

DRAFT

WHITE RIVER HERD MANAGEMENT PLAN DATA ANALYSIS UNIT D-7

Game Management Units
11, 211, 12, 13, 131, 231, 22, 23, 24

PREPARED FOR

COLORADO PARKS AND WILDLIFE



BY

DARBY FINLEY
BRAD BANULIS
BILL DE VERGIE

This plan was approved by the Colorado Parks and Wildlife Commission on

I. EXECUTIVE SUMMARY

White River Herd Management Plan

Data Analysis Unit D-7

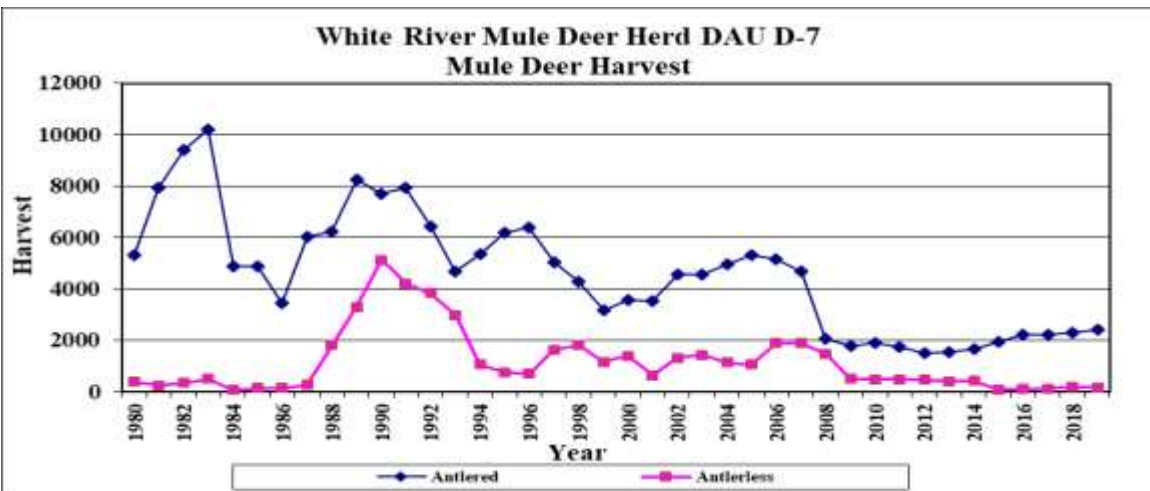
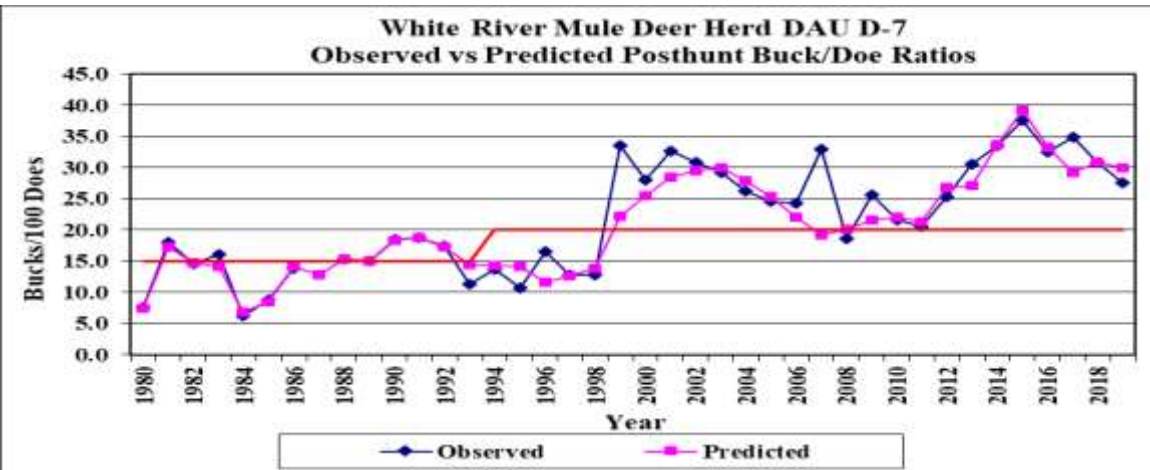
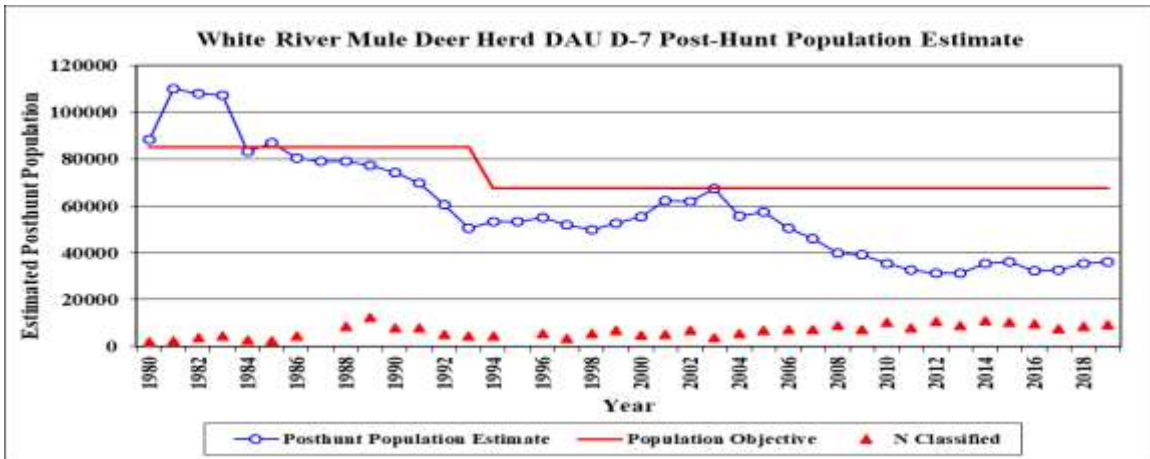
White River Mule Deer Herd (DAU D-7) GMUS 11, 12, 13, 22, 23, 24, 131, 211, and 231

Post-hunt Population: Previous Objective: 67,500; Estimate 2019: 36,000

Preferred Objective: 25,000-35,000

Post-hunt Sex Ratio (Bucks:100 Does): Previous Objective: 20;

Post-hunt 2019 Observed 27.6; Modeled: 30.0 Preferred Objective: 18-25



D-7 Background

The White River Mule Deer DAU, D-7, is located in northwest Colorado and includes portions of Routt, Moffat, Rio Blanco, and Garfield counties. The DAU is comprised of 9 Game Management Units (GMUs): 11, 211, 12, 13, 22, 23, 24, 131 & 231. The towns of Craig, Steamboat Springs, Yampa, and Oak Creek are located on the periphery of the DAU and Meeker is centrally located within the DAU.

The White River deer DAU covers 4,120 square miles. Of this, 42% (1,714 mi²) is private property, 33% (1352 mi²) is Bureau of Land Management (BLM) land, 21% (856 mi²) is administered by the United States Forest Service (USFS), 3% (116 mi²) is State Land Board land, and less than 2% (78 mi²) is Colorado Parks and Wildlife (CPW) land (Figure 5 & 6). Ownership patterns vary across mule deer seasonal ranges within the DAU comprised of private, state and federal lands. Half of all mule deer winter range is managed by BLM and the other half is primarily private property with minimal state owned lands. Summer range is primarily comprised of private property and Forest Service lands.

Mule deer within D-7 are migratory, moving from higher elevation summer ranges in eastern portions of the DAU to lower elevation winter ranges in the western portions of the DAU. Migratory distances vary greatly with some deer moving 60 to 70 miles between seasonal ranges while others move relatively short distances, 10 to 20 miles or are year-round resident herds.

D-7 Significant Issues

Characteristic of deer populations throughout Colorado and elsewhere in the West, population trends within the D-7 herd are cyclical (Gill et al. 2001). These cyclical trends are most affected by severe winters and drought. Historically, the White River deer herd was very robust, likely exceeding 100,000 deer in the early-1960s. More favorable habitat (early seral stage vegetation) and widespread poisoning to control predators during this time likely created a situation in which deer populations were unnaturally high. The most recent population peak occurred in the early-1980s with modeled estimates consistently predicting the population at over 100,000 deer. Since the early-80s, population estimates have shown a steadily declining trend. The declining trends in the modeled estimates are consistent with on the ground observations. Going into the severe winter of 1983-84 the D-7 deer herd was at an all-time high and has not rebounded to those population levels since.

The average population size has declined from 92,000 in the 1980s, to 61,000 in the 1990s, to 53,000 in the 2000s, and to 34,000 in the 2010s. In turn, population objectives for the D-7 herd have also been set lower. The population objective prior to 1990 was 85,000 deer and in 1994, the objective was lowered to 67,500. Throughout the decades of a steady overall population decline, deer herd numbers stabilized for a short period from 1993-2000 before rebounding slightly from 2001-2006. This increase was due, in part, to an increased number of bucks recruited into populations after the limitation of deer licenses statewide in 1999. The increasing trend was short-lived. Coming out of the drought in the early 2000s, deer numbers were at the highest population level since the early 1990s entering the severe winter of 2007-2008. Population dynamics within the herd changed after the severe winter of 2007-2008. Contributing factors to the changes within the D-7 herd were the combination of high deer numbers and drought stressed winter ranges leading into the severe winter. The poor range conditions could not support the high deer densities resulting in further range degradation. Ultimately, this has resulted in long-term reductions in the nutritional carrying capacities across winter ranges within the DAU. Over-winter survival rates from radio collared fawns prior to 2007 averaged 72.2%. Post 2007, over-winter fawn survival has averaged 59.7%.

Furthermore, annual adult doe survival pre and post 2007 went from an average of 85.6% to 79.8%, respectively. Cause specific mortality rates from malnutrition doubled for both does and fawns after the 2007-2008 winter. It appears, based on evidence from radio-collared deer, the cumulative effects weather (drought and severe winters), habitat conditions, and disease (specifically, CWD) all appear to be contributing to the declining population trend in the D-7 herd. In recent years (likely since 2010s) chronic wasting disease has contributed in partially additive way to lowered doe survival. This is likely affecting population performance and preventing rebounds in the population even when habitat conditions temporarily improve (i.e. reducing herd resilience). In the last decade, the herd has not exceeded 40,000 animals.

Biological carrying capacity is not static. In reality, carrying capacities fluctuate annually and trend over time. The declines observed within the D-7 mule deer herd are evidence the carrying capacity is, and has been, on a downward trend. Sustaining historic or desired population levels can be difficult or impossible due to habitat constraints. The cumulative effects of all human related activities lower habitat capability and ultimately reduce the size of big game populations the habitat can sustain. In addition, drought plays a significant role in habitat capability by affecting winter and year-round forage condition. The direct and indirect impacts of fragmentation from energy development (oil and gas, solar, etc.), trail development for recreation, and rural residential development reduces habitat function. Drought in combination with overuse by livestock, wild horses, and wildlife effects habitat quality. Fire suppression has increased canopy cover reducing winter range quality and in other areas, wildfire has resulted in significant losses of browse on critical winter range and increased competition from invasive annual grasses. Compounding the impacts of wildfire has been increased elk competition on winter ranges.

CWD was first discovered within the D-7 herd in early 2002. A cluster of CWD cases was unexpectedly detected in mule deer entrapped in a captive elk facility in GMU 12 near Pagoda in the Williams Fork drainage. The initial management approach after discovering CWD was an attempt to eradicate the disease. Focused culling efforts were initiated to try to control CWD from spreading. However, testing results from hunter-harvested animals during the 2002 hunting season revealed the disease was more widespread within the DAU than initially thought. While CWD was present in D-7, prevalence rates in the herd were low, ~1%. Throughout the early 2000s, heightened hunter awareness about CWD, free testing, liberal license allocations, and relatively high harvest rates resulted in high hunter submission rates for CWD testing. Surveillance efforts indicated prevalence rates remained low within the D-7 herd from 2002-2007. With CWD prevalence rates remaining relatively low, hunters and managers became apathetic. In turn, hunter interest in having animals tested for CWD waned and hunter-harvested submission rates declined. From 2009-2016 hunter-harvested submissions remained low while prevalence rates showed an increasing trend. The increasing trend in CWD prevalence was cause for concern among wildlife managers and in 2017, mandatory testing was required for all deer harvested in D-7. The 2017 sampling effort solidified concerns about increasing prevalence rates revealing a 15.3% CWD prevalence rate in the D-7 herd, a 10-fold increase in 15 years. At this observed level of prevalence, CWD appears likely to be contributing to recent declines in adult deer abundance and herd-level resilience in those portions of the D-7 herd outside of the Piceance Basin.

D-7 Management Alternatives

Population Objective Alternatives

Basing population objective alternatives on historic D-7 population levels is unrealistic. Thus, current population objective alternatives were developed relative to the current population estimate of 36,000 mule deer. Additionally, CWD prevalence rates within the D-7 herd have increased from 1.5% in 2002 to 15.3% in 2017, with prevalence in several Game Management Units now exceeding 20%. In response to increasing CWD prevalence rates in the White River and elsewhere, a [CWD Response Plan](#) was developed to provide guidance to CPW managers aimed at incorporating management actions into Herd Management Plans. The CWD Response Plan includes a suite of actions and recommendations local wildlife managers can implement and assess at the individual herd level to control CWD prevalence while achieving population and herd composition objectives. A 5% prevalence threshold was established to trigger compulsory management action to reduce CWD prevalence when surveillance monitoring indicates prevalence is greater than or equal to 5% in adult male deer. Management actions within the plan are intended to provide maximum flexibility to customize management actions that will reduce or maintain CWD prevalence below the 5% threshold.

Population range objectives presented in each alternative are proposed to allow for management flexibility in response to changing conditions such as habitat capability, CWD prevalence and changes in population size due to severe winter events. Licenses will be issued annually to manage to a target population size within the population objective range and CWD prevalence threshold of 5% or less. The following three population objective alternatives are proposed:

Population Objective Alternatives:

Alternative 1: 20,000 - 30,000 (decrease)

Preferred Alternative 2: 25,000 - 35,000 (same to somewhat fewer deer)

Alternative 3: 30,000 - 40,000 (current population size)

Preferred Alternative 2 - would allow for a 30% reduction in herd numbers from current population estimates. A population objective range of 25,000-35,000 would allow for increased flexibility in management options if desired CWD prevalence rate reductions were not being achieved. In addition, it would allow further population reductions to address density-dependence mortality factors if survival-monitoring data indicated malnutrition rates continued to be a significant factor. Management actions recommended to achieve the population objective and reduce CWD prevalence rates include: increased female and/or either sex hunting licenses, increased harvest in later season or in high CWD prevalence areas, increase private land only license availability, and increase harvest within targeted high-density mule deer winter ranges. The specific areas in which increased harvest on high-density mule deer winter ranges would be determined based on data from D-7 mule deer survival monitoring results. Moderate incremental increases in license recommendations would be utilized to achieve desired objectives.

Sex Ratio Objective Alternatives

Historically, various management strategies have been implemented in D-7 ranging from unlimited buck hunting with a minimum 5-inch antler regulation for yearling bucks, to 3-point antler restrictions, to limited season lengths, and finally, totally limited licensing. All management strategies have presented challenges in maintaining sex ratio objectives within the D-7 herd. Antler point restrictions and shortened season lengths were ineffective at increasing mature buck ratios when

below objective. Since the 1999 limitation of all mule deer licenses, achieving sex ratio objectives has been challenging. The D-7 herd has been chronically over the current sex ratio objective, only falling below objective once in 20 years. The current 3-year average buck ratio, 31.1 bucks per 100 does, is the highest average buck ratio ever observed in the D-7 herd.

Given the 10-fold increase in CWD prevalence within D-7 over the past 17 years, consideration must be given to management strategies that will reduce buck ratios to within sex ratio objective ranges in an attempt to reduce CWD prevalence rates. The CWD Response Plan includes a suite of actions and recommendations local wildlife managers can implement and assess at the individual herd level to control CWD prevalence while achieving population and herd composition objectives. A 5% prevalence threshold was established to trigger compulsory management action to reduce CWD prevalence when surveillance monitoring indicates prevalence is greater than or equal to 5% in adult male deer. Management actions within the plan are intended to provide maximum flexibility to customize management actions that will reduce or maintain CWD prevalence below the 5% threshold.

Sex Ratio Objective Alternatives:

Alternative 1: 15-22 bucks:100 does

Preferred Alternative 2: 18-25 bucks:100 does

Alternative 3: 23-30 bucks:100 does

Preferred Alternative 2 - would allow for a moderate reduction from the current 3-year average observed sex ratio of 31.1 bucks per 100 does. A reduction in sex ratio objective from current 3-year average observed sex ratios would allow for increased hunting opportunity and the ability to address management concerns regarding high CWD prevalence rates. Management actions implemented to achieve sex ratio objectives and reduce CWD prevalence rates would include: reduce male:female ratios, change age structure, and maximize ability to remove diseased animals at smallest scale possible. Management tactics to achieve sex ratio objectives and CWD prevalence rates will include disease management hunts and/or increasing and/or shifting male hunting licenses into later seasons and creation or modification of hunt code groupings for more targeted harvest. The lower end of the sex ratio would allow for management flexibility if CWD prevalence thresholds were not met despite a reduction in overall sex ratios.

Table of Contents

	Page
I. EXECUTIVE SUMMARY	8
II. INTRODUCTION AND PURPOSE	13
Management by Objective	14
III. DESCRIPTION OF DAU	15
Location	15
Physiography	15
Topography.....	15
Climate	16
Vegetation.....	16
Land Use.....	18
Land Status.....	18
Land Uses.....	19
IV. HERD MANAGEMENT HISTORY	21
Disclaimer for Population Size Estimation	21
Post-Hunt Population Size	21
Post-Hunt Herd Composition	22
Fawn Ratios	22
Buck Ratios.....	23
Harvest History and Hunting Seasons.....	25
Total Harvest	25
Buck Harvest.....	26
Antlerless Harvest.....	26
Hunting Season History	26
Hunting Pressure	27
V. CURRENT HERD MANAGEMENT	28
Current Objectives.....	28
Current Management Strategies	28
Current Management Concerns	28
Chronic Wasting Disease	28
Habitat Condition and Capability	34
Long-term Population Objective	38
VI. HABITAT RESOURCE	43
Habitat Distribution.....	43
Habitat Condition, Capability, and Function	48
Habitat Condition	48
Weather	48
Habitat Capability.....	53
Density Dependence	53
Fire	60
Elk and Mule Deer Interactions.....	63
Habitat Function	65
Energy Exploration	66
Rural Residential Development.....	68
Public Lands.....	68
Grazing.....	69
Rangeland Conditions	71
Noxious Weeds	75
Fire and Vegetation Succession	75
Private Lands	76
Habitat Partnership Program	78

VII. ISSUES AND STRATEGIES	79
Issue Solicitation Process	79
Issue Identification	79
Issues and concerns - Public	79
Issues and concerns - Habitat Partnership Program	81
Issues and concerns - Board of County Commissioners	81
Issues and concerns - Bureau of Land Management	81
Issues and concerns - United States Forest Service	81
Issues and Concerns - State Land Board	81
VIII. ALTERNATIVE DEVELOPMENT	82
Population Objectives	82
Sex Ratio Objectives	83
IX. PREFERRED OBJECTIVES AND ALTERNATIVES	86
Population Objective	86
Sex Ratio Objective	86
Management Strategy	86
X. LITERATURE CITED	88
XI. APPENDICIES	
Appendix A Public Comments Pre-plan Development.....	90
Appendix B Public Questionnaire Survey Results	98
Appendix C Population Dynamics, Maximum Sustained Yield, and Density Dependence	133
Appendix D Habitat Partnership Program Letter	136
Appendix E Rio Blanco Board of County Commissioners Letter	138
Appendix F Bureau of Land Management Letter	140
Appendix G United States Forest Service Letter	141

List of Figures

Page

Figure 1. Management by objectives process used by the CPW to manage big game populations on a DAU basis.....	14
Figure 2. White River DAU D-7 GMU boundaries.....	15
Figure 3. White River DAU D-7 elevation gradient from higher elevation	16
Figure 4. White River DAU D-7 vegetation types.	17
Figure 5. Overall land status for the White River DAU D-7.	18
Figure 6. Surface land status across the Whiter River DAU D-7.	19
Figure 7. White River DAU D-7 observed mule deer population trend from 1980 - 2019.....	22
Figure 8. White River DAU D-7 observed mule deer fawn ratios post-hunt 1980 - 2019.....	23
Figure 9. White River DAU D-7 observed mule deer buck ratios post-hunt 1980 - 2019.	24
Figure 10. White River DAU D-7 observed post-hunt buck ratios by age class 1988-2019.	25
Figure 11. White River DAU D-7 mule deer harvest 1953-2019.....	25
Figure 12. White River DAU D-7 mule deer antlered and antlerless harvest 1953-2019.	26
Figure 13. White River DAU D-7 total hunter numbers 1955-2019.	27
Figure 14. Actual versus modeled CWD epidemic curves show a similar trajectory over time with an inflection point of approximately 5% CWD prevalence (Miller et al. 2000; EFSA panel on Biological Hazards 2018).	29
Figure 15. White River DAU D-7 CWD prevalence rates 2002-2019.	30
Figure 16. Pooled three-year CWD prevalence rates by GMU.	31
Figure 17. Hunter harvested mule deer submitted for CWD sampling 2002-2019.	31
Figure 18. Surface density of hunter-harvested mule deer representing distribution of samples across DAU D-7.	32
Figure 19. Observed CWD prevalence rates from mandatory testing during the 2017 hunting season shown by GMU and surface density of hunter-harvested mule deer bucks testing positive for CWD. .	32
Figure 20. White River DAU D-7 mule deer harvest rates vs CWD prevalence rates (Miller pers comm). Increasing prevalence trend parallels increasing observed buck:doe ratios.	33
Figure 21. White River DAU D-7 mule deer winter range densities and fire perimeters from 1963 - 2018.....	35
Figure 22. Pictures show the loss of brush due to wildfire on high-density mule deer winter range in northwestern portion of D-7. The capacity for these ranges to support wintering mule deer has diminished significantly.	35
Figure 23. Photo 1 - shows loss of sagebrush in drainage due to herbicide treatments to control white top infestation in northern portion of Axial Basin. Photo 2 - shows herbicide treatment meant to increase herbaceous understory on mule deer winter range in southern portion of Axial Basin. Photo 3 - shows sagebrush in poor condition due to high intensity winter use by mule deer and domestic sheep in central portion of Axial Basin. Photo 4 - shows high intensity use sagebrush by mule deer on winter range in eastern portion of Axial Basin.	36
Figure 24. An example of loss of winter range due to rural residential development and subtle changes in sagebrush mortality occurring on high deer density winter range habitat due to drought and heavy browsing by wintering deer on Little Oakridge east of Meeker, CO. (Note the difference in color of sagebrush between 2014 (sage-green) vs 2019 (gray-woody) images) (photos courtesy of Brian Holmes)	37
Figure 25. Bone marrow condition of mule deer mortalities from radio-collared deer in D-7 2001-2019.....	37

Figure 26. Mule deer annual survival and recruitment cycle resulting in annual population growth or decline.	39
Figure 27 Cause-specific mortality for radio-collared doe mule deer 2001-2019.	40
Figure 28. Annual doe mule deer survival from 2001 - 2019.	40
Figure 29. Cause-specific mortality for radio-collared mule deer fawns 2001-2019.	41
Figure 30. Over-winter mule deer fawn survival 2001 - 2019.	41
Figure 31. Cause-specific mortality for radio-collared buck mule deer 2001-2019.	42
Figure 32. Annual buck mule deer survival from 2001-2019.	42
Figure 33. Brownian bridge movements and general migratory paths from GPS radio collared deer within the D-7 herd. Green dots depict mule deer locations during spring migration and outlines show migration paths of individual deer.	44
Figure 34. Mule deer summer range occurs across 90% (3710 mi ²) of the DAU.	45
Figure 35. Brownian bridge movements and general migratory paths from GPS radio collared deer within the D-7 herd. Orange dots depict mule deer locations during spring migration and outlines show migration paths of individual deer.	46
Figure 36. Winter range within the White River Deer DAU D-7.	48
Figure 37. The difference from average annual precipitation across D-7 winter ranges from 1950 - 2019. Average precipitation is the x-axis (0.00). Blue bars = above average annual precipitation and red bars indicate below average annual precipitation (www.wrcc.dri.edu).	50
Figure 38. Average annual snowfall data from four weather stations on D-7 winter ranges (www.wrci.dri.edu).	50
Figure 39. Time series drought graphic illustrating persistent drought conditions across Moffat (top) and Rio Blanco (bottom) Counties. X-axis is time and Y-axis shows percent of area impacted by drought conditions (www.droughtmonitor.unl.edu).	51
Figure 40. Graphic showing the effects of weather related events through time on over-winter fawn survival. Notable, are the high fawn survival rates during dry springs and below average snowfall compared to above average spring moisture and above average snowfall.	52
Figure 41. Time series of maps showing spatial and temporal drought conditions across DAU D-7. Yellow and brown portions of maps outlined by blue show mule deer winter range within D-7. Map - 1. 1971-75 (dry), 2. 1976-80 (dry), 3. 1981-85 (wet), 4. 1986-90 (dry), 5. 1991-95 (dry), 6. 1996-00 (moderate), 7. 2001-05 (dry), 8. 2006-10 (wet).	53
Figure 42. Mule deer winter range densities in the northern and southern portions of DAU D-7 with red line showing White River-Yampa River Divide.	56
Figure 43. Reference used for classifying bone marrow condition of mule deer carcasses.	56
Figure 44. Carcass bone marrow classifications showing higher numbers of malnourished animals in the northern portion of the DAU.	57
Figure 45. Radio-collared fawn mule deer carcass bone marrow scores north vs south of Danforth Hills.	57
Figure 46. Comparison of radio-collared fawn mule deer carcasses with poor bone marrow condition scores, indicating animal died from malnutrition, north vs south of the Danforth Hills.	58
Figure 47. Comparison of radio-collared fawn mule deer bone marrow condition from predator caused mortality, north vs south of Danforth Hills.	58
Figure 48. Comparison of radio-collared adult mule deer doe carcass bone marrow condition, north vs south of Danforth Hills.	59
Figure 49. Comparison of radio-collared adult mule deer doe carcass bone marrow condition score of poor, indicating animal died from malnutrition or disease, north vs south of Danforth Hills.	59
Figure 50. Comparison of radio-collared adult mule deer bone marrow condition from predator caused mortality, north vs south of Danforth Hills.	60
Figure 51. Wildfire perimeters that have occurred across D-7 1963 - 2018.	61

Figure 52. Cheatgrass infestations still present 30 years post-fire on the Bitterbrush State Wildlife Area. Picture 1. Shows scale of landscape converted from shrub dominated bitterbrush community prior to 1990 to cheatgrass monoculture with no winter range value for mule deer. Picture 2. Shows cheatgrass dominance within burned area and lack of diversity post-fire (photos courtesy of Trevor Balzer, CPW Habitat Coordinator).....	61
Figure 53. Maps shows wildfire perimeter from burns that occurred from the late 1980s through early 2000s and current mule deer winter use from GPS radio collar data and mule deer groups observed during annual winter classification flights.	62
Figure 54. Map shows timing and perimeter of wildfires resulting in significant reductions in high-quality winter range habitat in northwestern portion of GMU 11.	62
Figure 55. Map shows mule deer winter use in within wildfire perimeter in GMU 22 from burn that occurred in the mid-1990s.....	63
Figure 56. White River elk herd winter range densities based on classification flight group data showing high densities of elk occurring on burn complexes in the northern portion of GMU 11 once dominated by bitterbrush.	64
Figure 57. White River mule deer and elk population trends from 1986 - 2019.	65
Figure 58. Oil and gas development within GMU 22 has fragmented the landscape.	66
Figure 59. Cumulative oil and gas disturbance across D-7 winter ranges from 1970 to 2010.....	67
Figure 60. Cumulative oil and gas disturbance across D-7 winter ranges from 1970 to 2010.....	67
Figure 61. Cumulative rural residential development across mule deer winter range within D-7.	68
Figure 62. Mule deer winter range surface land status in D-7.	68
Figure 63. Grazing allotment boundaries on public lands across the D-7 landscape.....	69
Figure 64. BLM, AIM site locations within the Little Snake and White River Field Offices from which data has been collected since 2011.	70
Figure 65. Picture 1. Cheatgrass dominated winter range post wildfire in northern portion of GMU 11. Picture 2. Drought stressed sagebrush on winter range in northern portion of GMU 211 (photo courtesy of BLM). Picture 3. Decadent mountain shrub community in northwestern portion GMU 23 (photo courtesy DWM Bailey Franklin, CPW). Picture 4. Heavily browsed sagebrush by mule deer in pinyon-juniper understory in western portion of GMU 23 (photo courtesy Trevor Balzer, CPW Habitat Coordinator).	72
Figure 66. Pictures 1a - before and 1b - after, mixed mountain shrub mastication treatment designed to increase forage to cover ratio on Oakridge State Wildlife Area in GMU 23 (photo courtesy DWM Bailey Franklin, CPW). Pictures 2a - before and 2b - after, pinyon-juniper mastication treatment designed to increase forage availability in the Piceance Basin in GMU 22 (photo courtesy Chuck Anderson, CPW Mammals Research).	73
Figure 67. Picture 1 - Old growth aspen stand without any regeneration. Picture 2 - Old growth aspen stand with young aspen suckering and regrowth.	74
Figure 68 Time series showing pre and post treatment of mature pinyon-juniper stand designed to increase forage-to-cover ratio and improve plant diversity for wintering mule deer. (photos courtesy of Ranch Advisory Partners).....	74
Figure 69. Sagebrush community with an understory composed of a monoculture of cheatgrass and white top.....	75
Figure 70. Acres of wheat planted in Moffat, Rio Blanco and Routt counties as reported by agricultural statistics (www.nass.usda.gov).	76
Figure 71. Sheep inventory (total sheep) in Rio Blanco, Moffatt, Garfield, and Routt Counties as reported by National Agricultural Statistic Services 1930 - 2017 (www.nass.usda.gov).....	76
Figure 72. Cattle inventory as reported by National Agricultural Statistics Services 1959 - 2017 in Rio Blanco and Moffat Counties (www.nass.usda.gov).....	76

LIST OF TABLES

Page

Table 1. Land ownership data for the Game Management Units in DAU D-7, presented in square miles and percentages.9

II. Introduction and Purpose

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 changes occurring across Colorado's landscapes from natural events like drought, wildfire, and severe winters to increasing public demands and growing impacts from people.

The purpose of this document and the Herd Management Planning (HMP) process is to provide CPW with long-term objectives that support and accomplish the broader objectives of CPW's Strategic Plan. The HMP planning process incorporates public input, habitat capabilities, CWD prevalence, and herd considerations into management objectives for each of Colorado's big game herds. Specifically, the HMP identifies desired population and sex ratio objectives that guide CPW's deer management practices. CPW is required by statute to manage all wildlife species for the benefit of all Colorado residents and visitors to the state. To ensure public needs are met, the general public, sportspeople, livestock producers, guides and outfitters, federal land management agencies, landowners, wildlife viewers, recreationists, and local businesses are involved in determining HMP plan objectives through surveys, public meetings, comments on draft plans, and input to the Colorado Parks and Wildlife Commission. Secondly, the DAU plan collects and organizes most of the important management data for the herd into one utilitarian planning document; determines DAU issues through a public scoping process; identifies alternative solutions to the issues and problems identified in the scoping process; and selects the preferred alternative. HMP objectives are set for 10 years.

In Colorado, big game populations are managed as a herd, which is called a Data Analysis Unit (DAU). Normally each DAU is composed of several game management units (GMUs) but in some cases only one GMU makes up a DAU. DAU boundaries follow established boundaries of GMUs in an effort to approximate the year-round range of that herd; the DAU includes the area where the majority of the animals in the herd are born and raised and where they die with as little mixing with from other herds as possible.

CPW uses a "management by objective" approach, to manage the state's big game populations (Figure 1). The objectives set forth in the HMP drive the most important decision in the annual big game license setting process: How many animals need to be harvested to maintain or move the population toward those objectives? The management by objective approach is an annual cycle of information collection, information analysis, and decision making that culminates each year in a hunting season. Data used in this process are collected through hunter harvest survey estimates, aerial herd composition surveys, radio telemetry studies to determine survival, wounding loss, and illegal kill estimates. These data are then used to estimate population size and composition through a computer modeling analysis. The computer modeling analysis generates harvest recommendations that align population estimates and herd composition with long-term HMP objectives. The cyclical objective setting approach is designed to guide the decision making process to data collection and analysis. It also focuses the Parks and Wildlife Commission on goals and objectives.

**COLORADO'S BIG GAME MANAGEMENT
BY OBJECTIVE PROCESS**

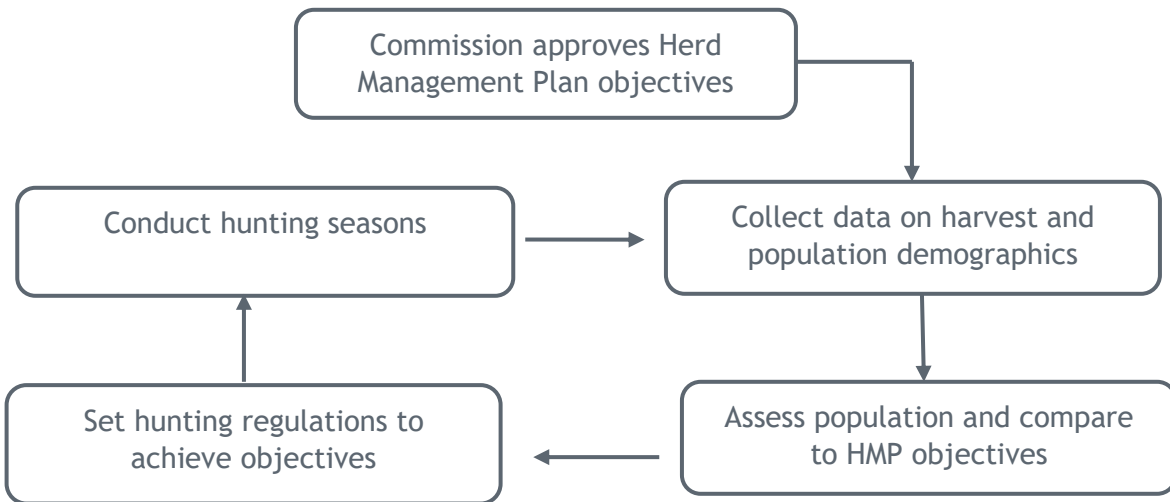


Figure 1. Management by objectives process used by the CPW to manage big game populations on a DAU basis.

III. Description of the White River Data Analysis Unit

Location

The White River deer DAU includes portions of Routt, Moffat, Rio Blanco, and Garfield counties in northwest Colorado and consists of 9 Game Management Units (GMUs): 11, 211, 12, 13, 22, 23, 24, 131 & 231. The DAU is bounded on the north by the Yampa River, U.S. Highway 40, Colorado State Highway 318, and the Little Snake River; on the east by U.S. Highway 40, Colorado State Highway 131, and the Yampa-Williams Fork River divide; on the south by the Colorado-White River divide; and on the west by the Douglas Creek-Piceance Creek divide. The towns of Craig, Steamboat Springs, Yampa, and Oak Creek can be found on the periphery of the DAU and Meeker is centrally located within the DAU. DAU D-7 covers 4120 square miles (Figure 2).

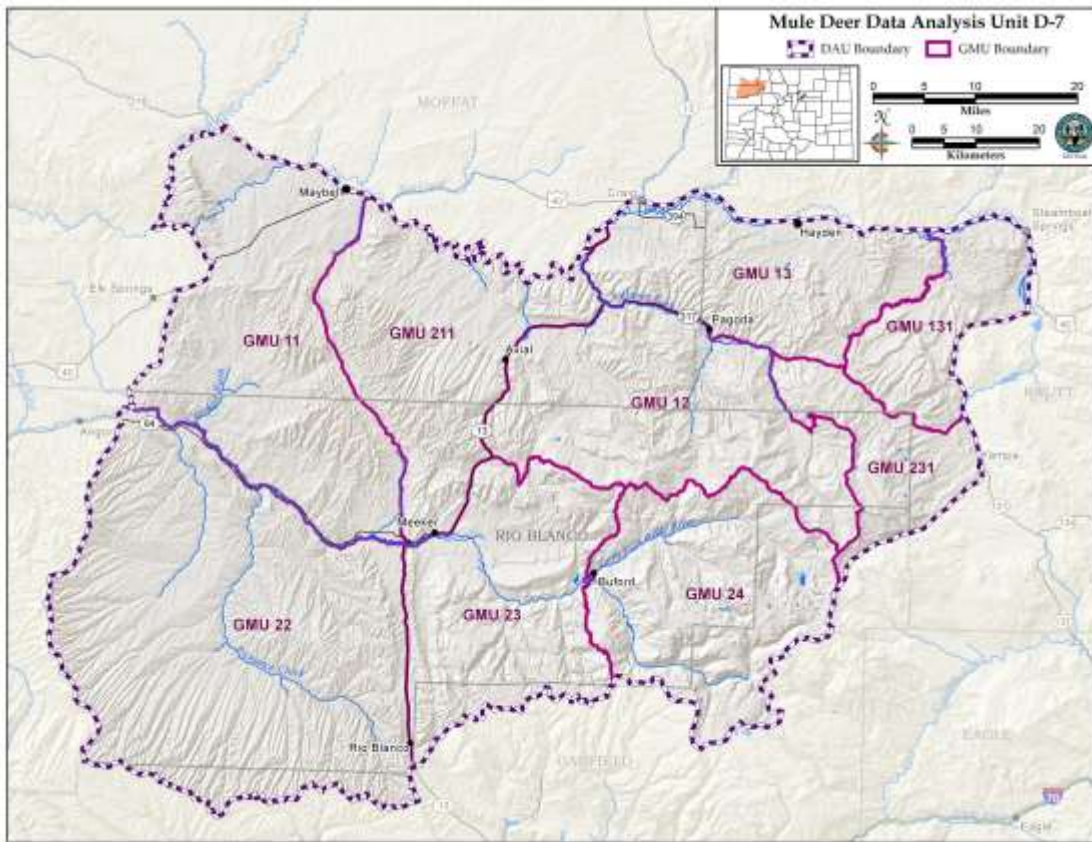


Figure 2. White River DAU D-7 GMU boundaries.

ECOREGION - Colorado Plateau Shrubland/Forest and Intermountain West

DAU D-7 has characteristics of both the Colorado Plateau Shrubland/Forest and Intermountain West ecoregions.

Topography

The major topographic features in the DAU include Axial Basin and the Danforth Hills in the northwest, the Williams Fork Mountains in the north, the Flattops in the east and the Grand Hogback and Piceance Basin in the southwest. Three major river drainages are found in or on the border of the DAU; the White River,

Williams Fork River, and Yampa River. Elevations range from 12,000 feet on Shingle Peak in the Flattops to a low of 5,389 feet along the White River in the western portion of the DAU (Figure 3). The overall gradient from high elevation summer ranges to expansive low elevation winter ranges is relatively gradual.

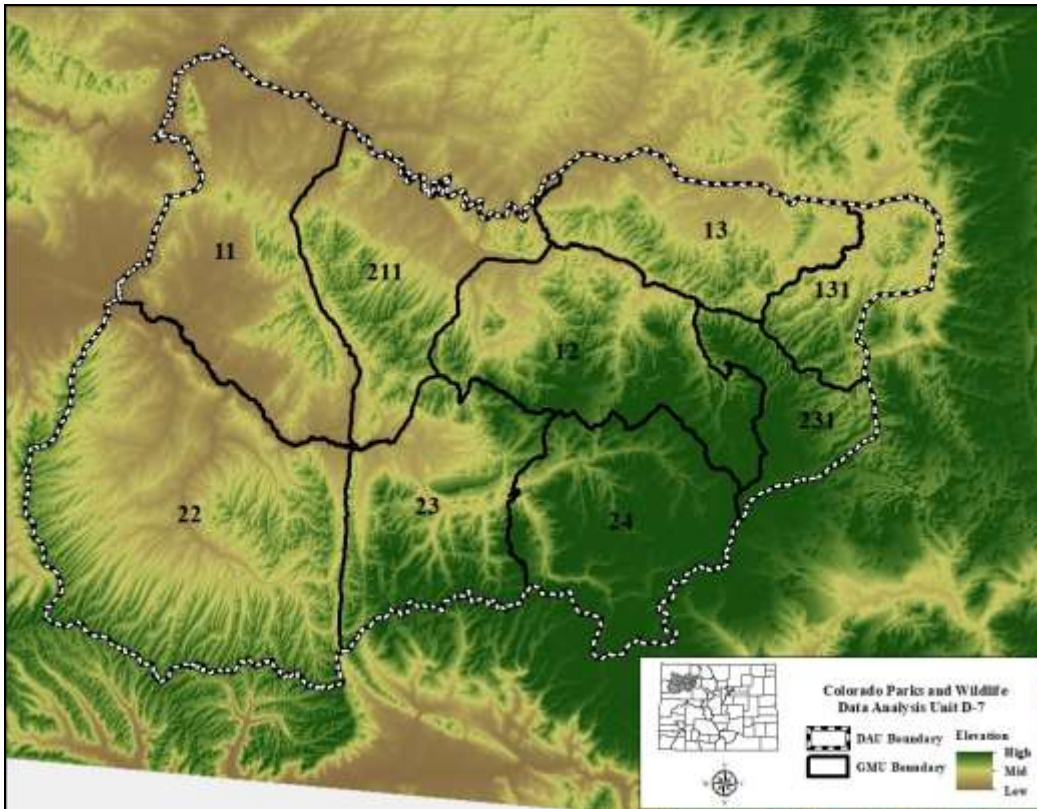


Figure 3. White River DAU D-7 elevation gradient from higher elevation summer ranges (green) to lower elevation winter ranges (brown).

Climate

The climate varies greatly across the DAU. Generally, the higher elevations in the eastern and central portions of the DAU experience heavy snowfall, and short, cool summers. The lower elevations in the southern and western portions of the DAU, have comparatively mild winters with minimal snow depths and hot summer temperatures. However, winter conditions at lower elevations can be severe with deep snow and extremely cold temperatures. In fact, Colorado's state record low temperature (-63° F) occurred in Maybell, CO in the northwest corner of the DAU. Mean annual precipitation at 10,000 feet in the Routt National Forest is about 40 inches, while approximately 10-12 inches falls in the lower elevations in the western portion of the DAU. Prolonged summer drought cycles and the frequency of severe winters vary across the region having a direct impact on range conditions and mule deer population trends.

Vegetation

The varied topography and elevations within the DAU contribute to differences in habitat types across the area. Generally, vegetation types range from a montane/subalpine zone at higher elevations to a broad transitional zone at mid-elevations, to a Great Basin zone at lower elevations (Figure 4).

Spruce-fir forests characterize the montane/subalpine zone. Depending on the degree of canopy closure and resultant understory of grasses and forbs, the spruce-fir areas represent moderate to good summer and fall forage for deer. The Flattops Wilderness Area is a mosaic of expansive wet meadows interspersed with spruce-fir stands. Extensive aspen groves occur below the spruce-fir forests. These expansive aspen stands

and associated meadows provide high quality forage, spring through fall. Aspen habitats are also extremely important as fawning areas for deer, especially when there is sufficient understory.

The mountain shrub zone consists of native grasses, forbs, and Gamble oak interspersed with mountain big sagebrush. Other common shrubs within this zone are serviceberry, mountain mahogany, and chokecherry. Bitterbrush also occurs to a more limited extent, intermixed with mountain big sagebrush communities. This zone, roughly from 6,500 to 8,500 feet in elevation, is very important for both food and cover. The lower half of the mountain shrub zone serves as traditional deer winter range except during extreme winters when snow depths force animals to lower elevations.

Sagebrush steppe and grasslands dominate the Great Basin Zone, occurring generally below 6,500-feet. This zone is primarily winter range for deer although there are some resident family groups of deer using these areas year-round. Pinyon-juniper stands occur throughout this zone and are most prevalent on north aspects of higher ridges; however, they do occur in drier sites on south facing aspects. Pinyon-juniper serves as important winter cover especially when snow conditions in more open sagebrush communities becomes crusted from freezing and thawing or drifted and hard packed from wind. The understories throughout pinyon-juniper communities are generally less productive so winter forage is more limited. In broad drainage, bottoms where sufficient irrigation water exists sagebrush brush communities have been converted into fields for hay production.

Wetland/riparian vegetation types occur along river bottoms and irrigated meadows. Most notable are the White River, Williams Fork River and Yampa River corridors. Narrowleaf cottonwood and willow dominate most riparian areas. These habitats are extremely valuable to wildlife and support the greatest abundance and diversity of wildlife species.

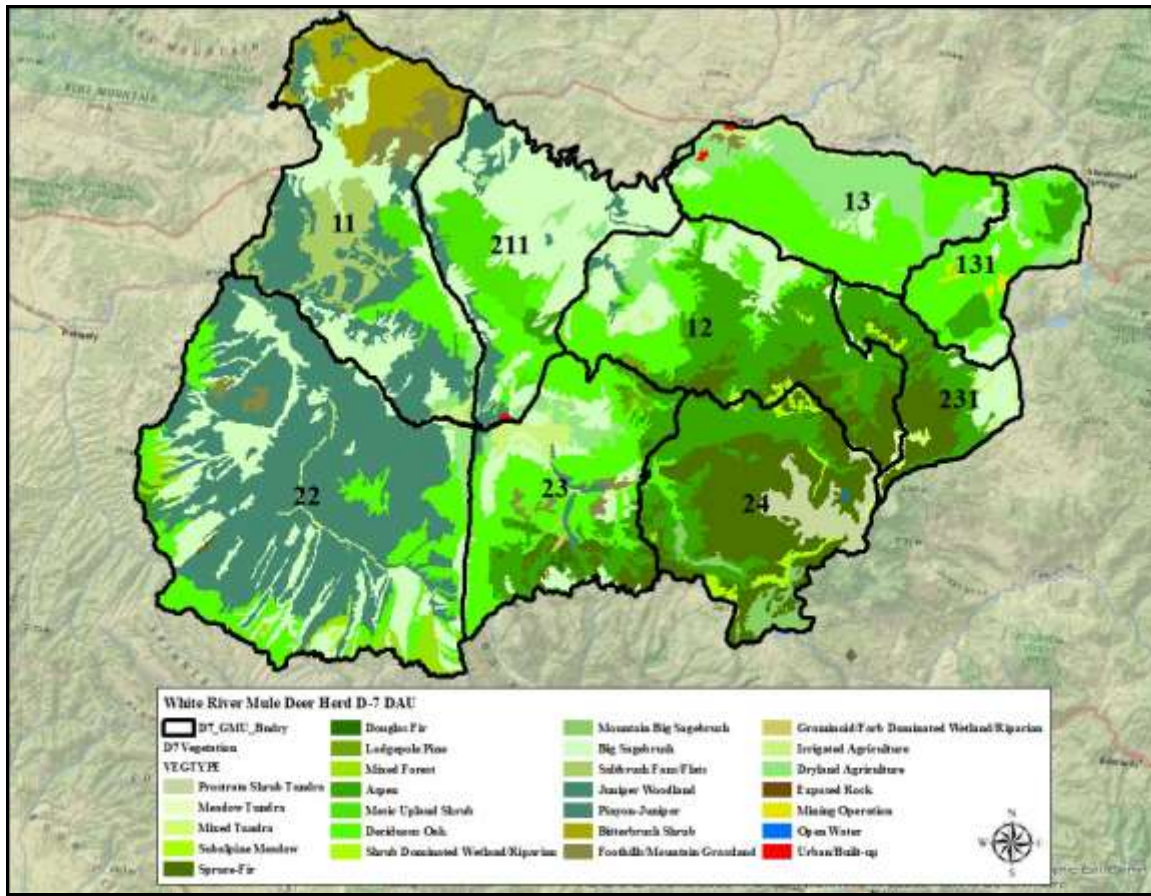


Figure 4. White River DAU D-7 vegetation types.

LAND USE

Land Status

The White River deer DAU covers 4,120 square miles. Of this, 42% (1,714 sq. mi.) is private property, 33% (1352 sq. mi.) is Bureau of Land Management (BLM) land, 21% (856 sq. mi.) is administered by the United States Forest Service (USFS), 3% (116 sq. mi.) is State Land Board land, and less than 2% (78 sq. mi.) is Colorado Parks and Wildlife (CPW) land (Figure 5 & 6). See Table 1 for ownership patterns in each GMU and DAU totals.

