative factors for the herd's decline. The Eagle-Holy Cross Ranger District has partnered with Vail Valley Mountain Trails Association to monitor our seasonal trail closures and train community volunteers in wildlife education at the trail heads. Additionally, gates and signs have been installed at all of our seasonally closed trails. We are still seeing an increase in violations during the closures however, particularly with the COVID-19 pandemic. As a result, next year we will be further exploring enforcement options to reduce use during sensitive times of year for mule deer. The White River National Forest welcomes the opportunity to continue to collaborate with CPW in this effort.

In addition, we will continue to identify unauthorized travel routes that need to be restored and habitat improvement projects designed to improve range conditions.

Next week, crews will be removing juniper in mule deer winter range in the Muddy Pass area to improve forage productivity for the species. Next year, we plan on conducting prescribed burns in D-8 as well, and initiating the NEPA for a forest-wide sage enhancement project that will benefit sagebrush obligate species and mule deer herds across the forest.

Thank you for the opportunity to share my support and comment on the plan.

If you have any questions or would like to discuss further, please contact District Wildlife Biologist Jennifer Prusse at 970-827-5160.

Sincerely,

Lisa M. Stoeffler

for SCOTT G. FITZWILLIAMS
Forest Supervisor

cc: Sarah Hankens, Natasha Goedert, Leanne Veldhuis, Jennifer Prusse