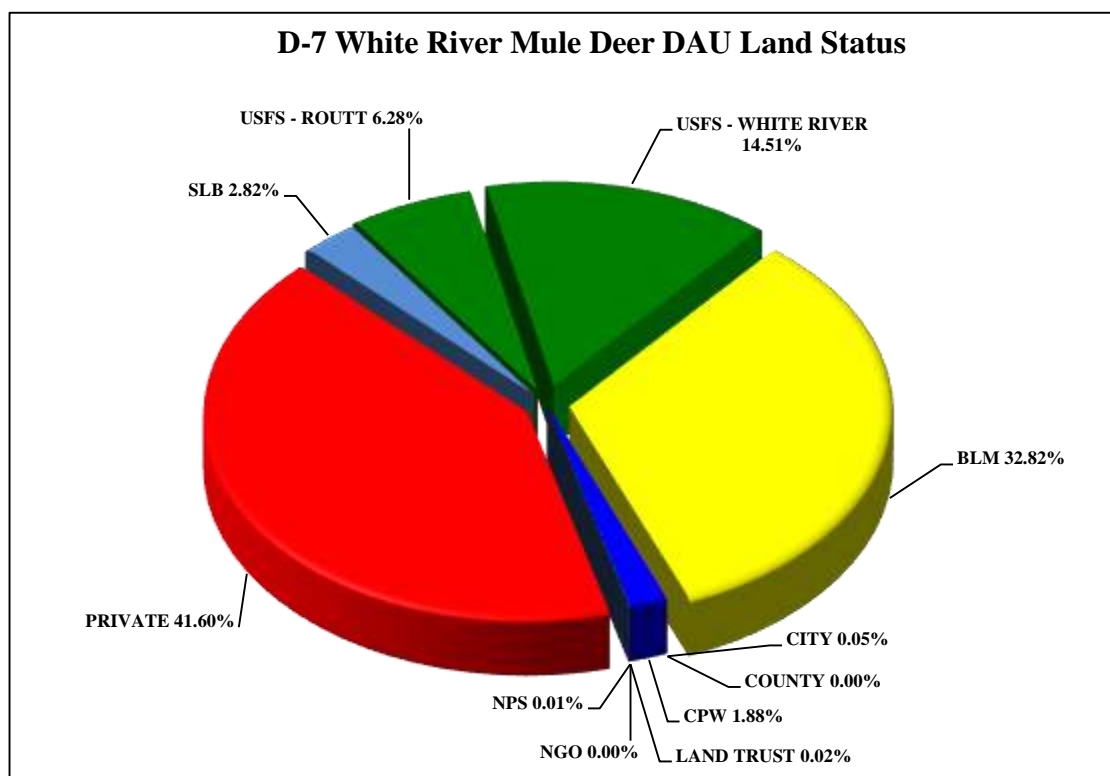


Figure 5. Overall land status for the White River DAU D-7.

Table 1. Land ownership data for the Game Management Units in DAU D-7, presented in square miles and percentages.

GMU	BLM	USFS	PVT	SLB	SWA	Other	Total
11	375	0	195	24	16	0	610
12	31	210	236	7	8	0	493
13	24	0	280	55	2	1	361
22	696	0	266	0	27	0	989
23	33	134	234	0	22	1	423
24	4	403	32	0	0	0	439
131	17	1	161	10	2	0	288
211	168	0	246	18	0	3	432
231	3	109	64	2	0	0	178
Total	1351	856	1714	116	78	5	4120
Percent	33%	21%	42%	3%	2%	< 1%	100%

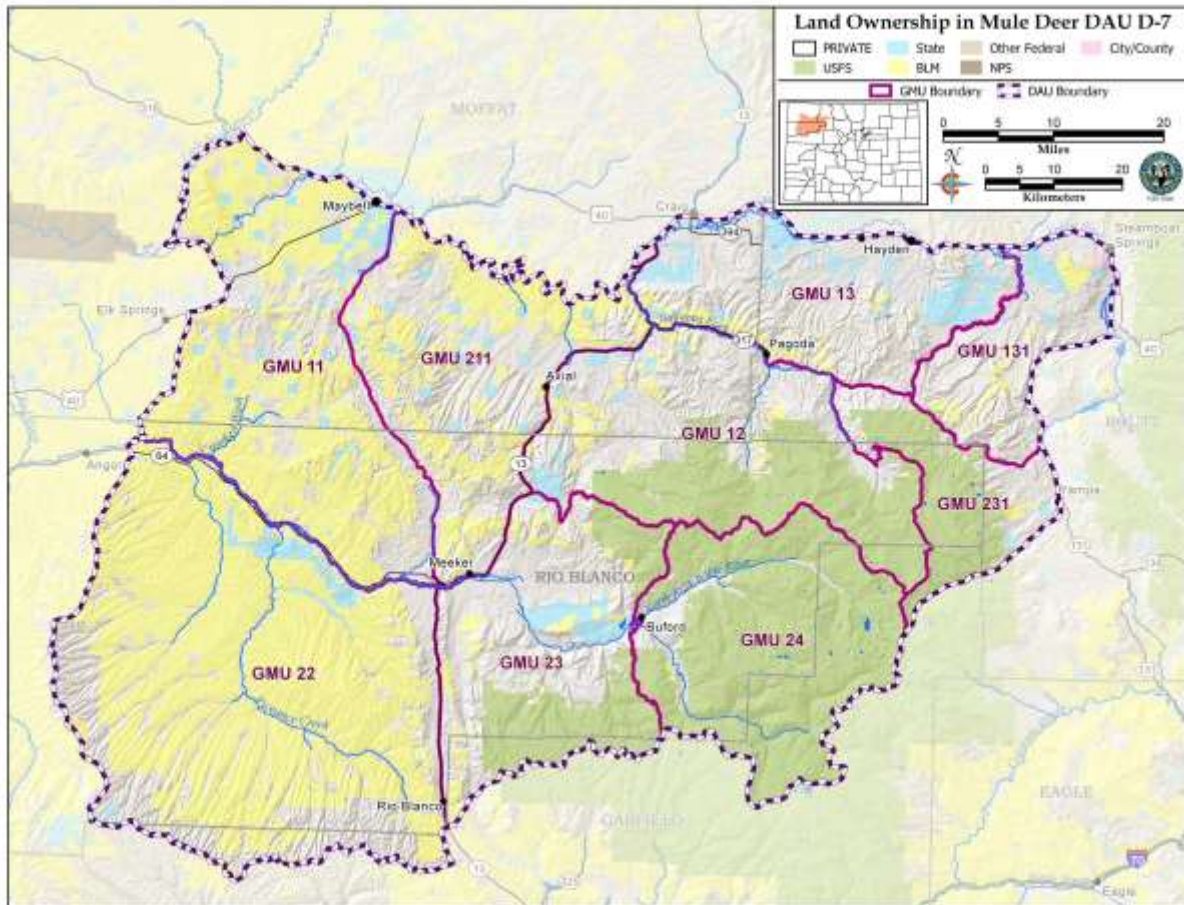


Figure 6. Surface land status across the Whiter River DAU D-7.

Land Uses

Fortunately, for wildlife, land use practices within the White River DAU have left the majority of the landscapes open, intact and undeveloped relative to many places in Colorado. The main industries are ranching, outdoor recreation, and mineral extraction.

Cattle and sheep ranching occurs throughout the DAU. Private sheep and cattle ranches are primarily located in drainage bottoms along the White River, Williams Fork River, Yampa River, and tributaries throughout the watershed. These low-lying areas are generally irrigated fields used for summer hay production, fall pasture, winter-feeding, and spring calving. Summer grazing occurs primarily on federal BLM and Forest Service permitted allotments.

Hunting for both big and small game is a principal business in the DAU. The Northwest region of the state and the White River DAU specifically is one of the largest contributors to big game hunting in the state. It is estimated that hunting directly contributes over \$49 million annually to the economy of Rio Blanco, Moffat, and Routt counties (Southwick Associates 2018). Hunters can pursue mule deer, elk, moose, pronghorn, bear, mountain lion, bobcats, waterfowl, three species of grouse, and various other small game animals in the DAU.

In recent years, off-highway vehicle (OHV) trail riding has become very popular. Rio Blanco and Moffatt counties are promoting OHV trail riding to encourage economic development. For example, projects such as

the Wagon Wheel Trail System based out of Meeker includes more than 250 miles of existing roads and trails that have been developed to promote the OHV industry. Other forms of outdoor recreation like mountain biking has increased in recent years with significant trail development around the Steamboat Springs area in the northeastern portion of the DAU. In addition, federal land management agencies are receiving increased requests for permits to hold various trail running, mountain biking, and OHV trail racing types of events on public lands. Outdoor recreational activities associated with various types of roads and trails on public lands will likely increase significantly over the life of this plan.

In 1973, strip mining of coal was initiated in the Yampa Valley around Oak Creek, Hayden, and Craig in the northeastern portion of D-7. Some of these open-pit and underground coalmines are still in operation today in GMUs 13, 131, and 211. The coal mining industry is extremely important to the economies of the small communities within the DAU. However, a growing concern, especially in GMUs 13 and 131, is that mines are reaching their life expectancy, being reclaimed and are transitioning towards obtaining bond release. Once these mine properties achieve bond release the companies that own the mines are looking to sell these acreages and developers are very interested in acquiring these properties. Developers are then subdividing these tracts into small to mid-sized ranchettes. These types of developments are resulting in major land use changes and will certainly have a significant impact on deer habitats across all seasonal ranges.

As the U.S. weathered the Middle East oil crisis in the 1970s, energy development arrived on the West Slope of Colorado in a big way. The BLM leased two 5,120 acre tracts for oil shale development in the Piceance Basin in 1973. The Piceance Basin, located in GMU 22 in the southwestern portion of the DAU is one of the nation's largest oil shale and natural gas reserves. Energy development throughout northwest Colorado is market driven with boom-bust cycles. During the 2007-08 boom it was projected 15,000 wells would have been drilled within the next 20 years, many of which would have occurred in the Piceance Basin in GMU 22. However, these projections quickly changed after the economic downturn in 2008. Oil and gas activities subsided, however, the flurry of drilling activity resulted in significant surface disturbance from infrastructure built during the "boom". Currently there are approximately 800 well pads (6,123 active oil and gas wells) within Rio Blanco County, CO, however, not all of these wells are within D-7 (<http://cogcc.state.co.us>). In the past, most oil and gas development has occurred primarily on winter ranges within GMU 22; however, development that is more recent has occurred on summer ranges. Currently, activities associated with oil and gas development are minimal, however, it can be expected that activity will ebb and flow with commodity prices. In addition to the landscape changes associated with oil and gas development, significant changes in landownership also occurred during the oil shale boom in the 1970s and 1980s. Oil and gas companies acquired large tracts of former ranch lands. Land uses across these properties changed. Hunting access on these properties was restricted due to liability concerns from the oil and gas companies and energy infrastructure has been built in bottomlands that were formerly hay fields. Infrastructure development has resulted in losses of winter range and limited hunting access has created challenges in managing both mule deer and elk populations.

IV. Herd Management History

Disclaimer for Population Size Estimate

Estimating population size of wild animals over large geographic areas is a difficult and inexact exercise. In several research projects, attempts to accurately count all the known number of animals in large fenced areas have consistently failed (Bartman et al. 1986, Bartman et al. 1987, White et al. 1989, Freddy et al. 2004). In some case's less than 50% of the animals can be observed and counted. High-tech methods using infrared sensing have also been met with limited success (Dunn et al. 2002, Drake et al. 2005). CPW recognizes this as a serious challenge to wildlife management. CPW attempts to minimize this problem using the latest technology and inventory methodology available. Most population estimates are derived using computer model simulations that involve estimations for mortality rates, hunter harvest, wounding loss and annual production. These simulations are then adjusted to align on measured post-hunting season age and sex ratio composition flights and in some cases density estimates derived from line transect or quadrant surveys. CPW recognizes the limitations of the system and strives to do the best job with the resources available. If better information becomes available, such as new estimates of survival rates, wounding loss, sex ratio at birth, density estimates, or new modeling techniques and programs, CPW will use this new information and the new techniques. This may result in significant changes in the population size estimates, and could change our management strategies. It is recommended that the population estimates presented in this document be used more as trend data and not as an absolute estimate of the deer population in the DAU.

CPW biologists estimate big game population size using a computer modeling process. This process has evolved significantly through time. In the 1970s, ONE POP was the platform used to model big game populations. The program was cumbersome to operate and accessed from a mainframe computer at Colorado State University. In the early 1980s, CPW switched to, POPII, a personal computer based program. Finally, in 2002, CPW moved to a computer spreadsheet model. All programs worked the same: sex and age ratios, harvest figures, mortality estimates, initial population size, sex ratio at birth, and wounding loss rates are all inputs into the model. Modeled post-hunt population estimates are generated by solving for the best fit between measured vs. predicted post-hunt sex ratio data. Computer models are the primary method for estimating big game populations however, when feasible, quadrat census, mark-resight, or line transect techniques are implemented to provide a second, independent estimate of population size.

Post-Hunt Population Size

Characteristic of deer populations throughout Colorado and elsewhere in the West, the D-7 population has fluctuated through time with an overall declining trend (Gill et al. 2001). These cyclical trends are most effected by severe winters and drought. Historically, the White River mule deer herd was very robust likely exceeding 100,000 deer in the early-1960s. The most recent population peak occurred in the early-1980s with modeled estimates consistently predicting the population over 100,000 deer once again. Since then, population estimates have shown a declining trend. The declining trends in the modeled estimates are consistent with on the ground observations. Going into the severe winter of 1983-84 the D-7 deer herd was at an all-time high and has not rebounded to those historic population levels since.

The average population size has declined from 92,000 in the 1980s, to 61,000 in the 1990s, to 53,000 in the 2000s, and 34,000 in the 2010s (Figure 7). In turn, population objectives for the D-7 herd have also been set lower. The population objective prior to 1990 was 85,000 deer and in 1994, the objective was lowered to 67,500. Throughout the decades of a steady overall population decline, mule deer numbers stabilized for a short period from 1993-2000 before rebounding slightly from 2001-2006. The increasing trend was short-

lived as the deer herd entered the severe winter of 2007-2008 on the heels of a prolonged drought cycle and at its highest point since the early 1990s. Population dynamics within the herd changed after the severe winter of 2007-2008. The high numbers of deer going into the 2007-2008 severe winter confounded the impacts of the extended drought cycle during the early 2000s. Over-winter survival rates from radio collared fawns prior to 2007 averaged 72.2%. Post-2007, over-winter survival has averaged 59.7%. Furthermore, annual adult doe survival pre and post-2007 went from an average of 85.6% to 79.8%, respectively. Average cause specific mortality rates from malnutrition has doubled for both does and fawns after the 2007-2008 winter. It appears the cumulative effects of drought, CWD, and severe winters are limiting population size in the D-7 herd. In the last decade, the herd has not exceeded 40,000 animals.

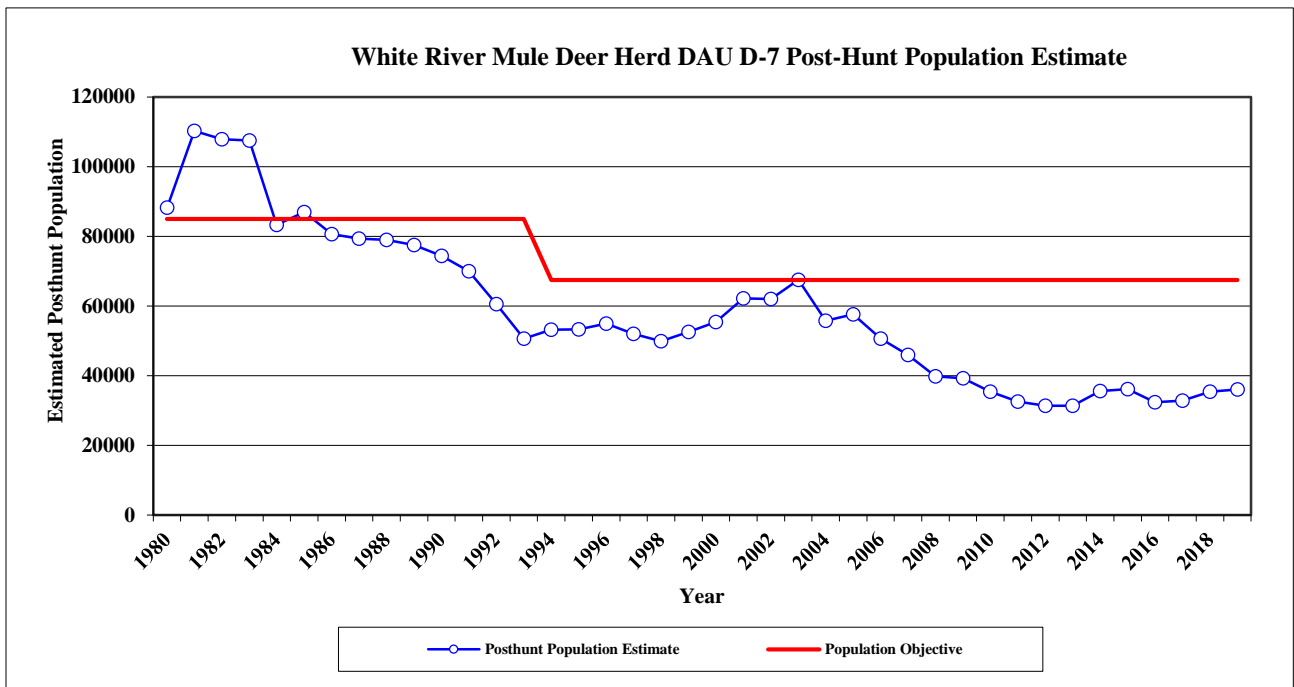


Figure 7. White River DAU D-7 observed mule deer population trend from 1980 - 2019.

Post-Hunt Herd Composition

Post-hunt herd composition flight data for D-7 dates back to the 1960s. Typically, flights are completed in December and January. Surveys are conducted from a helicopter used to position the observer over the deer. Each deer in the group are classified into one of five categories: does, fawns, yearling bucks, young bucks (2 ½), and mature bucks (3 ½+). After the flight, the data are summarized by drainage and game management unit and age ratios (fawns per 100 does) and sex ratios (bucks per 100 does) are computed. The composition flights are not a total count, rather, are designed to give a statistically valid estimate of sex and age ratios across the DAU.

Fawn Ratios - Since 1980, the post-hunt age ratio has averaged 60.5 fawns:100 does (Figure 8). The highest age ratio observed during this period was 92.0 fawns:100 does in 2003 and the lowest was 47.1 fawns: 100 does in 1993. The long-term fawn:doe ratio trend is stable to slightly declining. Average observed ratios during the 1970s were 75.5 fawns:100 does, dropped to 68.7 fawns:100 does throughout the 1980s, and further declined to an average 51.5 fawns:100 does in the 1990s. However, that trend reversed during the drought years of the early 2000s with average observed ratios increasing to 68.9 fawns:100 does only to drop back down to an average of 52.4 fawns:100 does in the 2010s.

Understanding the reasons for increasing or declining trends is important as fawn ratios ultimately determine rate of change in the population. Beginning in 2001, as part of a statewide effort to monitor over-winter fawn survival, radio collars were deployed on 6-month old fawns within the D-7 deer herd. Monitoring over-winter fawn survival not only provides managers with a direct estimate of fawn survival and recruitment to 1-year of age, but it also provides for a more comprehensive understanding of cause specific mortality during winter months. Results from this monitoring effort have shown fawn survival to fluctuate widely on an annual basis. Survival rates are most effected by winter severity. For example, during the persistent summer drought and mild winters in the early 2000s, the D-7 herd was growing. Observed fawn ratios were at all-time highs and fawn survival averaged 72.2%. In contrast, above average snowfall on winter ranges has been more frequent since 2007, population trends have been in decline, fawn ratios have been lower, and average fawn survival dropped by over 12%. Furthermore, observed fawn malnutrition rates of radio-collared deer doubled when comparing the two periods while other causes of mortality have remained relatively the same. These trends indicate current population levels and poor winter range conditions are resulting in significant winter mortality during winters with above average snowfall especially in the northern portion of the DAU.

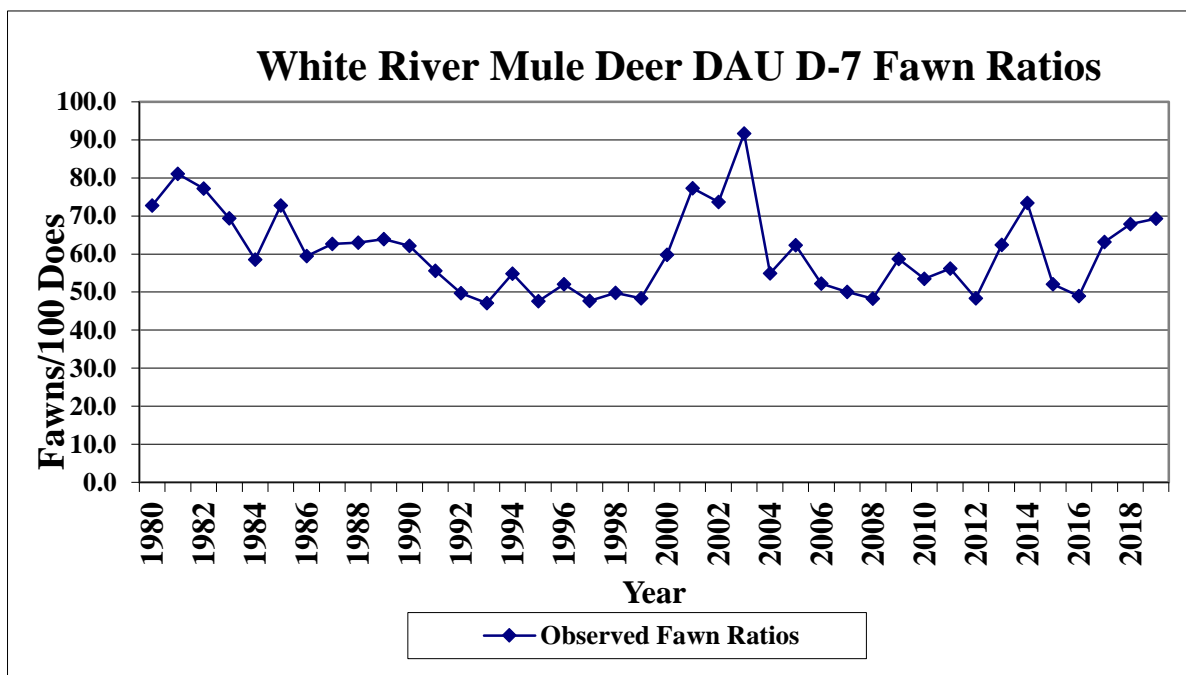


Figure 8. White River DAU D-7 observed mule deer fawn ratios post-hunt 1980 - 2019.

Buck Ratios - Historically, buck ratios within the White River deer herd have fluctuated greatly (Figure 9). Observed sex ratios have been as low as 7.1 bucks:100 does in 1971 to a high of 37.5 bucks:100 does in 2015. During the early 1980s, sex ratios averaged 11.7 bucks:100 does. Yearling bucks were not protected from harvest at this time. Regulation required a buck to have a 5-inch antler to be legal. In 1986, the sex ratio objective was set at 18 bucks:100 does. Managers attempted to achieve this objective using a 3-point antler restriction. While the 3-point antler restriction did result in an increase in the buck ratio, 16.1 bucks:100 does, it did so through increased yearling buck recruitment. The 3-point antler restriction was a hotly debated subject at that time. Two important observations were made while the 3-point antler restriction was in place: 1. Observed mature buck ratios within the herd actually decreased and 2. “Illegal” harvest of bucks (did not meet the minimum 3-point restriction) were estimated at 40%. These factors led to the removal of the 3-point antler regulation in 1992. Subsequently, the 1994 herd management plan established a sex ratio objective of 20 bucks:100 does. Achieving the sex ratio objective continued to be a challenge so a shortened 3 day buck season was implemented in an attempt to increase buck ratios. This season structure proved to be ineffective at increasing buck ratios and in 1999 deer hunting was limited statewide.

The 1999 limitation resulted in a significant increase in the buck ratio. Observed buck ratios from post-hunt composition flights increased from 12.8 to 33.6 from 1998 to 1999. While this change was well received by hunters and resulted in an increased number of bucks on the landscape, achieving herd management sex ratio objectives has remained a challenge. Instead of being below objective, the D-7 herd has been chronically over the sex ratio objective. In fact, since 1999 observed buck ratios have been below the sex ratio objective only one time, 2008. This low buck ratio was observed one year after the severe winter of 2007-2008. Prior to this winter, fawn production and survival were high yielding increased recruitment rates and an increasing population. As a result, increased buck license allocations were issued in an effort to manage to the sex ratio objective. However, after the severe winter, buck ratios were slow to recover. Fawn survival was low, yielding low recruitment and as such, a very conservative management approach was taken to protect against dropping below the sex ratio objective. While the conservative management approach was well intended and effective at maintaining and even increasing buck ratios, it has likely contributed to an increase in chronic wasting disease prevalence in D-7.

Regardless of the management strategy implemented to meet sex ratio objectives, all present challenges. It is notable however; overall observed sex ratios in D-7 have increased considerably since the low of 6.2 bucks:100 does observed in 1984. Average buck ratios in the 1980s were 12.9 bucks:100 does, 16.6 bucks:100 does in the 1990s, 27.4 bucks:100 does in the 2000s, and 29.5 bucks:100 does in the 2010s. The most recent 5-year average buck ratio, 32.7 bucks:100 does, is the highest average ever observed in D-7.

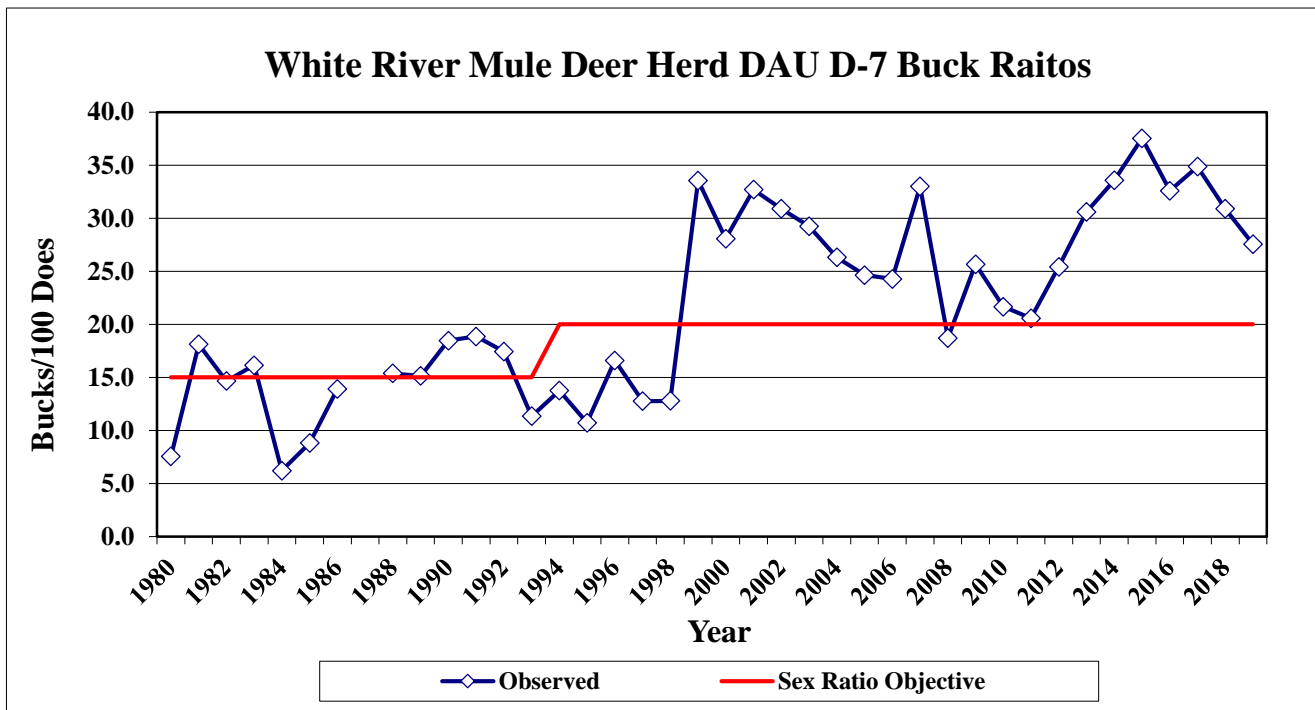


Figure 9. White River DAU D-7 observed mule deer buck ratios post-hunt 1980 - 2019.

Yearling buck ratios fluctuate through time and are a reflection of over-winter fawn survival from the previous year. This in turn effects the composition of buck age structure observed through time. Prior to 2007, high fawn survival rates allowed for excellent yearling buck recruitment. This allowed for liberal license allocations and excellent hunting opportunity aimed at reducing buck ratios to achieve the sex ratio objective. Post 2007, fawn survival rates have been more variable and yearling ratios have fluctuated widely resulting in lower buck ratios from 2008-2010. However, more conservative license allocations and excellent fawn survival during the 2013-2014, and 2014-2015 winters resulted in an abundance of yearling bucks being recruited into the population. As a result, observed buck ratios climbed to all-time highs with mature buck ratios peaking in 2017 (Figure 10).

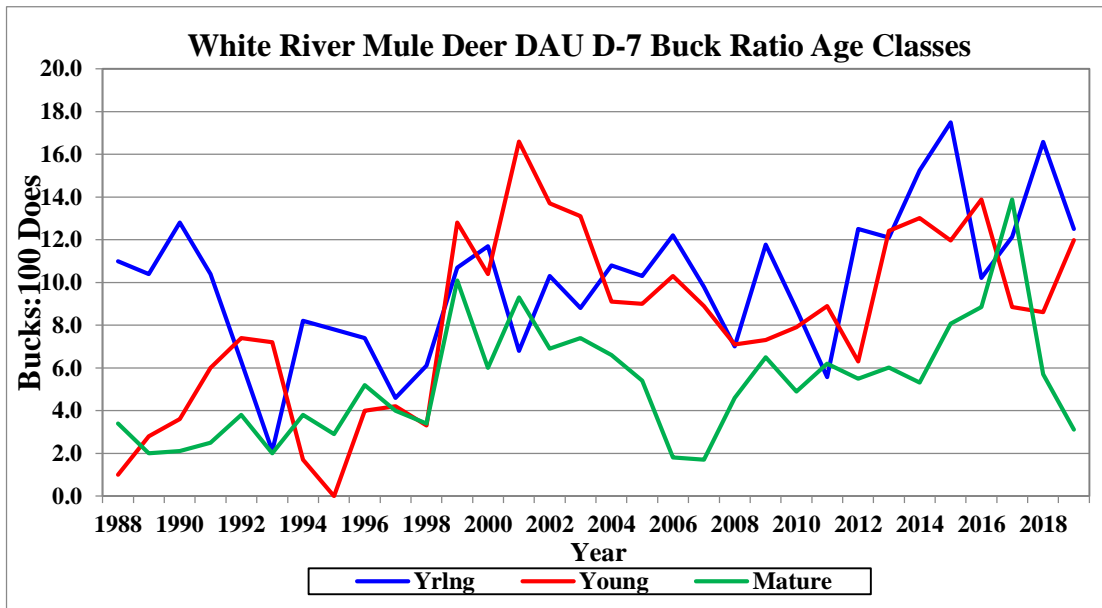


Figure 10. White River DAU D-7 observed post-hunt buck ratios by age class 1988-2019.

Harvest History and Season

Total Harvest - Harvest estimates are produced by typical statistical sampling techniques, not an attempt to conduct a total count. Harvest figures are the most precise figures generated by the CPW in our attempts to measure the status of big game herds. Deer harvest figures for D-7 date back to 1953 (Figure 11). The highest harvest was in 1963 of 25,064 deer. The lowest recorded harvest was in 2013 of 1940 deer. Harvest regimes have varied widely over the years from very liberal to very conservative, mainly in response to population levels dictated by winter severity. Average total harvest during the 1950s was 11,000 deer, 1960s 13,800 deer, 1970s 9,300 deer, 1980s 6,900 deer, 1990s 8,500 deer, 2000s 5,300 deer, and 2010s 2200 deer.

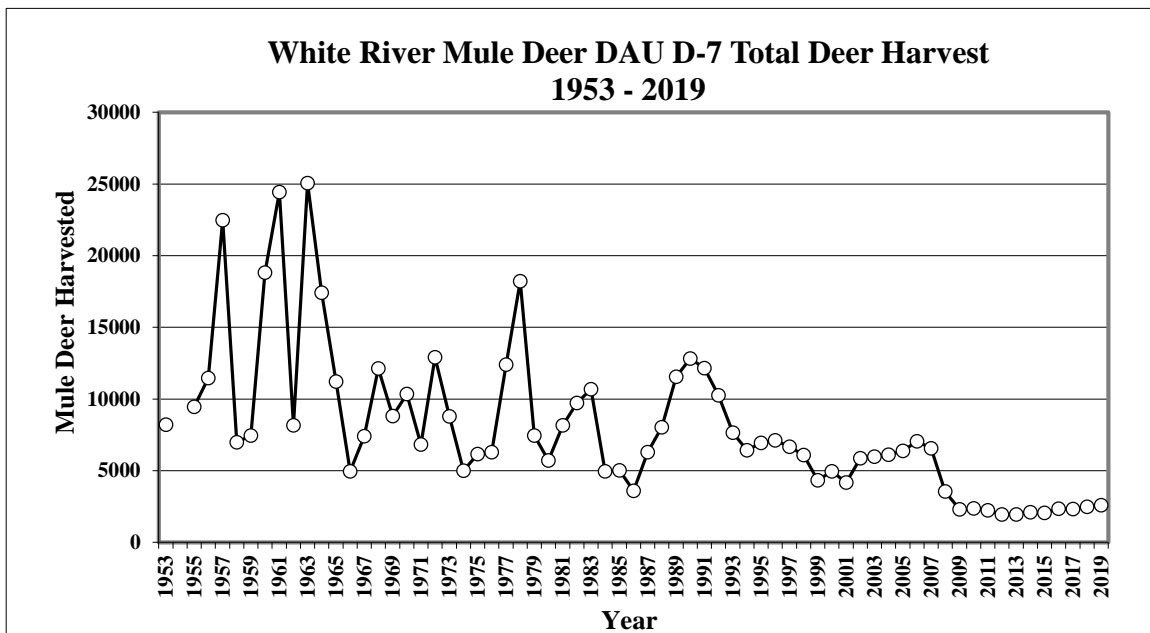


Figure 11. White River DAU D-7 mule deer harvest 1953-2019.

Composition of deer harvest has changed through time (Figure 12). During the 1950s and 1960s, antlered and antlerless harvest was similar. In fact, antlerless harvest exceeded antlered harvest several years in the 1960s. However, antlerless harvest dropped significantly in the 1970s while antlered harvest remained relatively high. Studies conducted in the 1980s evaluating compensatory mortality in the Piceance Basin and declining fawn ratios in the early 1990s believed to be a result of the herd reaching carrying capacity prompted increased antlerless harvest in the late '80s and early 90s (Bartmann et al. 1992). Since 1993, overall antlered and antlerless harvest has trended downward.

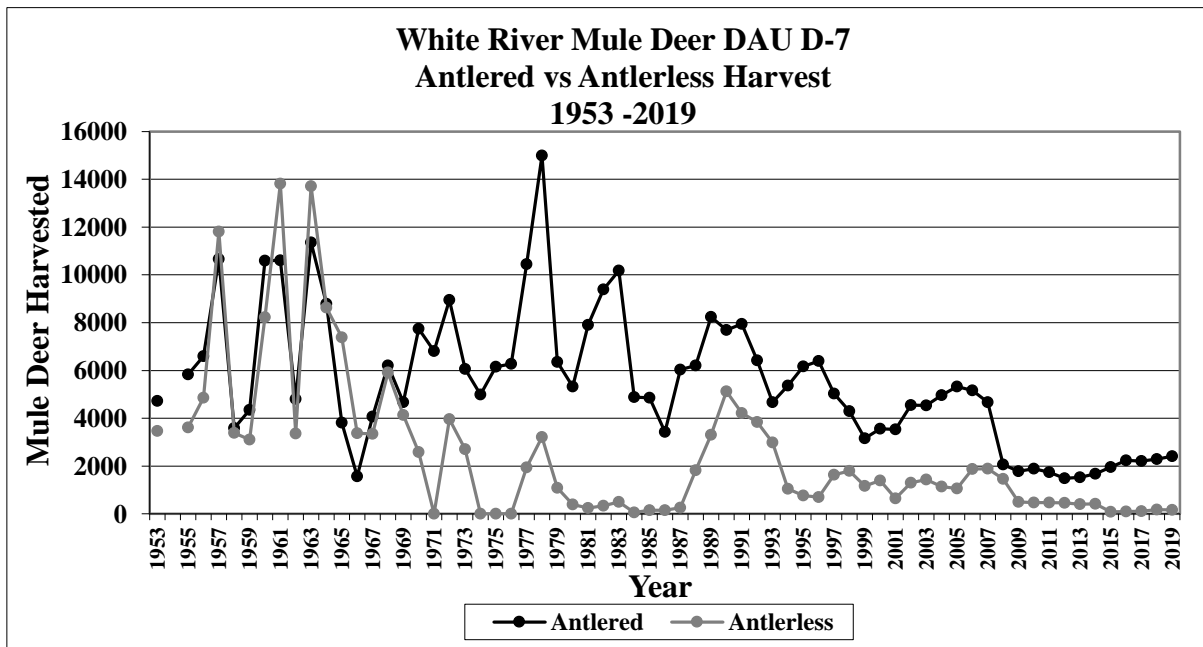


Figure 12. White River DAU D-7 mule deer antlered and antlerless harvest 1953-2019.

Hunting Season History - For the past 20 years, annual deer hunting seasons in D-7 have generally included an either-sex archery season, a limited muzzleloading season, and limited buck and doe rifle seasons.

In 1986, the Wildlife Commission approved a combined deer and elk rifle season structure spread out over three seasons to mitigate increasing hunter pressure and crowding issues. The three combined seasons were 5, 12, and 9 days in length for a total of 27 days of deer and elk rifle hunting. The short, five-day season was first to reduce the incentive for hunters to go to first season and get “first crack” at the animals. Low buck ratios in the 1970s and 1980s prompted the Wildlife Commission to approve buck antler-point restrictions (APR) from 1986-1991 for the White River Deer herd. The APR regulation was replaced by a 3-day buck season from 1992-1994. In 1995, the 3-day buck season was extended to a 5-day buck season and a five-year season structure was implemented. Starting in 1999, all deer licenses were limited statewide.

Since 2000, CPW has maintained a 5-year season structure that includes:

- 1) limited either-sex archery deer season
- 2) limited muzzleloading season antlered and antlerless licenses
- 3) two combined rifle seasons (2nd and 3rd season) antlered and antlerless licenses
- 4) limited 4th season (antlered only)

*In addition to the regular seasons, there is a late doe season in Axial Basin GMU 211 to address game damage.

Hunting Pressure

Historically hunter numbers fluctuated throughout the 1950s, '60s, and '70s (Figure 13). The fluctuation of hunter numbers during this time was likely more a reflection of the number of U.S. troops deployed to the Vietnam and Korean Wars than mule deer herd dynamics. This was especially true for hunter numbers throughout the mid-1960s and early-1970s during the Vietnam War. The highest number of U.S. troops in Vietnam occurred in 1968 when over a half million troops were deployed. Over 2.7 million U.S. troops served in Vietnam representing 9.7% of this generation (<http://www.uswardogs.org>). World events during this era certainly had an impact on the number of hunters hunting mule deer during a time most consider the pinnacle of the White River mule deer herd.

Peak hunter numbers occurred in D-7 in 1990. Since 1990, the number of deer hunters has shown a rather dramatic decrease. With the exception of the statewide limited license change in 1999, major drops in hunter numbers are a result of limiting license numbers in response to severe winter events resulting in significant winter mortality. The highest number of hunters during a hunting season occurred in 1990 with over 28,000 hunters participating in the seasons. The lowest number of hunters was just over 3500 in 2015. Due in part to extremely limited licenses, hunter numbers have been at all-time lows the last ten years.

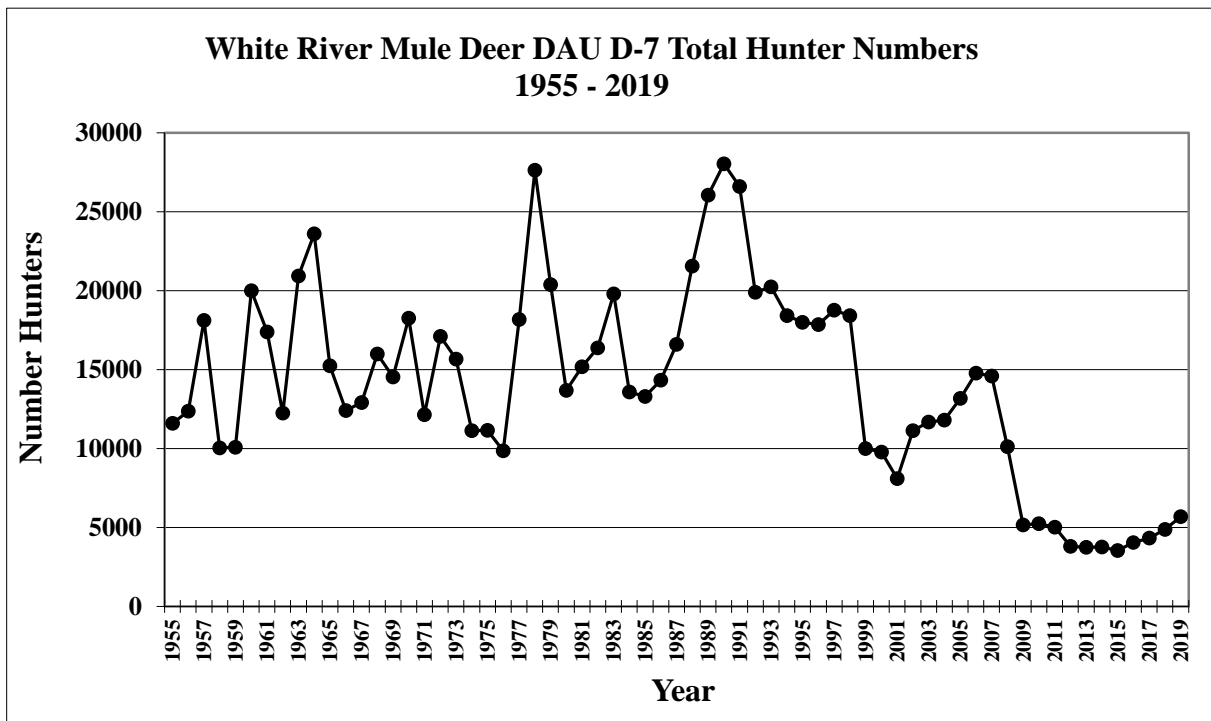


Figure 13. White River DAU D-7 total hunter numbers 1955-2019.

V. CURRENT HERD MANAGEMENT

White River Mule Deer Herd DAU D-7

Game Management Units: 11, 12, 13, 23, 24, 131, 211, and 231

Population Objective

Current Population Estimate: 36,000 (Post-hunt 2019)

Current Population Objective: 67,500

Sex Ratio Objective

Current Sex Ratio: 27.6 bucks:100 does

Current Sex Ratio Objective: 20 bucks:100 does

CURRENT MANAGEMENT STRATEGIES

Management strategies in D-7 over the past decade have been aimed at increasing the deer population. The D-7 herd was last at the current population objective of 67,500 deer in 2003. Since 2003, the population has shown an overall declining trend. Management actions during the early 2000s were intended to reduce the herd with liberal license allocations and even List B doe licenses. However, winter mortality losses experienced during the severe winter of 2007-2008 changed the course of management. Since 2008, license allocations have been extremely conservative in an effort to stimulate growth and move the deer herd back towards population objective. Management actions taken to promote growth of the herd included a 75% reduction in doe licenses in 2009 and subsequent reductions after 2009 have resulted in a 97% reduction compared to licenses sold in 2007. In addition, reductions in antlered license allocations were also implemented. From 2007 to 2012, buck license allocations had been reduced by 72%. Antlered license reductions were successful at increasing buck ratios and since 2014, buck license allocations have slowly increased. However, allocations are still 50% below the number of licenses sold in 2007. The results of these license reductions reduced harvest rates to minimal levels. Since 2008, doe harvest rates have averaged 1% (300 does harvested) and buck harvest rates have averaged 29% (1800 bucks harvested). Despite these efforts, growth of the deer herd has been stagnate at about 34,000 deer on average, half the current objective. Based on the significant changes to license allocations since 2007, the minimal doe harvest does not appear to be limiting the growth of the D-7 population.

CURRENT MANAGEMENT CONCERNS

Chronic Wasting Disease (CWD)

Chronic wasting disease is a fatal neurological disease found in deer, elk, and moose. The disease agent, prions (pre-e-ons), are present in saliva, feces, and carcass parts of infected animals (Mathiason et al 2006). CWD is 100% fatal. Prions are a protein, not a virus or bacteria, and CWD cannot be treated or prevented through vaccination. The disease is spread through direct or indirect contact between animals. Prions can stay in the environment for long periods and studies have shown animals can actually become infected by consuming contaminated soils or vegetation (Miller et al 2004). Furthermore, CWD prevalence rates are

highest in adult males (Miller et al. 2000). Thus, it is important to monitor and manage herds that are infected to minimize long-term contamination of ranges with CWD prions. Controlling CWD prevalence through active management is critical to the long-term sustainability and health of herds (Miller et al 2000, Miller and Conner 2005, Miller et al 2020).

A CWD prevalence rate of 5% in adult male deer within a DAU was established as a threshold for triggering compulsory intervention and implementation of management actions aimed at reducing CWD prevalence (Colorado Chronic Wasting Disease Response Plan, 2018). Large sample sizes are needed to generate a small statistical confidence interval for CWD prevalence estimates. In order to achieve large sample sizes for each DAU, CWD monitoring efforts are focused on mandatory testing of hunter-harvested male mule deer. Considering the smallest statistical confidence interval for CWD prevalence is a 95% confidence interval, $\pm 2-4\%$, a 5% prevalence threshold is the lowest rate of adult male prevalence that allows for detection of change in CWD prevalence. The 5% threshold was selected based on the lowest CWD prevalence that CPW can manage to minimize adult female mortality. Furthermore, a 5% prevalence threshold is justified when comparing observed Colorado prevalence data to modeled disease trends showing how CWD infection rate increases over time. CWD monitoring data from Colorado were used to create a composite epidemic curve to learn whether actual changes in prevalence for mule deer followed the model (Figure 14). The modeled curve does reflect a similar trend in prevalence observed in the D-7 herd from 2002-2017 where prevalence increased from 1.3% to 15.3%. According to both the modeled curve and the composite field data, the inflection point at which CWD prevalence accelerates exponentially within a population is 5% (Miller et al. 2000; EFSA Panel on Biological Hazards 2018). From a management perspective, maintaining prevalence below the inflection point would prevent a rapid increase in CWD prevalence.

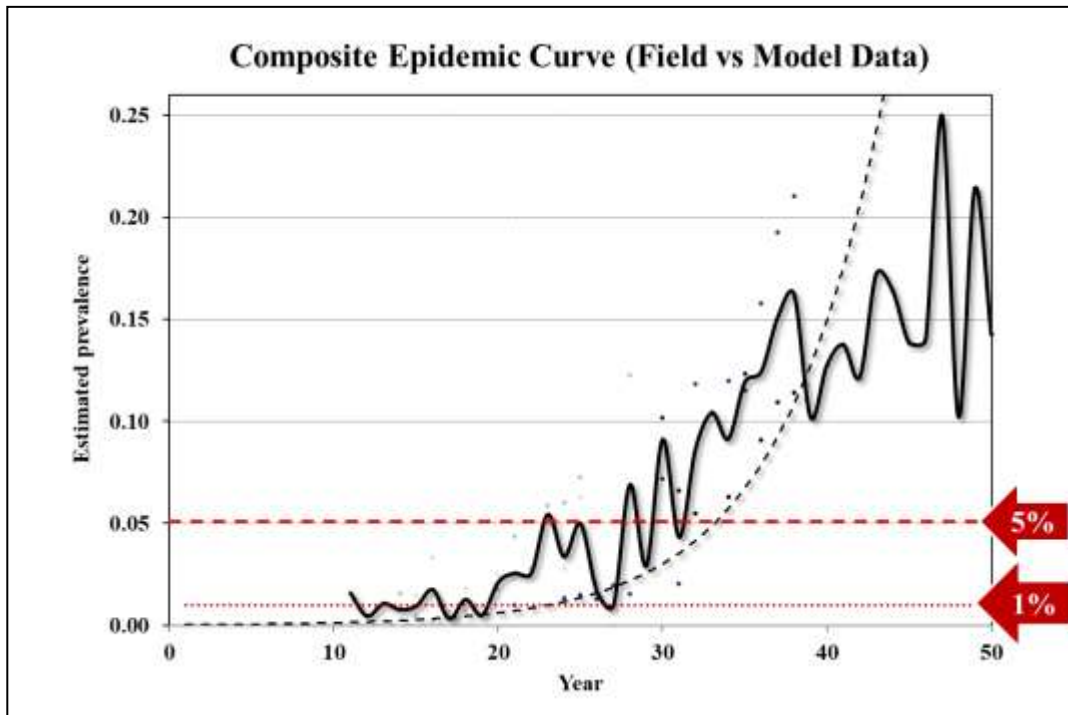


Figure 14. Actual versus modeled CWD epidemic curves show a similar trajectory over time with an inflection point of approximately 5% CWD prevalence (Miller et al. 2000; EFSA panel on Biological Hazards 2018).

There is a growing concern over the increasing CWD prevalence in D-7. CWD was first discovered within the D-7 herd in early 2002. A cluster of CWD cases was unexpectedly detected in mule deer entrapped in a captive wildlife facility in GMU 12 near Pagoda in the Williams Fork drainage. The initial management approach after discovering CWD was an attempt to eradicate the disease. Focused culling efforts were

initiated to try to control CWD from spreading. However, testing results from hunter-harvested animals during the 2002 hunting season revealed the disease was already widespread within the DAU. While CWD was present in D-7, prevalence rates in the herd were low, 1.3%. Throughout the early 2000s, heightened hunter awareness about CWD, increased license allocations and relatively high harvest rates resulted in high hunter submission rates for CWD testing (Figure 15). These surveillance efforts indicated prevalence rates remained low within the D-7 herd from 2002-2007. With CWD prevalence rates remaining relatively low, hunters and managers became apathetic. In turn, hunter interest in having animals tested for CWD waned and hunter-harvested submission rates declined. This also coincided with a period of reduced hunting pressure and buck harvest in D-7 (Figure 13; Miller et al 2020). From 2009-2016 hunter-harvested submissions remained low while prevalence rates suggested an increasing trend. That increasing trend in CWD prevalence caused concern among wildlife managers and in 2017, mandatory testing was required for all deer harvested in D-7. The 2017 sampling effort confirmed suspicions about increasing prevalence, revealing a 15.3% CWD prevalence rate in the D-7 herd.

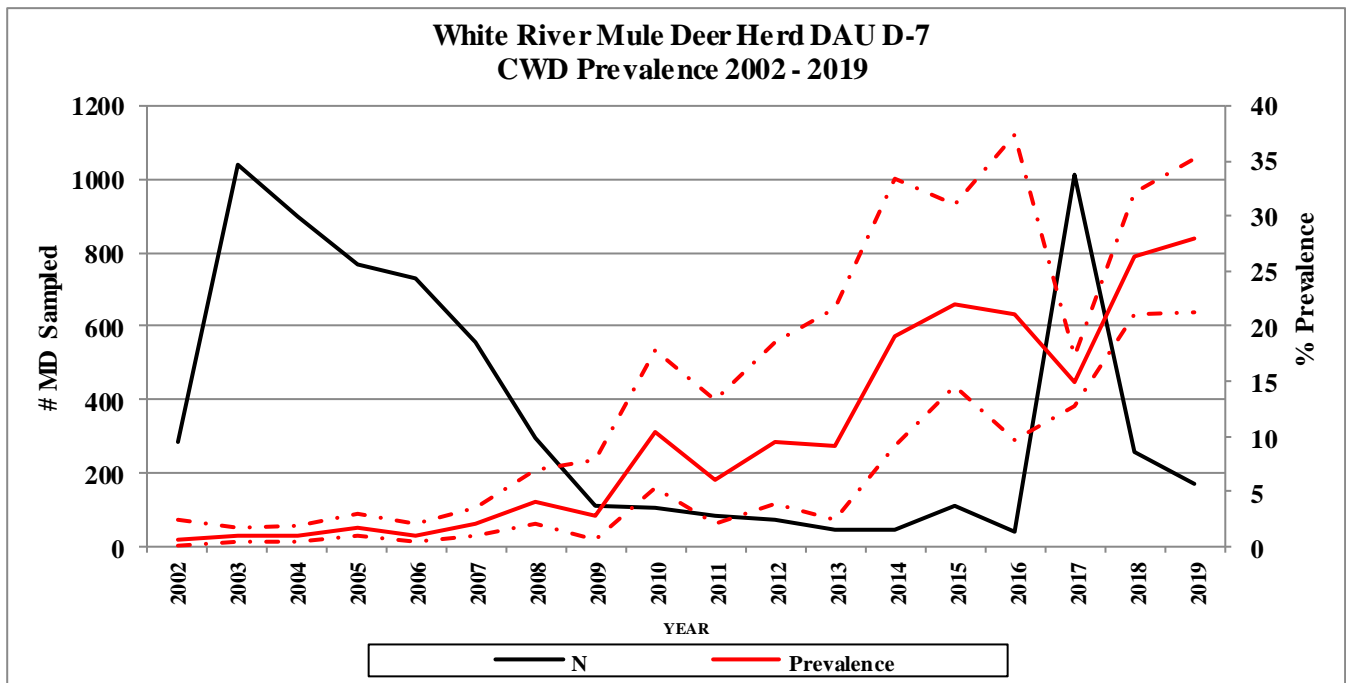


Figure 15. White River DAU D-7 CWD prevalence rates 2002-2019.

This marked, 10-fold increase in CWD prevalence from 1.3% to 15.3% is real and is now likely causing population level effects in this herd. Considering the 2017 prevalence estimate is 15%, and that deer start to die from CWD within 2.5 years from infection, approximately 7.5% of adult male and 3.5% of adult female mule deer in D-7 will die each year from CWD (Miller et al 2008). [Note: Prevalence among adult female mule deer is about half the rate measured in males in the same herd (Miller and Conner 2005).] However, it is reasonable to expect that CWD prevalence in adults will continue to increase in this herd unless curtailed, thus an increasing proportion of adults will die. Since the D-7 herd is already suffering from a long-term decline any additional mortality from CWD would increase the rate of decline. Furthermore, looking at the GMU scale, prevalence rates are variable across D-7. Figure 16 displays the increase in CWD prevalence estimates for D-7 by GMU over a 15-year period. Prevalence in GMUs 12, 13, and 211 now exceeds 25%. At this rate of increase, prevalence can be expected to exceed 30% within 5-years, and if this occurs, more than 15% of adult males and 7.5% of adult females will die annually from CWD (Miller et al. 2008). These rates of increase demonstrate the need to take management actions now to reduce prevalence.

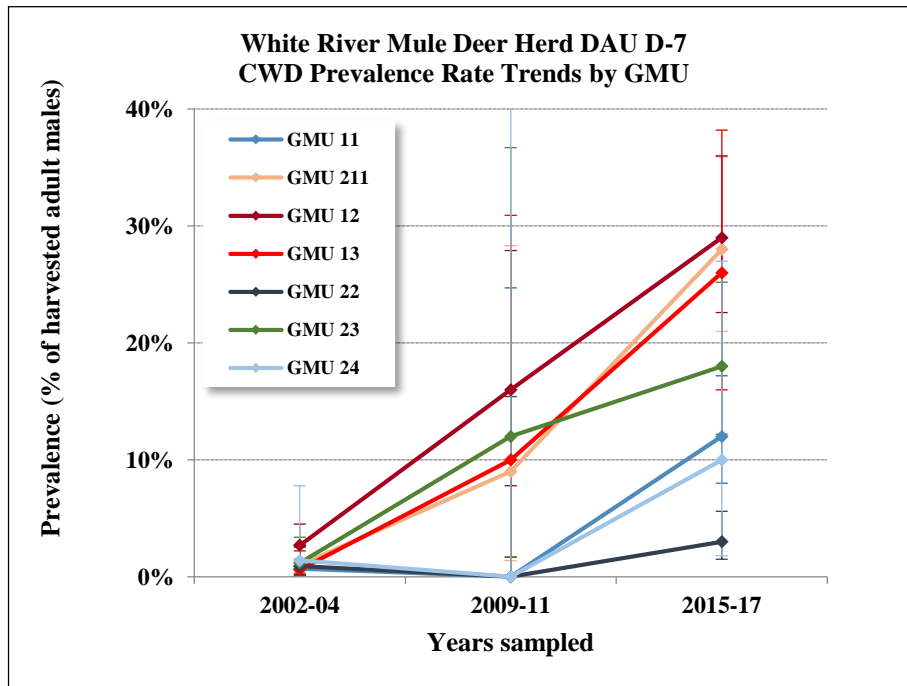


Figure 16. Pooled three-year CWD prevalence rates by GMU.

Spatial data collected from hunter-harvested deer were used to map the distribution of CWD within the DAU. CWD sample distribution of hunter-harvested deer is widespread across the DAU and provides a thorough representation of the geographic area (Figure 17).

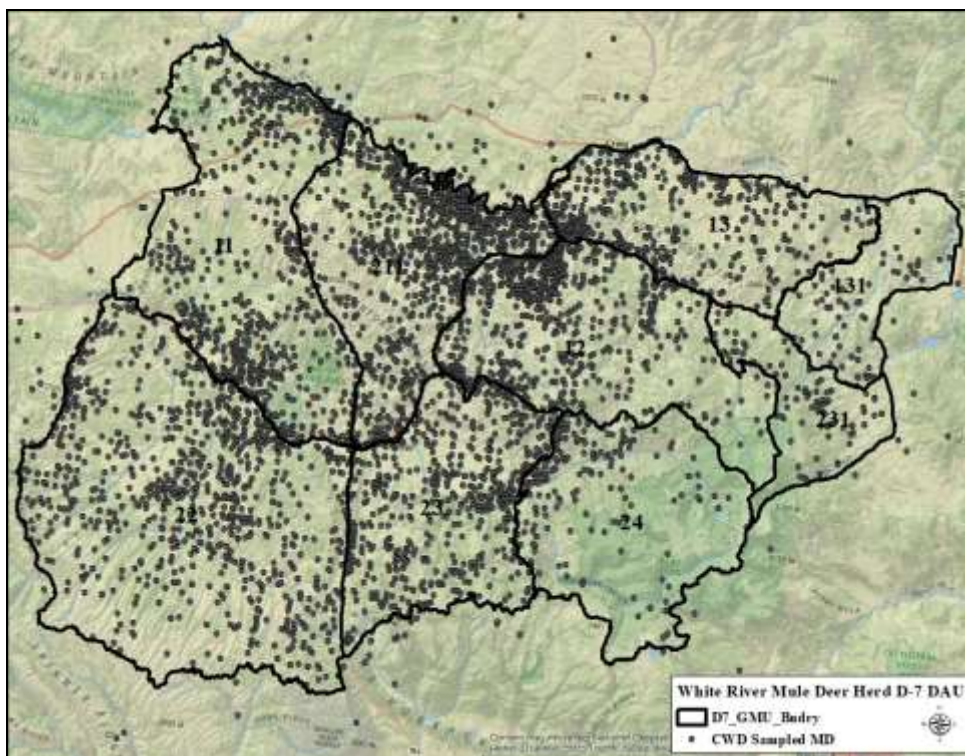


Figure 17. Hunter harvested mule deer submitted for CWD sampling 2002-2019.

As expected, highest sampling densities occur on mule deer winter ranges as a result of the timing of hunting seasons and deer distribution (Figure 18).

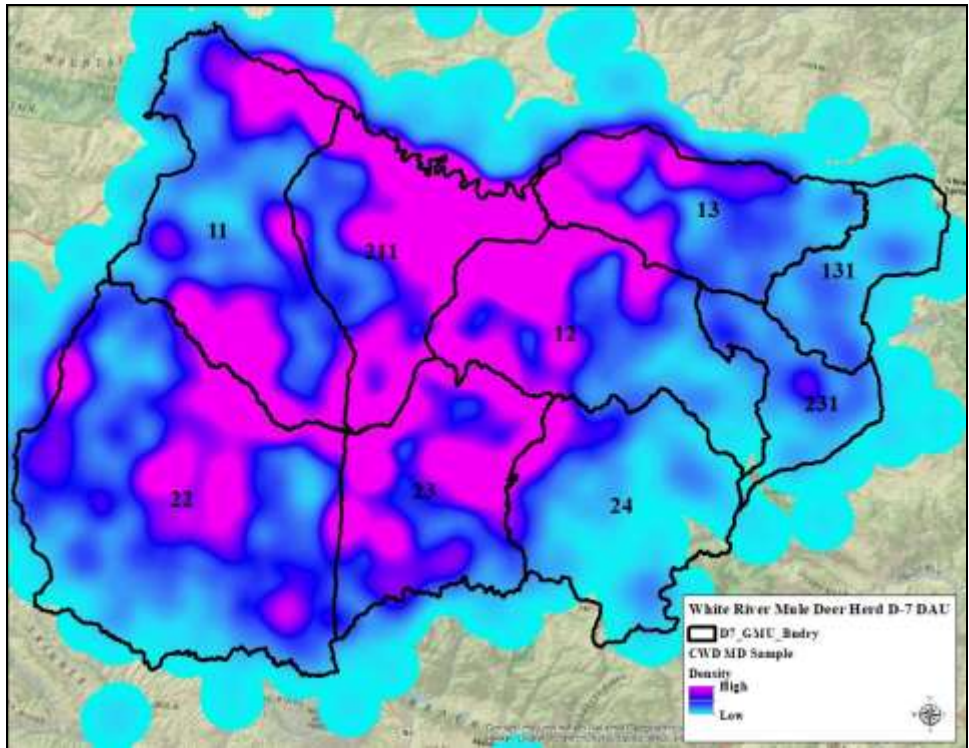


Figure 18. Surface density of hunter-harvested mule deer representing distribution of samples across DAU D-7.

GMUs 12, 13, and 211 have the highest prevalence of CWD with the highest concentration of CWD positive animals centered in the northern, western, and eastern portions of those respective GMUs (Figure 19). Targeted management actions recommended in the CWD Response Plan will be considered to reduce prevalence in this area.

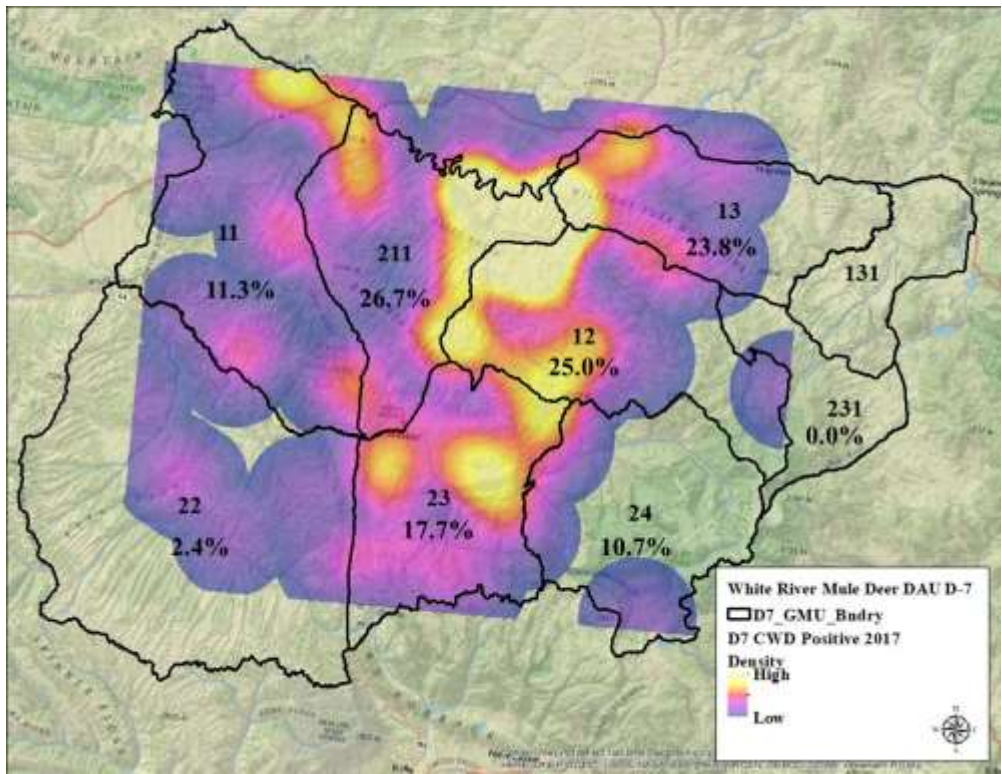


Figure 19. Observed CWD prevalence rates from mandatory testing during the 2017 hunting season shown by GMU and surface density of hunter-harvested mule deer bucks testing positive for CWD.

Two decades of increasingly conservative buck harvest, combined with the seasonal concentration of deer on limited winter range, likely have created conditions favoring the sharp rise in CWD prevalence observed in D-7. Severe winter conditions that concentrate deer onto smaller landscapes have likely played some role in increased CWD prevalence within parts of D-7. High concentrations of deer on winter ranges would be expected to increase the likelihood of CWD transmission, although high prevalence also occurs in some Front Range deer ranges where winter conditions tend to be milder. Some increase in prevalence would be expected in the absence of attempts to control CWD, but the conservative harvest management actions taken in D-7 since 1999, and especially the 2007-2008 winter, have likely exacerbated the rate of increase over the last decade (Figure 20). Since the 2007-2008 winter, license allocations have been extremely conservative in an effort to grow the D-7 herd. Unfortunately, these efforts have not resulted in an increase in the population, but they have been successful in increasing buck ratios. CWD monitoring in Colorado has shown that mature adult males have the highest prevalence in herds statewide and adult females typically exhibit CWD infection at half the rate of adult males (Miller et al. 2000, Miller and Conner 2005). Consequently, the conservative management actions that have led to higher buck ratios in D-7 and elsewhere are likely contributing to increased prevalence (Miller et al 2020). In comparison, prevalence has declined or remained relatively constant in herds where sustained buck harvest and other management actions were prescribed to control CWD prevalence (Figure 20; Miller et al 2020).

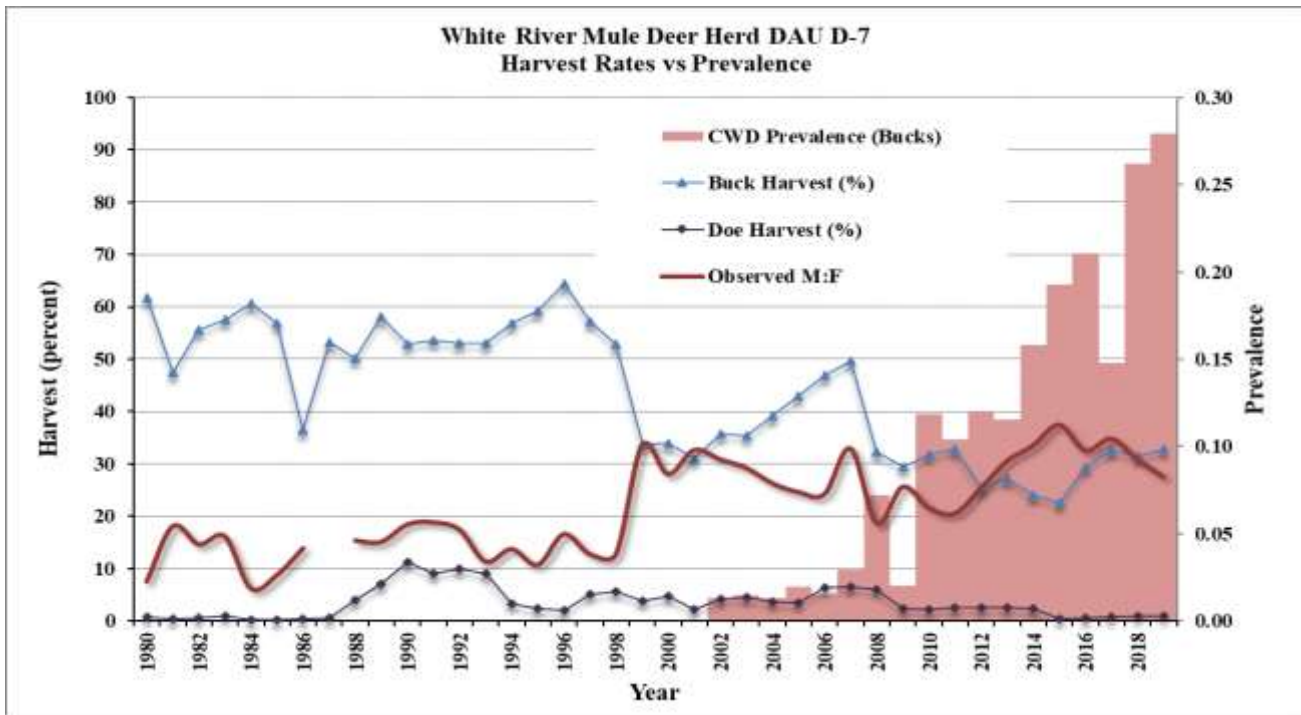


Figure 20. White River DAU D-7 mule deer harvest rates vs CWD prevalence rate. Increasing prevalence trend parallels increasing observed buck:doe ratios.

The overall prevalence trends found during the mandatory testing results in 2017 prompted the development of a statewide CWD Response Plan. The plan includes a suite of actions and recommendations that local wildlife managers can implement and assess at the individual herd level to control CWD prevalence while achieving population and herd composition objectives within Herd Management Plans. The suite of actions are recognized as tools in the toolbox available to local managers and local constituencies when determining which actions are best suited to manage CWD in a herd. The plan is intended to provide maximum flexibility to maintain healthy big game populations while achieving management objectives, with review and assessment of management performance in individual herds at five-year intervals. Future management actions to reduce CWD prevalence within the D-7 herd will be discussed in the Alternative Development section of this plan.

Habitat Condition and Capability

In D-7, there is a limited amount of winter range habitat available and the nutritional carrying capacities on these winter ranges is the single most limiting factor to the number of deer that can be supported. Winter snow forces deer out of the higher elevations of the DAU to the more limited winter ranges in the western and central portions of the DAU. Deer are more concentrated when restricted to winter ranges within the DAU, generally below 7500 - 8000 feet. Vegetation types vary across winter ranges including mixed mountain shrub, big sagebrush, pinyon-juniper, and bitterbrush. Mule deer abundance on winter ranges is ultimately determined by the quality and quantity of those winter range habitats. Weather patterns, especially precipitation, is the primary factor driving deer population cycles and affecting the carrying capacity on these winter ranges. The effects of weather patterns are cumulative and have long lasting effects. Summer drought cycles, for example, have had lasting impacts on the quality of winter range including shrub mortality and increased competition from invasive weeds. The quantity of winter range available due to wildland fires occurring on critical deer winter ranges has also diminished. Conversely, mule deer populations tend to increase during these drought periods, especially when winter conditions are mild and weather related mortality is low. The combination of drought, wildfire, and increased deer densities degrades the condition of winter ranges even further due to the stress placed on these shrub communities from overuse and lack of moisture.

The quality and quantity of winter range that has been lost in D-7 is significant. The changes that have occurred on winter ranges due to the degradation in quality from drought and direct loss due to wildfire are compounded during severe winter events. During light to average winters, mortality rates usually do not exceed 10% of the total deer herd. However, in severe winters, when deep snow forces deer to become very concentrated, competition for these low quality, less abundant forage resources results in higher winter mortality, especially fawns. Measured fawn mortality rates during severe winters have been as high as 60% in D-7. Adult doe mortality during severe winters in D-7 is usually less but in recent years has started to exceed 20%.

Perhaps more important than how much winter range has been lost, is where these losses have occurred in D-7. The quality and importance of winter ranges across D-7 are not equal. A series of large-scale wildfires in the late-1980s, early-1990s and early-2000s in GMU 11 converted over 50,000 acres of critical high-density mule deer winter range habitats dominated by bitterbrush shrublands and pinyon-juniper to grassland habitats (Figures 21 & 22). The impact of these burns were three-fold: 1. it resulted in a significant loss of browse in extremely critical high density mule deer winter range within the D-7 herd, 2. it increased mule deer densities and browse pressure on the existing remnant pockets of bitterbrush that remained, and 3. the conversion of the landscape from a bitterbrush shrub dominated community to an open grassland created thousands of acres of elk winter range. The deer densities across the critical winter ranges that were lost were the highest densities in the DAU and dramatically lowered the carrying capacity of the D-7 herd. Furthermore, the effect the wildfires had resulted in increased deer densities on remnant bitterbrush patches spared by wildfires. This caused an increase in browse pressure, which in turn, negatively affected the quality of the habitat that remained. Ultimately, this leads to increased mortality through time as deer are lost through attrition if harvest rates are not adequate to balance compensatory losses. The wildfires have resulted in large concentrations of elk wintering in these areas and created a scenario in which elk are now directly competing with deer for forage resources on winter range. This is especially true during severe winters when elk seek out browse on winter ranges when grass dominated winter ranges are under deep snow and the energy demands required to paw through the snow are high.

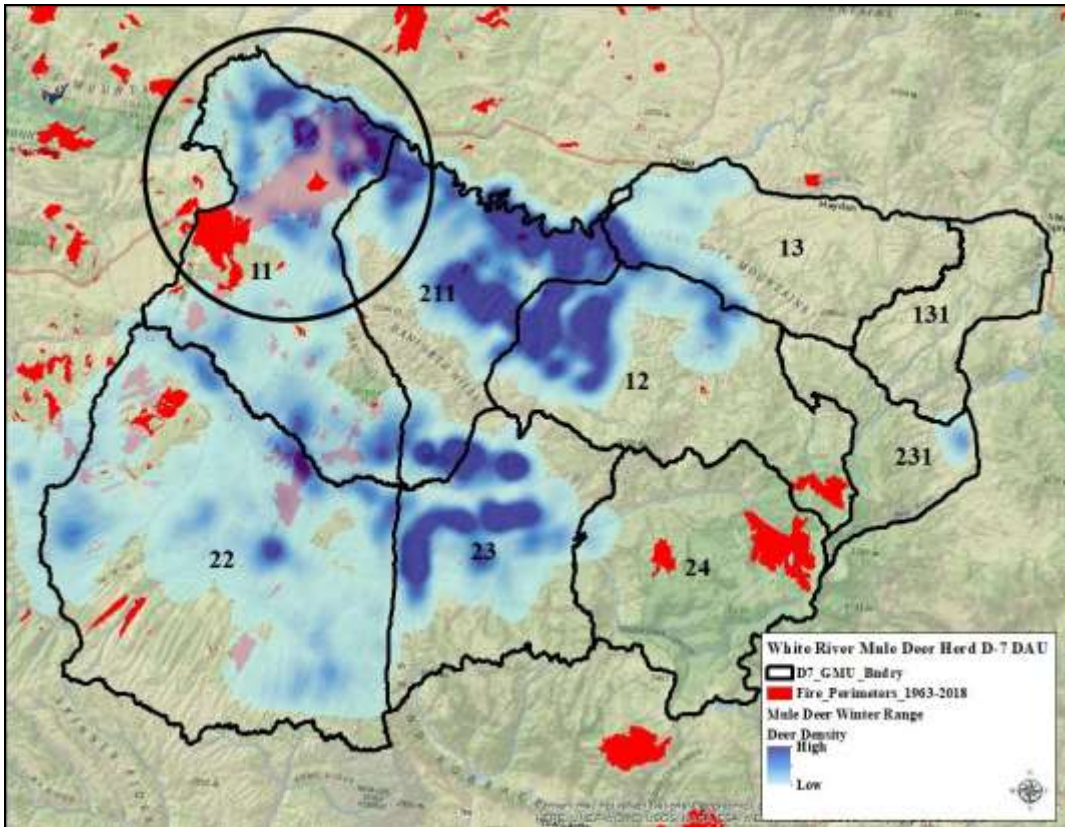


Figure 21. White River DAU D-7 mule deer winter range densities and fire perimeters from 1963 - 2018.

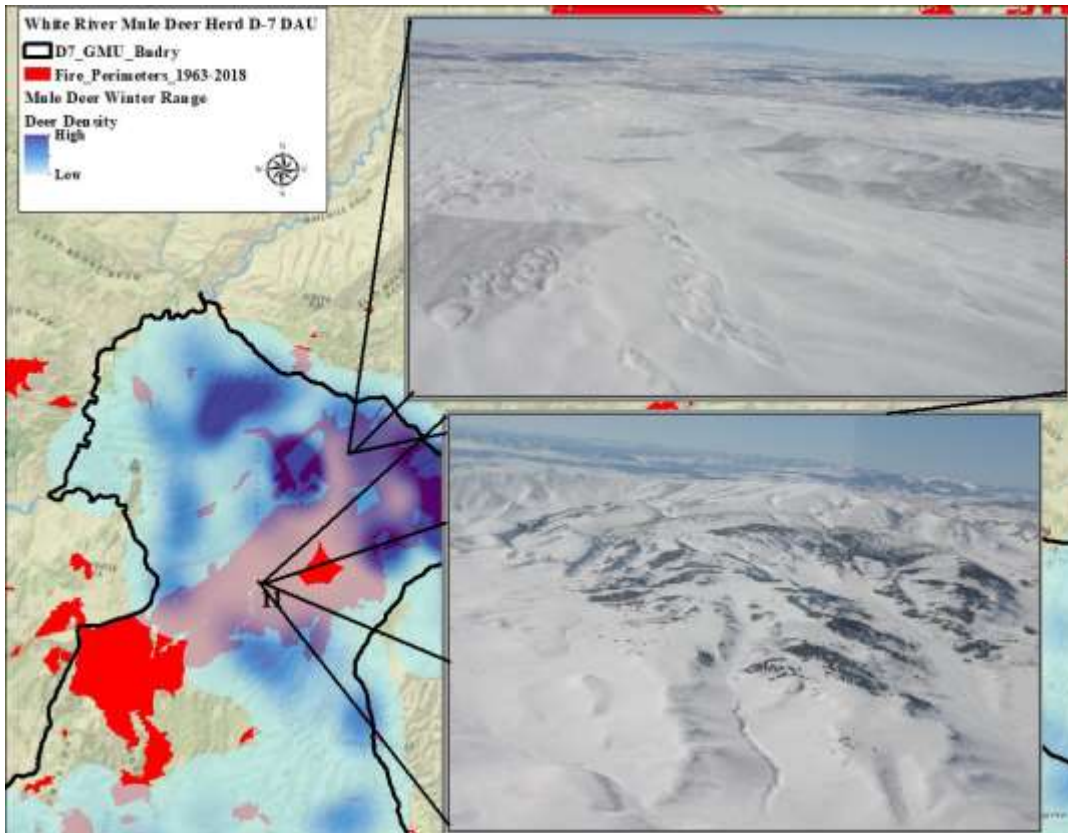


Figure 22. Pictures show the loss of brush due to wildfire on high-density mule deer winter range in northwestern portion of D-7. The capacity for these ranges to support wintering mule deer has diminished significantly.

In addition to the direct loss of winter range habitat in northern portions of GMU 11 due to fire, is the degraded quality of winter ranges in the northern portions of the DAU due to drought and overuse by high wintering deer densities. Varying levels of sagebrush mortality is evident across much of the winter range throughout Axial Basin, Duffy Mountain, and Juniper Mountain in the northern portions of GMU 211. Some of the sagebrush mortality within Axial Basin can be attributed to chemical herbicide applications aimed at controlling invasive weeds like whitetop (hoary cress - *Lepidium draba*) (Figure 23). The spread of whitetop throughout Axial Basin has been challenging for land managers. If left untreated whitetop will take over and out compete desirable native plant species. Effectively treating whitetop within Axial Basin required aerial spraying which also killed the sagebrush. On Duffy and Juniper Mountains, sagebrush mortality appears to be occurring due to prolonged drought and overuse. Some of the sagebrush mortality is subtle with only partial mortality occurring on individual bushes while other shrubs are completely dead (Figure 23). Old, decadent stands of sagebrush also occur across these winter ranges and severe hedging from overuse can be observed.

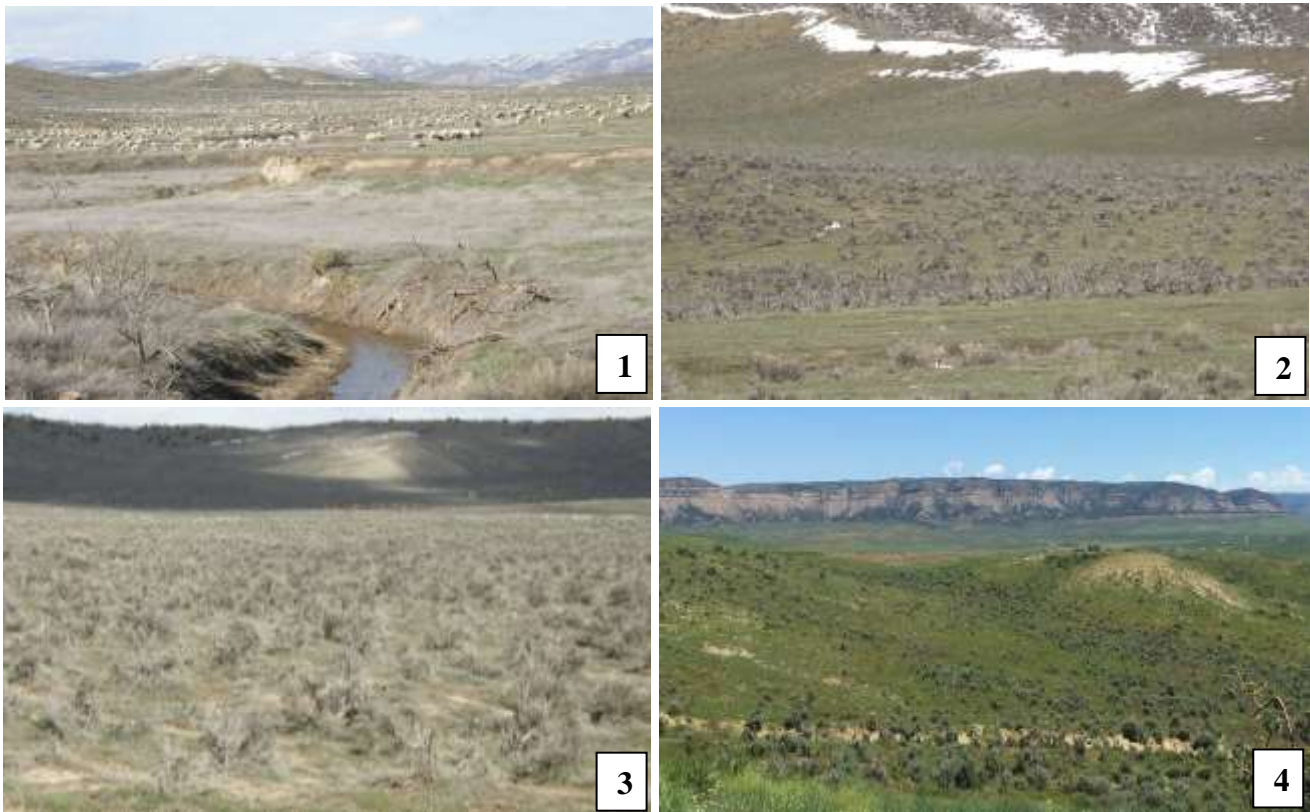


Figure 23. Photo 1 - shows loss of sagebrush in drainage due to herbicide treatments to control whitetop infestation in northern portion of Axial Basin. Photo 2 - shows herbicide treatment meant to increase herbaceous understory on mule deer winter range in southern portion of Axial Basin. Photo 3 - shows sagebrush in poor condition due to high intensity winter use by mule deer and domestic sheep in central portion of Axial Basin. Photo 4 - shows high intensity use sagebrush by mule deer on winter range in eastern portion of Axial Basin.

On winter ranges across southern portions of the DAU subtle losses in sagebrush mortality to drought and diminished total shrub cover have been observed. For example, photo points from habitat monitoring on CPWs Oakridge State Wildlife Area shows the subtlety of individual sagebrush that have died back when comparing photos taken in 2014 compared to 2019 (Figure 24). This indicates a slow loss of browse vigor due to heavy pressure from deer and elk use on Little Oak Ridge, something that is minor and slow but cumulative over time and hard to quantify without repeat photos and measurements.

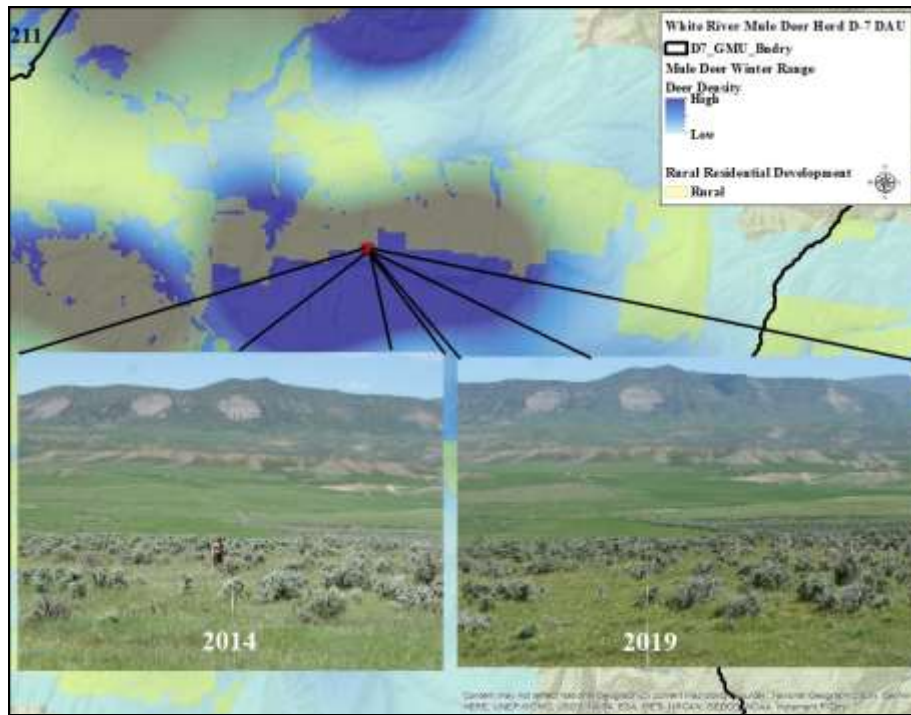


Figure 24. An example of loss of winter range due to rural residential development and subtle changes in sagebrush mortality occurring on high deer density winter range habitat due to drought and heavy browsing by wintering deer on Little Oakridge east of Meeker, CO. (Note the difference in color of sagebrush between 2014 (sage-green) vs 2019 (gray-woody) images (photos courtesy of Brian Holmes).

Evidence of poor habitat quality is apparent based on an increasing trend in malnutrition related mortality being observed in radio-collared deer that are part of the D-7 mule deer survival study (Figure 25). Based on bone marrow condition, a higher number of radio-collared deer are dying due to malnutrition on winter ranges in the northern compared to southern portions of the DAU. Further discussion of observed malnutrition mortality is discussed in the Habitat Resource section of this plan.

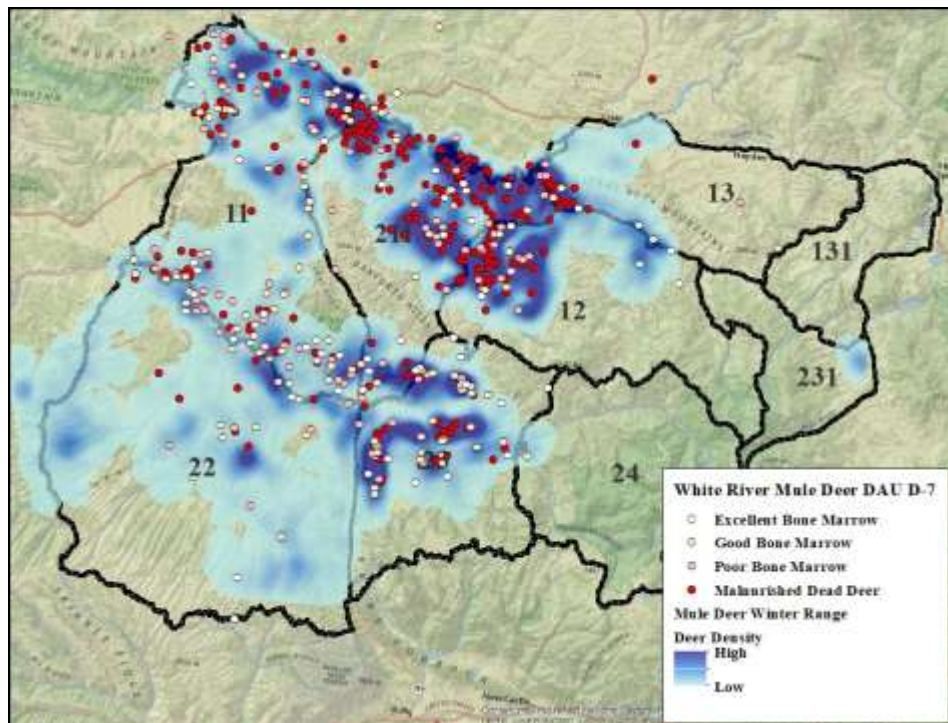


Figure 25. Bone marrow condition of mule deer mortalities from radio-collared deer in D-7 2001-2019.

Long-Term Mule Deer Population Objective

Establishing a herd management plan population objective is challenging when trying to strike a balance between public desires to grow the D-7 deer herd while considering all factors affecting population dynamics within the herd. These challenges are increasingly difficult when constituents' references are based on past peak population benchmarks. Shifting benchmarks are common when it comes to mule deer management across the West. In general, mule deer populations in Colorado have been declining over the last 60-70 years (Gill et al 2001). Long-term population objectives for the White River deer herd are a reflection of that same trend over the past 40 years. Current D-7 mule deer population estimates are a third of what the population objective was in the 1980s and half of the objective set in 1994. D-7 is one of the most researched deer herds in Colorado and it's notoriety as the largest migratory deer herd in North America presents challenges when it comes to expectations of how the D-7 herd should perform and perceptions of what the long-term population objective should be.

Factors affecting herd performance are very complex and require reflection, consideration of multiple factors, and historical perspective. Wildlife population dynamics are directly tied to changes that occur on the landscape through time. A combination of several factors effecting changes across the landscape have had an impact on the D-7 mule deer population including; weather, habitat quality, habitat quantity, predators, highway mortality, disease, competition with elk, recreational impacts, mineral extraction, and harvest management strategies. These changes to the landscape are cumulative and have long-term impacts to mule deer populations. Some of the changes are positive and some are negative. However, perspectives and the impacts as to how, what, when, where and why the effects of these changes have on the landscape lag behind the changes themselves. In many circumstances, these changes are subtle and answers to these questions require research. Research requires time and it is often difficult to design research projects in wildland situations where multiple variables can influence the outcomes to the question trying to be answered. Thus, often times wildlife managers are reactionary when attempting to implement management actions to correct for changes that have occurred on the landscape. Some of these changes are irreversible or can have long-term impacts on deer populations based on where changes occur on the landscape. Although not as evident as other places in Colorado, significant changes have occurred and are still occurring across the D-7 landscape.

Weather is perhaps the most influential factor affecting landscape scale changes across D-7. Weather patterns have affected habitat condition, which in turn effects the level of impact all activities have on the landscape. Prolonged drought cycles followed by severe winters have been recurring cyclical patterns in D-7 for decades (Figure 37). In fact, drought periods have intensified and become more persistent during past 20 years across the West ([National Drought Monitor](#)). However, the conservative approach to managing the D-7 deer population has not changed. The desire to achieve historic population levels on ever shrinking, less productive landscapes in an attempt to stockpile and grow bigger deer populations with more mature bucks during drought cycles only to have the population experience significant mortality during severe winters has been counterproductive. This management strategy has led to the trend of reduced long-term population objectives through time. Perspectives on setting future long-term populations for the D-7 herd need to change for both constituents and managers. Given the multitude of factors that have effected change across the D-7 landscape over the past several decades, it is an unrealistic expectation population objectives of the past are achievable. Instead, long-term population objectives should be based on herd health and management prescriptions that allow for long-term winter range recovery.

Data from intensive population monitoring efforts have provided managers with valuable insights into factors effecting mule deer survival within the D-7 herd. From 2001 to present, CPW managers have monitored survival rates for 1900 adult doe years, 1775 6-month old fawn winters, and 1059 adult buck years. This

survivorship data has provided managers with annual snapshots of what factors effect mule deer survival. Long-term, the trends in survivorship data have helped to provide insight into complex population dynamics occurring within the D-7 herd. Even more, advances in technology have allowed managers to replace VHF radio collars with GPS satellite collars, which allows for the collection of temporal and spatial use data. Understanding what factors are effecting mule deer survival in combination with population demographic and spatial data collected from annual classification flights and GPS collar data should be integral in setting long-term population objectives.

Survival and recruitment of fawns to adults (yearlings) ultimately determines mule deer herd performance. If annual adult doe mortality is greater than or less than female fawn survival, herd growth is either negative or positive. The diagram below illustrates population growth or decline based on recruitment of fawns from birth to the yearling age class (Figure 26). Annual mule deer population cycles begin with doe pregnancy rates. **Step 1** Fetal rates among pregnant does determines the potential number of fawns to be recruited for the year. **Step 2** Fawning within D-7 generally occurs from May 31st - June 30th. Not all fawns will survive parturition, so birth site mortalities result in losses from total fetuses. **Step 3** Neonate mortality from June 30th - December 15th results in additional losses within the population. **Step 4** Total birth site and neonate fawn mortality equals the ratio of 6-month old fawns recruited into the population as of December 15th. **Step 5** Over-winter survival of 6-month old fawns (December 15th - June 15th) determines the percentage of fawns recruited into the population as yearlings. **Step 6** Fawn sex ratios at birth are 50:50 and assuming half of the fawns recruited are does and half are bucks the number of yearling females per 100 does is added to the population. **Step 7** The difference between annual adult doe mortality and the number of yearling does recruited into the population results in net positive or negative population growth.



Figure 26. Mule deer annual survival and recruitment cycle resulting in annual population growth or decline.

Doe survival within the D-7 herd has averaged 82% from 2001-2019 (Figure 27). Overall, doe survival has been on a declining trend (Figure 28). Of particular concern is the nearly 6% drop in average survival since 2008. Prior to the severe winter of 2007-2008 doe survival averaged 85.6%. Since that winter, doe survival has averaged 79.8%. The most notable cause specific mortality changes through time have been an increase in predation and malnutrition the last four years. This recent trend is likely related to a combination of factors including increased CWD prevalence, poor winter range conditions, and increasing predator numbers. Relevant management actions needed to reverse the declining trend in doe survival within the D-7 herd have to be considered in setting the long-term population objective.

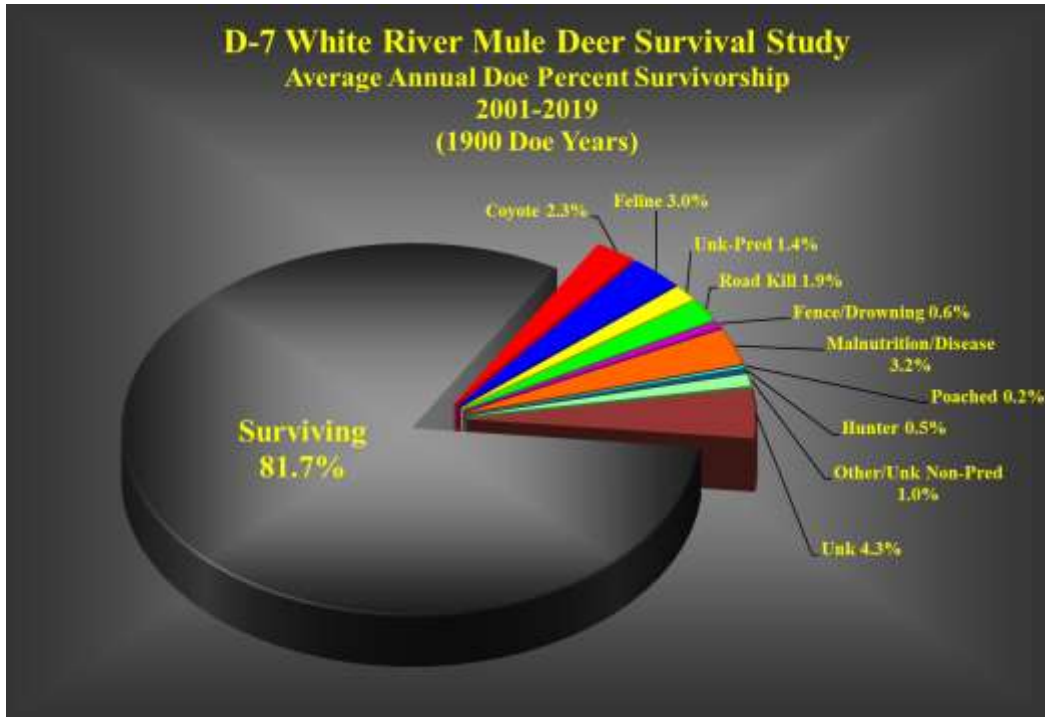


Figure 27. Cause-specific mortality for radio-collared doe mule deer 2001 - 2019.

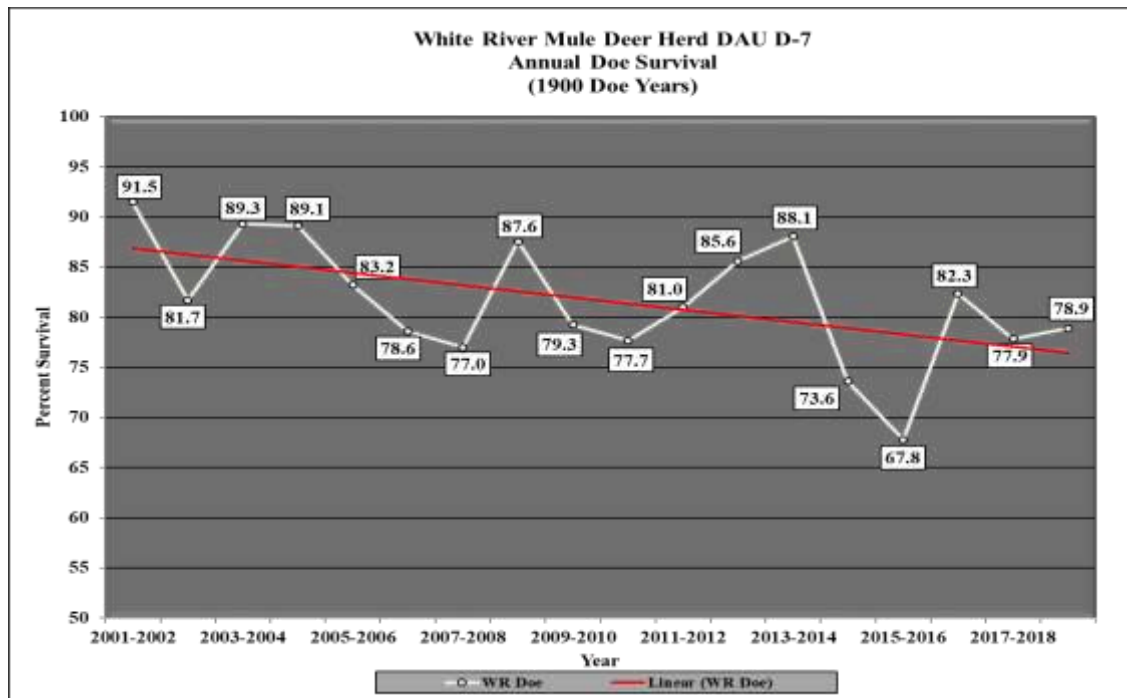


Figure 28. Annual doe mule deer survival from 2001 - 2019.

Over-winter fawn survival within D-7 has averaged 64% from 2001-2019 (Figure 29). Overall, over-winter fawn survival has exhibited a more stable trend (Figure 30). Cause-specific mortality data indicates density-dependence is playing a role in fawn survival. As with adult doe survival, there is more than a 12% difference between average fawn survival pre versus post winter 2007-2008. Prior to 2007, fawn survival averaged 72.2%. Since 2008, average fawn survival has dropped to 59.7%. Part of the reason for lower fawn survival is the above average snowfall that has occurred across winter ranges 7 out of the last 10 years. As expected, malnutrition mortality rates are high during severe winters; however, examination of femur marrow from fawn predation shows an increasing number of fawns are in poor condition even during less severe winters. Compensatory fawn mortality has to be considered when determining the future long-term population objective.

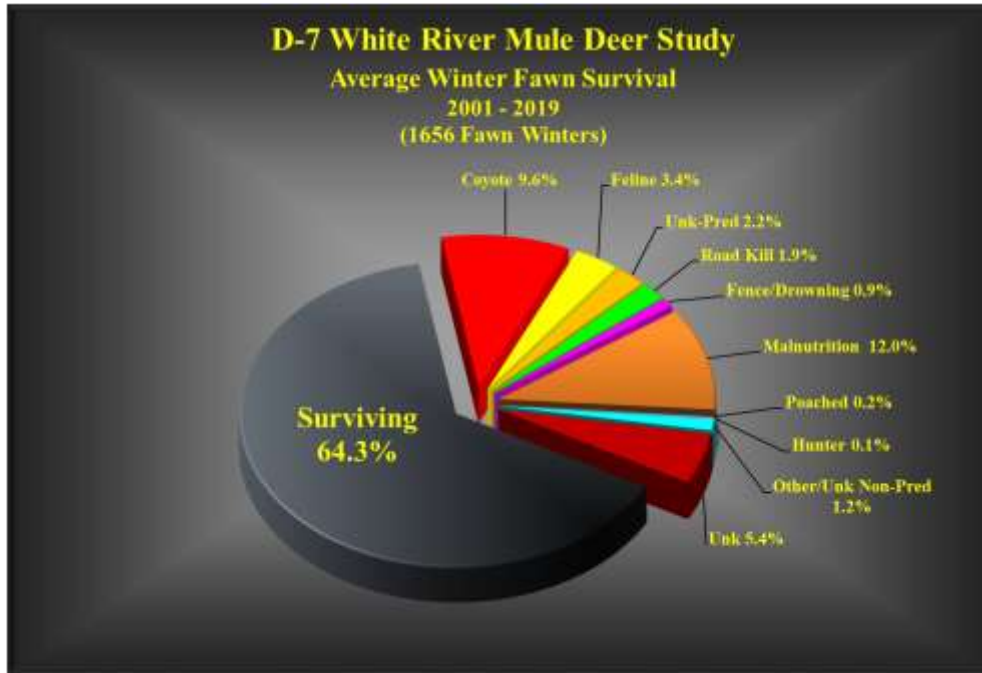


Figure 29. Cause-specific mortality for radio-collared mule deer fawns 2001-2019.

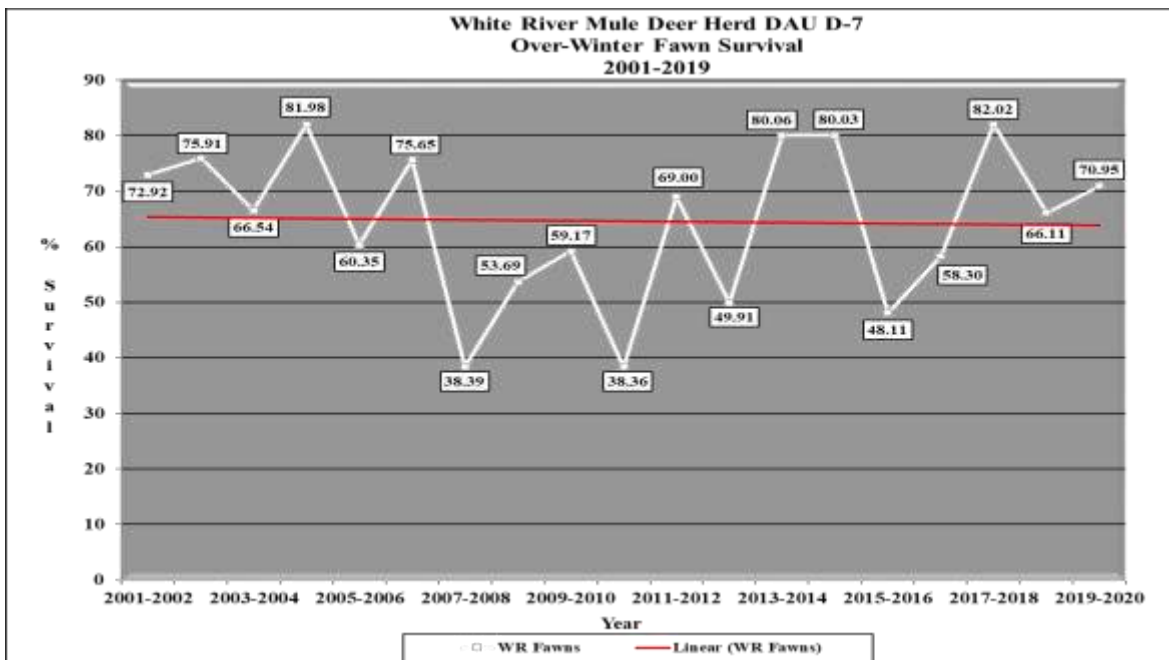


Figure 30. Over-winter mule deer fawn survival 2001-2019.

Buck survival has average 79.7% from 2008-2019 (Figure 31). Buck survival was stable from 2008-2014. Since 2014, average buck survival dropped significantly (Figure 32). From 2008-2014, buck survival averaged 85%, however, average survival dropped by almost 12% and has averaged 73.4% the past 4 years. This drop in survival coincides with increasing CWD prevalence within D-7 and an increase in CWD positive mortalities in radio collared bucks. Management actions up to this point have likely contributed to increased CWD prevalence and careful consideration should be given to future management as it relates not only to a long-term population objective but also to a sex ratio objective.

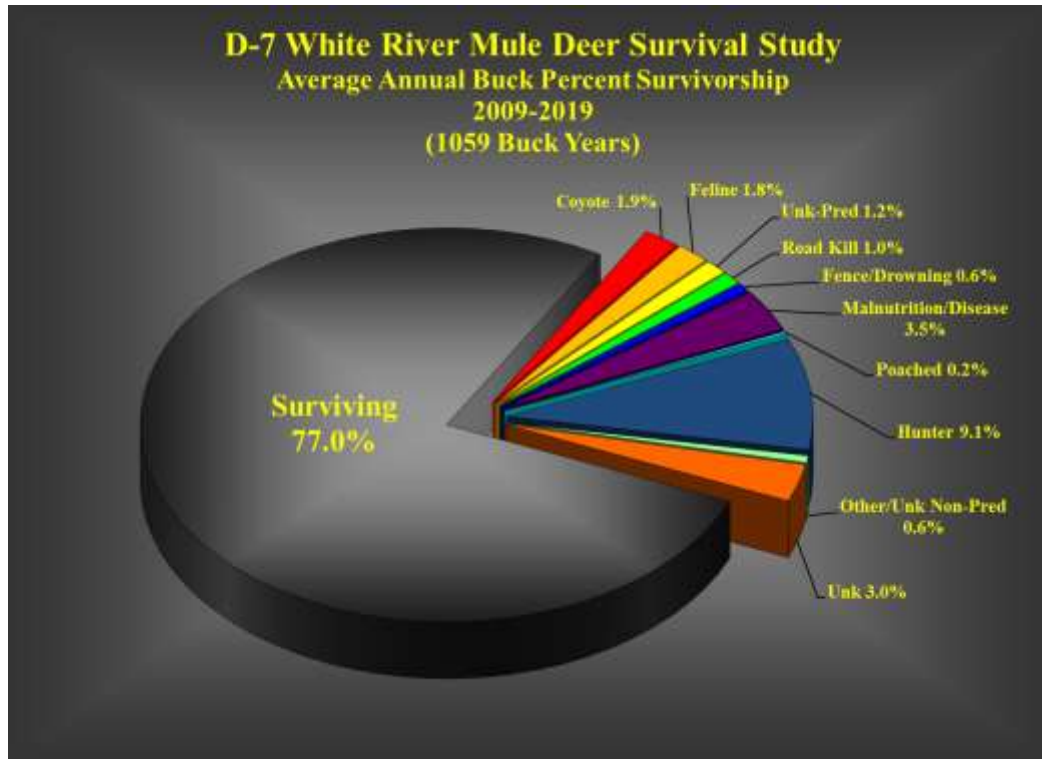


Figure 31. Cause-specific mortality for radio-collared buck mule deer 2001-2019.

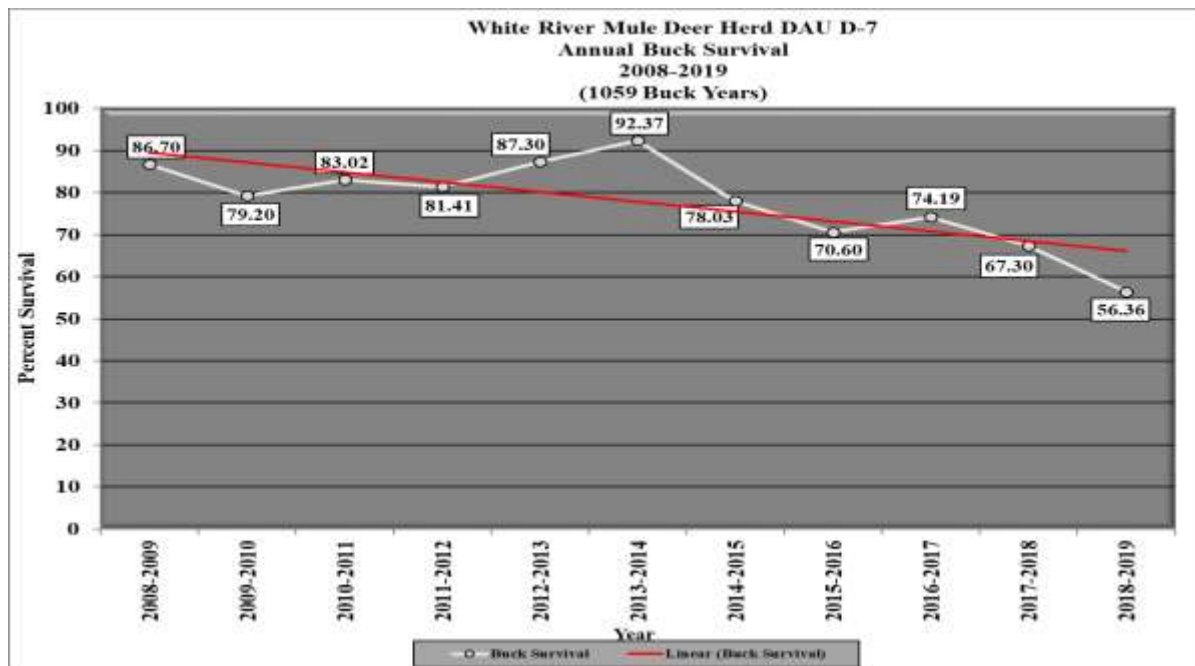


Figure 32. Annual buck mule deer survival from 2001-2019.

VI. HABITAT RESOURCE

ECOREGION

The White River mule deer herd is located within the Colorado Plateau Shrubland and Forest Ecoregion. Principle factors that affect mule deer population dynamics within this ecoregion are long duration, winter energy deficits and environmental extremes (drought and severe winters). This in turn factors into forage quality and quantity available to mule deer and effects an animal's body condition.

Deer within the D-7 herd are migratory moving from high elevation summer ranges to lower elevation winter ranges to escape deep snow at high elevations. Lower elevation winter ranges are most critical to limiting the mule deer population in D-7. Winter ranges within the DAU are more susceptible to drought and vulnerable to overuse by both wildlife and livestock. Sustained drought combined with severe winter can have long-term negative effects on plant vigor, which can in turn affect winter deer survival.

HABITAT DISTRIBUTION

Habitat within a DAU is classified by seasonal use. Wildlife distribution across those habitats is used to determine the seasonal importance of specific ranges to various wildlife species. CPW uses a GIS based Species Activity Mapping (SAM) program to map seasonal ranges and activities. Data used to map these features are typically gathered at a scale of 1:24000 or 1:50000. Given the fluidity of animal distribution due to changes occurring on the landscape, species activity maps are updated every five years. Data from inventory flights, telemetry studies, and general field observations are all used to update changes in animal distribution.

Mule deer seasonal ranges or activities are classified into 11 different categories including; overall range, summer range, concentration area, winter range, winter concentration area, sever winter range, resident population, limited use, migration pattern, migration corridors, and highway crossing. The most relevant seasonal ranges within D-7 are summer, winter, and transitional (migration corridors).

Principle habitat components for any wildlife are food, cover, water and space. The arrangement of those components on the landscape are important to habitat function and utilization by mule deer. Mule deer dietary requirements vary seasonally. Quality seasonal mule deer ranges require a mixture of trees, shrubs, forbs, and grasses. Deer will preferentially select for areas with seasonally important forage resources within close proximity to cover and water. Seasonal availability of various plants and seasonal metabolic requirements of deer influence the selection of forages throughout their range.

Spring Transition

Due to the migratory nature of the D-7 mule deer herd, transitional habitat between summer and winter ranges is important. Migration movements between seasonal ranges in D-7 are very broad scale (Figure 33). Migrations through transitional ranges are traditional, learned behaviors passed on generationally within family groups of deer. Some of these migrations are extensive (50-70 miles) and others are relatively short (10-20 miles).

The seasonal transition from winter to spring can be extremely challenging for mule deer as a dietary shift occurs from a low nutritional woody shrub dominated winter diet to emergent green grasses and forbs. Energy reserves are lowest and animals are generally in their poorest nutritional condition. The transition from a low quality diet to consuming highly palatable, succulent herbaceous plants rich in protein is

important to recovering body condition this time of year. Migratory deer are able to capitalize on these emerging highly nutritious plants by following spring green-up back to higher elevation summer ranges.

However, delays in snowmelt and cold, wet spring storms can be devastating to deer at this critical stage. The spring of 1992-1993 and spring of 2008-2009 are two examples of high fawn mortality incurred in D-7 due to adverse weather conditions. Energy costs are highest for mule deer does spring through early summer. Does are trying to recover their body condition when nutritional forage resources are marginal all while migrating back to summer range, preparing for parturition, and the exponential increase in energy required for lactation in the successful rearing of a fawn. Thus, a doe's over-winter body condition and the timing of spring green-up are critical to increasing the success of a doe's pregnancy.

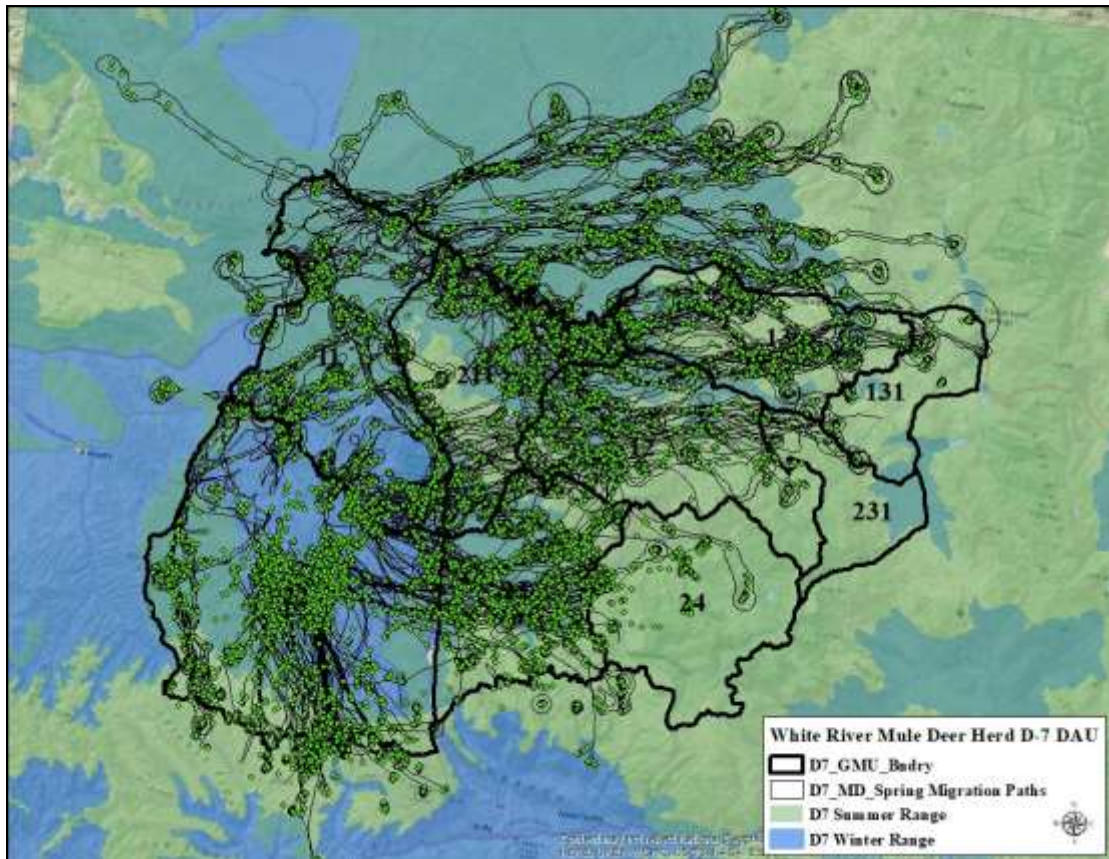


Figure 33. Brownian bridge movements and general migratory paths from GPS radio collared deer within the D-7 herd. Green dots depict mule deer locations during spring migration and outlines show migration paths of individual deer.

As landscape fragmentation increases because of human development and land-use changes, conserving the integrity of these habitats is critical to the continuity of migratory movement throughout these ranges. Deployment of satellite collars within the D-7 herd has helped to define transitional ranges and migratory movements of deer within the herd.

Summer Range

Mule deer summer range within D-7 is expansive and generally occurs across the entire DAU. Most deer summer at higher elevations within the DAU however, some deer are resident and occupy lower elevations year-round (Figure 34). High elevation summer ranges are primarily comprised of USFS lands although many deer summer at mid-elevations on private lands.

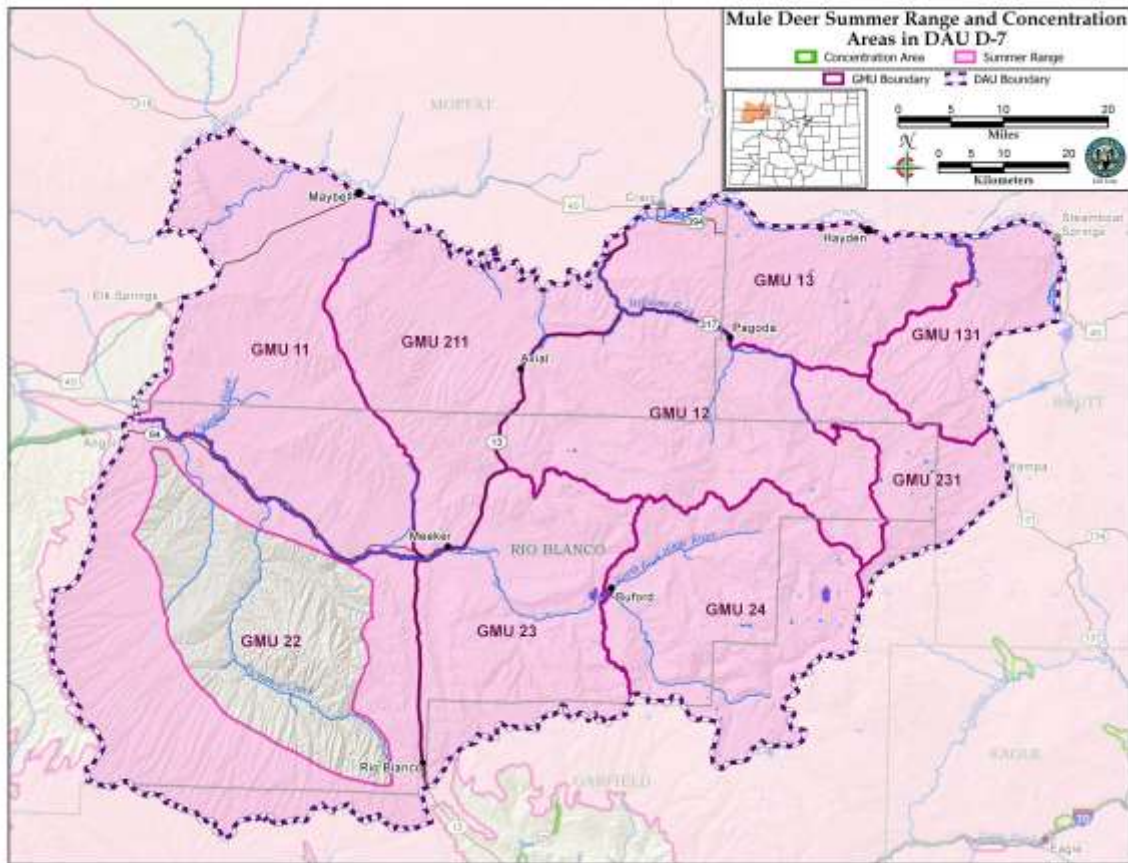


Figure 34. Mule deer summer range occurs across 90% (3710 mi²) of the DAU.

Summer range habitats can vary widely across the D-7 landscape. Habitat types at lower elevations include Wyoming big sagebrush and pinyon-juniper, mid-elevations contain mountain big sagebrush, mixed mountain shrub, and aspen, and higher elevation summer ranges are predominately aspen and mixed conifer forest. Plant diversity and production is higher at mid to high elevation summer ranges. Nutrition on summer ranges is generally not a limiting factor for mule deer. Historically naturally occurring wildfire played a major role in the ecology of these habitats. Suppression of fire on summer ranges has resulted in older and more decadent mixed mountain shrub, aspen, and mixed conifer forests more susceptible to disease, insect infestations, and catastrophic wildfires. Drought is believed to have had a significant impact on mid-elevation serviceberry and aspen habitats. Many aspen clones at mid-elevations are dead or dying with varying degrees of regeneration. Drought stressed serviceberry have been top-killed from a leaf blight. The effects of the blight are widespread, however, many of the shrubs effected appear to show signs of basal sprouting.

The optimum combination of cover types on summer ranges includes 40% of the area that is a mosaic of hiding, thermal, or fawning cover and 60% foraging area (Olson 1992). Dietary shifts occur over the course of the summer. As grasses dry and cure mid-summer, mule deer transition to forbs and shrubs. By mid to late summer, forbs and leaves can comprise up to two-thirds of the diet. As forbs senesce, deer replace forbs with shrubs in their diet.

Although riparian areas comprise a small portion of the landscape, they are of high importance for mule deer. The optimum combination of cover types occur in these small areas and provide year-round forage for deer. Higher water tables within riparian zones support more diverse plant communities with extended

green periods when surrounding uplands dry out providing deer with access to nutritious grasses, forbs and shrubs.

Fall Transition

The path taken during fall transition along migratory routes often mirrors the path from spring migration (Figure 35). Fall transition in D-7 occurs from higher elevation summer ranges to lower elevation winter ranges. As mule deer descend in elevation in fall, their diets shift and contain a higher percentage of browse and mast (acorns/berries) from mixed mountain shrub species. Depending on the distance between seasonal ranges and weather, the amount of time spent and intensity of use on transitional ranges can vary. During winters with lighter snow cover, mule deer may remain within transitional ranges longer, where forage quality and plant diversity is often higher than lower elevation winter habitats.

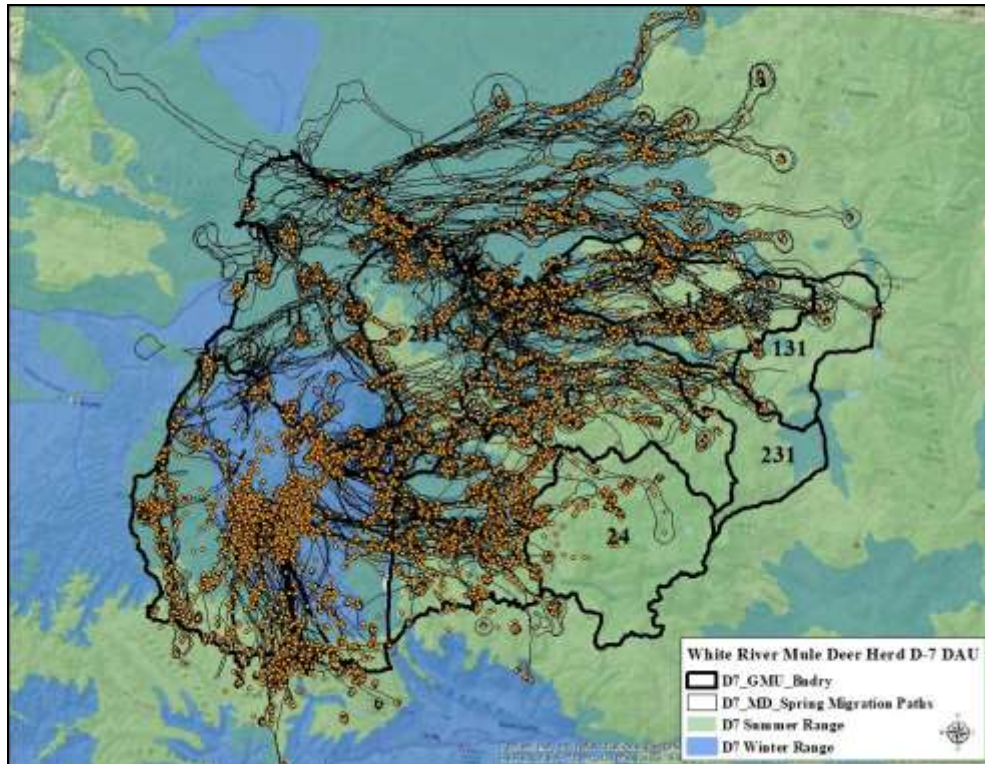


Figure 35. Brownian bridge movements and general migratory paths from GPS radio collared deer within the D-7 herd. Orange dots depict mule deer locations during spring migration and outlines show migration paths of individual deer.

Energy requirements differ for bucks, does, and fawns during the fall. Bucks spend less time foraging this time of year during the rut so quality of summer and fall transition forage resources are important to body condition considering energy requirements needed during the rut. Increased activity levels result in depletion of fat reserves going into the winter. In contrast, doe body condition improves as fawns are weaned and the demands of lactation decrease. Body condition of does effects timing of ovulation, conception, and fecundity (Tollefson et al. 2010). Odds of winter fawn survival increases for fawns with access to high quality forage. Fawns on a higher nutritional plane have larger body mass, which translates into higher survival rates and subsequent recruitment into the population.

In addition to weather, human activity can also influence time spent in transitional ranges. Deer tend to spend less time in highly developed areas by increasing the rate of movement through or altering the use of habitats within these areas (Sawyer et al. 2013, Lendrum et al. 2013). Where disturbances occur and at what level can potentially have a significant impact on deer population dynamics. Therefore, knowing how

deer use transitional ranges is important to making informed land-use decisions in order to avoid or minimize impacts to these critical transition ranges.

Winter range

Forage quality and abundance are at the lowest levels while energy demands are highest during winter months. Browse from the leader growth of shrubs comprise the bulk of the deer diet. Important winter browse species across winter ranges within D-7 include Wyoming big sagebrush, black sagebrush, antelope bitterbrush, serviceberry, rabbitbrush, true mountain mahogany, Gambel oak, snowberry, four-winged saltbush, shadscale saltbush, and winterfat. Dietary quantity and quality are highly variable, with significant declines in digestible nutrients during the winter. Regardless of habitat type, nutritional gains from consuming winter browse is often less than the energy expenditures resulting in depletion of fat reserves as winter progresses. Body protein is often catabolized in order to survive the winter resulting in significant losses in body weight. However, the rate of weight loss can be reduced by improving winter range forage conditions. Enhanced nutritional condition can buffer the effects of the high energy demands needed to survive the winter.

Winter weather conditions influence mule deer distribution on winter ranges. Increased snow depths force deer to concentrate onto smaller landscapes within D-7. Generally, on open sagebrush winter ranges within the northern portions of D-7, deer concentrate in areas with open southern and western aspects where snow depths are minimal and access to forage resources are greater, although forage is limited. This differs from the southern portion of the DAU where deer tend to seek pinyon-juniper woodlands for thermal cover and lighter snow conditions allowing for increased mobility and requires less energy.

Mule deer winter ranges within D-7 are classified into 3 different categories; winter range, winter concentration areas, and severe winter range (Figure 36). Winter range is defined as that part of the overall range where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up. Winter concentration areas are defined as that part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten. Severe winter range is defined as that part of the overall range where 90% of the individuals are located when the annual snow pack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten.

The DAU contains approximately 2,262 mi² of winter range, 1025 mi² of winter concentration areas, 861 mi² of severe winter range. Just over half, 55%, of the landscape within D-7 is classified as winter range. The highest proportion of winter range occurs within the western portion of the DAU in GMUs 11, 211, and 22. The western most portions of GMUs 12, 13, and 23 also serve as important winter range. Severe winter range and winter concentration areas are the most critical within the DAU. The highest concentrations of deer occur in these areas when winter conditions are most severe, however, winter concentration areas and severe winter range are most limited across the landscape. Only 25% of the winter range within D-7 is classified as winter concentration areas and even less, 21%, is classified as severe winter range.

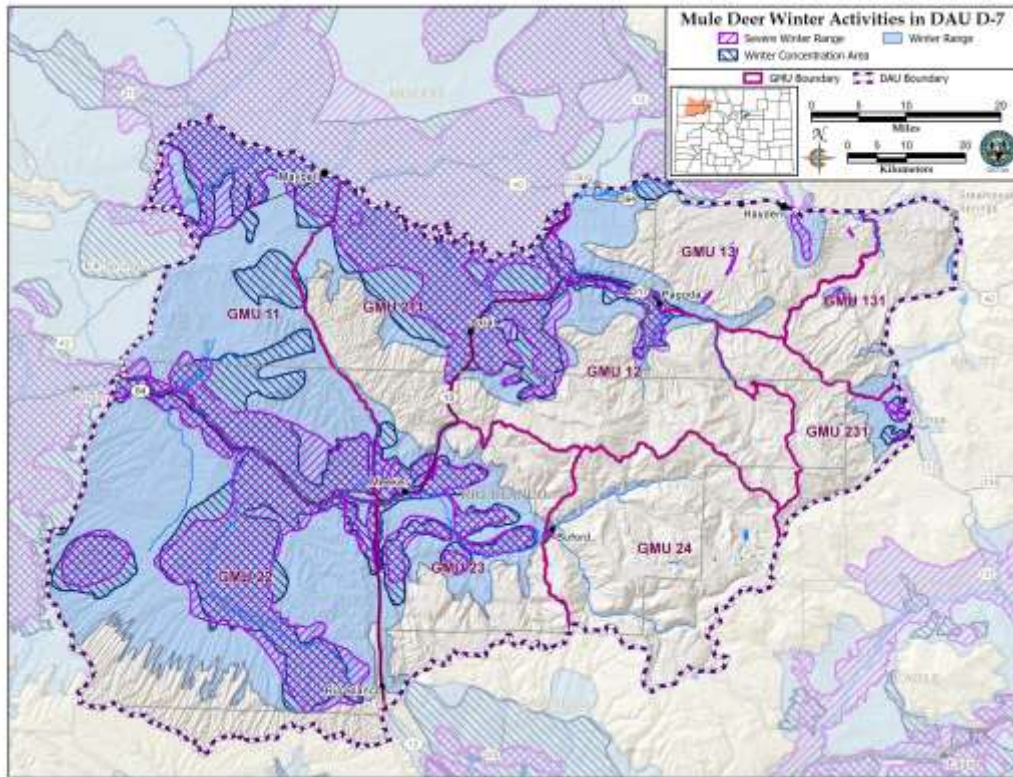


Figure 36. Winter range within the White River Deer DAU D-7.

HABITAT CONDITION, CAPABILITY, AND FUNCTION

A fundamental question that should be asked when assessing habitat function, condition, and capability in regards to mule deer populations is... Are more deer better?

To answer that question managers must evaluate what they know about population demographics, survival rates, recruitment, and body condition of animals within a herd. These feedback loops provide insights into overall herd health and population levels relative to the nutritional carrying capacity of the habitat. Generally, winter range habitats are the limiting factor for mule deer population size during average to severe winters. Further complicating the question, the quality and quantity of winter range available to mule deer within a given herd is not constant. Drought, severe winters, fire, overuse (both wildlife and domestic), changes in vegetation, and development (suburban, rural residential, oil and gas, solar, recreational, etc.) all effect habitat condition, capability, and function. The impacts all these variables have on population dynamics within a herd are not immediate and change the long-term sustainability of historic or desired population levels making it difficult or impossible to achieve desired outcomes due to habitat constraints.

HABITAT CONDITION

Weather

Annual variations in seasonal precipitation affect habitat conditions, which drives distribution, reproduction, survival and ultimately abundance of mule deer. Perhaps the most critical weather related periods effecting herd performance in D-7 are April-June and December-March. Seasonal precipitation April-June

affects woody plant growth on winter range that deer rely on for winter forage, December-March. Snow depths and minimum temperatures effect winter survival.

Data gathered from four Western Regional Climate Center weather stations scattered across D-7 winter ranges shows annual precipitation across winter range can be highly variable (Figures 37). The 1950s were a decade of above average snowfall with 7 out of 10 winters receiving greater than 60 inches of snow across mule deer winter ranges. In contrast, it was unseasonably dry from April-June throughout the '50s with 8 - 10 growing seasons receiving below average precipitation. The dry early growing season moisture pattern continued into the early 1960s paired with more average winter snowfall. Weather patterns shifted the second half of the '60s with above average annual precipitation and below average winter snowfall with the exception of a severe winter of 1967-68. Early spring moisture provided for ideal leader growth and abundant winter forage while below average snowfall allowed for high over-winter fawn survival. The 1970s were dominated by persistent drought throughout the early growing season resulting in declining forage conditions on winter ranges. Despite deteriorating winter range conditions, deer populations remained high due to mild winter conditions throughout the first half of the '70s. However, winter weather patterns shifted in the late 1970s and the frequency of severe winters increased. In fact, the two most pivotal severe winters in D-7 took place back to back in 1978-79 and 1979-80 (Figure 38). Snow depths during these two winters were unprecedented and resulted in the first accounts of elk moving west onto what had been traditional deer winter ranges. The long-term impacts this change in elk migration has had on once traditional deer winter range is a subject of debate, however, it is likely not a coincidence that mule deer population dynamics within the D-7 herd started to change shortly after elk distribution onto these once deer dominated winter ranges occurred. After back-to-back severe winters at the turn of the decade, dry early spring conditions persisted through the early-'80s accompanied by mild winter conditions. These conditions allowed for a quick resurgence of the deer population. Unfortunately, the winter of 1983-1984 abruptly ended this rebound in the deer herd. The severity of the 1983-1984 winter was devastating to the D-7 herd. Significant winter mortality occurred despite efforts to mitigate winter losses with supplemental feeding. Modeled estimates indicate deer numbers were at a peak going into the winter after more than a decade of below average precipitation. The cumulative effects of three severe winters in 5 years on the heels of almost two decades of drought and the highest sustained deer numbers on record have contributed to the downward trajectory of the D-7 herd since the winter event of '83-'84. In addition, the occupation of traditional deer winter ranges by elk has only compounded impacts to winter range habitats. While monsoonal moisture July through October provided for above average annual precipitation from 1981-1986, the late-1980s into the mid-1990s were extremely dry with numerous large-scale lightning caused wildfires resulting in significant losses in critical mule deer winter ranges. The one exception to this dry period was 1992 and 1993 when the combination of an average winter snowfall and late wet, cold spring caused significant over-winter fawn mortality. Above average annual precipitation was short-lived in the mid-'90s before giving way to another extended drought cycle from 1999-2004 (Figure 39). Despite the extremely dry conditions, the D-7 population was increasing during this time with below average snowfall and minimal winter weather related mortality. Following the prolonged drought conditions experienced through the early-2000s, above average precipitation levels returned from 2005-2009, including the severe winter in 2007-2008. Once again, the D-7 deer population was at a peak when the severe winter occurred. Winter range habitats were in poor condition due to the extreme drought conditions from 1999-2004. Sagebrush mortality was occurring due to drought and overuse from high deer numbers. The above average snowfall and cold, wet spring conditions from 2009-2011 resulted in poor fawn survival. In addition, another hard winter occurred in 2010-2011, once again concentrating deer on degraded winter ranges resulting in high fawn mortality. Other notable severe winter events occurred in 2012-2013 and again in 2015-2016 resulting in below average fawn survival. With only a couple exceptions, dry summers and above average winter snowfall have dominated the weather patterns throughout the 2010s. In fact, 2012 was one of the driest years on record, while above average snowfall has occurred 7 out of the last 10 winters. The combination of

summer drought and above average winter snowfall the last 10 years has further reduced the nutritional carrying capacities on winter ranges.

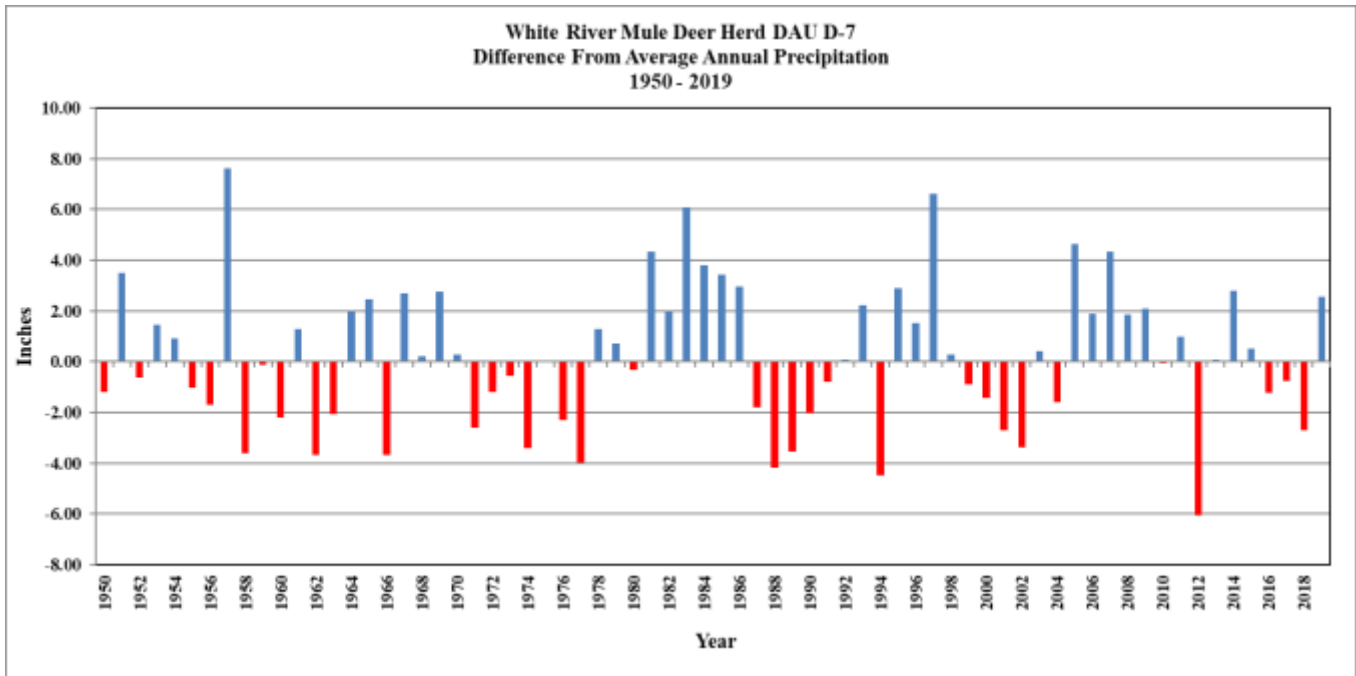


Figure 37. The difference from average annual precipitation across D-7 winter ranges from 1950-2019. Average precipitation is the x-axis (0.00). Blue bars = above average annual precipitation and red bars indicate below average annual precipitation (<http://www.wrcc.dri.edu>).

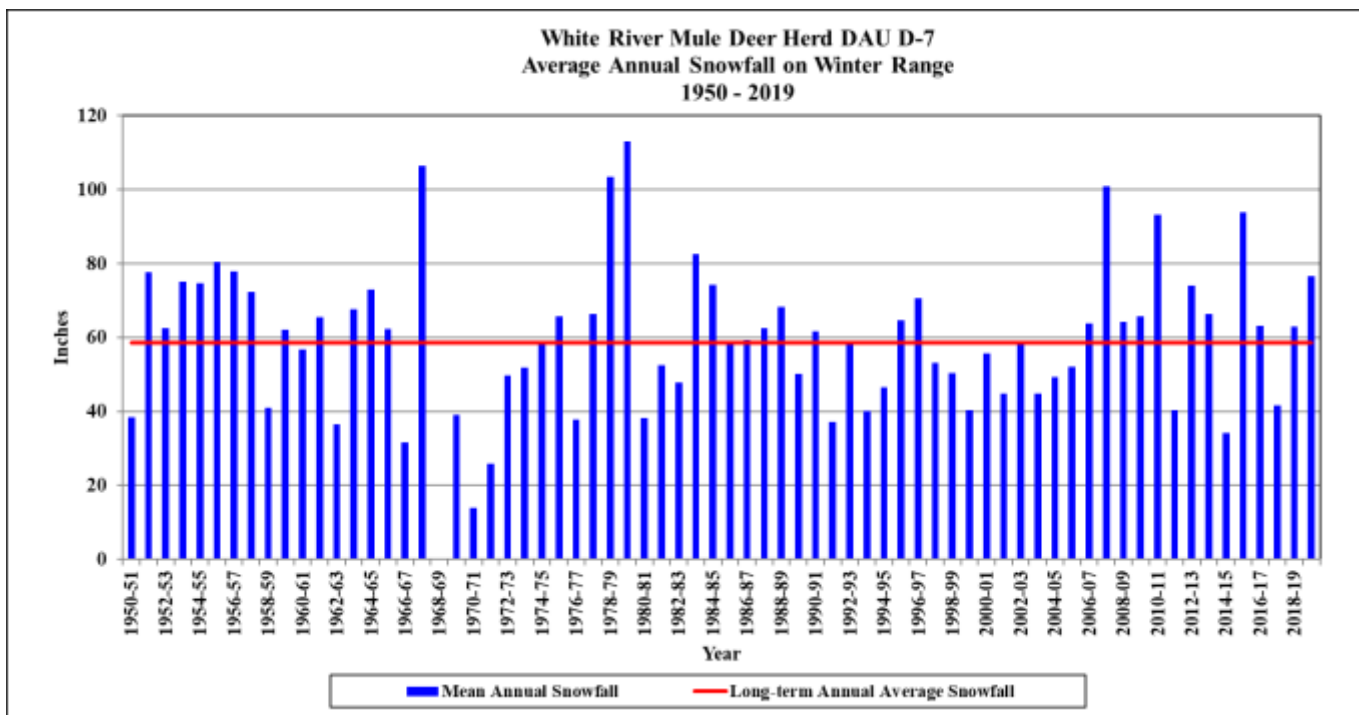
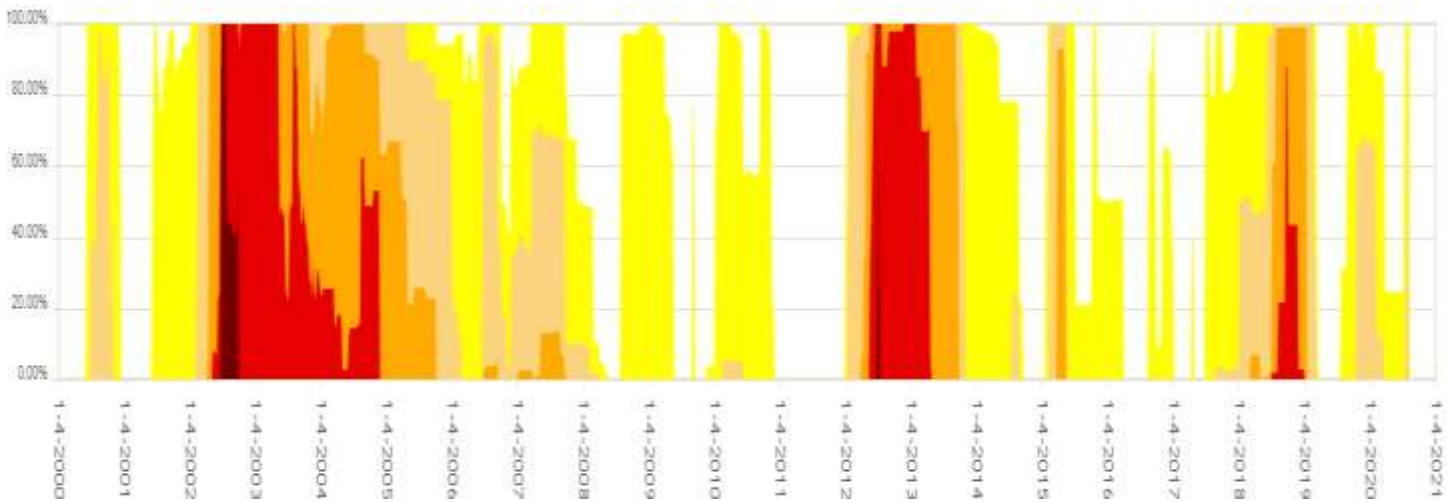
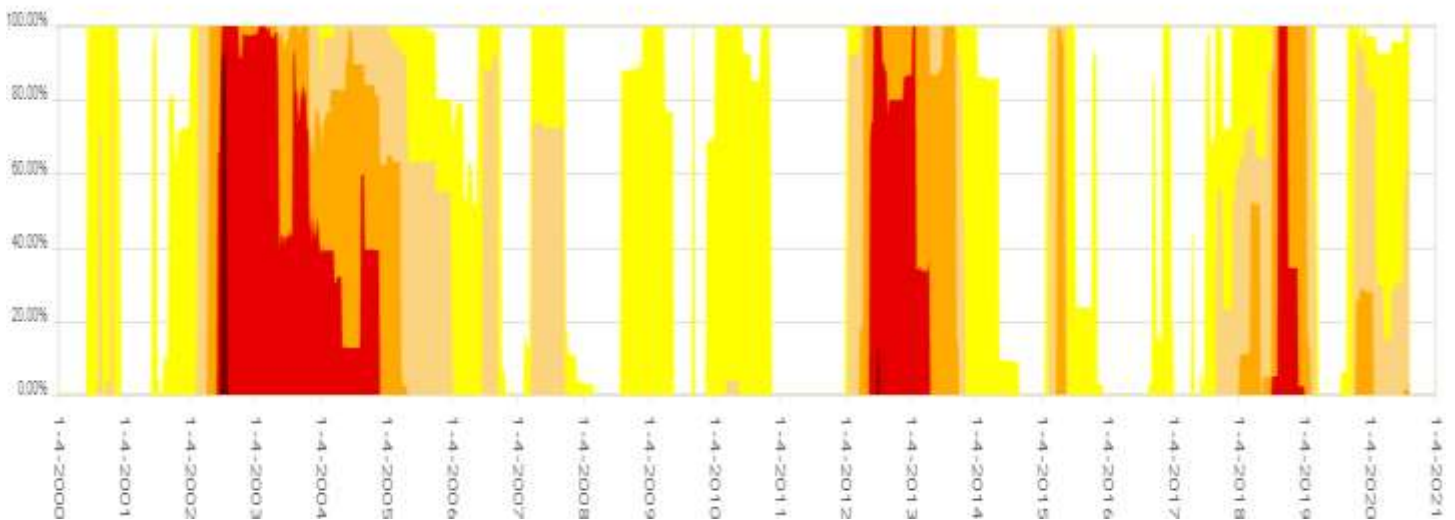


Figure 38. Average annual snowfall data from four weather stations on D-7 winter ranges (www.wrci.dri.edu).

Moffat County (CO) Percent Area



Rio Blanco County (CO) Percent Area



■ Abnormally Dry
 ■ Moderate Dry
 ■ Severe Drought
 ■ Extreme Drought
 ■ Exceptional Drought

Figure 38. Time series drought graphic illustrating persistent drought conditions across Moffat (top) and Rio Blanco (bottom) Counties. X-axis is time and Y-axis shows percent of area impacted by drought conditions (www.droughtmonitor.unl.edu).

The changes that occurred on winter ranges across the D-7 landscape from 1979-1993 were significant and reduced carrying capacity. Despite the degradation and losses of critical winter range due to drought, wildfire, and overuse, demands to manage for a larger D-7 deer herd persisted. The sentiment to grow the deer herd continued even though early growing season drought conditions from 1999-2007 further degraded overstocked mule deer winter ranges. With the exception of 2009-2011, the cyclical weather pattern of summer drought and above average winter snowfall has been consistent since 2007 (Figure 40). Yet, desires to increase deer numbers still factor into management decision even though data from radio-collared deer show evidence of reduced nutritional carrying capacities on winter ranges in northern portions of the DAU.

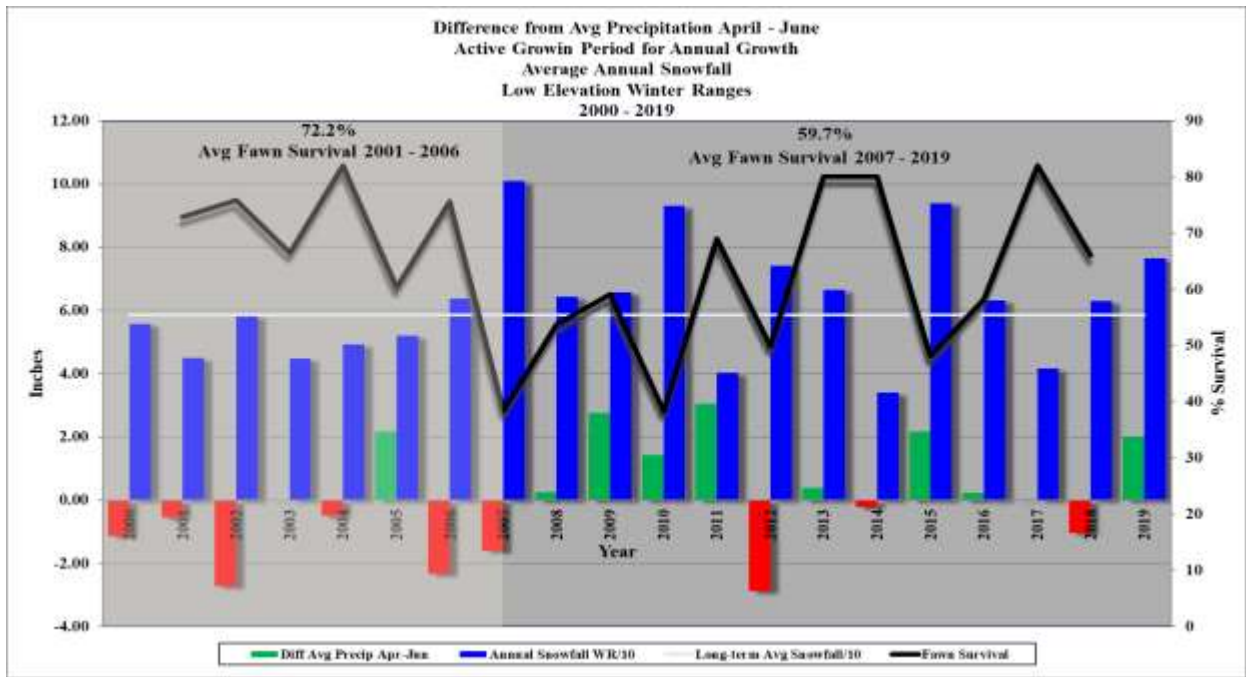
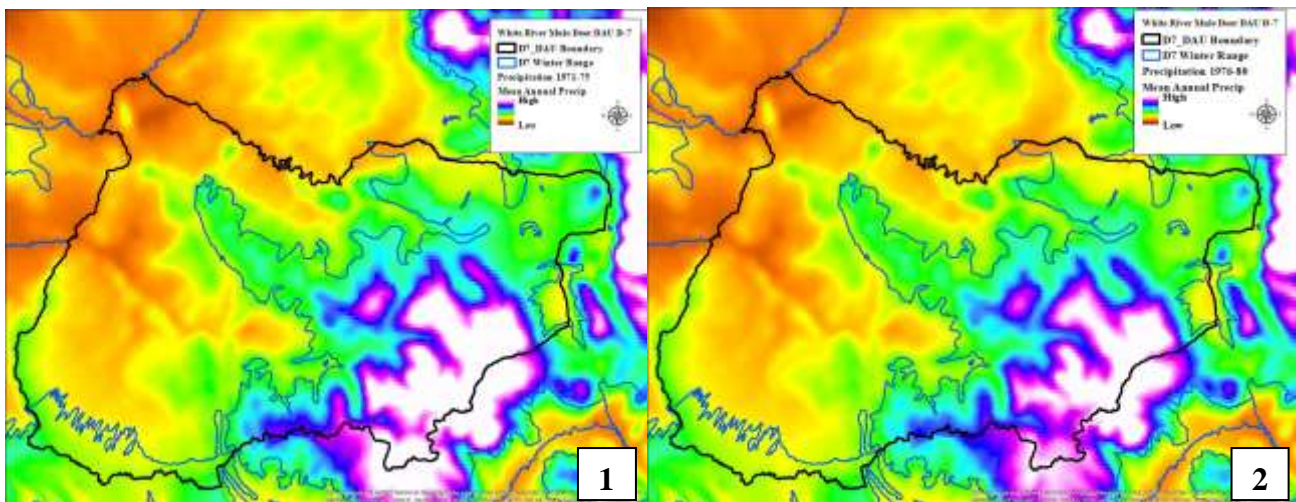


Figure 39. Graphic showing the effects of weather related events through time on over-winter fawn survival. Notable, are the high fawn survival rates during dry springs and below average snowfall compared to above average spring moisture and above average snowfall.

The timing of management actions aimed at growing mule deer herds during periods of prolonged drought and the cumulative effect these actions can have on habitat quality and quantity often do not receive adequate consideration. These impacts on the range are amplified further when deer numbers are highest going into a severe winter. The combination of all these factors have contributed to the inability to achieve desired population levels and objectives within the D-7 herd.

The series of maps below show 5-year intervals of mean annual precipitation trends from 1970-2010. The maps illustrate both temporally and spatially where drought impacts have been greatest on winter ranges (Figure 41). As discussed above, the most notable drought conditions impacting mule deer winter ranges occurred from the mid-1980s to mid-1990s and again in the early 2000s.



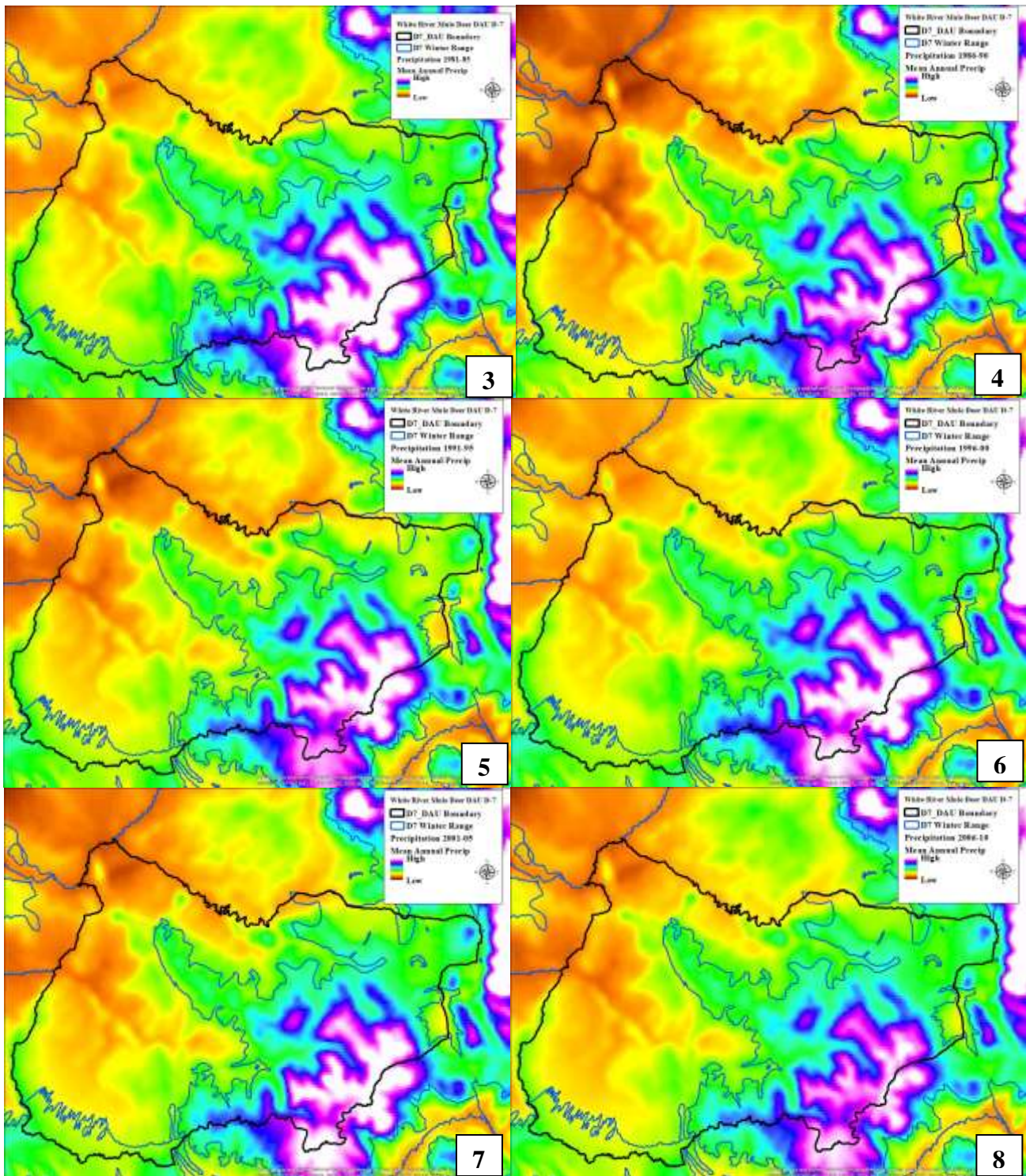


Figure 40. Time series of maps showing spatial and temporal drought conditions across DAU D-7. Yellow and brown portions of maps outlined by blue show mule deer winter range within D-7. Map - 1. 1971-75 (dry), 2. 1976-80 (dry), 3. 1981-85 (wet), 4. 1986-90 (dry), 5. 1991-95 (dry), 6. 1996-00 (moderate), 7. 2001-05 (dry), 8. 2006-10 (wet).

HABITAT CAPABILITY

There is no easy or accurate way to assess habitat capability (i.e., carrying capacity) for big game on a DAU basis. In 2001, legislation required CPWs Habitat Partnership Program (HPP) to assess habitat capability for each committee area statewide. As a result, a Habitat Assessment Model was developed as a tool to aid HPP

committees in discerning the relationships between wildlife populations and habitat sustainability. The model incorporated general habitat based management principles utilizing an Arc View platform. Although the model was a useful tool for evaluating different management options, it was a simplistic view of very complex systems. Software programs used to run the model became obsolete and the modeling program needs to be updated. Recently, researchers from CPW collaborated with spatial analysts from the Wildlife Conservation Society and Colorado State University to develop a GIS tool to quantify spatial and temporal land-use and land-cover changes in mule deer habitat across western Colorado over the past 40 years (Sushinsky et al. 2014). The objectives for this project were; 1. to map changes to deer habitat related to human development, fire suppression, weather, and plant productivity; 2. quantify cumulative degradation and loss of habitat; and 3. examine spatial and temporal changes to habitat conditions associated with observed deer population trends. Modeled outputs from this analysis illustrate how dynamic carrying capacities for deer populations can be and can shift dramatically depending on weather conditions, arrangement of habitat components, animal distribution, disturbance factors, and multispecies interactions. While modeling exercises provide managers great predictive tools, body condition and population productivity are probably the best indicators of density-dependent effects and habitat capability. Low reproductive success, high fawn mortality, and poor body condition are indicators a population is near or above the nutritional carrying capacity of the habitat.

Mule deer abundance is ultimately limited by the quality and availability of habitat. Factors that influence habitat quality include extreme weather conditions, invasive noxious weeds, fire, shrub eradication, overuse, and fragmentation. Quality habitat allows an animal to physically access the biological components needed for survival, including nutritious vegetation for growth and sustenance and security cover for thermal protection and predator avoidance. Mule deer are selective feeders with a diverse diet, always consuming relatively high quality foods with readily digestible nutrients like leaves, browse, and newly emergent grasses and forbs. Functionally, a mule deer's digestive system is dependent upon relatively high quality forage and low consumption rates when compared to more generalist grazers, such as cattle and elk. Nutritional requirements for mule deer require a variety of plant types including shrubs, forbs, and grasses, which vary across seasonal ranges.

Diverse plant communities are more beneficial for deer than single species communities. Varying seral stages of plant communities are also critical to mule deer. Generally, there is an inverse correlation between plant age and plant forage value. So diverse, early seral stage plant communities provide the best forage for deer. However, mixed age class plant communities are also important to provide for hiding and thermal cover.

Plant phenology across the landscape influences many factors effecting mule deer populations. Disturbance is key to maintaining high quality mule deer habitat. Historically, natural fire cycles and active forest management practices, such as logging, resulted in more diverse early seral stage plant communities. The diversity within these plant communities greatly benefited mule deer by maintaining vigor and productivity within the shrub communities. The browse provided by the leader growth from the young shrubs in early successional habitats are highly nutritious and digestible. Although weather patterns drive mule deer populations and influence productivity of vegetation communities, landscape-scale habitat treatments are needed to provide the habitat diversity needed to achieve long-term gains in mule deer abundance.

In addition, the amount of habitat available to mule deer in Colorado has changed significantly over the last century (Gruell 1986). However, the rate at which habitat loss has occurred within the last 50 years has accelerated considerably compared to the homesteading days of the late 1800s-early 1900s (Sushinsky et al. 2014). Settlement of the West resulted in intensive livestock grazing through the 1930's that actually increased the size, density, and vigor of shrub communities in Colorado and increased the amount of habitat

available to mule deer. The expression of vigorous shrub communities during this time along with aggressive and extensive predator control measures allowed deer herds to grow considerably and likely played a major role in peak population levels observed during the 1960s and 1970s (Gill et al 2001). These increases in habitat contrast greatly with the losses of mule deer habitat within the last 50 years. Changes in weather patterns resulting in more intense, longer drought periods and the direct and indirect losses of mule deer habitat due to the growth of Colorado's human population have been driving factors in trends in mule deer populations.

Density-Dependence

CPW places a high priority on mule deer management and research and devotes significant resources to better understand the interactions between several complex factors affecting herd performance. Identification of limiting factors is necessary to understand population performance and guide management (Bartmann et al. 1992, Gill et al. 2001 Bishop et al. 2009). The two primary variables often identified by public stakeholders and wildlife managers as limiting factors within the D-7 herd are whether habitat or predation are limiting population growth. Determining which of these variables is limiting has substantially different management implications. To inform management, five intensive population-monitoring studies have been implemented across the state to compare annual adult and over-winter fawn survival rates (recruitment of fawns to the yearling age class). The study areas represent various mule deer habitat complexes. D-7 was one of the DAUs selected as an intensive monitoring area.

Data collected from monitoring efforts has provided managers with important insights into population dynamics within the D-7 herd. Results from survival monitoring combined with relative deer densities on winter range based on post-hunt flight composition surveys were used to evaluate potential factors influencing herd performance within the D-7 mule deer herd. It appears density-dependence, predation, and disease are all playing a role in herd performance.

The nutritional condition of a mule deer plays a fundamental role in every life process including ovulation, conception, gestation, lactation, and survival. In addition, nutrition influences a deer's susceptibility to predation, ability to compete for resources, resistance to disease, and its ability to survive severe weather conditions.

To obtain sufficient nutrients mule deer require a high quality diet. In D-7, dietary needs vary seasonally as animals migrate between seasonal ranges. Growth promoting, high protein diets are needed in the spring from newly emerging grasses and forbs. Summer through fall deer select for leaves, new leader growth from shrubs, grasses, and flowering forbs high in carbohydrates as they attempt to put on fat to sustain the winter. Deer try to minimize energy expenditures and burn fat reserves to get through winter months. Winter diets are composed of low protein forage including leader growth from shrubs, dried forbs and grasses. Nutritional deficiencies realized from poor quality seasonal habitats can negatively affect productivity within a herd.

Poor bone marrow condition observed in radio-collared mule deer carcasses is evidence of potential nutrition deficiencies within the D-7 herd. Density-dependent effects are likely at play in the northern half of the DAU while predation may be more of a factor in the southern portion of the DAU. The White River DAU is bisected by the White River-Yampa River divide (Figure 42). The ridge complex separating mule deer winter range within the two drainages in the western portion of the DAU are the Danforth Hills. Cause specific mortality differences north and south of the Danforth Hills are evident.

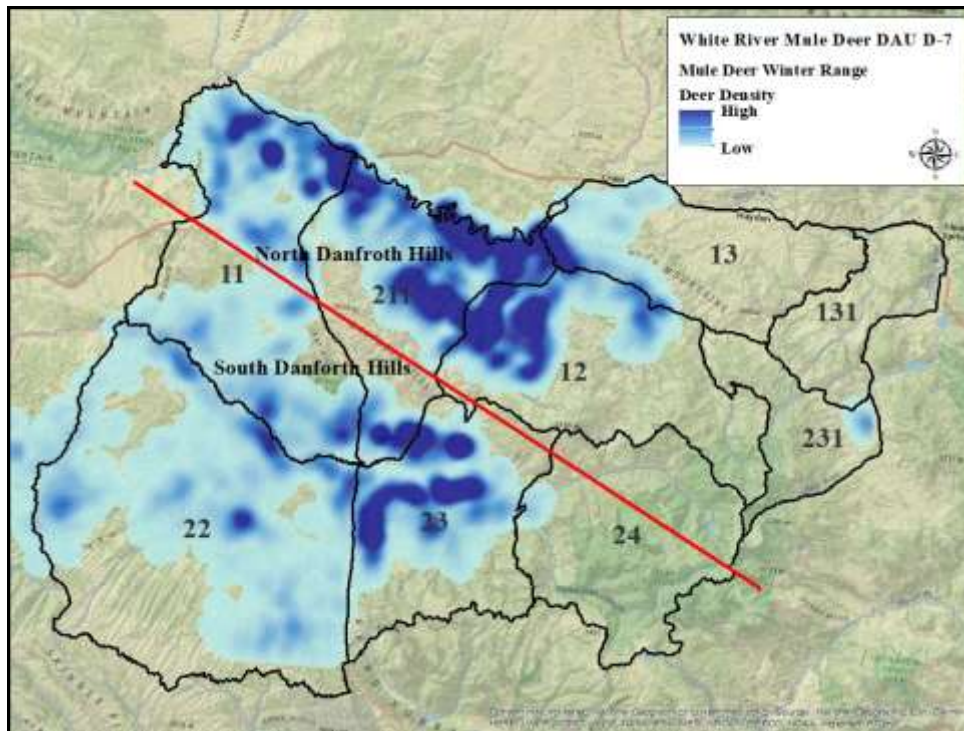


Figure 41. Mule deer winter range densities in the northern and southern portions of DAU D-7 with red line showing White River-Yampa River Divide.

As part of the D-7 survival study, nutritional condition of carcasses are assessed by examining femur or mandible marrow when investigating cause of mortality (Figure 43). Bone marrow condition is classified into four different categories: 1 = excellent, 2 = good, 3 = fair, 4 = poor. Generally, condition scores of 3 or 4 indicate the animal was in very poor nutritional condition and the proximate cause of mortality was malnutrition. Bone marrow condition scores have been collected from 586 carcasses, 240 adults and 346 fawns. Overall bone marrow condition scores have been lowest north of the Danforth Hills (Figure 44).

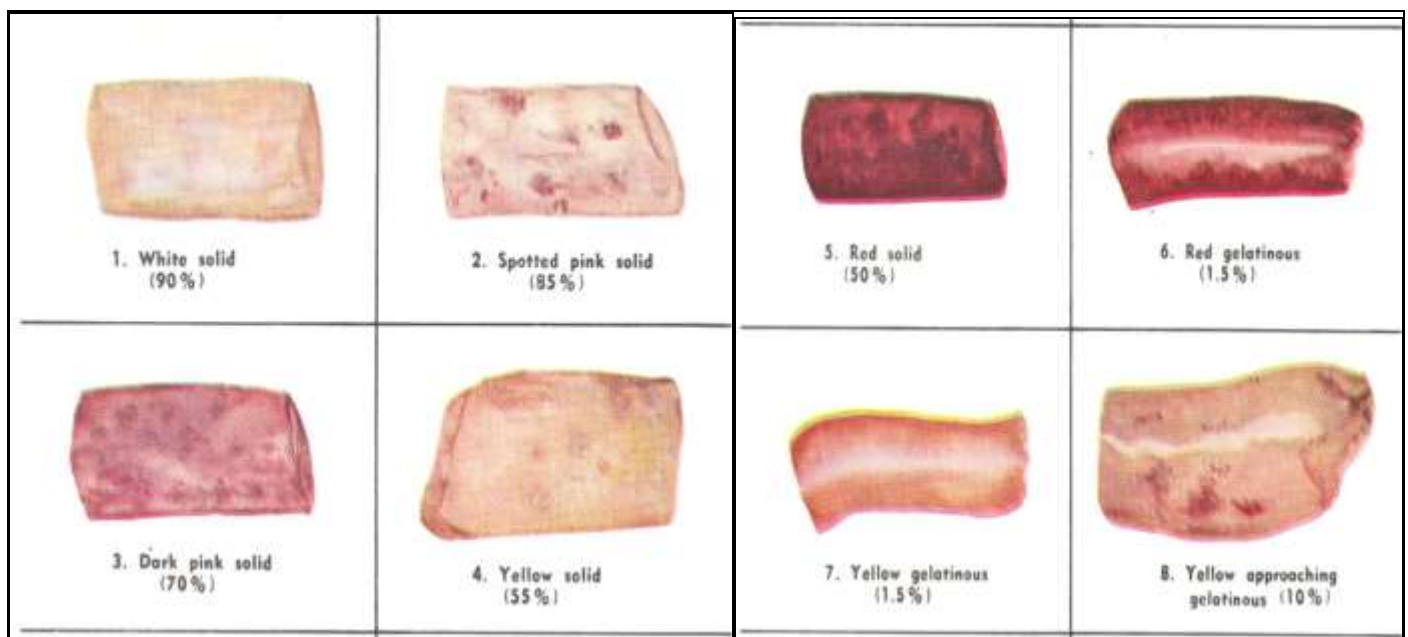


Figure 42. Reference used for classifying bone marrow condition of mule deer carcasses.

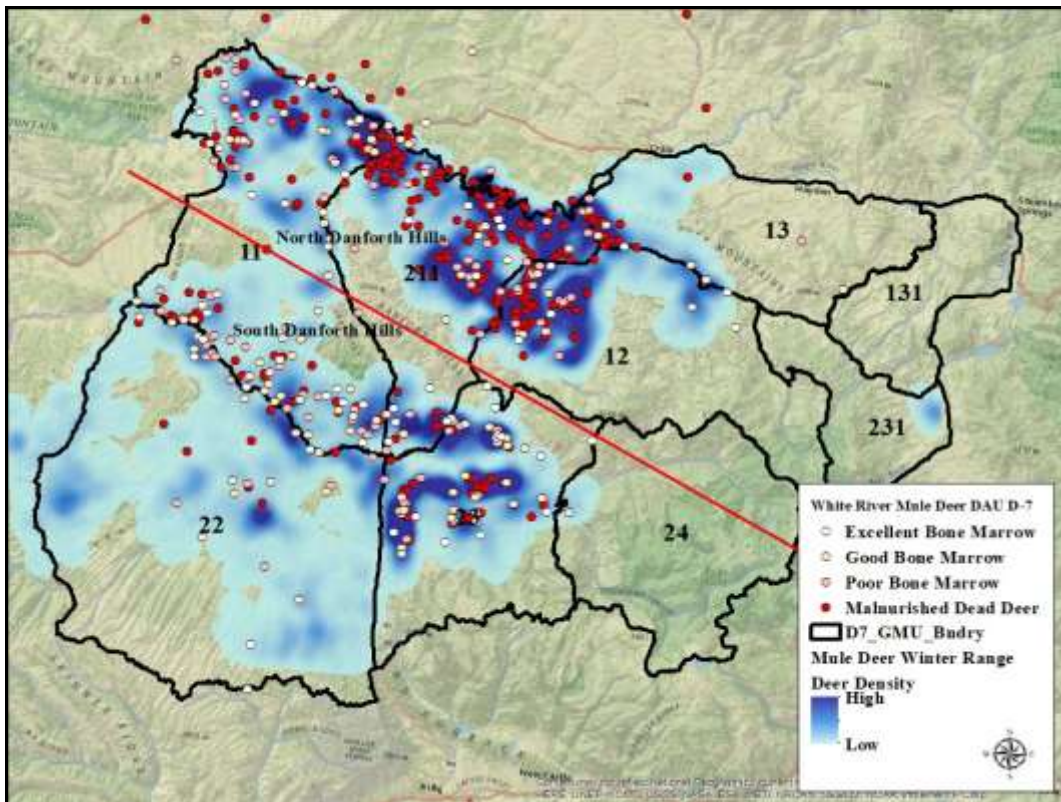


Figure 43. Carcass bone marrow classifications showing higher numbers of malnourished animals in the northern portion of the DAU.

Examination of fawn bone marrow scores resulted in 67% of all fawn carcasses with a fair to poor marrow condition score being north of the Danforth Hills (Figure 45).

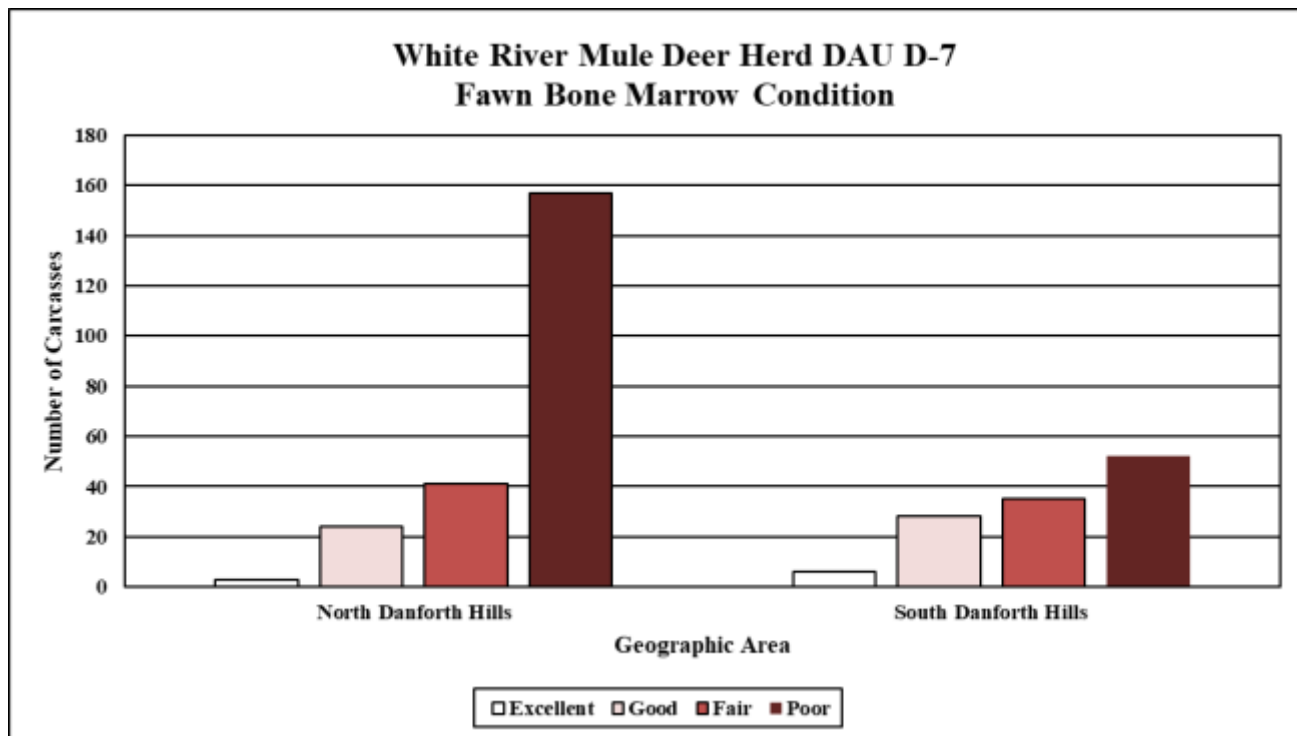


Figure 44. Radio-collared fawn mule deer carcass bone marrow scores north vs south of Danforth Hills.

Additionally, the number of fawn mortalities attributed specifically to malnutrition are 50% higher north of the Danforth Hills (Figure 46).

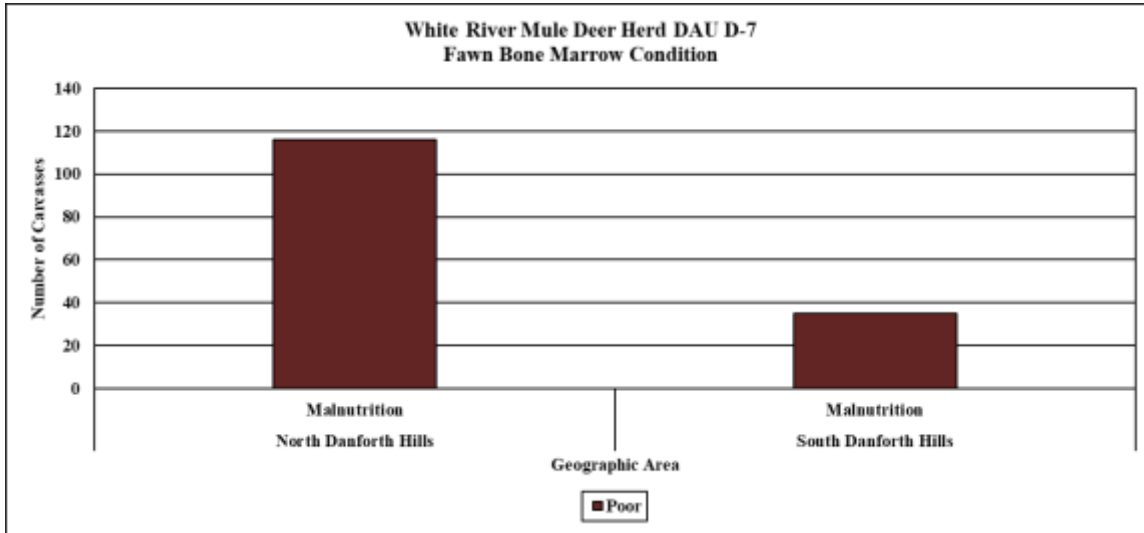


Figure 45. Comparison of radio-collared fawn mule deer carcasses with poor bone marrow condition scores, indicating animal died from malnutrition, north vs south of the Danforth

Predator related fawn mortality within D-7 appears to be compensatory (Figure 47). Coyotes and mountain lions are the primary predators of fawns ≥ 6 -months old within the D-7 herd. More than 67% of fawns depredated by coyotes and 75% of fawns depredated by mountain lions north of the Danforth Hills had a marrow score of fair to poor. Predation of fawns with the same marrow condition by coyotes and mountain lions south of the Danforth Hills was less than north at, 53% and 61%, respectively. Although coyote and mountain lion predation on fawns with a bone marrow condition of fair to poor was less south of the Danforth Hills, it still accounted for more than half of all the mortality attributed to coyotes and lions. While fawn survivorship may benefit from increased predator control south of the Danforth Hills during winter months, the cost-benefit would be minimal.

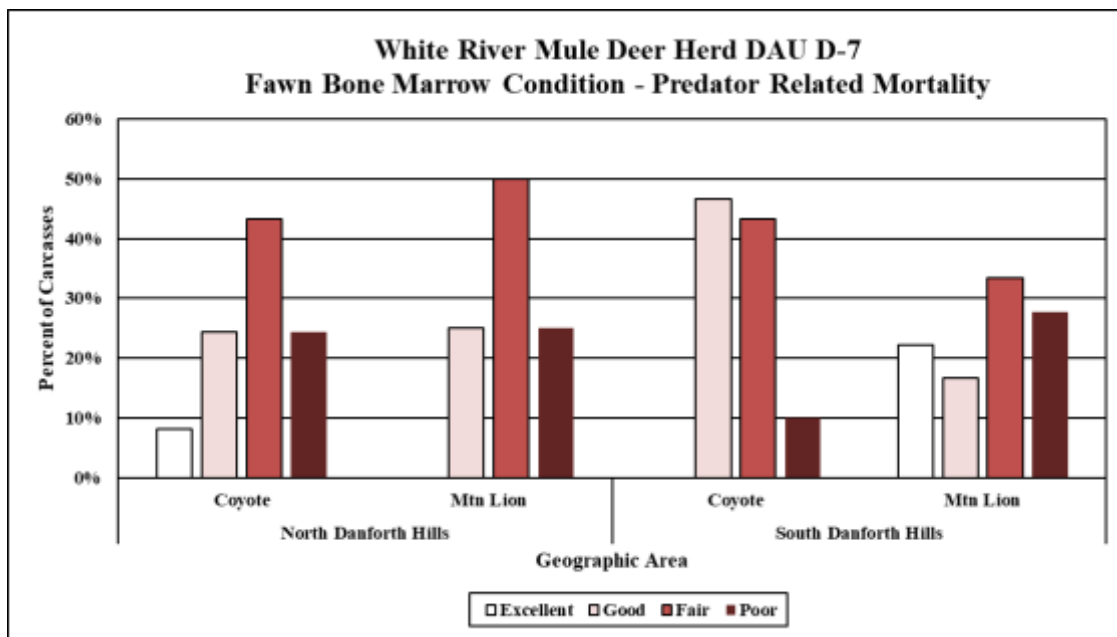


Figure 46. Comparison of radio-collared fawn mule deer bone marrow condition from predator caused mortality, north vs south of Danforth Hills.

In comparison, some differences between marrow condition were observed between adults and fawns north versus south of the Danforth Hills. Marrow condition of adult carcasses were consistent with fawn marrow condition north of the Danforth Hills. Fifty-nine percent of adult carcasses examined from north of the Danforth Hills had fair to poor marrow scores compared to 35% with the same marrow scores south of the Danforth Hills (Figure 48).

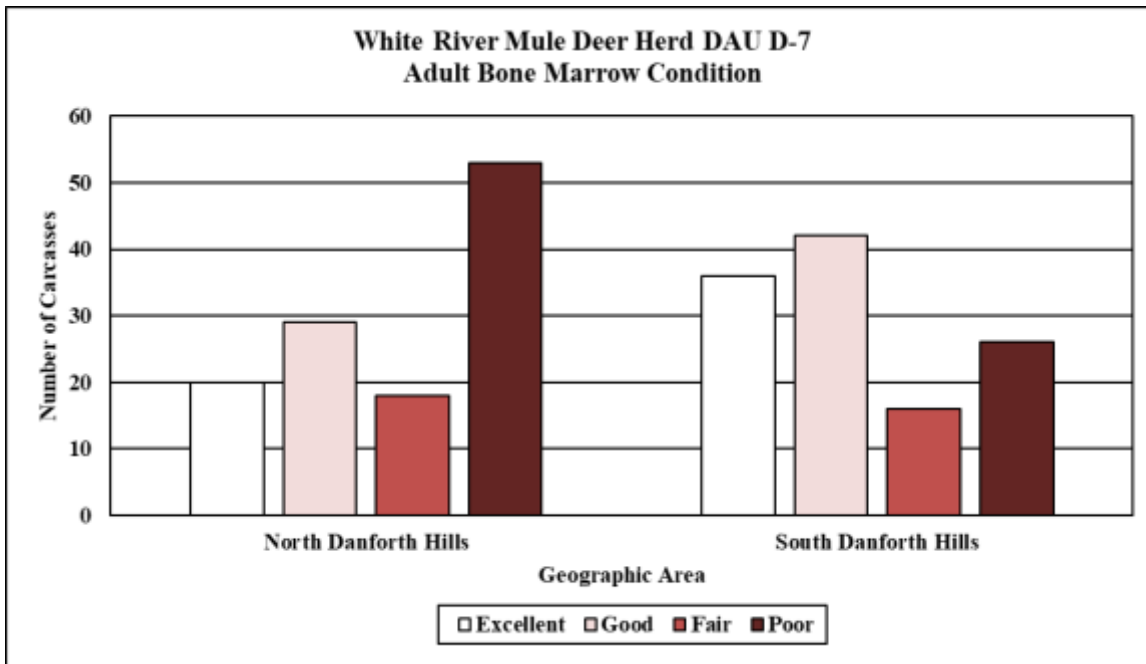


Figure 47. Comparison of radio-collared adult mule deer doe carcass bone marrow condition, north vs south of Danforth Hills.

Malnutrition related mortality was also similar for adults and fawns when comparing adult marrow condition between the two geographic areas with 76% of malnutrition related mortality occurring north of the Danforth Hills (Figure 49).

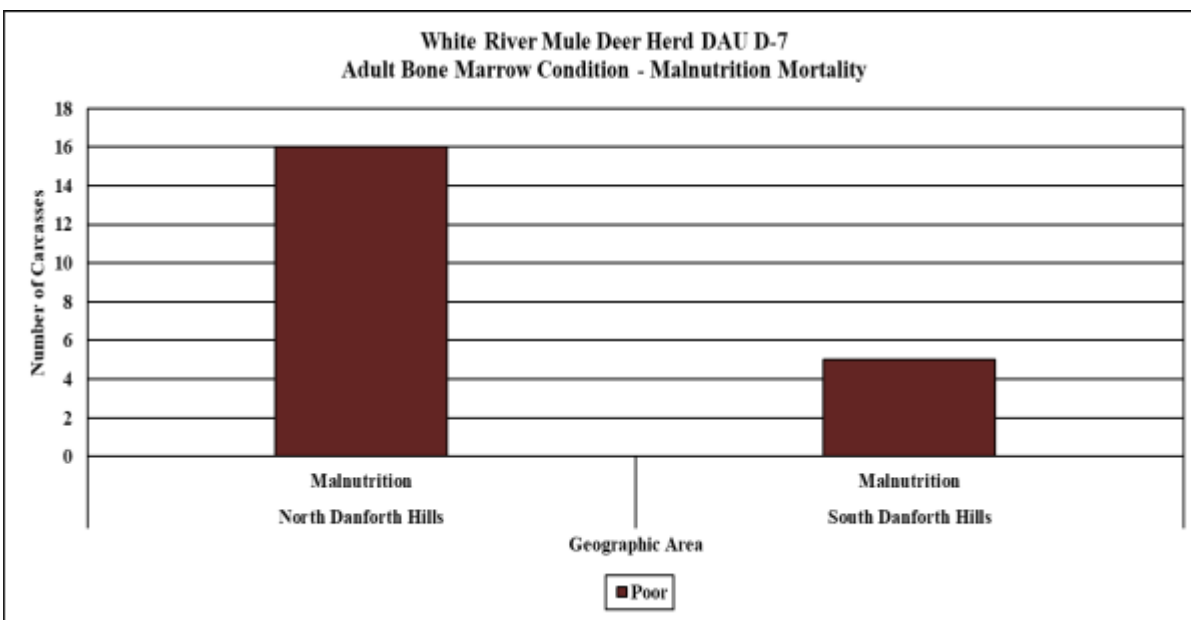


Figure 48. Comparison of radio-collared adult mule deer doe carcass bone marrow condition score of poor, indicating animal died from malnutrition or disease, north vs south of Danforth Hills.

However, there were some significant differences when comparing marrow condition of predator related mortalities between fawns and adults. The majority of marrow condition scores for adult mule deer dying from predation by coyotes or mountain lions were excellent to good condition regardless of geographic area. North of Danforth Hills, 79% of adult deer dying from coyote predation and 82% of adult deer dying from mountain lion predation had excellent to good marrow condition scores. South of the Danforth Hills, 86% of adult deer dying from coyote predation and 89% of adult deer dying from mountain lion predation had excellent to good marrow condition scores (Figure 50). Based on marrow condition at the time of mortality, it would appear, given current habitat conditions, adult survivorship might benefit from increased predator control or harvest management efforts especially south of the Danforth Hills where malnutrition related mortality is relatively low. However, it should be noted CWD prevalence should be considered before any management actions regarding predator management are taken. Given current habitat condition and high CWD prevalence, benefits from such management actions north of the Danforth Hills would likely not be realized.

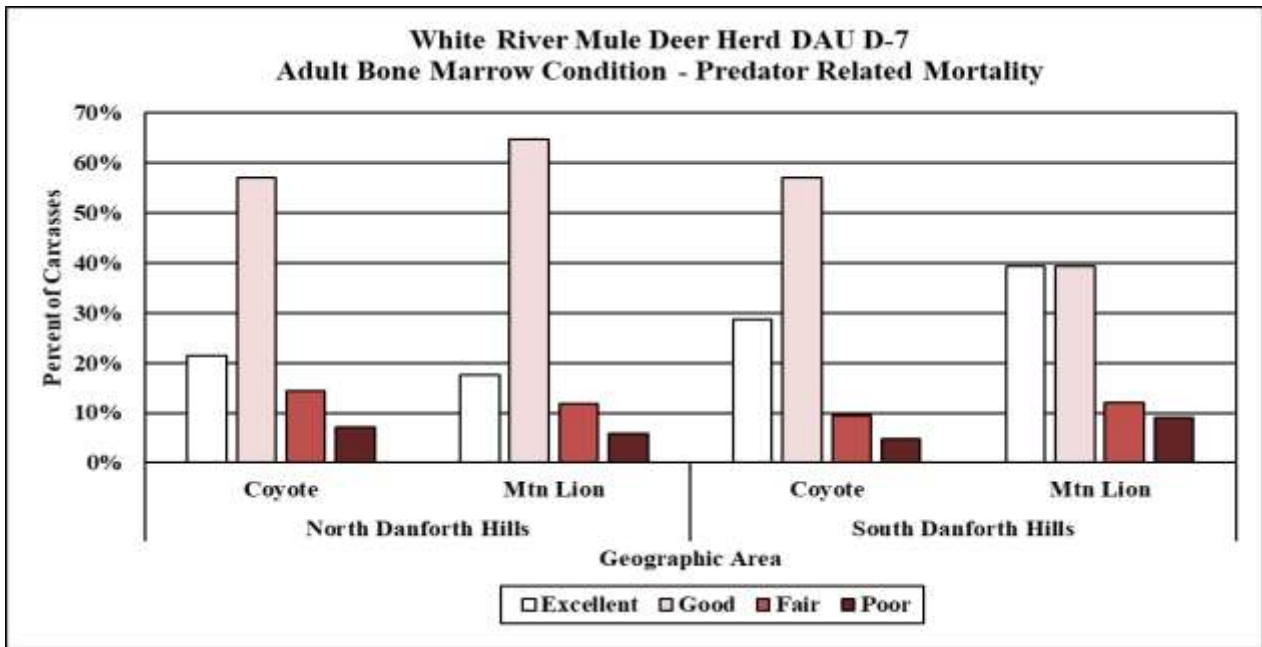


Figure 49. Comparison of radio-collared adult mule deer bone marrow condition from predator caused mortality, north vs south of Danforth Hills.

Fire

Large-scale wildfires have occurred throughout the DAU across both summer and winter ranges (Figure 51). While habitat response to wildfires on deer summer ranges across higher elevations within the DAU have been beneficial for deer, habitat responses to wildfires on winter ranges have varied with some having adverse impacts to the D-7 population.

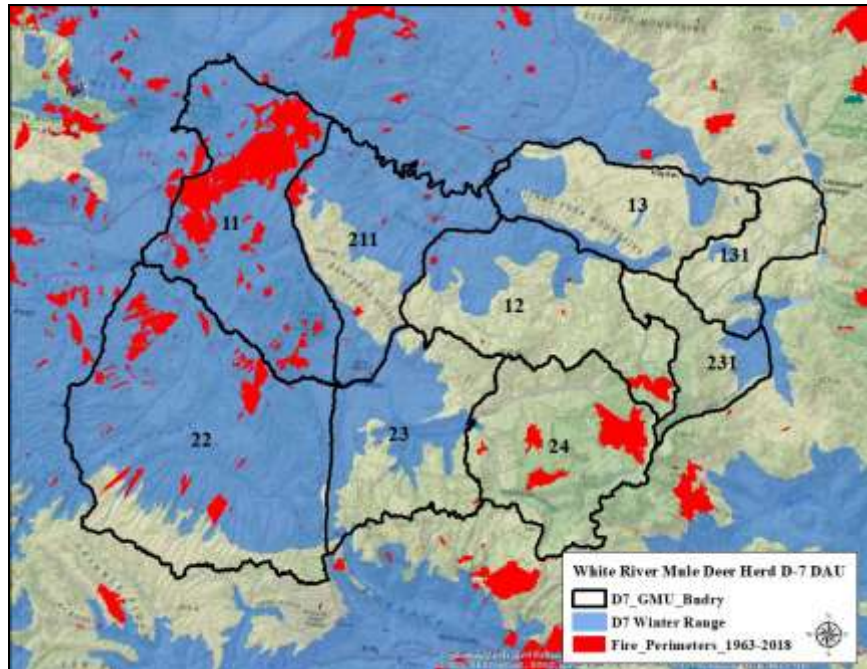


Figure 50. Wildfire perimeters that have occurred across D-7 1963 - 2018.

Many of these fires have occurred in high density, critical deer winter ranges and converted these very productive winter range habitats once dominated by bitterbrush and sagebrush into less productive grassland habitats void of any browse and in some cases infested with cheatgrass (Figure 52). The geographic occurrence of these fires has fundamentally reduced the number of deer that can be sustained on winter ranges across D-7. These reductions in carrying capacity are related not only to the direct loss of browse on these winter ranges due to the fires but also the displacement of deer that were once dispersed across these winter ranges onto the remnant brush communities spared by the fires (Figure 53). In effect, the loss of browse from the fires results in a significant increase in deer densities and browsing pressure on the often-small patches of brush that remain. The increased browsing pressure leads to increased stress on the remnant brush, resulting in decreased nutritive value, decreased vigor, less productivity, and lower palatability. Ultimately, these situations lead to winter ranges capable of supporting fewer deer until the browse component within these landscapes are re-established to levels usable by deer.

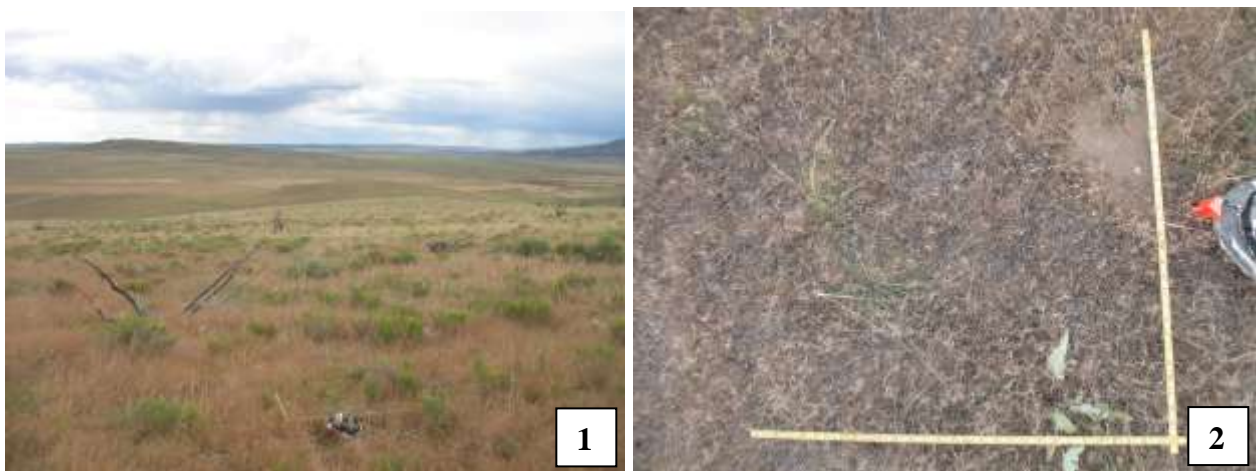


Figure 51. Cheatgrass infestations still present 30 years post-fire on the Bitterbrush State Wildlife Area. Picture 1. Shows scale of landscape converted from shrub dominated bitterbrush community prior to 1990 to cheatgrass monoculture with no winter range value for mule deer. Picture 2. Shows cheatgrass dominance within burned area and lack of diversity post-fire (photos courtesy of Trevor Balzer, CPW Habitat Coordinator).

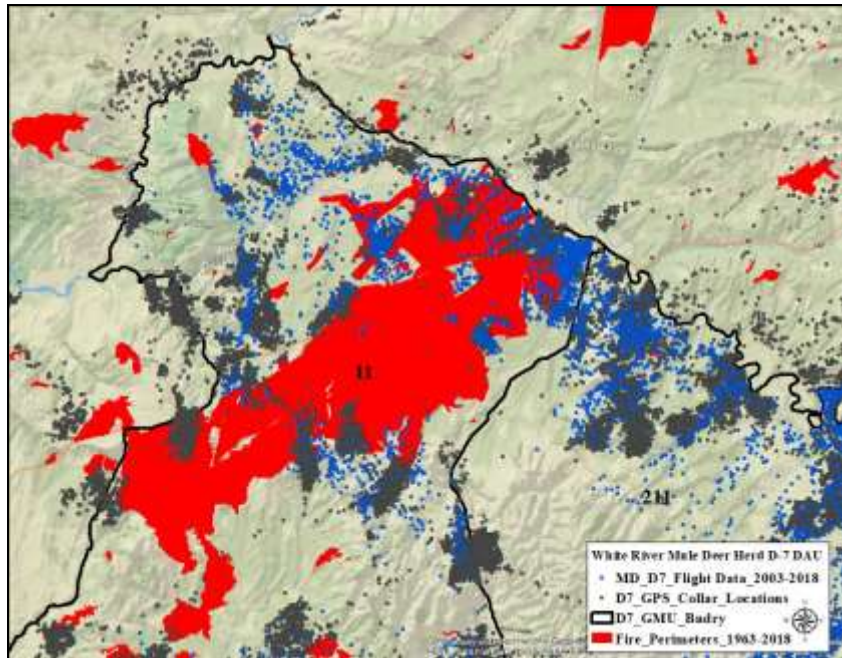


Figure 52. Maps shows wildfire perimeter from burns that occurred from the late 1980s through early 2000s and current mule deer winter use from GPS radio collar data and mule deer groups observed during annual winter classification flights.

The most active periods of wildfire on mule deer winter range within D-7 occurred during the late 1980s, 1990s, and early 2000s (Figure 54). From 1984 to 1994 approximately 51,000 acres of some the most productive and highest mule deer density winter range in the northern portion of GMU 11 was lost to wildfire. This burn complex accounted for 9% of all mule deer winter range within the DAU. An additional 7,700 more acres within this same complex burned between 2001 and 2015. Vegetation in this area was dominated by bitterbrush capable of supporting exceptionally high densities of wintering deer. The high intensity of these burns converted the landscape from a bitterbrush shrub dominated community to open grasslands. The loss of these bitterbrush dominated winter ranges has had a significant effect on the overall carrying capacity of the D-7 herd.

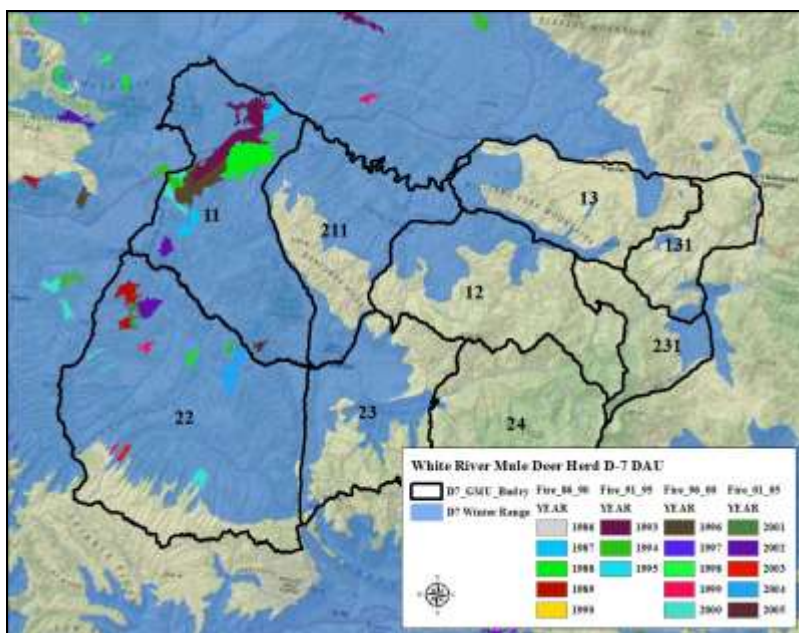


Figure 53. Map shows timing and perimeter of wildfires resulting in significant reductions in high-quality winter range habitat in northwestern portion of GMU 11.

While the wildfires across deer winter ranges in the northern portion of GMU 11 have had a negative effect by converting shrub dominated landscapes to grasslands, the vegetative response to wildfires in GMU 22 within pinyon-juniper communities have been positive (Figure 55). The expression of mixed mountain shrub within these burn scars has provided for woody forage component beneficial to wintering mule deer. The fires within these areas increased the quality of mule deer winter range.

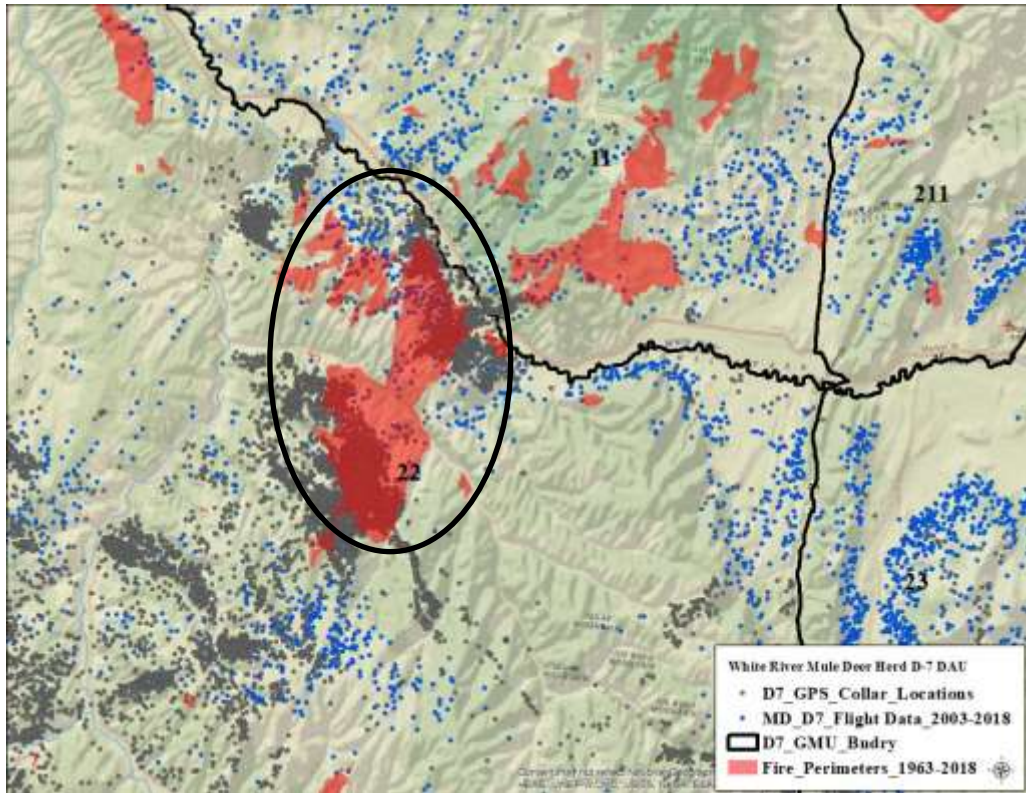


Figure 54. Map shows mule deer winter use in within wildfire perimeter in GMU 22 from burn that occurred in the mid-1990s.

Elk and Mule Deer Interactions

Based on accounts from multiple ranchers that have lived in the White and Yampa River valleys their entire lives, they have stated mule deer numbers in D-7 were far greater than elk numbers through the 1950s, '60s, '70s, and '80s. These same folks also corroborate the fact that elk were rarely observed west of Highway 13 on traditional mule deer winter ranges prior to the winter of 1978-79. After that winter, elk have returned to those winter ranges regularly. Although these observations are anecdotal, it does relate to a period in time when there was an overall inverse relationship between increasing elk populations and decreasing deer populations. The most precipitous decline in deer numbers in D-7 occurred from 1983 to 1993. While the winter of 1983-1984 marks the start of this decline, several changes also occurred on critical mule deer winter ranges in D-7 during this decade. This was a very dry decade with active, large-scale wildfires occurring on mule deer winter range that were detrimental for mule deer but favored elk. These fires converted bitterbrush dominated winter ranges to grasslands that favored elk. This type conversion instantly increased winter range carrying capacity for elk and abruptly reduced carrying capacities for deer (Figure 56).

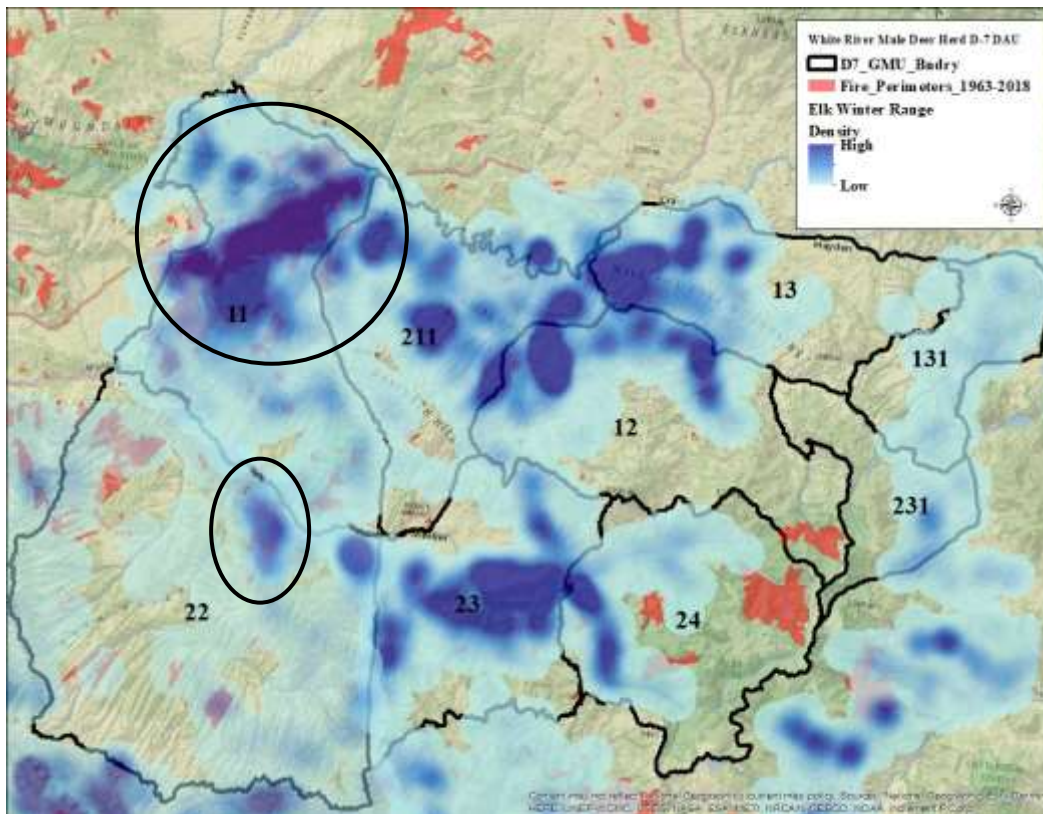


Figure 55. White River elk herd winter range densities based on classification flight group data showing high densities of elk occurring on burn complexes in the northern portion of GMU 11 once dominated by bitterbrush.

Since 1993, the White River mule deer and elk populations have shown similar trends (Figure 57). Populations of both species peaked in 2003 during the midst of another prolonged drought. Mule deer had reached population objective for the first time since 1985 and elk numbers were at an all-time high. In reaction to increasing numbers, CPW managers increased license numbers for both species in an effort to reduce population levels to be more in line with drought stressed range conditions. While these license increases were successful in reducing populations, the impacts from carrying high numbers of deer and elk through this drought period has had long lasting impacts. The impacts to mule deer from the drought have been more profound due to the shrub mortality that has occurred on already limited winter ranges due to fires that occurred during the 1987-1992 drought. Elk, on the other hand, have maintained higher population levels since 2006 due to their ability to withstand the severe winters and the expansive grasslands that occur across more winter ranges because of the wildfires. Severe winters have been more frequent since 2007. Increased interspecific competition between deer and elk occurs during hard winters as elk are displaced onto shrub dominated winter ranges when snow depths prohibit access to preferred grass dominated burns, mining reclamation, or CRP fields. Elk can also swamp south facing slopes when winter conditions are severe and deplete limited browse resources critical to mule deer when conditions are harsh. It is difficult to make a direct correlation to elk being the cause of declining deer numbers in D-7 but conditions over the last three decades have certainly been more favorable for elk than deer.

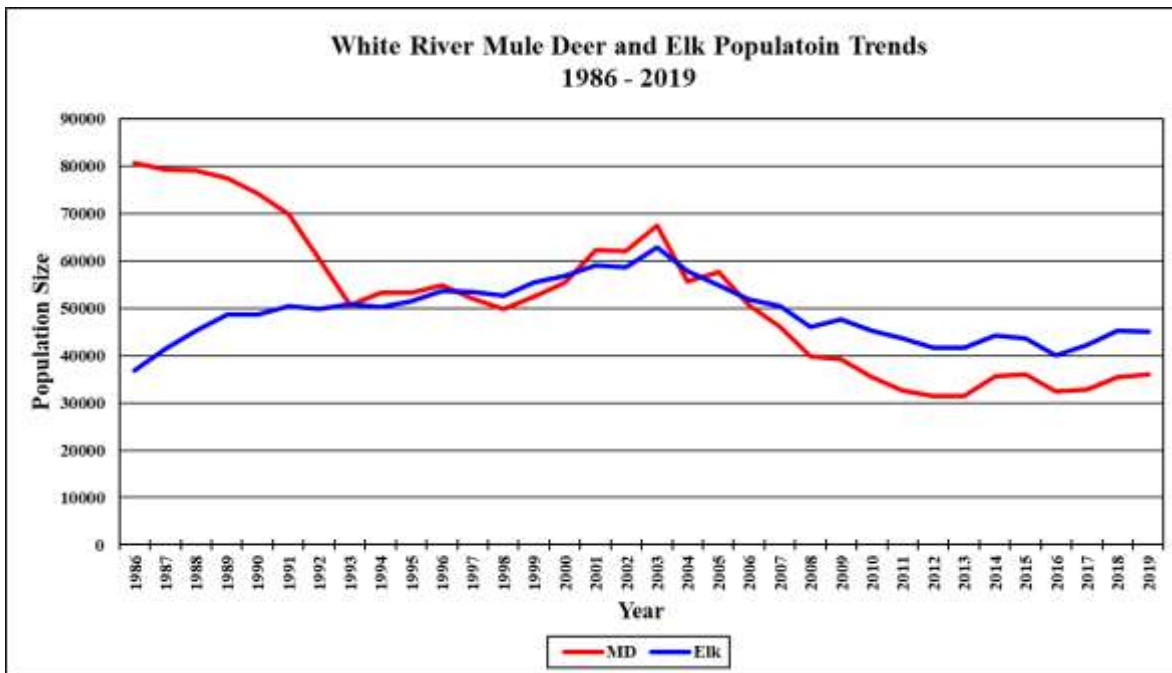


Figure 56. White River mule deer and elk population trends from 1986 - 2019.

HABITAT FUNCTION

Mule deer within D-7 inhabit established seasonal “home ranges”. Depending on arrangement and abundance of food, cover, and water resources seasonal home ranges can vary but generally are a few hundred acres. Winter ranges are shrub or woodland communities that provide forage as well as hiding, escape and thermal cover. Summer ranges are a mosaic of diverse plant communities intermixed to provide hiding cover, thermal cover, fawn-rearing habitat, and foraging areas. Transition ranges provide abundant, high quality forage that can improve the condition of deer prior to arriving on winter ranges and help deer regain condition more quickly in the spring (Searle et al. 2015). Time spent in transition varies amongst migratory deer in D-7 with some deer moving short distances within a day or two and others may take several days to migrate between seasonal ranges.

An intact mix of cover and foraging habitat is critical to habitat function on seasonal ranges to ensure the ability to escape predation, thermoregulation, and meet nutritional needs. Conserving the integrity of transitional habitats is critical to the continuity of migratory movement and stopover areas between seasonal ranges (Sawyer and Kauffman 2011). Perhaps as important as the composition of habitat, is the strong fidelity deer have to these seasonal home ranges and migratory routes. Therefore, where and to what degree habitat loss or degradation occurs within these ranges and how it effects habitat function can have significant long-term impacts to deer population dynamics.

Disturbances that alter habitat composition can increase vulnerability to predation and expose deer to increased energy demands. Energy exploration, solar development, urban and rural development, recreation, highways, railroads, and fence lines all have direct and indirect impacts on habitat composition. These activities, structures, and developments fragment habitats and diminish habitat function by limiting access to foraging and resting areas. Fragmentation can also introduce travel corridors that allow predators to be more efficient when hunting. The quality of vegetative communities can be degraded by land management practices. Fire suppression, overgrazing, wild horse use, shrub eradication, and disturbances that promote invasion of cheat grass and other noxious weeds all have impacts on habitat quality.

Energy Exploration

Extraction of oil and natural gas directly affects the potential suitability of the landscape used by mule deer through the loss of native habitat vegetation with drill pads, roads, and other infrastructure. Noxious weeds are introduced or can take hold from the disturbance that occurs from these activities. Habitat function is diminished by fragmentation from drill pads and roads, increased noise levels from compressor stations and vehicle traffic, and increased year-round presence of human activities. Extraction will indirectly affect deer by increasing the human work-force population of the region resulting in the need for additional landscape for human housing, supporting businesses, and upgraded road/transportation infrastructure. Additionally, increased traffic on rural roads will raise the potential for wildlife vehicle collisions and additive direct mortality to mule deer populations.

Extensive development of oil and gas reserves has occurred across the western and southern portions of the DAU resulting in varying degrees of habitat fragmentation (Figure 58). Surface disturbance created by access roads, well pads, and pipelines has involved primarily summer range and general winter ranges, with lesser involvement of severe winter range. Development activity dramatically changed landscapes formerly supporting only ranching and seasonal big game hunting use.



Figure 57. Oil and gas development within GMU 22 has fragmented the landscape .

Most of the disturbance on summer ranges has occurred within GMUs 22, 211, and 13. Much of the development within GMU 13 and 211 occurred prior to 1970 with short-lived pulses of activity occurring in the early-1990s and again in the early-2000s (Figure 59). Development across summer ranges within GMU 22 have been more recent with a significant pulse in activity occurring in the late-2000s. Although the intensity of drilling activities slowed, development has remained steady over the last 10 years.

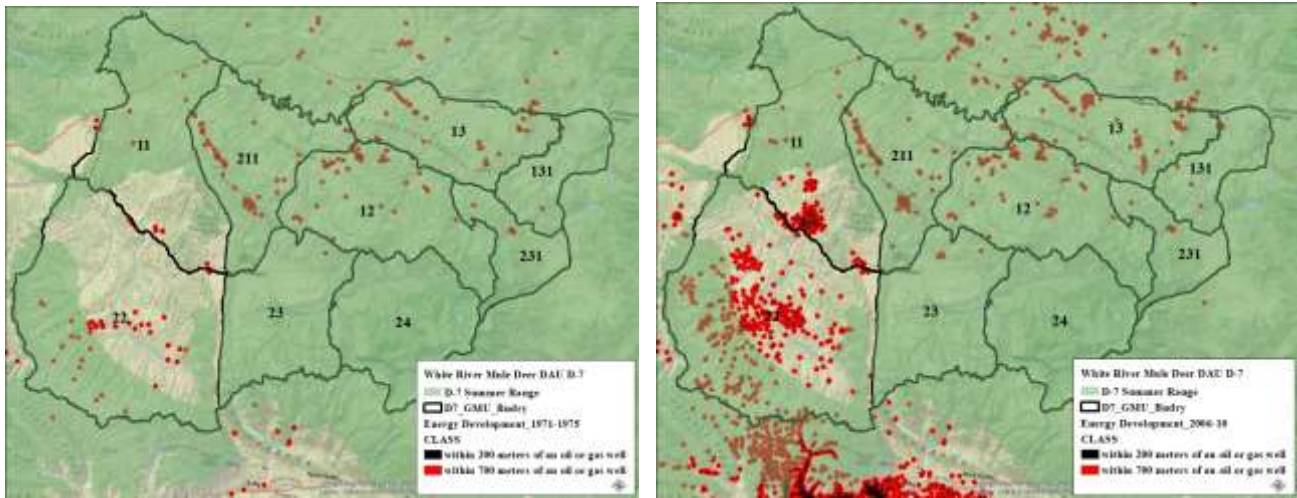


Figure 58. Cumulative oil and gas disturbance across D-7 winter ranges from 1970 to 2010.

The Piceance Basin within D-7 is an important area of overlap between mule deer winter range and significant natural gas and oil shale reserves. Oil and gas development has been most intense on mule deer winter ranges in the southern portion of GMU 11 and the southern and central portions of GMU 22. Throughout the 1990s and early-2000s about 8000 acres of mule deer winter range in the southern portion of GMU 11 underwent intense natural gas development. Since that time, much of the developed acreage has been reclaimed and the wells are in production. Oil and gas development grew exponentially across winter ranges within GMU 22 throughout the mid-2000s. Driven by strong oil markets, development activities within GMU 22 peaked in 2008 with several companies initiating aggressive drilling programs throughout the central and southern portions of the Piceance Basin.

Typical of the “boom-bust” nature of oil and gas development, activity associated with development ebbs and flows. However, the effects on mule deer population dynamics from habitat fragmentation due to the disturbance footprint left on the landscape remains. The impacts incurred by these disturbances are cumulative and the effect on the population can be exacerbated when combined with impacts from drought, noxious weeds, and predation pressures. For example, the number of acres affected by oil and gas development across mule deer winter ranges within D-7 increased 5-fold from 1970 to 2010 (Figure 60). A long-term research project, 2009-2018, addressing mule deer/energy development interactions was recently completed by CPW (Anderson 2019), which will provide management implications to inform future development planning options on pinyon-juniper winter range.

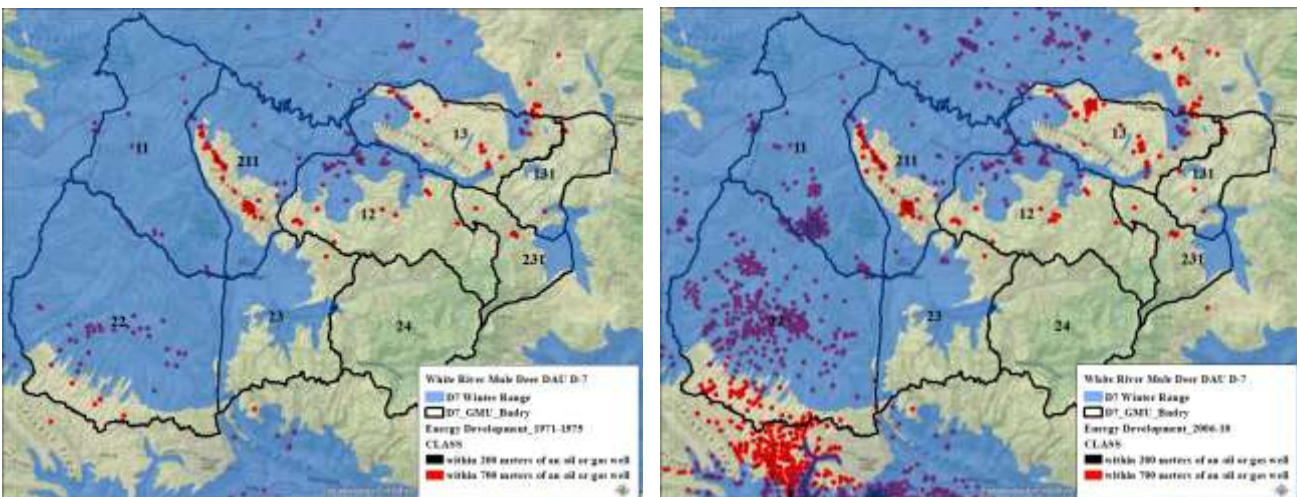


Figure 59. Cumulative oil and gas disturbance across D-7 winter ranges from 1970 to 2010.

Rural Residential Development

Rural residential development within D-7 has been a subtle occurrence through time but has had significant impacts to mule deer winter ranges within the DAU. Proportionally the amount of mule deer winter range impacted by rural residential development doubled between 1970 and 2010 (Figure 61). Former ranch lands have been purchased and developed into smaller parcels. Developments have been relatively small scale, composed of mid to small acreage ranchettes on traditional deer winter range. Often times, landowners remove brush from the property to promote grass for pasturing a horse or small number of livestock. Removal of the browse from each individual owner's property adds up and eventually fragments the winter range making it marginal for wintering deer.

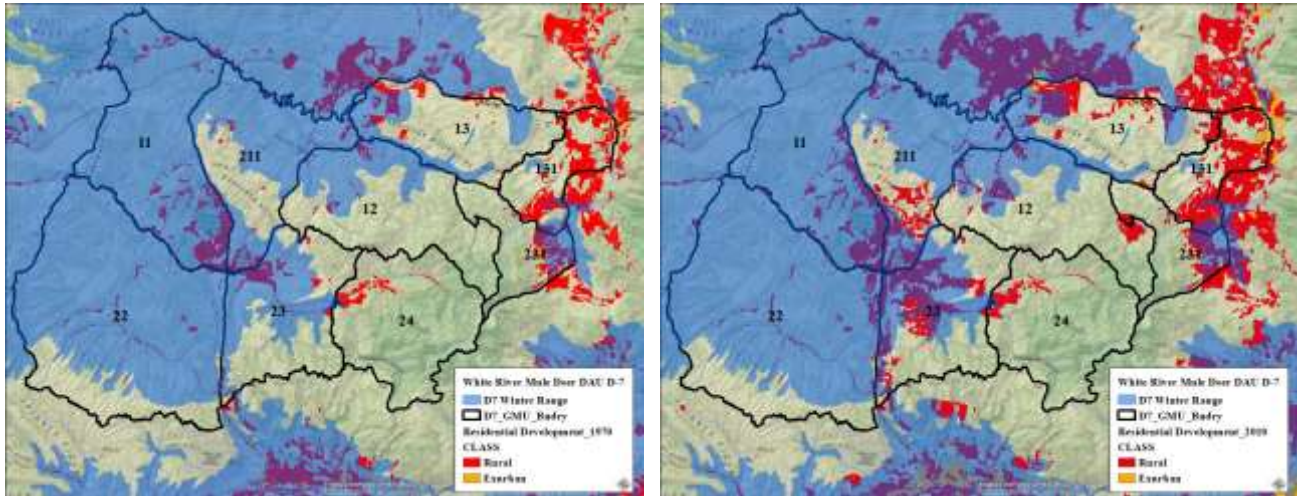


Figure 60. Cumulative rural residential development across mule deer winter range within D-7.

PUBLIC LANDS

Habitat on public lands within D-7 are extremely important to wintering mule deer. Over half of all winter range within the DAU occurs on BLM administered lands (Figure 62). The predominant woody forage base on BLM-administered winter ranges is composed of mature to decadent stands of antelope bitterbrush, serviceberry, oakbrush, black and Wyoming big sagebrush that sustain heavy use by deer during the winter and early spring months. Pinyon-juniper woodlands are expansive throughout BLM lands in GMU 22 and southern portions of GMU 11. Utah juniper is the predominant woodland cover. Mountain mahogany, serviceberry, and sagebrush are common in pinyon-juniper understories.

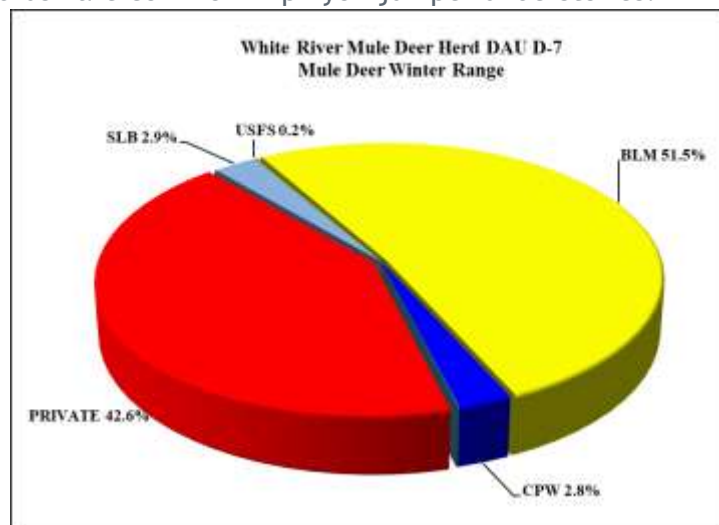


Figure 61. Mule deer winter range surface land status in D-7.

For the purpose of the herd management plan, CPW requested information concerning the land health status of public rangelands, present utilization rates specific to livestock, and any specific concerns regarding BLM and Forest Service public lands. Additionally, the Resource Management Plans and Environmental Assessments for each of the agencies were reviewed regarding grazing management on the public lands within the DAU.

Grazing

DAU D-7 covers portions of two National Forests (NF), the White River NF and the Routt NF, and two BLM field offices, the Little Snake and White River field offices. Domestic grazing is provided primarily for cattle and sheep, some allotments allow horse use (Figure 63). Forest allotments, composed primarily of mule deer summer range and are generally grazed June through mid-October by sheep and cattle. Timing and use of grazing on mid-elevation BLM allotments is similar to the Forest. Lower elevation BLM allotments are within mule deer winter range with early spring, summer, and winter use by sheep or cattle.

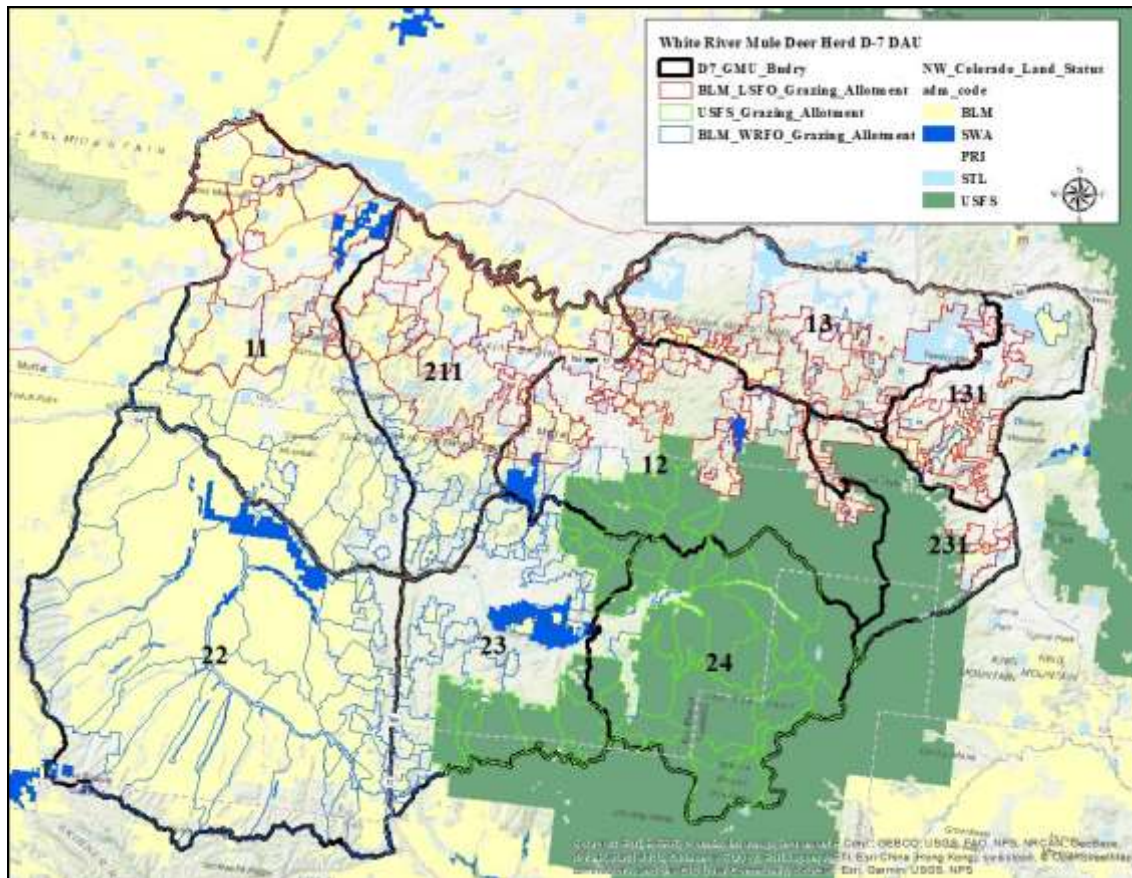


Figure 62. Grazing allotment boundaries on public lands across the D-7 landscape.

Wild horses are present across BLM allotments within the western portions of GMU 22 year-round. Wild horses are over population management objectives and continually expanding outside of the prescribed Horse Management Areas (HMA). Management of wild horse populations is highly controversial. Proposed gathers to manage horse populations often end up in litigation. The inability to manage wild horse populations to herd objectives has had negative impacts on range conditions. This in turn creates challenges for land managers when trying to balance permitted livestock use within these allotments with competing wild horse use resulting in further range degradation.

In January 1997, Colorado Bureau of Land Management (BLM) approved the Standards for Public Land Health. The standards cover upland soils, riparian systems, plant and animal communities, threatened and

endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. The Forest service also manages land health through a series of Federal regulations, national strategic goals, and forest wide Standards and Guidelines. An integral component of assessing land health is the requirement to monitor and evaluate management actions on public land. More recently (2011), BLM has implemented the Assessment, Inventory, and Monitoring Strategy (AIM) to inform rangeland health. The goal of AIM is to collect standardized data to inform management decisions (Taylor et al 2014). The five key elements of the AIM strategy are:

1. Provides standardized qualitative methods and indicators
 - Allows for spatial and temporal data comparison
2. Statistically valid sample designs
 - Minimizes bias and allows for integrated data analyses
3. Electronic data management
 - Improves data quality, accessibility, and interpretation
4. Structured implementation
 - Strategy built from management questions and based on ecological site descriptions
5. Integration with remote sensing
 - Used in conjunction with remote sensing for mapping

To date, data has been collected from 240 AIM sites within D-7. Less than 50% of the AIM sites have been revisited so rangeland trend data is lacking across the field offices (Figure 64).

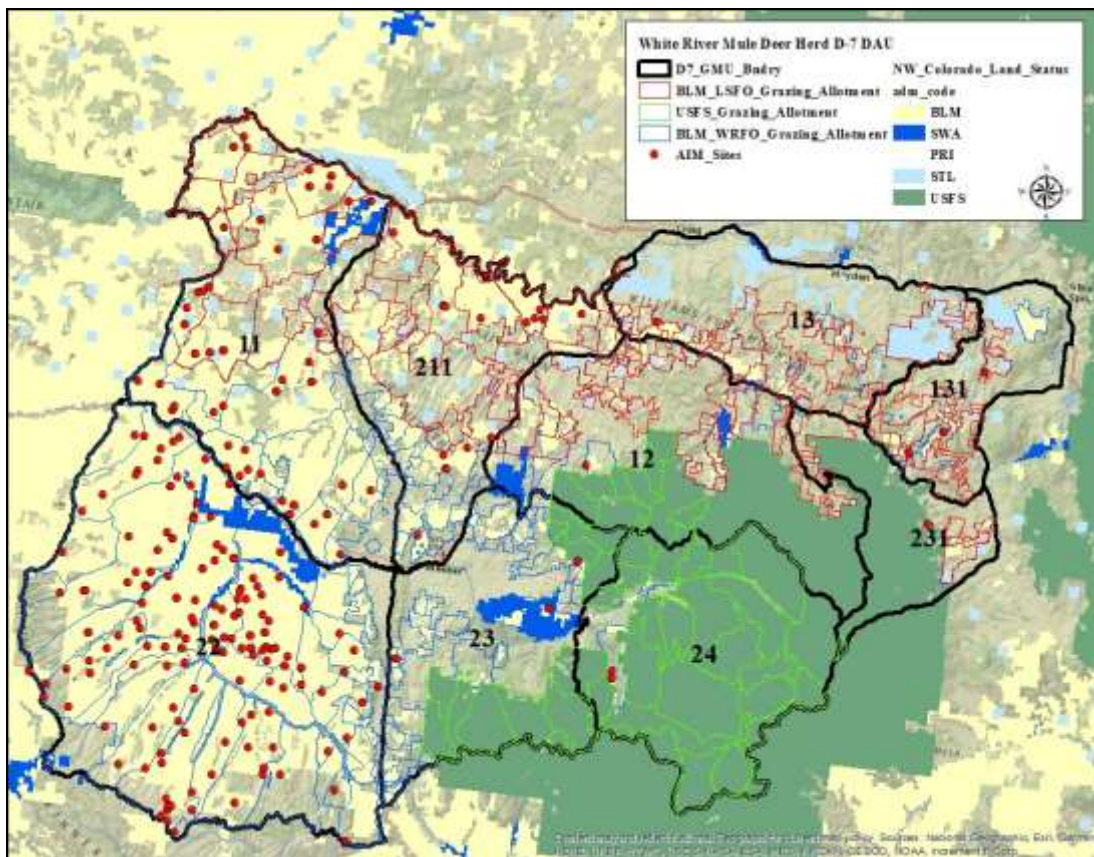


Figure 63. BLM, AIM site locations within the Little Snake and White River Field Offices from which data has been collected since 2011.

Causal factors for most range problems identified by federal land management agencies include late seral stage, climax or disclimax communities, inappropriate historic livestock grazing, localized excessive big

game use, over objective in wild horse management areas, increased fire frequency interval and intensity, increased recreation, energy development, drought, and invasion of noxious weeds.

For each environmental analysis required to issue grazing leases, an assessment of land health status is conducted. Changes in allotment categorization, levels of management, and permit modifications can be made if evaluation and monitoring information indicates they are warranted in order to achieve or make significant progress toward achieving the standards for rangeland health.

Improper livestock grazing on public lands occurred from the late 1800's to the 1930's. During this period, excessive livestock numbers (cattle and sheep) and unregulated grazing resulted in overuse and changed the composition of landscapes. Many of the native bunch grasses and forbs were overgrazed. In some cases, this resulted in higher sagebrush canopy densities that continued to suppress and reduce understory plant diversity. Crested wheat grass was planted to control erosion and re-establish an herbaceous component to the understory. While crested wheat grass provides high forage production early in the growing season it has resulted in a grass monoculture understory within some sagebrush communities. Since the late 1960's, the BLM and U. S. Forest Service have developed improved grazing management plans that have addressed much of the historic livestock problems.

Current data collected from AIM sites from BLM monitoring efforts indicate herbaceous expression on lower elevation foothill swale sites, big sagebrush benches, juniper woodlands, and greasewood bottomlands is below potential. A strong component of weedy annuals and limited perennial grasses occur within these areas. Cheatgrass and desert madwort are the two primary invasive annuals showing steady expansion throughout sagebrush communities. Pinyon Ridge, Crooked Wash, and Peck Mesa areas within GMU 11 have been identified by BLM as areas of concern where monitoring is showing increased cheatgrass coverage. Long-term rangeland health assessments conducted within the Axial Basin watershed and recent allotment assessments indicate the healthy, productive plant and animal communities standard is not being met due to the lack of diversity and abundance of native perennial grasses and presence/abundance of noxious/invasive species. The presence of cheatgrass, annual pepperweed, and whitetop are contributing to reduced habitat quality and species diversity. Since the 1990's, changes to grazing scenarios have been implemented to address the degraded range conditions within the Axial Basin watershed. Despite the changes, range conditions have been slow to recover. Persistent drought, historical livestock use, and high densities of wintering mule deer are likely contributors to the lack of recovery. However, adjustments to livestock grazing continue to be made to benefit plant and animal communities (EA DOI-BLM-CO-N010-2019-0022).

Rangeland Conditions

Persistent drought has resulted in poor winter range conditions especially across the northern half of the DAU and lessened the nutritional carrying capacities of these winter range habitats to support historic mule deer populations. This is especially true on sagebrush dominated winter ranges. Browse seedlings and young plants are sparse within sagebrush communities and in many areas, native perennial grass-forb understories are shifting to cheatgrass dominated systems and lack diversity. Mixed mountain shrublands are decadent, lack productivity, and are hedged or grown beyond the browse line of mule deer (Figure 65). Drought and overuse by wintering deer are the primary contributors to the poor condition of these islands of mixed mountain shrub patches on low elevation winter ranges. However, Anderson's research study in the Piceance Basin showed good forage conditions facilitated an increase in numbers of deer within the herd segments wintering in pinyon-juniper communities in GMU 22 from 2008-2016.

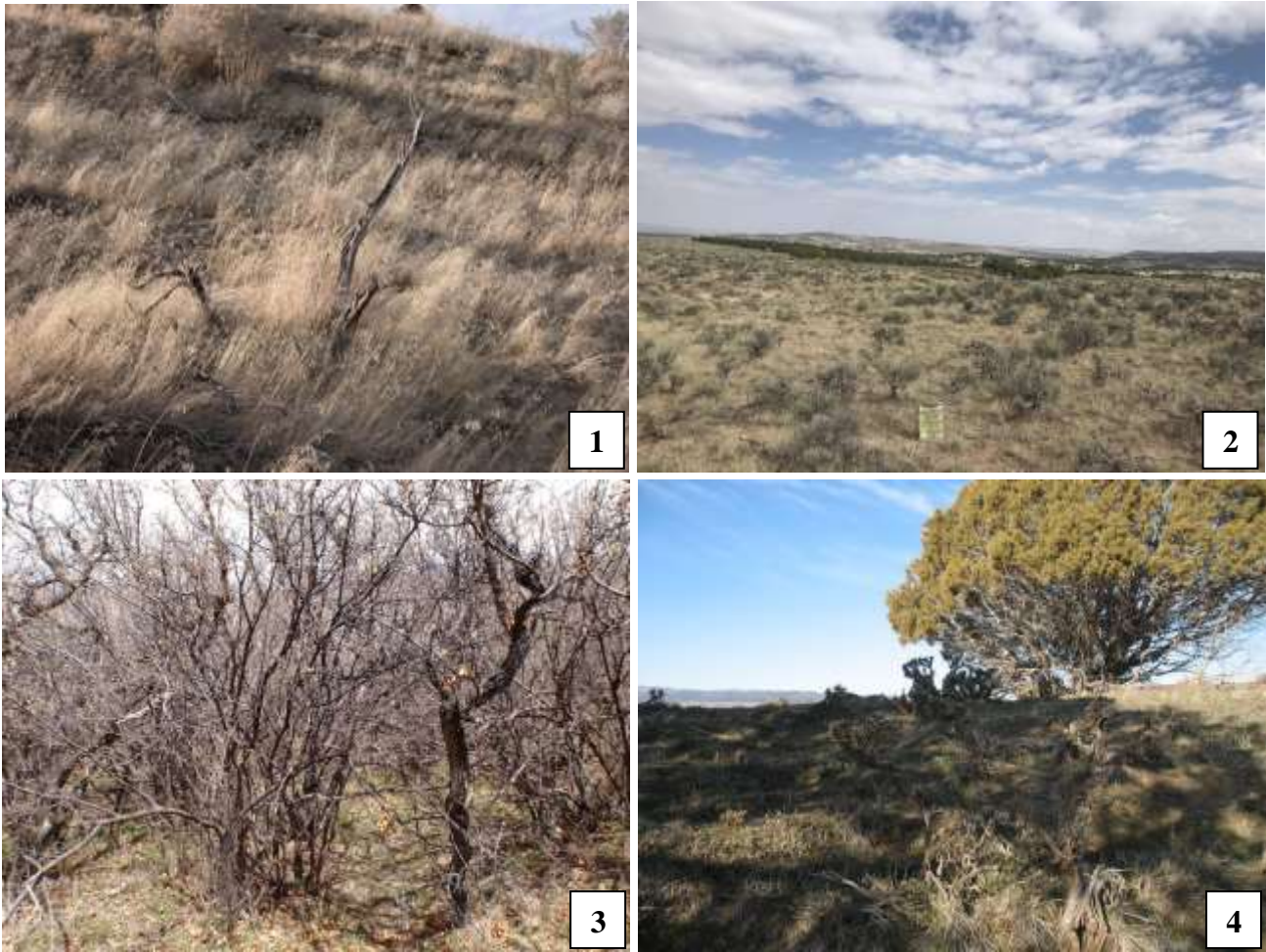


Figure 64. Picture 1. Cheatgrass dominated winter range post wildfire in northern portion of GMU 11. Picture 2. Drought stressed sagebrush on winter range in northern portion of GMU 211 (photo courtesy of BLM). Picture 3. Decadent mountain shrub community in northwestern portion GMU 23 (photo courtesy DWM Bailey Franklin, CPW). Picture 4. Heavily browsed sagebrush by mule deer in pinyon-juniper understory in western portion of GMU 23 (photo courtesy Trevor Balzer, CPW Habitat Coordinator).

Multiple habitat projects have and continue to be implemented, aimed at achieving landscape scale level changes (Figure 66). Most habitat treatments on public lands have occurred on BLM lands within GMU 22. CPW has also worked with the BLM and private landowners to mechanically treat mixed mountain shrub and pinyon-juniper communities. The treatments are designed to diversify age classes within these communities and improve woody forage base for deer.

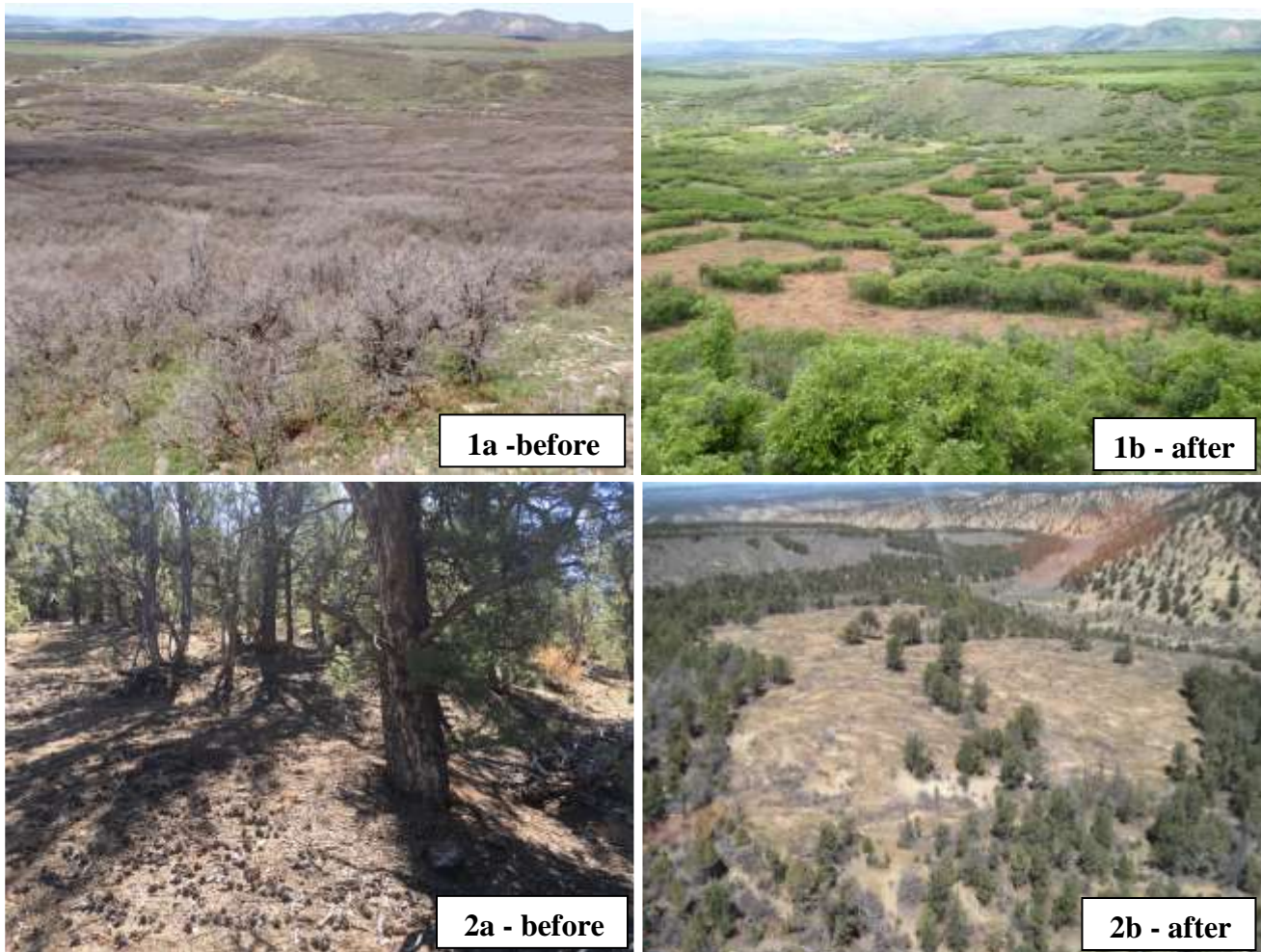


Figure 65. Pictures 1a - before and 1b - after, mixed mountain shrub mastication treatment designed to increase forage to cover ratio on Oakridge State Wildlife Area in GMU 23 (photo courtesy DWM Bailey Franklin, CPW). Pictures 2a - before and 2b - after, pinyon-juniper mastication treatment designed to increase forage availability in the Piceance Basin in GMU 22 (photo courtesy Chuck Anderson, CPW Mammals Research).

Aspen communities at mid to upper elevations across much of the White River and Routt National Forests within D-7 are declining. The rate of aspen decline increased dramatically after the prolonged drought conditions experienced from 2000-2005. In addition, increased herbivory by elk and age of stands are also likely contributing to this declining trend. While some stands are showing signs of regeneration, old growth stands have very little to no suckering of young aspen trees in the understory (Figure 67). Surveys conducted in 1981 confirmed the average age of aspen stands in Colorado was 80 years old with stands younger than 50 years of age difficult to find. This would mean the average age of aspen stands in 2020 are 120 years old with fewer stands around 90 years of age. Generally, aspen are short-lived and rarely survive more than 100 years. Without disturbance such as fire, timber harvest, or mechanical treatment aspen stands can become too old to replace themselves, conifer encroachment increases and understories become less productive.

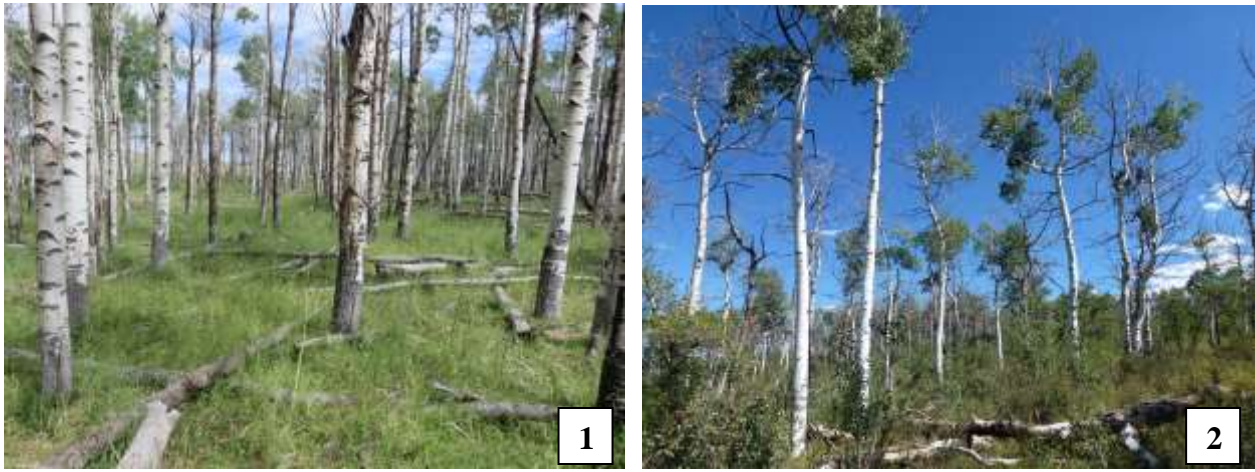


Figure 66. Picture 1 - Old growth aspen stand without any regeneration. Picture 2 - Old growth aspen stand with young aspen suckering and regrowth.

Pinyon-juniper stands are diverse within D-7. Some stands are mature with a closed canopy that severely reduces understory vegetation while encroachment into sage parks is occurring in other areas. Pinyon-juniper encroachment into sagebrush communities initially can be beneficial to mule deer by improving plant diversity and cover. However, those benefits are relatively short-lived especially during prolonged drought cycles when pinyon-juniper trees outcompete important forage species in the understory like grasses, forbs, and shrubs. Thus, knowing when to introduce a treatment such as fire or mechanical treatment is important to maintaining adequate forage-to-cover ratios within these communities. White River BLM personnel and CPW personnel have worked closely to implement a number of mechanical treatments within dense pinyon-juniper stands in GMU 22 to improve forage-to-cover ratios (Figure 68).

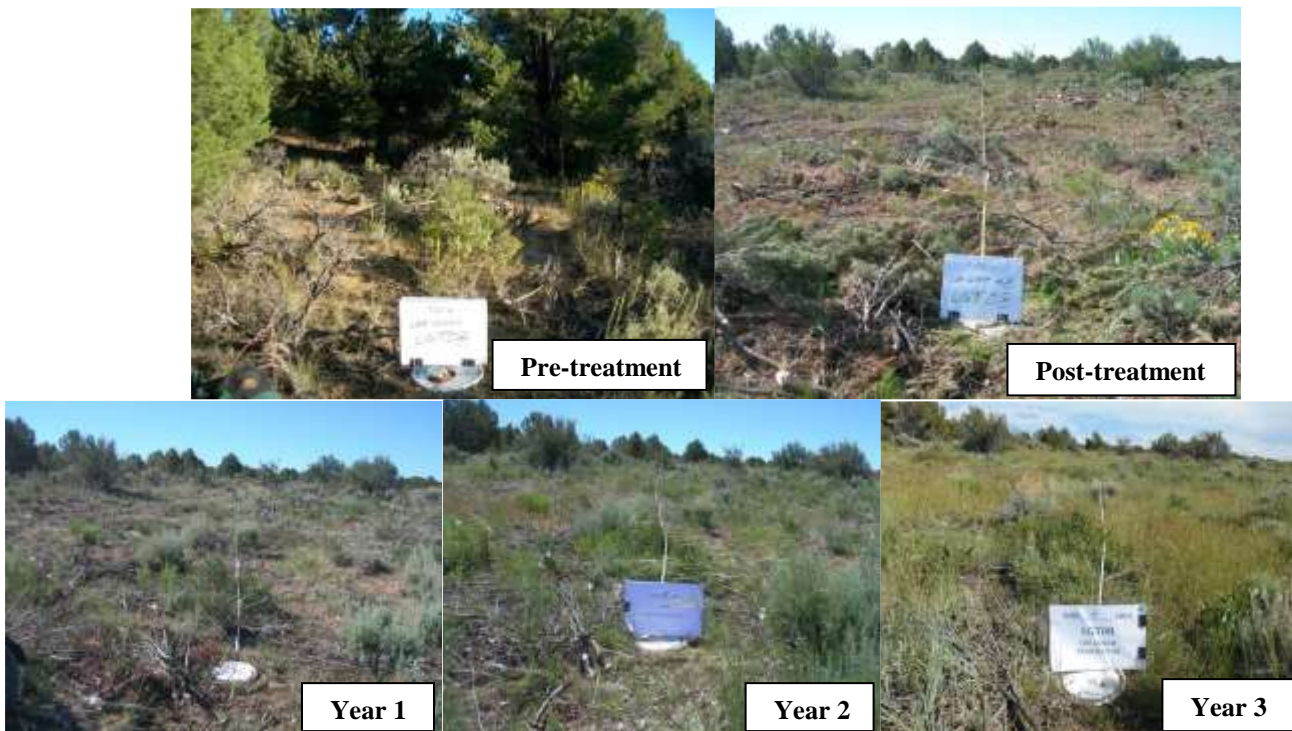


Figure 67. Time series showing pre and post treatment of mature pinyon-juniper stand designed to increase forage-to-cover ratio and improve plant diversity for wintering mule deer (photos courtesy of Ranch Advisory Partners).

Noxious Weeds

Noxious weeds have the potential to reduce habitat values for a variety of wildlife species and are a concern for all land managers (Figure 69). Controlling noxious weed infestations requires substantial resources and can be an overwhelming task. The most prevalent noxious weeds within D-7 include cheatgrass, whitetop, hounds tongue, toadflax, Canadian thistle, leafy spurge, knapweed, and desert madwort.



Figure 68. Sagebrush community with an understory composed of a monoculture of cheatgrass and white top.

Persistence is key when trying to manage noxious weed infestations, however, personnel and budget cuts within the Blanco Ranger District of the White River National Forest (WRNF) have made it increasingly difficult to effectively manage weeds on the Forest. Noxious weed infestations identified by the WRNF include the Lost Solar drainage, Crook's Park, Marvine drainages, Pack Horse Park, and upper South Fork of the White River. The Yampa District of the Medicine Bow-Routt National Forest (MBRNF) identified concerns about noxious weed infestations in the Pagoda area, especially Salt Park, Horse Park, Corral Creek, and the South Fork of the Williams Fork. The White River BLM identified the most serious noxious weed problem within GMU 11 where whitetop is prevalent in the floodplains of Crooked Wash and Deep Channel Creek. The Little Snake BLM field office also identified whitetop as the primary concern within the Danforth Hills and Axial Basin. Cooperative control efforts are expected to continue among BLM, Rio Blanco County, Moffat County, HPP, USFS, and the livestock permittees.

Fire and Vegetation Succession

Since 2003, the BLM White River and Little Snake Field Offices have actively implemented a Fire Management Plan that recognizes and attempts to more fully integrate fire as a fundamental vegetation management process. However, recent catastrophic fires throughout the West that have involved loss of property and life have made it exceedingly difficult to implement fire as a management tool on the landscape. The primary focus of BLM fire management within D-7 has been within pinyon-juniper woodland communities and to a lesser extent, sagebrush communities. Much of the emphasis now is aimed at reducing fuel loads in areas through mechanical treatments to serve as fire breaks to mitigate against large-scale catastrophic fires. Many of the mechanical vegetation treatments designed to create firebreaks on the landscape are beneficial to mule deer. Generally, these treatments involve mechanical treatment of decadent mixed mountain shrub, encroaching or secondary age class pinyon-juniper woodlands that results in an increase in woody forage production.

PRIVATE LANDS

The importance of habitats on private lands across DAU D-7 is significant. In fact, 41% of the total land base within the DAU is privately owned. Private lands expand across seasonal ranges occupied by mule deer and are some of the highest quality habitats on the landscape.

Historically, many of the privately owned irrigated fields contained an alfalfa grass mix and were seasonally very important to deer during early spring prior to migration back to summer ranges and late fall after arriving back on winter ranges. This was perhaps most pronounced along the Piceance Creek drainage in GMU 22 where annual deer counts resulted in thousands of deer being counted on these meadows. However, in time the grasses within these fields has outcompeted the alfalfa and landownership along many of the bottoms has changed resulting in rural residential development or development of oil and gas infrastructure. Without the alfalfa component, the value of these areas to mule deer has diminished. The importance of legumes like alfalfa in these fields can still be witnessed today when large congregations of mule deer occur on dryland or irrigated alfalfa fields that are still in production, especially in the fall.

High wheat prices in the 1970s and again in the early 1980s resulted in large tracts of land in GMUs 12, 13, 23, 131 and 211 being converted from native range, primarily sagebrush, to winter wheat production (Figure 69). Low yields due to poor soils and lack of dependable moisture as well as fluctuating markets resulted in many of the fields once in wheat production to be incorporated into the Conservation Reserve Program (CRP) or revert to native sagebrush communities by the mid-1980s. The conversion of these native sagebrush communities into agricultural fields and now into grass dominated CRP communities or back to native sagebrush communities with understories lacking diversity, certainly diminished the carrying capacities for mule deer within D-7, especially on winter ranges that likely supported high densities of deer.

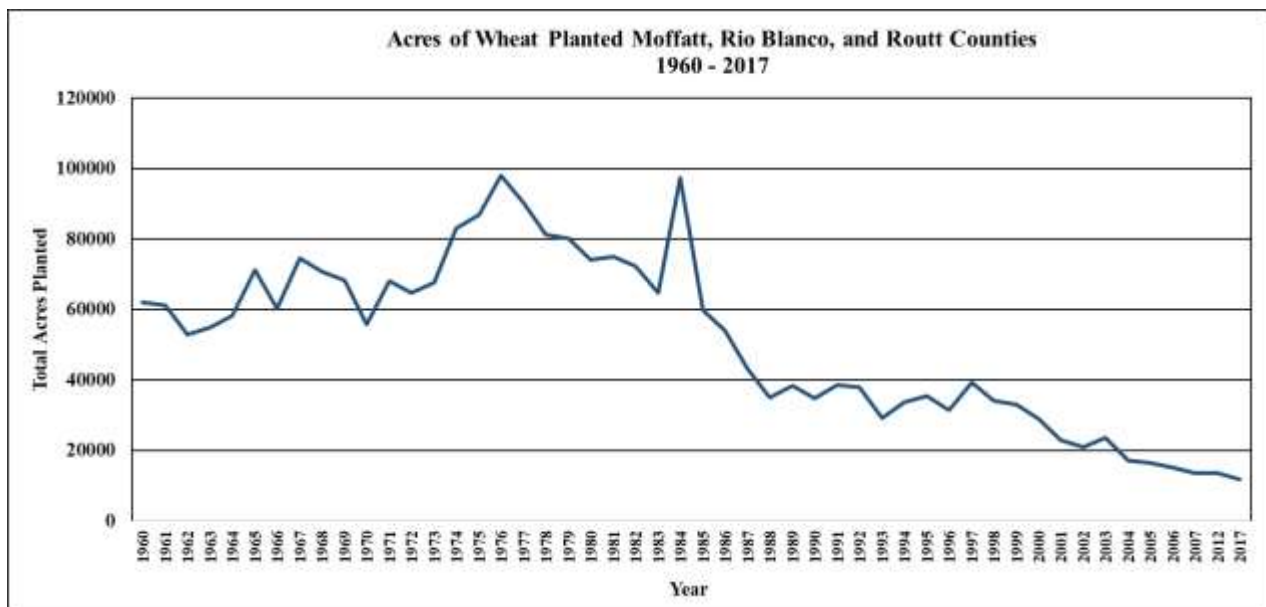


Figure 69. Acres of wheat planted in Moffatt, Rio Blanco and Routt counties as reported by agricultural statistics (<http://www.nass.usda.gov>).

Historically, livestock numbers across the D-7 landscape were much higher. Based on USDA National Agricultural Statistics Service livestock inventory for sheep and cattle within counties encompassed in part by D-7, sheep inventories peaked around 1960 and cattle inventories had a bimodal peak with apexes occurring in the mid-1970s and another in 1997 (Figures 70 & 71). These peak livestock inventories coincide with the often referenced “hey day” of mule deer populations in the 1960s and 1970s. Because mule deer

populations and livestock inventories peaked concurrently, it is often argued mule deer benefitted from grazing practices during this period. However, it is more likely the intensity of both livestock and mule deer use at the time caused long-term changes in plant community structure and composition. Since the 1970s, the general trend for both livestock inventories and mule deer populations has been declining. While there are multiple factors that have influenced these concurrent trends, one of the common factors is the diminished carrying capacities of the habitat.

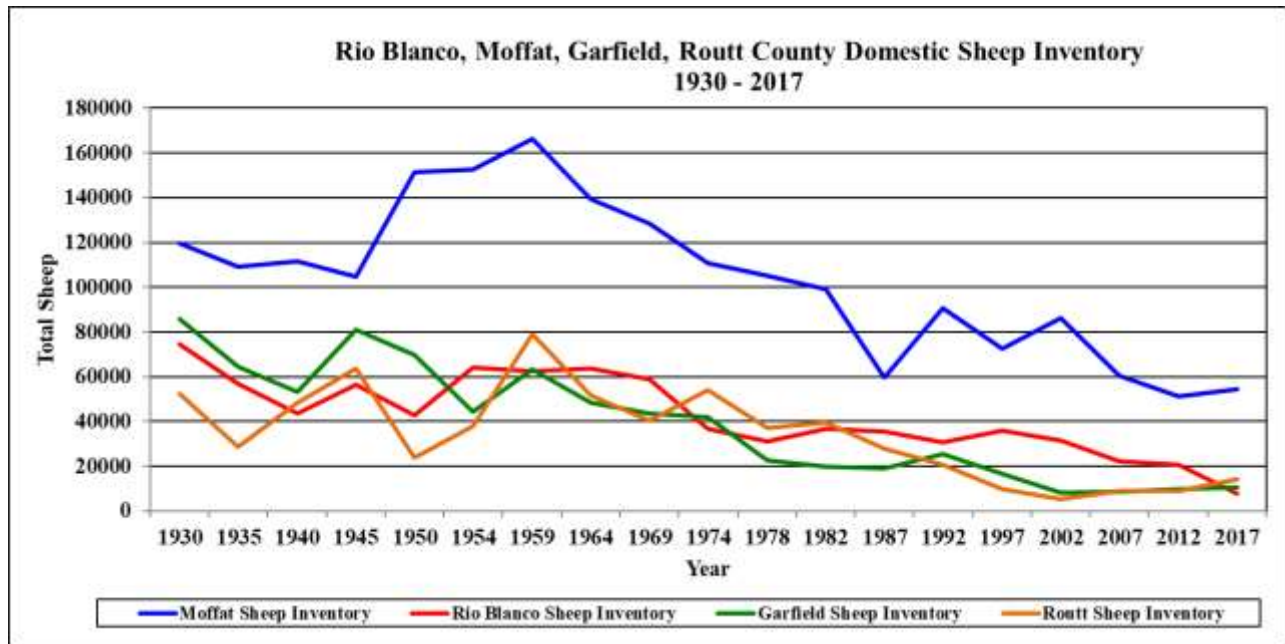


Figure 70. Sheep inventory (total sheep) in Rio Blanco, Moffatt, Garfield, and Routt Counties as reported by National Agricultural Statistic Services 1930 - 2017 (<http://www.nass.usda.gov>).

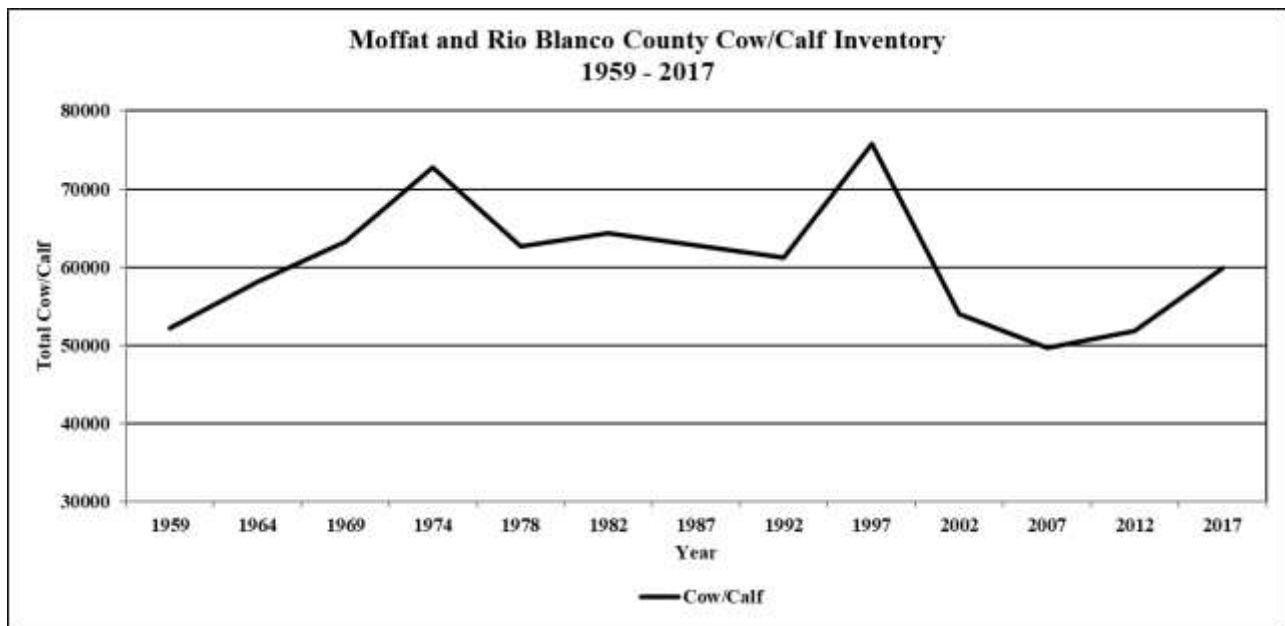


Figure 71. Cattle inventory as reported by National Agricultural Statistics Services 1959 - 2017 in Rio Blanco and Moffat Counties (<http://www.nass.usda.gov>).

The Habitat Partnership Program

Colorado's Habitat Partnership Program (HPP) was initiated in 1989 to better address the problems private landowners and federal land management agencies have with big game animals. The program is designed to directly solve forage and fence problems with local input. A committee of local landowners, sportsmen and federal agency personnel is established to ensure appropriate public involvement in identifying range management problems and recommending solutions to these problems. Five percent of the total deer, elk, and pronghorn license revenue produced is allocated to committees statewide to conduct habitat work and other methods to alleviate conflicts.

The committee produces a 10-year Big Game Distribution Management Plan. This plan identifies locations and seasons of big game concentrations, which the landowner/land manager considers to be conflict areas. For each conflict area identified, the plan includes a strategy by which CPW and the landowner/land manager agree to eliminate or reduce the conflict.

Another significant portion of each committee's involvement in local big game management is participation in the Herd Management planning process. They insure that private land habitat issues are considered in setting the DAU objectives and that conflict areas and solution strategies are identified and appropriate.

Three HPP committees are involved with DAU D-7 the White River HPP (WRHPP) Committee in Meeker, the Northwest Colorado HPP (NWHPP) Committee in Craig, and the Upper Yampa River HPP (UYRHPP) Committee in Steamboat Springs. The WRHPP committee has been instrumental in expanding the mission of the HPP program. Recognizing the need for habitat improvement, beginning in 2009, the WRHPP committee embarked on a pro-active landscape scale habitat improvement program for big game. The goals of this program are to perpetuate the sustainability of the White River mule deer herd, improve transitional and winter range habitats, increase the capacity of winter ranges and hold animals within transitional ranges longer by improving diversity and quality of forage, compare a variety of habitat management tools, and monitor/compare long-term vegetative responses of various habitat treatments. Since 2009, WRHPP committee has completed 129 habitat improvement projects effecting 25,678 acres of which 18,401 acres have been treated. The majority (96%) of the treated acreage has occurred on private or state wildlife area lands with the remaining projects occurring on federally managed lands. A variety of treatment methods have been used including, mechanical mastication, prescribed fire, prescribed livestock grazing, fertilization, agricultural reclamation, and chemical/herbicide treatments. In addition to treatments, the committee also has an intensive long-term monitoring program to determine the success of various treatment types. All of these efforts in attempt to benefit mule deer habitat.

VII. ISSUES AND STRATEGIES

Issue Solicitation Process

An important aspect of the DAU planning process is obtaining input from all segments of the affected local populations, including the BLM, US Forest Service, HPP committees, and the interested public. Scoping meetings were held to gather input from all stakeholders that have an interest in mule deer management, including the BLM, US Forest Service, HPP committees, and the public. Public meetings were held on January 23rd and February 27th, 2019 in Meeker and February 12th, 2019 in Craig. Herd history, management strategies, and management challenges were all discussed at the public meeting. Members of the public, outfitters, sportspersons, county commissioners, HPP committee members, state and federal land management agencies were all invited to attend. An optional comment form was provided to attendees at the meeting to provide input regarding issues and concerns with mule deer management in the DAU. In addition to the public meetings, 2,000 questionnaires were mailed out to randomly selected first choice applicants who had applied for a mule deer license in D-7 in 2019. To obtain a representative sample of resident and non-resident hunters 65% of the questionnaires were sent to resident and 35% were sent to non-resident applicants. This ratio reflects the resident vs non-resident license allocation ratio. Respondents were given the option to respond on-line or mail-in the survey. Results from this survey can be found in Appendix A.

Issue Identification

The primary purpose of the Herd Management planning process is to determine objectives for the size and structure of post-hunt population. The secondary purpose of the process is to gather input from the public regarding concerns about mule deer herd management within the DAU. In the case of D-7 this includes determining objectives for the size and structure of the mule deer herd and controlling CWD prevalence.

Issues and Concerns: Public

Public outreach was conducted in the form of local public meetings and a broader survey sent out to 2,000 first choice applicants to allow for input from resident and non-resident hunters. Approximately 60 people attended the Meeker public meeting, however, only members of the NWHP committee attended the Craig meeting. Those that attended the public meeting were given the opportunity to fill out a comment form regarding their concerns about deer management in the D-7 herd. A brief summary of results is provided below from local public meetings and the questionnaire. Responses to the questionnaire can be found in Appendices A and B.

White River Mule Deer DAU D-7 Comment Forms - Local Public Meetings

Comments were received from 58 people who attended the public meetings. Fifty seven percent of respondents lived within the White River GMUs and 43% did not. Most respondents (68%) had participated in some other outdoor activity other than hunting within the White River deer herd GMUs. When asked to identify how to best describe interactions with deer within the White River the vast majority of respondents identified as hunters (93%). In addition, respondents also identified their interactions with deer as wildlife viewers (47%), landowners (43%), outdoor recreationists (36%), livestock producers (26%) and guide/outfitter (19%). Respondents were most concerned about predation on deer within the White River herd. Concerns other than predation listed highest to lowest were habitat loss, potential for deer to starve during the winter, increasing outdoor recreation, economic losses to local residents due to decreased hunting opportunity, deer-vehicle collisions, potential for deer to spread disease to humans, pets or livestock, and lastly, economic losses to ranchers/farmers due to deer damaging crops, fences, etc. Respondents identified herd health and not having enough deer to hunt as the leading concern when it comes to chronic

wasting disease. Eating meat from harvested deer and family health were less of a concern. The majority of respondents (79%) felt the White River deer herd has declined in the previous 10 years. While only 11% thought the herd had increased and the other 11% were not sure. Increasing the White River deer herd was most important to respondents, followed by staying the same as current population. Hunting mature bucks was more important to respondents than being able to hunt deer of either sex most years. Eighty nine percent of respondents had hunted deer in the White River herd. Of those who had hunted in the White River herd just over half, 56%, were satisfied or very satisfied with their hunt and a third, 32% were dissatisfied, 13% were neither dissatisfied nor satisfied.

White River Mule Deer DAU D-7 Survey Questionnaire

Two thousand questionnaires were mailed out to randomly selected first choice applicants who had applied for a mule deer license in D-7 in 2018. To obtain a representative sample of resident and non-resident hunters 65% of the questionnaires were sent to resident and 35% were sent to non-resident applicants. This ratio reflects the resident vs non-resident license allocation ratio. Respondents were given the option to respond on-line or mail-in the survey.

Background Information

Of the 2,000 surveys sent out 73 were returned due to invalid addresses for a total of 1,927 potential respondents. One thousand sixty nine participants responded to the survey, a 55.2% response rate. Of the respondents, 80.6% responded with mail-in questionnaires and 19.3% responded on-line. These results indicate respondents clearly preferred the mail-in response option. Responses to the survey were representative of the resident vs non-resident hunters surveyed, 59.9% resident and 40.1% non-resident. Only 11.5% of those surveyed lived within DAU D-7.

Your Experiences with Mule Deer

Just over 20% of the respondents were enrolled in the Landowner Preference Program. When those surveyed were asked to best describe how they interacted with deer in D-7 almost all respondents identified as a hunter (96%). Respondents also identified their interactions with deer as wildlife watchers and outdoor recreationists. Over 98% of the respondents have hunted deer in Colorado and almost 95% of those hunters had hunted deer in D-7. Sixty percent of the hunters who had hunted in D-7 in the last 10 years were satisfied with their hunt while 27% of respondents were dissatisfied. Hunter crowding appears to be an issue with 59% of respondents indicating they felt moderately crowded while hunting in D-7.

Reason Why You Hunt

When asked the importance of reasons to hunt deer, respondents were most motivated to spend time in nature, followed closely by spending time with friends and family. The second, almost equally most important reasons respondents ranked to hunt is to contribute to wildlife management and obtaining game meat. Physical exercise, to improve skills, and to contribute to local community, respectively, were less important reasons to hunt. Overall, harvesting a trophy was the least important reason to hunt for respondents however; it was the fourth most important reason to hunt for non-residents.

Potential Concerns About The White River Herd

The leading cause for concern about the White River deer herd among respondents was loss of habitat (79%), followed by deer starving to death on winter range (73%). Overall, concerns about increasing outdoor recreation (65.9%), economic loss to local residents due to decreased hunting opportunity (62.5%), and predation on mule deer (60.8%) all had similar levels of concern. Concerns over predation were higher

among non-resident versus resident respondents, while impacts from increasing outdoor recreation and economic losses due to decreased hunting opportunity were similar. Concerns over the potential for deer to spread disease to pets, livestock, or humans was of the fourth highest concern, deer-vehicle collisions fifth, and lastly was economic losses to ranchers/farmers due to game damage. Potential concerns about CWD were not specifically included in this question (Appendix B), but were addressed in a separate question that followed.

Potential Concerns About Chronic Wasting Disease (CWD)

Of equal and highest levels of concern regarding CWD were future generation's ability to enjoy hunting deer in the White River and the potential for CWD to reduce deer hunting opportunity in White River GMUs (86%). The second highest concern was the health of affected deer herds in White River GMUs (82.7%). Third were concerns over having enough healthy deer to hunt (79.6%). Fourth were concerns over family health (52.7%) and fifth was eating meat from a deer harvested in White River GMUs (47%). Based on survey results deer hunting opportunity and herd health are more of a concern to hunters than human health. Respondents preferred the highest priority for herd and harvest management be placed on striking a balance between controlling CWD and preserving hunting opportunity (83.3%). Secondly, respondents preferred CPW minimize adverse effects of CWD on overall herd health regardless of how it affected quality deer hunting opportunities. The least preferred was maximizing quality deer hunting opportunities, regardless of how it affected CWD prevalence or overall herd health.

Herd Management

Almost 40% of the respondents felt the number of deer in the White River deer herd has decreased the previous 10 years, an equal percentage were unsure, 10% responded the number of deer had increased, and 10% responded the herd had not changed. The majority of respondents would like to see the White River deer herd increase or stay at the current population levels. Finally, it was more important to respondents to be able to hunt mature bucks in the White River heard over being able to hunt deer of either sex most years. These results did differ between residents and non-residents. Residents actually preferred being able to hunt deer more often compared to non-residents that preferred hunting mature bucks.

Issues and Concerns: HPP - see Appendix D

Issues and Concerns: BOCC - see Appendix E

Issues and Concerns: BLM - see Appendix F

Primary concerns raised by the Bureau of Land Management included the lack of herbaceous expression on lower elevation, foothill swale sites performing below potential. Range assessments show a strong component of weedy annuals and limited perennial grasses occurring within these areas. The continued expansion of cheatgrass was also acknowledged as a concern. Livestock grazing and drought were the major contributors to the concerns identified by the BLM.

Issues and Concerns: USFS - see Appendix G

Issues and Concerns: SLB - did not receive comment

VIII. ALTERNATIVE DEVELOPMENT

Both sociopolitical and biological factors are considered when developing management alternatives. Sociopolitical issues generally involve hunter's desires in regards to population size, hunting opportunity, buck quality, economics to local economies, outfitters, and landowners and political issues with local county, state, or federal government agencies. Biological considerations involve the effects weather has on habitat capability, which in turn effects mule deer nutrition that plays a fundamental role in all mule deer life processes. In short, healthy mule deer populations are managed within the range of habitat capability and habitat capability is not static. Therefore, sustaining historic or desired population levels can be difficult or impossible to achieve due to habitat constraints most often dictated by weather driven factors. Given all of the factors that affect mule deer population dynamics and balancing those with sociopolitical desires often presents challenges in the development of management alternatives.

Population Objective Range Alternatives

It is important to consider historic population trends and the factors that have influenced those trends through time in the development of population objective alternatives. Understanding the causative factors for the decline is especially important when considering population objective alternatives for the White River mule deer herd. After sustaining an average estimated population size of 90,000 deer for almost 4 decades, the D-7 mule deer herd has steadily declined since the 1980s and over the past decade has averaged a third of those historic population levels. Basing population objective alternatives on historic D-7 population levels is unrealistic, so, the current population objective alternatives were developed relative to the current population estimate of 36,000 mule deer. Additionally, CWD prevalence within the D-7 herd has increased from 1.5% in 2002 to 15.3% in 2017, with one in every four to five harvested bucks now infected in some GMUs. In response to increasing CWD prevalence, a CWD Response Plan was developed to provide guidance to CPW managers aimed at incorporating management actions into Herd Management Plans. The CWD Response Plan includes a suite of actions and recommendations local wildlife managers can implement and assess at the individual herd level to control CWD prevalence while achieving population and herd composition objectives. A 5% prevalence threshold was established to trigger compulsory management action to reduce CWD prevalence when surveillance monitoring indicates prevalence is greater than or equal to 5% in adult male deer. Management actions within the plan are intended to provide maximum flexibility to customize management actions that will reduce or maintain CWD prevalence below the 5% threshold. The following management actions will be considered in the development of population and herd composition objective alternatives:

CWD Management Actions - Above 5% threshold

- A. Reduce Population Density
- B. Reduce Male:Female Ratio
- C. Change Age Structure
- D. Maximize Ability to Remove Diseased Animals at Smallest Scale Possible (hot spots)
- E. Remove Motivations that Cause Animals to Congregate
- F. Minimize Prion Point Sources
- G. Incorporation of CWD Management Actions and Prevalence Threshold into Herd Management Plans

Population range objectives presented in each alternative are proposed to allow for management flexibility in response to changing conditions such as drought, CWD prevalence, and changes in population size. Licenses will be issued annually to manage to a target population size within the population objective range and CWD prevalence threshold of 5% or less. The following three population objective alternatives are proposed:

Population Objective Alternatives:

Alternative 1: 20,000-30,000 (decrease)

Alternative 2: 25,000-35,000 (same to somewhat fewer deer)

Alternative 3: 30,000-40,000 (current population size)

Alternative 1 - would allow for a substantial reduction in herd numbers from current population estimates. A population objective range of 20,000-30,000 would allow for increased flexibility in management options if desired CWD prevalence rate reductions were not being achieved. In addition, it would allow further population reductions to address density-dependence mortality factors if survival-monitoring data indicated malnutrition rates continued to be a significant factor. Management actions recommended to achieve the population objective and reduce CWD prevalence rates include: increased female and/or either sex hunting licenses, increased harvest in later season or high prevalence areas, increase private land only license availability, and increase harvest within targeted high-density mule deer winter ranges. The specific areas in which increased harvest on high-density mule deer winter ranges would be determined based on data from D-7 mule deer survival and CWD monitoring results. Moderate incremental increases in license recommendations would be utilized to achieve desired objectives.

Alternative 2 - would allow for a moderate reduction in the herd from current population estimates. A reduction in deer numbers from current population estimates would allow the opportunity to address management concerns regarding effects of population density-dependence due to poor winter range conditions being observed in the D-7 survival study and high CWD prevalence rates in parts of the DAU. Management actions recommended to achieve the population objective and reduce CWD prevalence rates include: increased female and/or either sex hunting licenses, increased harvest in later season or in high prevalence areas, increase private land only license availability, and increase harvest within targeted high-density mule deer winter ranges. The specific areas in which increased harvest on high-density mule deer winter ranges would be determined based on data from D-7 mule deer survival and CWD monitoring results. Moderate incremental increases in license recommendations would be utilized to achieve desired objectives.

Alternative 3 - would maintain current mule deer numbers within the population estimate range over the past decade. This alternative would afford little flexibility in implementing management actions to address CWD prevalence rates or population density-dependence related factors of mortality currently being observed within the D-7 mule deer herd. Management actions would remain status quo with extremely conservative hunting license recommendations. Conservative management strategies over the past decade have been ineffective at increasing the D-7 population and have contributed to increased CWD prevalence. Current CWD prevalence rates are having population level effects and will continue to get worse if management actions are not taken to reduce prevalence.

Sex Ratio Objective Alternatives

Various management strategies have been implemented historically in D-7 ranging from unlimited buck hunting with a minimum 5-inch antler regulation for yearling bucks, to 3-point antler restrictions, to limited season lengths, and finally, totally limited licensing. All management strategies have presented challenges in maintaining sex ratio objectives within the D-7 herd. Antler point restrictions and shortened season lengths were ineffective at raising buck ratios when below objective and since the 1999 limitation of all mule deer licenses, lowering buck ratios to objective has been challenging. The D-7 herd has been chronically over the current sex ratio objective, only falling below objective once in 20 years. The current 3-year average buck ratio, 31.1 bucks per 100 does, is the highest average buck ratio ever observed in the D-7 herd.

Given the 10-fold increase in CWD prevalence within D-7 over the past 15 years, consideration must be given to management strategies that will reduce buck ratios to within sex ratio objective ranges in an attempt to reduce CWD prevalence rates. The CWD Response Plan includes a suite of actions and recommendations local wildlife managers can implement and assess at the individual herd level to control CWD prevalence while achieving population and herd composition objectives. A 5% prevalence threshold was established to trigger compulsory management action to reduce CWD prevalence when surveillance monitoring indicates prevalence is greater than or equal to 5% in adult male deer. Management actions within the plan are intended to provide maximum flexibility to customize management actions that will reduce or maintain CWD prevalence below the 5% threshold. The following management actions will be considered in the development of population and herd composition objective alternatives:

CWD Management Actions - Above 5% threshold

- A. Reduce Population Density
- B. Reduce Male:Female Ratio
- C. Change Age Structure
- D. Maximize Ability to Remove Diseased Animals at Smallest Scale Possible (hot spots)
- E. Remove Motivations that Cause Animals to Congregate
- F. Minimize Prion Point Sources
- G. Incorporation of CWD Management Actions and Prevalence Threshold into Herd Management Plans

Sex Ratio Objective Alternatives:

Alternative 1: 15-22 bucks:100 does

Alternative 2: 18-25 bucks:100 does

Alternative 3: 23-30 bucks:100 does

Alternative 1 - would allow for a substantial reduction from the current 3-year average observed sex ratio of 31.1 bucks per 100 does. A reduction in sex ratio objective from current 3-year average observed sex ratios would allow the opportunity to address management concerns regarding high CWD prevalence. Management actions implemented to achieve sex ratio objectives and reduce CWD prevalence rates would include: reduce male:female ratios, change age structure, and maximize ability to remove diseased animals at smallest scale possible. Management tactics to achieve sex ratio objectives and CWD prevalence will include disease management hunts and/or increasing and/or shifting male hunting licenses into later seasons and creation or modification of hunt code groupings for more targeted harvest. The lower end of the sex ratio would allow for the highest degree of management flexibility if CWD prevalence thresholds were not met despite a reduction in overall sex ratios.

Alternative 2 - would allow for a moderate reduction from the current 3-year average observed sex ratio of 31.1 bucks per 100 does. A reduction in sex ratio objective from current 3-year average observed sex ratios would allow the opportunity to address management concerns regarding high CWD prevalence. Management actions implemented to achieve sex ratio objectives and reduce CWD prevalence would include: reduce male:female ratios, change age structure, and maximize ability to remove diseased animals at smallest scale possible. Management tactics to achieve sex ratio objectives and CWD prevalence rates will include disease management hunts and/or increasing and/or shifting male hunting licenses into later seasons and creation or modification of hunt code groupings for more targeted harvest. The lower end of the sex ratio would allow for management flexibility if CWD prevalence thresholds were not met despite a reduction in overall sex ratios.

Alternative 3 - would allow for maintaining buck ratios slightly below the current 3-year average observed sex ratio of 31.1 bucks per 100 does. Maintaining the buck ratio near current levels would not allow the opportunity to address management concerns regarding high CWD prevalence. The lower end of the sex ratio would allow for minimal management flexibility if CWD prevalence thresholds were not met despite a reduction in overall sex ratios.

IX. PREFERRED OBJECTIVES AND ALTERNATIVE

CPW Recommendation to the Parks and Wildlife Commission

Population Objective: 25,000-35,000

The preferred alternative population objective range is 25,000-35,000 mule deer. This is a substantial decrease from the 1994 population objective 67,500 mule deer. The preferred population objective range will offer more management flexibility to address overall herd health issues including density-dependence and CWD.

It is important to consider historic population trends and the factors that have influenced those trends through time in the development of population objective alternatives. Understanding the causative factors for the decline is especially important when considering population objective alternatives for the White River mule deer herd. After sustaining an average estimated population size of 90,000 deer for almost 4 decades, the D-7 mule deer herd has steadily declined since the 1980s and over the past decade has averaged a third of those historic population levels. Basing population objective alternatives on historic D-7 population levels is unrealistic, so, population objective alternatives were developed relative to the current population estimate of 36,000 mule deer. The preferred alternative was selected with considerations given to herd performance and CWD prevalence trend over the past 20 years. Modeled estimates indicate the D-7 herd was last at the 67,500-population objective in the early 2000s. Mild winter conditions, high fawn ratios, and above average survival were all factors contributing to the increase in population. Even when mild winter conditions are conducive to high over-winter survival rates and fawn recruitment to yearlings is high, population growth rates within the D-7 population have been minimal. The reason for the stagnant population is adult doe mortality is higher than yearling recruitment.

Additionally, CWD prevalence within the D-7 herd has increased from 1.5% among harvested adult bucks in 2002 to 15.3% in 2017. In response to increasing CWD prevalence rates, a CWD Response Plan was developed to provide guidance to CPW managers aimed at incorporating management actions into Herd Management Plans. The CWD Response Plan includes a suite of actions and recommendations local wildlife managers can implement and assess at the individual herd level to control CWD prevalence while achieving population and herd composition objectives. A 5% prevalence threshold was established to trigger compulsory management action to reduce CWD prevalence when surveillance monitoring indicates prevalence is greater than or equal to 5% in adult male deer. Management actions within the plan are intended to provide maximum flexibility to customize management actions that will reduce or maintain CWD prevalence below the 5% threshold. The following management actions will be considered in the development of population and herd composition objective alternatives:

Sex Ratio: 18-25 bucks:100 does

The preferred alternative sex ratio objective is a range of 18-25 bucks per 100 does. This is essentially the same as the 1994 sex ratio objective of 20 bucks per 100 does. The sex ratio range will offer more management flexibility to address management concerns regarding CWD.

Management Strategy:

Various management strategies have been implement historically in D-7 ranging from unlimited buck hunting with a minimum 5-inch antler regulation for yearling bucks, to 3-point antler restrictions, to limited season

lengths, and finally, totally limited licensing. All management strategies have presented challenges in maintaining sex ratio objectives within the D-7 herd. Antler point restrictions and shortened season lengths were ineffective at raising buck ratios when below objective and since the 1999 limitation of all mule deer licenses, lowering buck ratios to objective has been challenging. The D-7 herd has been chronically over the current sex ratio objective, only falling below objective once in 20 years. The current 3-year average buck ratio, 31.1 bucks per 100 does, is the highest average buck ratio ever observed in the D-7 herd.

Given the 10-fold increase in CWD prevalence within D-7 over the past 15 years, consideration must be given to management strategies that will reduce buck ratios to within sex ratio objective ranges in an attempt to reduce CWD prevalence rates. The CWD Response Plan includes a suite of actions and recommendations local wildlife managers can implement and assess at the individual herd level to control CWD prevalence while achieving population and herd composition objectives. A 5% prevalence threshold was established to trigger compulsory management action to reduce CWD prevalence when surveillance monitoring indicates prevalence is greater than or equal to 5% in adult male deer. Management actions within the plan are intended to provide maximum flexibility to customize management actions that will reduce or maintain CWD prevalence below the 5% threshold. The following management actions will be considered in the development of population and herd composition objective alternatives:

Alternative 2 would allow for a moderate reduction from the current 3-year average observed sex ratio of 31.1 bucks per 100 does. A reduction in sex ratio objective from current 3-year average observed sex ratios would allow the opportunity to address management concerns regarding high CWD prevalence. Management actions implemented to achieve sex ratio objectives and reduce CWD prevalence rates would include: reduce male:female ratios, change age structure, and maximize ability to remove diseased animals at smallest scale possible. Management tactics to achieve sex ratio objectives and CWD prevalence rates will include disease management hunts and/or increasing and/or shifting male hunting licenses into later seasons and creation or modification of hunt code groupings for more targeted harvest. The lower end of the sex ratio would allow for management flexibility if CWD prevalence thresholds were not met despite a reduction in overall sex ratios.

XI. LITERATURE CITED

- Anderson, C. R., Jr. 2019. Population performance of Piceance Basin mule deer in response to natural gas resource extraction and mitigation efforts to address human activity and habitat degradation. Federal Aid Job Progress Report W-243-R3, Colorado Parks and Wildlife, Ft. Collins, CO, USA.
- Bartmann, R. H., L. H. Carpenter, R. A. Garrott, and D. C. Bowden. 1986. Accuracy of helicopter counts of mule deer in pinyon-juniper woodland. *Wildlife Society Bulletin* 14:356-363
- Bartmann, R. M., G. C. White, L. H. Carpenter, and R. A. Garrott. 1987. Aerial mark-recapture estimates of confined mule deer in pinyon-juniper woodland. *Journal of Wildlife Management* 51:41-46.
- Bartmann, R. M., G.C. White, and L.H. Carpenter. 1992. Compensatory mortality in a Colorado mule deer population. *Wildlife Monographs* 121:1-39.
- Bishop, C.J., G.C. White, D.J. Freddy, B.E. Watkins, and T.R. Stephenson. 2009. Effect of enhanced nutrition on mule deer population rate of change. *Wildlife Monographs* No. 172. 28 pp.
- Davies R., Fernández Escámez P.S., Gironés R., Herman L., Koutsoumanis K., Lindqvist R., Nørrung B., Robertson L., Ru G., Sanaa M., Skandamis P., Snary E., Speybroeck N., Kuile B.T., Threlfall J., Wahlström H., Benestad S., Gavier-Widen D., Miller M.W., Telling G.C., Tryland M., Latronico F., Ortiz-Pelaez A., Stella P. and Simmons M. 2018. Scientific opinion on chronic wasting disease (II). *EFSA Journal* 16(1):5132, 59
- Drake, D., C. Aquila, and G. Hunnington. 2005. Counting a suburban deer population using Forward-Looking Infrared radar and road counts. *Wildlife Society Bulletin* 33:656-661.
- Dunn, W. C., J. P. Donnelly, and W. J. Krausmann. 2002. Using thermal infrared sensing to count elk in the southwestern United State. *Wildlife Society Bulletin* 34:698-705.
- Freddy, D.J., G. C. White, M. C. Kneeland, R. H. Kahn, J. W. Unsworth, W. J. deVergie, V. K. Grahma, J. H. Ellenberger, and C. H. Wagner. 2004. How many mule deer are there? Challenges of credibility in Colorado. *Wildlife Society Bulletin* 32:916-927.
- Gill, R.B., T. D. I. Beck, C. J. Bishop, D. J. Freddy, N. T. Hobbs, R. H. Kahn, M. W. Miller, T. M. Pojar, and G.C. White. 2001. Declining mule deer populations in Colorado: reasons and responses. Colorado Division of Wildlife Special Report Number 77, Denver, Colorado, USA.
- Gruell, G. 1986. Post-1900 Mule Deer Irruptions In the Intermountain West: Principal causes and influences. General Technical Report INT-206. Ogden, UT: U.S. Department of Agriculture, Forest Service. Intermountain Research Station. 37 p.
- Lendrum, P.E., Anderson, C.R., Monteith, K.L., Jenks, J. A., Bowyer, R. T. 2013. Migrating Mule Deer: Effects of Anthropogenically Altered Landscapes. *PLOS ONE*. 8(5) pp. 1-10.
- Mathiason, C. K., Powers, J. G., Dahmes, S. J., Osborn, D. A., Miller, K. V., Warren, R. J. et al. 2006. Infectious prions in the saliva and blood of deer with chronic wasting Disease. *Science* 314, 133-136.

- Miller, M. W., Elizabeth S. Williams, Craig W. McCarty, Terry R. Spraker, Terry J. Kreeger, Catherine T. Larsen, and E. Tom Thorne. 2000. Epizootiology of Chronic Wasting Disease in Free-Ranging Cervids in Colorado and Wyoming. *Journal of Wildlife Diseases*: 36(4) 676-690.
- Miller, M. W., E.S. Williams, N.T. Hobbs, and L.L. Wolfe. 2004. Environmental Sources of Prion Transmission in Mule Deer. *Emerg Infect Dis*. 10(6) 1003 - 1006.
- Miller, M. W., M.M. Conner. 2005. Epidemiology of chronic wasting disease in free-ranging mule deer: Spatial, temporal, and demographic influences on observed prevalence patterns. *Journal of Wildlife Diseases* 41:275-290.
- M. W., H. M. Swanson, L. L. Wolfe, F. G. Quartarone, S. L. Huwer, C. H. Southwick, P. M. Lukacs. 2008. Lions and prions and deer demise. *PLoS ONE* 3:e4019.
- Miller, M. W., J. P. Runge, A. A. Holland, M. D. Eckert. 2020. Hunting pressure modulates prion infection risk in mule deer herds. *Journal of Wildlife Diseases* 56:(in press).
- Olson, R. 1992. Mule deer habitat requirements and management In Wyoming. Department of Renewable Resources, College of Agriculture, University of Wyoming, Laramie, USA.
- Sawyer, J and M.J. Kaufman. 2011. Stopover ecology of a migratory ungulate. *Journal of Animal Ecology*. 80, 1078-1087.
- Sawyer, H., Kauffman, M. J., Middleton, A. D., Morrison, T. A., Nielson, R. M., and Wyckoff, T. B. 2012. A framework for understanding semi-permeable barrier effects on migratory ungulates. *Journal of Applied Ecology*. pp. 1-11
- Searle, K. R., M. B. Rice, C. R. Anderson, C. Bishop, N. T. Hobbs. 2015. Asynchronous vegetation phenology enhances winter body condition of a large mobile herbivore. *Oecologia* 179, 377-391.
- Southwick Associates. 2018. The 2017 Economic Contributions of Outdoor Recreation in Colorado. A regional and county-level analysis. Colorador SCORP. Colorado Parks & Wildlife. Denver, CO.
- Sushinsky, J.R., H. Johnson, A. Holland, T. Balzer, J. Garner, and S. E. Reed. 2014. Quantifying Land-Use and Land-Cover in Mule Deer Habitat across Western Colorado. Technical report to Colorado Parks and Wildlife. Wildlife Conservation Society, North America Program, Bozeman, MT.
- Taylor, J.J., E.J. Kachergis, G.R. Toevs, J.W. Karl, M.R. Bobo, M. Karl, S. Miller, and C.S. Spurrier. 2014. AIM-Monitoring: A Component of the BLM Assessment, Inventory, and Monitoring Strategy. Technical Note 445. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO.
- Tollefson, T. N., L.A. Shipley, W. L. Myers, and N. Dasgupta. 2011. Forage quality's influence on mule deer fawns. *The Journal of Wildlife Management*, 75:919-928.
- White, G. C., R. M. Bartman, L. H. Carpenter, and R. A. Garrott. 1989. Evaluation of aerial line transects for estimating mule deer densities. *Journal of Wildlife Management* 53:625-635.

XII. Appendices

APPENDIX A

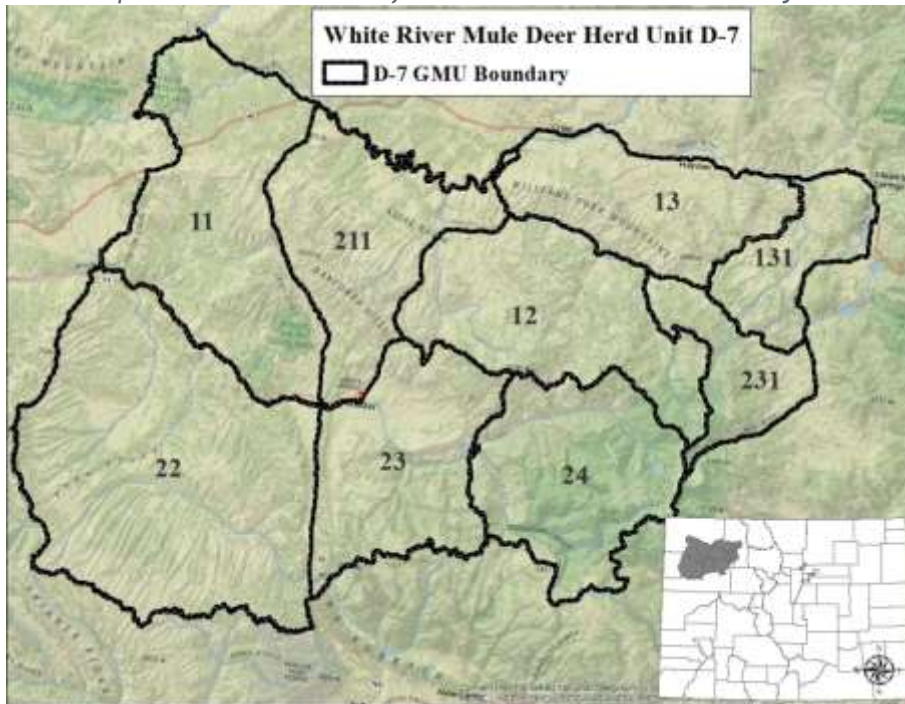
Colorado Deer Management in Game Management Units for the White River Herd.



Please return this form no later than _____ to CPW _____. Your contribution to this process is vital; thank you for taking part. This form is also available online at: _____

Colorado Parks & Wildlife (CPW) is interested in your input on the management of the White River deer herd, which includes Game Management Units (GMUs) 11, 12, 13, 22, 23, 24, 131, 211, and 231. **Your input is very important.** The information you provide will help guide management of deer herds for the next 10 years.

Your responses will remain confidential and at no time will they be associated with your name.



1. Do you currently live within any of the White River deer herd GMUs? (See map above)

(Please check one.)

- Yes 33 (56.9%)
 No 25 (43.1%)

2. During the last 12 months, have you participated in any outdoor recreation other than hunting (e.g. camping, snowmobiling, etc.) within any of the White River deer herd GMUs? (Please check one.)

- Yes 40 (69.0%)
 No 18 (31.0%)

3. Which of the following best describes how you interact with deer within the White River GMUs? (Please check all that apply.)

- As a viewer/wildlife watcher 27 (46.6%)
 As a landowner 25 (43.1%)
 As a hunter 54 (93.1%)
 As a livestock producer 15 (25.9%)
 As an Outdoor recreationist (e.g., hiker, skier, mountain biker, etc.) 21 (36.2%)
 As a Guide/Outfitter 11 (19.0%)
 Other (Please specify):

4. How concerned are you about the following items? (Please check one response for each item.)

	Not at all Concerned	Slightly Concerned	Moderately Concerned	Very Concerned
Deer-vehicle collisions 2.5	18.5%	31.5%	27.8%	22.2%
Economic losses to ranchers/farmers due to deer damaging crops, fences, etc. 1.6	53.4%	31.0%	13.8%	1.7%
The potential for deer to starve during the winter 3.1	5.2%	19.0%	37.9%	37.9%
Loss of deer habitat due to development 3.3	5.3%	8.8%	38.6%	47.4%
Increasing outdoor recreation 3.1	5.7%	20.8%	34.0%	39.6%
Economic losses to local residents due to decreased hunting opportunity 2.7	16.1%	30.4%	17.9%	35.7%
The potential for deer to spread disease to humans, pets, or livestock 2.0	43.1%	24.1%	20.7%	12.1%
Predation on deer 3.4	7.1%	10.7%	16.1%	66.1%
Other (please specify AND indicate your level of concern):				

5. Because of Chronic Wasting Disease (CWD) in deer, how concerned are you about each of the following? (Please check one response for each statement.)

<i>How concerned are you about...</i>	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned
...your or your family's health? 2.1	29.8%	40.4%	15.8%	14.0%
...the health of affected deer herds in White River GMUs? 3.3	6.9%	12.1%	22.4%	58.6%
...not having enough healthy deer to hunt in White River GMUs? 3.2	10.3%	10.3%	24.1%	55.2%
...eating meat from a deer harvested in White River GMUs? 2.2	32.8%	31.0%	19.0%	17.2%

6. How, if at all, has the White River deer herd changed during the previous 10 years? (Please check one.)

10.7% The number of deer has increased
78.6% The number of deer has decreased

10.7% The deer herd has not changed

7. How important to you is it that the population of the White River deer herd... (Please check one.)

	Not at all important to me	Somewhat important to me	Moderately important to me	Very important to me
...stays the same (i.e., the current population is maintained) 3.3	4.9%	19.5%	19.5%	56.1%
...increases somewhat 3.6	3.6%	5.4%	23.2%	67.9%
...decreases somewhat 2.1	54.1%	8.1%	10.8%	27.0%

8. How important to you are the following... (Please check one.)

	Not at all important to me	Somewhat important to me	Moderately important to me	Very important to me
Being able to hunt deer in the White River herd (either sex) 2.7	18.4%	28.6%	14.3%	38.8%
Being able to hunt trophy bucks in the White River Herd 3.4	8.9%	10.7%	12.5%	67.9%

9. Have you ever hunted deer in any of the White River deer herd GMUs? (If no, skip to question 11)

Yes 89.5%

No 10.5%

10. Overall, how satisfied were you with your deer hunting experience(s) in White River GMUs? (Please check one.)

Very unsatisfied 13.5%

Somewhat satisfied 32.7%

Somewhat unsatisfied 19.2%

Very satisfied 21.2%

Neither unsatisfied nor satisfied 13.5%

11. In what year were you born? (Please provide four-digit year.) _____

12. In what zip code is your primary residence? _____

13. Please use the space below to describe any other aspects about deer hunting that would improve your hunting experience or to share any additional comments you have about the management of White River deer herds.

Thank you for taking the time to provide comments.

Comment Form - Written Comments

Habitat

- I feel the mulching of oaks has ruined areas. Elk and Deer will have no place to hide. There is no oaks to stop bullets so more people have a chance of being shot. There are now half the stands to hunt from. I never seen an uglier mess then what you guys did at unit 12.
- We need to improve habitat on public land.
- I would also like to recommend more habitat improvements on federal lands. I think we need to be careful with the HPP program congregating animals in smaller areas on private property e.g. alfalfa fields with big gun sprinklers.

CWD

- CWD Has been around forever, Mother Nature has always done her job and harsh winters are just part of the cycle. Killing off the herd to try and combat something is ridiculous, you will thin the numbers to somehow fabricate a buck to doe ratio that a book says you should have, just leave them alone and nature will take its course. If you reduce the herd and then get a winterkill in the near future then what do you have? Kill more predators and you will be fine! Thank you for listening.

- I've had one buck come back positive for CWD and attempted to eat it. I could not finish it all kinda freaked me out. I'm not convinced that consumption of infected deer will transfer to humans. I believe it would have been proven to already done so.
- I appreciate CPWs attempt to get public in put on CWD management but I hope management actions are based on science and not watered down to appease short sighted people who are ignorant of BMPs for CWD management. Lets do what is needed to catch and manage CWD now. Future hunting will benefit more from that than trying to minimize short term impacts to a few outfitters bank accounts.
- I think we need to kill a good amount of deer to cut down the CWD and the start building back up the herd
- I believe we should target CWD in hot spots for management of the disease by decreasing buck to doe ratio and the number of old age class bucks. Once (if) CWD is lowered below the 5% mark, then we can change the focus to growing the herd in healthier ways. We need to work with the municipalities on targeting town deer.
- I would like to see CWD hot spots targeted to have a later season dates, area should be targeted very specifically, not unit wide.
- I am not concerned about CWD and don't support the killing of the big bucks or other deer thinking it will slow or stop the spread of cwd in the animals. It won't work and once you kill the deer it can't be undone and we may loose the deer herds forever if the CPW chooses to slaughter our herds!
- I don't think CWD is a reason to wipe out the mature bucks or deer herds forever. I am not concerned about CWD and there is no scientific evidence to support that any of the tactics tried before in other states or areas have had any effect in stoping or slowing the spread of CWD. Don't increase the buck tags for 3rd and 4th seasons to kill off our bucks thinking it will slow the spread of CWD. It won't work and our deer herds may be lost forever if this happens!
- Salt blocks and other feed should be restricted by ranchers as to prevent access from other wildlife in areas wildlife are infected with CWD. It is unfortunate that salt blocks and other feed sources are being used by wildlife (which is contributing to the spread of CWD) in the White River units. In addition, there could be targeted areas within the state which OTC bow tags could be used to

Population Management

- I seen a increase in deer list year than some of last few years
- We hunted 2018 2nd season rifle and did not see one deer or elk
- Proactive measures to reduce road kill, proactive measures to reduce mortality associated with fences. Continued/increase habitat improvement projects to increase winter range carrying capacity especially on public lands. Work with CDOT to ensure frontage fences are wildlife friendly including modifying larger stretches of the Hwy 13 fence south of Meeker.
- Concerned about: elk and CWD, CJD disease through eating the meat, wild horse impact to wildlife, improving wildlife habitat, financial support, implementation and on a large scale, more wildlife fences where there are no sheep, motion activated flashing lights at frequent crossing spots to lower road kill. Do this massive project with science not state office control or quick and favorite opinions.
- I want to see good numbers of deer with mature bucks. I don't want to see any does killed!

- Forget about making money and focus on the deer and elk numbers and overall quality and health.
- Want more doe tags
- I am supportive of the proposed mule deer management methods as presented at the Meeker meeting on 01/23/19 with the following exceptions: 1) I do not support culling methods similar to the one conducted during the Motherwell CWD discovery. 2) I do not think having antler point restrictions is a wise idea due to hunter error in counting antler points. I support an increase in deer license availability, especially as a CWD control measure in hot spots. There may be opportunity to have more deer hunting in late seasons, such as 4th season to harvest mature bucks. I would support and participate in habitat improvement projects for deer. I would support research to find out if shared salt and mineral stations between livestock and game animals is a factor in CWD and other disease transmission and if livestock salt and mineral stations and/or salt and mineral placement by livestock producers could be developed to minimize use by game animals?
- I believe in the science, do what the data suggests in terms of management.
- I believe deer numbers are related to elk numbers, vegetation (too much decadent growth) and predators. All 3 need to be checked into and \$ spent to fix.
- I think general consensus is increase in deer numbers. If that means a more aggressive approach to begin with to promote a lower prevalence which will in turn promote healthy herds then an increase can be achieved. Thanks for all you do!
- We need to seriously limit the tags in these units especially in units 23,24.ive lived here for 38 years and 25 miles up county rd 8,i have seen a huge decline in deer last 15 years,we used to drive to town in the evening and see 200 deer now we're lucky to see 20,we used to see 10 or so 160 inch trophy type bucks,havent seen 1 in 3 years,predation and disease is definitely a problem but giving tags for people to shoot little immature bucks because thats all there is,and does is the bigger issue.what if we put these units on a harder draw with a lot less tags?Colorado and land owners will loose some revenue but the goal of a bigger,healthy deer heard would be achieved.how can we plan ahead 10 years,its impossible, if we get 2 or 3 years with real bad winters there goes the majority of our deer.
- I think fawn mortality rates may have more to do with a declining herd in the white river valley than does over-hunting and loss of habitat at this point in time, although by no means do I think the latter two conditions are without consequence. I admit my knowledge of CWD statistics are lacking in this region, but I do know that we are seeing less and less fawns every summer.
- I think we have to be very cautious moving forward with planning hunting season dates, issuing too many tags, and managing recreational activities in these traumatized units. I think we have to be more proactive in managing creditors. I don't understand how we can be looking at a five-year management plan win we are not able to take into account the severity of the winters, harvest numbers per year, and fawn mortality rates. It's a fact that our deer numbers have dwindled. The decisions that are being made now to manage our deer herds are going to affect us for a very long time. I hope the correct decisions are made. I think units 23 and 24 need to be turned into trophy hunting units For both deer and elk.
- The white river deer herd needs help! I am a rancher/farmer that was born here and I have seen drastic changes in the deer population over the last 40 years. The hay fields around our house used to be filled with deer(100-400) now we have 10-20 and the ones we do have stay

really close to the house. I believe there is a combination of factors affecting the decrease in the population such as cwd, predators, elk population, traffic, fawn mortality, and lack of certain foods. The solution to these problems; the cwd I don't know, that's out of my realm.

- I would like to see the population increase and the number of mature bucks increase!
- I would like to see the hunting of does put to a stop and the population of the deer herds to increase and the number of mature bucks to increase.
- control mile deer populations which are over objectives and have CWD increasing in the population.

Livestock

- limit domestic sheep over grazing. the more sheep we see the less deer seen. more and more deer are balled up in private fields close to towns and don't migrate look at craig co from knez divide to yampa airport hundreds of deer, in rifle many deer live behind city market . meeker fields loaded with deer year round, i,ve been up there year round. so domestic sheep wiping out deer browse and too many deer in towns not migrating, probably inbreeding
- Cut cattle grazing down on public lands. Cattle should be moved off before hunting seasons, not during.

Hunting Opportunity

- I've hunted deer since 1975 in Colo. every year with the exception of serving in the US Navy 3 years and the few times I wasn't drawn. I want to hunt deer every year and have been 66% successful either sex but lately hunting only bucks. I try to take 2 1/2 year and older animals but have taken younger. I like big deer for their antlers and younger deer for meat.
- pleased with hunting here
- There is too much crowding from OTC elk hunters. I would like to see at least part of a deer hunt not overlap with any elk seasons.
- Too much crowding from OTC elk hunters. Would be nice to see a deer hunting season not the same time as elk hunting.
- Town deer need to have a late season archery hunt. Need to check with ERBM Rec Center for public hunting. Make list B and longer season dates.
- Too many over the counter tags distributed to out-of-state hunters. Plenty of Colorado hunters come from other parts of Colorado to hunt and boost economics for local businesses. Some out-of-state hunters is okay, but it's too many right now. Those of us who have lived here for generations and are teaching our children to hunt depend on the meat year round to feed our families. We pay local taxes, we support local businesses ALL year long and have come to depend on the land for our livelihood.
- In recent years, the CPW has only offered 10 muzzle loader doe tags for these areas. I would really like to see that number increased. I think that 10 is a ridiculously small number. That being said, I will probably not be hunting in these areas much longer now that Caerus Oil and Gas has kicked my family out of our traditional hunting grounds.
- Closed wintering ranges should be somewhat opened to predator hunters. Example: State Wildlife Areas. There are far too many elk hunters in these units during rifle seasons making

mule deer hunting frustrating. The quantity of deer in the area has become very disappointing over the last decade.

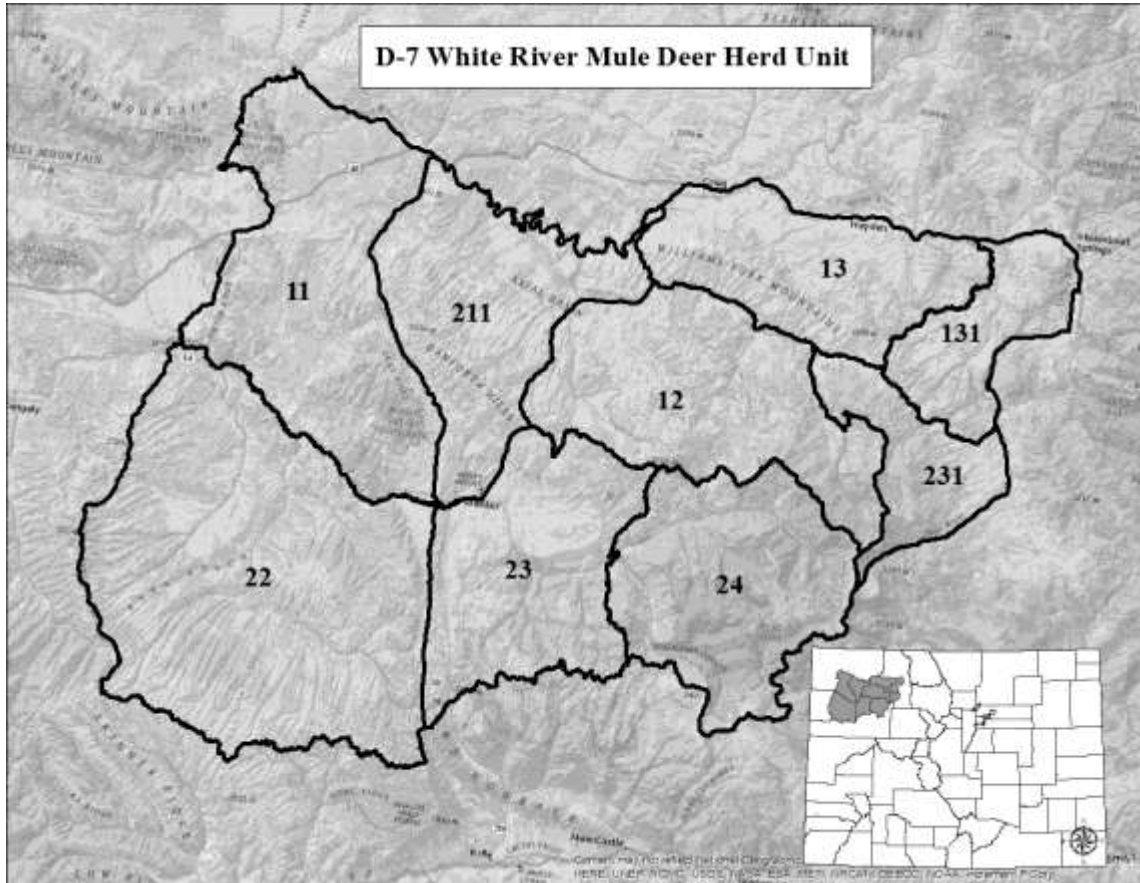
- Need to limit nonresidents, too many residents (myself included) cant draw every year and when we do we are overrun with nonresidents

Predation

- I believe predation is the #1 inhibitor to seeing an increase in the deer population. I believe the mule deer and greater sage grouse are on the same trajectory. Habitat management for both has improved immensley, but too many of the younger are being killed by predators before they can reproduce. That is leaving the population with primarily older, less productive animals.
- need to address predation
- I believe that more emphasis needs to be put on predator control/reduction. By removing predators in critical areas you can actually increase deer numbers. The harvest of mature bucks and harvesting more does will decrease an already struggling population. I think that we need to approach this problem from all sides, just reducing deer is a one sided approach.
- Open bear baiting and dog hunting June 1 - Oct. Kill more lions especially females. Open leg hold trapping for coyotes. Give out free mtn lion license and bear tag concurrent with big game season. Bounty for coyotes. Shut out doe tags completely and limit buck tags. No late deer seasons that are in the rut. No more tagging deer with helicopter. NO WOLVES!
- Predation is paramount. Lion quota: the taking of a female should count as .25 (1/4) of one animal off the quota. Manage predators, then the deer will not go to town and live with people seeking protection from predators. Build watering facilities and available watering impoundments and provide salt to diversify animals and lessen concentrations.
- We need to use all available means to control predators.
- It would also be nice to make a earlier bear hunt e.g. Aug 15.
- More and better control of predators, decrease the elk population, decrease traffic, decrease predators will help in fawn mortality, more controlled grazing for plant regrowth. I believe that if there were more sheep the deer food source would be better because sheep graze on plants that are more in line with the deer so there would be a better supply of regrowth to the plants that the deer thrive on. I am not a sheep rancher but its a fact that the sheep population in this area is some what like the deer population is now. Why has there been a decrease in sheep? just one of the reasons is predators. Between lion, coyotes, bears some of the ranchers cannot stay in business with the percent of lose that they are experiencing. All we need is the wolf and there wont be any deer left.
- Your entire focus seems to be on hunting vs preservation of any kind of 'natural' predator/prey environment. Really disturbing to me. Killing predators to increase herds for hunting income. I am not against hunting- just that it is now the primary reason to serve one segment of the population.
- bring in government hunters and trappers to reduce the predators on the deer and elk, get a handle on the limited licenses, get a handle on the gas and oil fields. Limit even more hunters if necessary.

APPENDIX B

White River Deer Herd Hunter Questionnaire



About This Questionnaire

Colorado Parks and Wildlife (CPW) is currently re-evaluating the Herd Management Plan that guides the agency's management of the White River Deer Herd. The White River Deer Herd includes Game Management Units (GMUs):

- 11, 12, 13, 22, 23, 24, 131, 211, and 231.

The purpose of this survey is to better understand the perspectives of hunters' like yourself, who hunt in these GMUs. **Learning from you** will help CPW effectively manage this herd!

If you would rather complete this survey **online**, please type the entire web address below directly into your browser's address bar.

<https://www.research.net/r/WhiteRiverDeer2019>

If you choose to participate online, you will be asked to enter the **unique number associated with the paper survey** located at the bottom of the last page.

Surveys must be complete by April 18, 2019

Background Information

1. Are you currently a resident of Colorado? (*Please check one.*) (n = 1,060; frequency and/or

mean included throughout in parentheses)

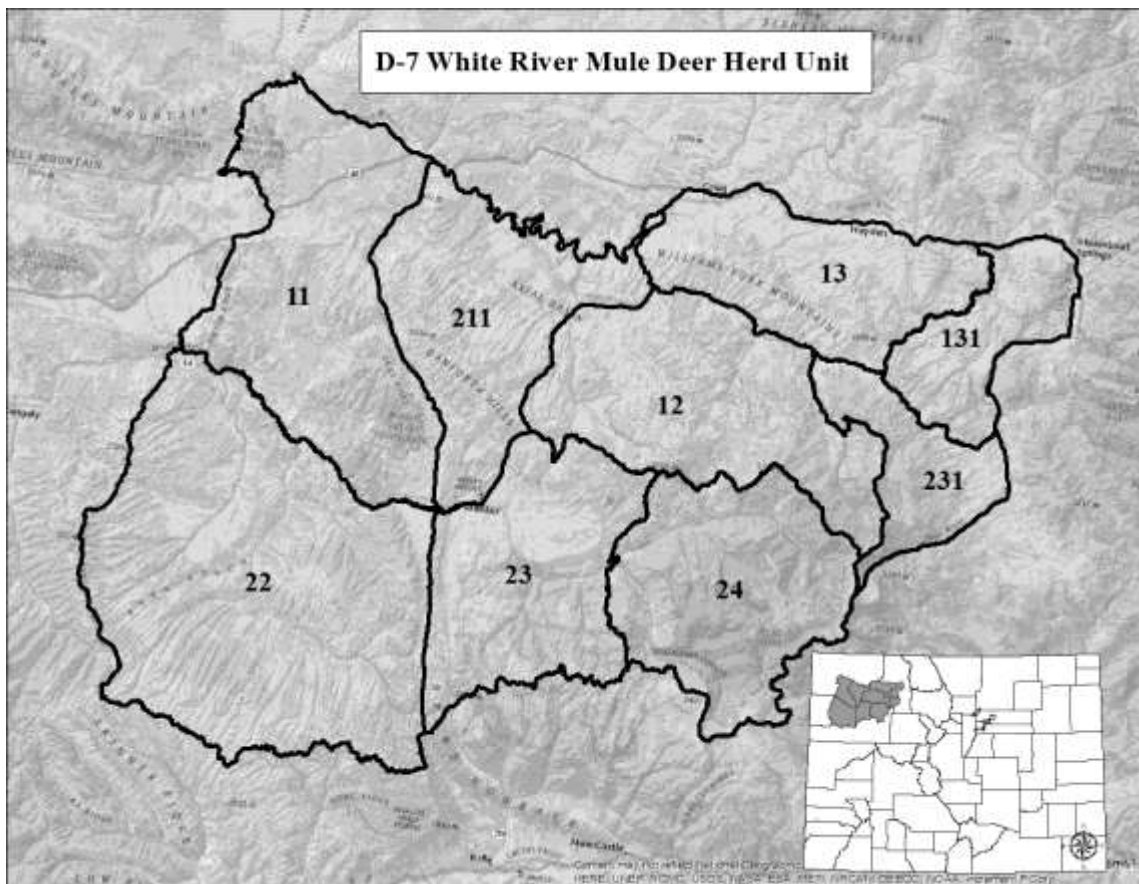
59.9% (635) Yes

40.1% (425) No

2. Do you currently live within any of the White River deer herd GMUs? (See map below) (*Please check one.*) (n = 1,049)

11.5% (121) → (Please **CONTINUE** to Question 3)

88.5% (928) → (Please **SKIP** to Question 4)



Your Experiences With Mule Deer

3. Do you currently lease or conduct hunts on any of your land for hunting deer as part of the

Landowner Preference Program (LPP)? (*Please check one.*)

20.5% (25)

79.5% (97)

4. Which of the following best describes how you interact with deer in the White River GMUs?
(Please check all that apply.)

22.3% (240) As a viewer/wildlife watcher

7.1% (76) As a landowner

96.0% (1,032) As a hunter

2.9% (31) As a livestock producer

18.0% (193) As an Outdoor recreationist (e.g., hiker, skier, mountain biker, etc.)

2.7% (29) As a Guide/Outfitter

Other (Please specify): (e.g., camping/camper; commuting to/from work; snowmobile; employment)

5. Have you ever hunted deer in Colorado? (Please check one.)

98.2% (1,042) Yes

1.8% (19) No

6. Have you ever hunted deer in any of the White River deer herd GMUs?

(Please check one.)

94.4% (981) Yes → (Please **CONTINUE** to Question 7)

5.6% (19) No → (Please **SKIP** to Question 9)

7. Overall, how satisfied were you with your deer hunting experiences in any of the White River deer herd GMUs during the previous 10 years? (Please check one.)

10.5% (105) Very dissatisfied (Somewhat - Very dissatisfied = 27%)

16.6% (164) Somewhat dissatisfied

12.9% (128) Neither dissatisfied nor satisfied

35.1% (347) Somewhat satisfied

24.9% (246) Very satisfied (Somewhat - Very satisfied = 60%)

8. To what extent have you felt crowded by other hunters while deer hunting in any of the White River deer herd GMUs? (Please check one.)

15.2% (150) Not at all crowded

25.7% (254) Slightly crowded

32.3% (319) Moderately crowded

26.9% (266) Very crowded

Reasons Why You Hunt

9. How important to you is each of the following reasons to hunt deer in Colorado?

(Please check one response for each statement.)

(sample size “n”, mean “ \bar{x} ”, and percentages “numerical responses” indicated below)

<i>Reasons to hunt</i>	Not important	Slightly important	Moderately important	Very Important*
To spend time in nature (n = 1,047; \bar{x} = 3.60)	2.5	5.5	21.2	70.8
To harvest a trophy (n = 1,049; \bar{x} = 2.42)	22.8	30.7	28.6	17.9
To spend time with family/friends (n = 1,050; \bar{x} = 3.61)	2.0	6.9	19.1	72.0
To obtain wild game meat (n = 1,055; \bar{x} = 3.27)	3.1	15.4	32.7	48.8
To contribute to wildlife management (n = 1,052; \bar{x} = 3.21)	2.9	15.4	40.1	41.6
To contribute to the local community (e.g., financial benefits from hunters) (n = 1,051; \bar{x} = 2.76)	12.7	25.7	34.3	27.4
To test/improve my skills (n = 1,049; \bar{x} = 2.74)	16.8	21.4	32.7	29.1
For physical exercise (n = 1,049; \bar{x} = 2.90)	11.2	18.4	39.9	30.4
Other (please specify): (n = 76) (e.g., access to land; animal populations; issues with outfitters; enjoyment and relaxation)				

*Top three motivations based on “*Very important*” responses were: Spending time with friends/family, Spending time in nature, Obtaining game meat.

Motivations (“*Reasons to hunt*”) recoded (for ease of interpretation)

<i>Reasons to hunt</i>	Important*
To spend time in nature	92.0
To spend time with family/friends	91.1
To contribute to wildlife management	81.7
To obtain wild game meat	81.5
For physical exercise	70.3
To test/improve my skills	61.8
To contribute to the local community (e.g., financial benefits from hunters)	61.7
To harvest a trophy	46.6

*Moderately and very important responses were recoded.

Potential Concerns About The White River Deer Herd

10. Please indicate how concerned you are about each of the following in White River deer herd GMUs (*Please check one response for each item.*)

(sample size “n”, mean “ \bar{x} ”, and percentages “numerical responses” indicated below)

<i>How concerned are you about...</i>	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned
Deer-vehicle collisions (n = 1,052; \bar{x} = 2.41)	24.3	29.7	27.0	19.0
Economic losses to ranchers/farmers due to deer damaging crops, fences, etc. (n = 1,051; \bar{x} = 2.12)	28.2	38.5	26.1	7.2
The potential for deer to starve during the winter season (n = 1,053; \bar{x} = 3.04)	6.6	21.0	34.0	38.5
Loss of deer habitat due to development (n = 1,058; \bar{x} = 3.25)	7.0	14.4	25.4	53.2
Increasing outdoor recreation (n = 1,049; \bar{x} = 2.84)	10.2	23.9	37.8	28.1
Economic losses to local residents due to decreased hunting opportunity (n = 1,053; \bar{x} = 2.80)	10.9	26.6	33.8	28.7
The potential for deer to spread disease to pets, livestock, or humans (n = 1,055; \bar{x} = 2.49)	25.5	25.8	22.6	26.2
Predation on deer (n = 1,052; \bar{x} = 2.80)	13.9	25.4	27.8	33.0
Other (Please specify AND indicate your level of concern): (n = 13) e.g., wintering grounds; uncontrolled ATV use; development/oil and gas; preference point/hunt draw issues; concerns about predators; outfitters; CWD				

Potential Concerns About Chronic Wasting Disease (CWD)

11. Because of CWD in deer, how concerned are you about each of the following in White River

deer herd GMUs? (Please check one response for each statement.)

(sample size “n”, mean “ \bar{x} ”, and percentages “numerical responses” indicated below)

<i>How concerned are you about...</i>	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned
...your or your family’s health? (n = 1,057; \bar{x} = 2.66)	20.9	26.4	18.8	33.9
...the health of affected deer herds in White River GMUs? (n = 1,055; \bar{x} = 3.31)	2.7	14.6	32.3	50.4
...not having enough healthy deer to hunt in White River GMUs? (n = 1,054; \bar{x} = 3.25)	6.4	14.0	27.8	51.8
...future generations ability to enjoy hunting deer in White River GMUs because of CWD? (n = 1,057; \bar{x} = 3.44)	4.1	9.7	24.0	61.8
...the potential for CWD to reduce deer hunting opportunity in White River GMUs? (n = 1,055; \bar{x} = 3.44)	3.5	10.7	24.0	61.8
...eating meat from a deer harvested in White River GMUs (n = 1,052; \bar{x} = 2.50)	22.9	30.0	21.0	26.0

Concerns about CWD (recoded for ease of interpretation)

<i>How concerned are you about...*</i>	Concerned**
...future generations ability to enjoy hunting deer in White River GMUs because of CWD?	86.2
...the potential for CWD to reduce deer hunting opportunity in White River GMUs?	85.8
...the health of affected deer herds in White River GMUs?	82.7
...not having enough healthy deer to hunt in White River GMUs?	79.6
...your or your family's health?	52.7
...eating meat from a deer harvested in White River GMUs	47.0

*Respondents were most concerned about reduced hunting opportunity and herd health because of CWD.

**Moderately and very concerned responses were recoded.

12. How much of a priority should Colorado Parks and Wildlife place on the following herd and harvest management decisions in White River deer herd GMUs?
(Please check one response for each statement.)
 (sample size “n”, mean “ \bar{x} ”, and percentages “numerical responses” indicated below)

	Not a priority	Low priority	Neutral	Moderate priority	Essential priority
Striking a balance between controlling the disease and preserving hunting opportunity (n = 1,050; \bar{x} = 4.31)	1.3	2.2	13.1	31.1	52.2
Maximizing quality deer hunting opportunities (i.e., trophy bucks), regardless of how they affect CWD prevalence or overall herd health (n = 1,047; \bar{x} = 2.94)	15.9	19.9	30.5	21.9	11.9
Minimizing adverse effects of CWD on overall herd health regardless of how they affect quality deer hunting opportunities (i.e., trophy bucks) (n = 1,042; \bar{x} = 3.76)	3.6	8.3	24.9	34.7	28.5
Other <i>(Please specify and also indicate priority level)</i> : (n = 18) e.g., herd health/long-term sustainability of wildlife populations.					

CPW management preferences recoded (for ease of interpretation)

	High priority*
Striking a balance between controlling the disease and preserving hunting opportunity	83.3
Minimizing adverse effects of CWD on overall herd health regardless of how they affect quality deer hunting opportunities (i.e., trophy bucks)	63.2
Maximizing quality deer hunting opportunities (i.e., trophy bucks), regardless of how they affect CWD prevalence or overall herd health	33.8

*Moderate and Essential priorities were recoded.

**Respondents would prefer CPW prioritize finding a balance between disease prevalence and hunting opportunity.

Herd Management

13. How, if at all, has the White River deer herd changed during the previous 10 years?

(Please check one.) (n = 1,033)

- 10.2% The number of deer has **increased**
- 39.6% The number of deer has **decreased**
- 10.3% The deer herd has **not changed**
- 40.0% I'm **not sure**

14. How important to you is it that the population of the White River deer herd...

(Please check one.)

(sample size “n”, mean “ \bar{x} ”, and percentages “numerical responses” indicated below)

	Not at all important to me	Somewhat important to me	Moderately important to me	Very important to me
...stays the same (i.e., the current population range is maintained) (n = 936; \bar{x} = 3.00)	7.5	19.1	39.1	34.3
...increases somewhat (n = 1,004; \bar{x} = 3.24)	6.3	13.3	30.1	50.3
...decreases somewhat (n = 866; \bar{x} = 2.03)	50.8	14.7	15.4	19.2

Population preferences recoded (for ease of interpretation)

	Important*
...increases somewhat	80.4
...stays the same (i.e., the current population range is maintained)	73.4
...decreases somewhat	34.6

*Moderately and very important responses were recoded.

15. How important to you are the following... (Please check one.)

(sample size “n”, mean “ \bar{x} ”, and percentages “numerical responses” indicated below)

	Not at all important to me	Somewhat important to me	Moderately important to me	Very important to me
Being able to hunt deer in the White River deer herd most years (either sex) (n = 1,012; \bar{x} = 3.12)	12.4	13.4	23.6	50.6
Being able to hunt mature bucks in the White River deer herd (n = 1,016; \bar{x} = 3.21)	6.9	15.6	26.8	50.7

Sex-based hunting preferences recoded (for ease of interpretation)

	Important*
Being able to hunt mature bucks in the White River deer herd	77.5
Being able to hunt deer in the White River deer herd most years (either sex)	74.2

*Moderately and very important responses were recoded.

About You

16. How old are you? (Please write-in your response.) YEARS OLD \bar{x} = 53 years old
17. In what zip code is your primary residence? (Please write-in the 5-digit code.) see open-ended responses
18. Approximately how many years have you lived in Colorado? (Please write-in your Response. If you are not a Colorado resident, write "N/A" or "Not applicable"). YEARS \bar{x} = 35 years
19. With what gender do you identify? (Please check one.)
- 92.1% (972) Male
 - 6.6% (70) Female
 - 1.1% (12) Other (Please specify): N/A
 - 0.1% (1) Prefer not to say
20. How would you describe your racial or ethnic background? (Please check one.)
- 94.2% (950) White, non-Hispanic/Latino
 - 4.0% (40) Hispanic/Latino
 - 0.1% (1) Black or African American
 - 0.7% (7) American Indian or Native Alaskan
 - 0% (0) Native Hawaiian or other Pacific Islander
 - 0.8% (8) Asian
 - 0.3% (3) Other (Please specify): N/A

Please use the space provided below to share any additional opinions you have about the White River deer herd.

D-7 Questionnaire - Written Comments

Hunting Experience

- I have hunted this GMU for 2 years. Although not able to hunt deer during archery. I did hunt elk season. During my elk hunt we observed plenty of deer. My hunting partners, who have hunted this property for over 30 years commented that "although the deer population seems robust, the bucks are not even close to the size they used to be".
- I thoroughly enjoy our hunting trip every year. You guys always do a great job answering questions and making my out-of-state hunting party feel as welcome as your in-state hunters. Keep up the good work, hopefully I'll draw again and head y'all's way in September
- September muzzleloader hunted last year passed on numerous bucks at close range. Did not shoot at any deer (1 reason because of high temperatures - Sept.8-16) (2nd reason was looking for mature 4x4 and did not have a deer in that category within range)
- 2018 I harvested a mature mule deer (buck). Came out primarily for elk. Concerned for overall hunting productivity in the near future 5-10 years.
- Colorado has to be one of the most beautiful states in the Americas. 70% of the time hunting 3rd season deer population is good or above average.
- Had a fun time with my three married boys. Ate 9 points to draw. Only saw 1 -180" buck - mostly 160"-170". Didn't shoot a deer - hopefully someone next year will be able to shoot a 180 plus buck.
- When trying to apply for a big game license this year, it appears that I am required to purchase a small game license, even though I won't be using it. What a waste of money. This is extremely frustrating as your rates for non-resident big game licenses are already outrageous.
- I have hunted area 22 since 1983 seen up and down changes but for most part it has improved over last 15 years. I do believe there is more poaching going on in off-season. As I or hunting buds have come across old carcass with heads missing/cover-up elk and deer. My last two years to draw a buck tag in 22 were 2007 and 2018. Went just to camp 2015, seen nice mature buck and doe all 3 years.
- Used 20 PP to obtain a 4th season buck tag unit 22. Very disappointed with the hunt. Several smaller 4 points seen but no big bucks spotted after a week of hard hunting. Deer numbers were low.
- I have hunted in units 11, 211 one time. It took 3 years to draw the tag. The hunting was superior to Utah for a 3 point unit. The only thing I would change is reducing the number of 3rd season tags to allow more bucks to mature
- As an out of state hunter, I've seen price increases on deer and elk tags. Deer have increased every year since we started hunting in Colorado, same with elk. Tags continue to increase and make it harder to afford. We've been going to Colorado since 1989. We have our 4th generation starting to hunt there and would really like to see some kind of price break for non-resident.
- New mandatory small game license requirement is bad for hunter relations problem for big game hunters.
- This area is severely overhunted. Bow season, black powder season and I hunted the third rifle season. In 6 days of hunting, I saw no elk tracks and no one in the gmu got an elk that I

know of. I saw one set of deer tracks in 6 days. Never saw a deer or an elk and neither did anyone of the five of us. Just a waste of time and money.

- The area over in Area 11 south east by Meeker area, that herd is really low. It was very crowded this past season and we only saw a heard with does, no bucks. I did end up filling my tag but had to go up by Maybell in that section to get a buck.
- Overall, love hunting the White River area.
- I have hunting in the White River area for 18 of the last 21 years. I used to be able to harvest, or at least hunt a doe every year. During the last 5 or 6 a doe license has been more difficult to obtain, yet I have never seen more does in the area than ever before.
- Stop w/ the new draw system. That does nothing to give residents a fair chance at getting tags. These units were flooded by out of state hunters who had very little regard for our laws, safety, regulations or the environment!!!
- The deer in our area, we felt hunting was good. My dad and myself each got a buck - we'd like to see more deer though - we had a very enjoyable hunt - when hunting last year we met a young game warden in district (12, 13, 23, & 24) he was very helpful and professional very courteous and have us a lot of good information.
- I only saw 1 mature buck in 10 day of hunting 6-8 hrs a day with a group of 14 guys who had hunted the area for 30 years. The group I hunted with will not return for the 2019 season.
- many mule deer = (happy face on survey)
- This last year was my 1st year hunting unit 22, 3rd season - ONE OF THE BEST experiences of my life. However, it's not what it used to be. We have friends from Meeker they hunt regularly there and over the years, the herd has gone downhill. Both in quality and quantity. That said, it was my best deer hunt. I can't imagine what 10 years ago would have looked like. I only wish I could hunt this again in my lifetime. Thank you!
- I have hunted the area for many years. My experience has been fantastic!!! It is a family trip we look forward to every year. Thank you.
- I have been hunting 28 years in units 23 and 33. You need to combined units 23 and 33 together again.
- The last 2 years hunting in area 131 I have seen 2 deer total. Both deer were does and I hunt all day, every day of the season. My hunting is in the cow creek area of Emerald Mountain, nut even with an occasional hiker or biker I always used to see deer and some bucks.
- I am extremely disappointed in the new policy relative to an out of state application for a preference point or a license. I thought I was misreading the instructions when they directed me to buy a small game license before I was eligible to purchase a preference point this year. Your department must know that a very high percentage of out of state individuals will never use the small game license. So the requirement is simply piling on the already hefty cost of deer/elk licenses. Quite frankly it's a ridiculous requirement...almost blackmail like. I have, in the past, always been happy to cooperate with your surveys; however, until Colorado adopts a more reasonable approach to it's out of state patrons, I will no longer be interesting in helping. Please, drop this insane small game license requirement and/or other schemes to balance your budget on the backs of people outside the state.
- Very satisfied with the hunt I had. have enjoyed Colorado hunts. I have had the opportunity to hunt on 7 different hunts since 2005. P.S. I didn't care much for the small game tag, \$81.00, that I had to purchase this year in order to put in for large game tag. Why didn't you just save the permit?

- Used 14 bonus points - hunted with guide service. Saw 2 buck the first day (1 trophy) and did not see another DEER in 6 more days of hunting!
- My first trip to Colorado was in 1986. I fell in love with Colorado (don't tell my wife). Moved to Colorado in 1997. Lived in Meeker for a number of years. It's still home to me even though I now live in Sterling. Hopefully, I will hunt and fish northwest Colorado until the day I die! Keep up the good work at Colorado Parks and Wildlife for future generations.
- I've carried a license in the White River for deer for several of the last 20 years. I have never harvested.
- I have been hunting 11, 211 for 15 years. Never had a problem harvesting my buck. Now my two boys have hunted same area with me for 3 years and are successful every year. Not once have we had (CWD). The hunters are very nice just too crowded some years.
- Very dissatisfied with hunt used 9 preference points to draw!
- I really enjoy seeing all the deer in the area. Please keep them healthy.
- I started hunting at age 12 there were 100 deer in Craig at that time we had to go to the hills to find them. Today there are some big bucks in my yard.
- I have experienced out of state people that cannot shoot wounding and wasting animal you harvest and I'm not seeing a lot of that these days and I hurts to see. I think people that are new comers should be better looked at before they are allowed the privilege to take any animal people need to have respect of the land and the animals they are harvesting meat should be the priority.
- Last year I only saw one deer in 8 days
- I primarily hunt elk and deer for meat and trophy only with my family and have my whole life.
- I love hunting in the Flattops because I am not hunting around other hunters. It is one of the last hunting gems in the west. We love it!!! Thank you for all your good work!!!
- Was disappointed in the low number of mature bucks to hunt. I hunted on private property and didn't see any fully mature bucks.
- We did not see many deer, but we all harvested 4x4 mule deer. The hunt was enjoyable!
Thanks
- Didn't see very many deer or elk and we hunted hard, going further back than most. I did see a radio collared doe and several moose. There did seem to be a lot of deer and elk sign that looked to be several weeks old. This seems to be the case each time we hunt in Colorado.
- Hunted 3rd season and saw multiple mule deer so quantity was prevalent. Quality, trophy bucks was non-existent! Even when we brought our animals into the processor there were NO trophy bucks in his shop in Meeker from the hunters in the area.
- Didn't see very many deer also had hunters shooting over my head at deer I was about to shoot. Only two shooters all week for 3 guys.
- I have hunted these areas. I love 11 and 211 areas I feel these areas all being well managed. And I hope to be able to return in 2019. Really, love the Meeker area. Very satisfied with the hunt I have enjoyed Colorado hunts. I have had the opportunity to hunt on 7 different hunts since 2005.
- Last year was my first year to hunt in the White River area. I thought it was wonderful. I'm coming back for the 2019 season.
- I have hunted 131 four times. The first 2 times I harvested 2 really nice bucks. Hunted there 1st season 1 year, deer not in season, 1 time 3rd season and the deer had moved out due to snow. Still enjoyed being there.

- great place to hunt
- The deer in our area, we felt hunting was good. My dad and myself each got a buck - we'd like to see more deer though - we had a very enjoyable hunt - when hunting last year we met a young game warden in district (12, 13, 23, & 24) he was very helpful and professional very courteous and have a lot of good information.
- It is a great experience being in the White River Nation Forest. Thank you for providing us the opportunity. Cost is what keeps so many from being able to do it but I understand the costs involved.
- We hunt the Yampa River. Seven years ago there was next to no deer. Last year it was crawling with deer, several mature bucks. We got a couple. The elk herd is almost nonexistent. We have not seen anything but a spike for two years.
- We see better deer some years than others I say winter has a big part in that and now with the warm weather the big buck lay just like the elk (2nd season). We love hunting your state but lately it's been very warm which sucks but there is nothing anyone can do about that other than back the dates up. If possible, don't raise the cost of licenses for nonresidents. Soon we won't be able to come.
- All though not always successful deer hunting I have always enjoyed my hunting visits to Colorado. I wish the best for the animals and the citizens of Colorado. Unfortunately Michigan also has a CWD issue
- Very disappointed in the hunting in 11, 211 this last year. Especially for a 4th season. Very few deer. Wasn't anywhere near worth the points I used to get it. If I had it to do over again. I'd pick something else. I hunted 22 3rd in '16 and we at least found a few deer (my Dad's tag). Still didn't find the buck we were looking for. Been hunting in CO as much as I could for the last 20 years. Seems like it just keeps getting less deer every year. More and more demand for the tags and fewer of them.
- Have taken quality deer there. Drawing tags has become harder to get for non-resident. Herd seems to be about the same since I started going. Sometimes gets a little crowded at times. Overall good experience.
- Hunting White River deer herd has been the best experience. I look forward to setting on top of a mountain reflecting on family, friends, and priority in life.
- The hunting has been great all deer look healthy
- I am a hardcore hunter from NM and really was not impressed with the GMU23. On my hunt I only saw 1 buck (a small forky). I would have really enjoyed seeing more deer and the opportunity at a mature deer.
- Thankful for being able to hunt in your great state
- We spend a lot of money hunting in this state for about 15 year and now can hardly find a deer or elk. The prices go up and the deer, elk population go down.

Hunting Opportunity

- I have had great success taking both young bucks, mature bucks and doe. I hunt only public lands and only draw a buck tag every other year.
- Increase number of antlerless deer tags issued during all seasons. Point creep is killing us. Used to draw DM02203R every other year it's now taking 3-4 points to draw for resident. Non-

residents are taking about 10 years. 14 years for resident to draw, a 4th season buck tag is crazy! Increasing number of lion tags would help with predation.

- Thanks for your effort! We have had a large increase in hunting and fishing in Colorado over the last 5 years. Please do what you have to keep me hunting.
- This also includes elk hunting, being an out-of-state hunter and the very "high" price to pay for deer and elk license I wish you would consider adjusting hunting dates back due to weather conditions. Missing now the migrations because of warmer weather trends. Thanks.
- Don't penalize youth hunters. We are losing them to price and dumb rules. Make it enjoy and less expensive for youth hunters in all areas.
- Create more resident opportunity - less nonresident!
- Residents should be priority on drawing in state licenses and GMSs. It's very overcrowded while hunting, too many out of state licenses are granted - so there should be a limit.
- Might as well harvest the "big" bucks - They would die anyway. I am a meat eater and hunter. Less and less opportunities to harvest deer for the non-wealthy.
- Would like to harvest one trophy in my lifetime
- Considering the price of non-resident tags and licenses and the fact that non-residents bring outside revenue to local Colorado areas, please re-consider your tag allocation numbers to non-residents by increasing opportunities to hunt your state. Thank you!
- No more Ranching for Wildlife. It's not ethical!! I'm a landowner and I can't imagine wanting to harvest a deer in Dec, Jan, or Feb. It's not ethical and the meat is inedible! Ranching for wildlife is stealing from the ethical public hunter and responsible landowner.
- Ranching for wildlife needs to go away.
- Questions about the price increase of CO resident tags. I understand why they are increased but the amount of money my family now has to spend for deer and elk tags is incredibly expensive. Why was the non-resident tags not increased the same? We will always hunt and raise our children to, but it's frustrating that we're the cheapest non-resident state for tags yet resident prices increased more than 10% and small game license is required and that also went up in price.
- Units 23, 33 should be combined like it was before for many years!
- I look forward to taking my children hunting in the white river GMU.
- I would like to see either sex licenses for the public land in the White River GMUs. I think it would keep the herd healthier.
- We need special tags and hunt dates for senior citizens 65 and older and discounted license fees.
- Colorado DOW keeps increasing the out of state hunting fees. New for 2019 is an increase in the application fees and I must purchase a qualifying license to apply for a big game license. With the current cost of big game tags for out of state hunters this is getting to the point of pricing myself and other hunters out of the Colorado market.
- put out more tags for locals
- Limit non-resident tags
- I want to be able to hunt in Area 10. That is where I live. Why do we have to drive 50 miles and hunt in area 11? I think the people of Dinosaur should at least be able to hunt cow elk and doe deer in our own area. Area 10 is no longer a big trophy area. Those trophies were taken out a long time ago. I think area 10 needs to be re-designated as a regular hunting area. It's not prime anymore.

- limit tags to higher percentage for resident tags only.
- we all need tags every year not every 4-5 years especially youth
- Please cut down on the number of out of state licenses being sold. All of the out of state hunters I met do not respect our hunting privileges. Most do not obey the non-motorized areas and have no respect for our lands. Just because CPW makes a ton of money off the out of state licenses doesn't mean they should be a priority - our lands and animals come first.
- There has been an extreme uptick in non-hunter recreational activity in this area during archery season. It would be nice if the archery season could be extended 1 week or the season adjusted to start a week later. Another option would be to offer an option where archery hunters can purchase an extended license or offer it as a draw option so archery hunters have the option to catch more of the cooler season. Keep up the good work!!! Thank you
- It takes too long to draw a tag. To many nonresident hunters
- have only hunted 1 time in past 10+ years
- I would like to be able to hunt deer each year or at least shoot a doe each year. Many deer are killed in highway collisions. More hunting opportunities for archery deer.
- When we reach 70 years of age we should receive a buck tag every year. We don't have that many years left to hunt!!!
- I have hunted deer in area 23 only - muzzle loading. We hunt elk, rifle, same place (area 23) and deer population is definitely down - they do move down to the meadows/river as the winter and rut take over. It is really hard to get a permit in Area 23 - I am assuming it is because of reduced herds - not increased hunters. PLEASE consider changing permit rules to issue permits to VETERANS or over 70 years old that are Colorado residents. I am 77 now and get a permit only every other year - bucks muzzle loading. I don't have many years left.
- About 45 years ago the game department told us how important the Piceance Creek river bottom was to the survival of the deer herd. You used to advertise that you could drive that road in Jan and Feb and see 5000 deer along the river. In time about 2 miles of river bottom was purchased. It proved great duck hunting a campground and access to very good hunting. Later when elk numbers were growing in the area, elk hunting was good. I've taken 2 very good 6 point bulls close by, also several trophy deer and then one year it was posted, were told by your personnel in Meeker that it was traded for 2 sections of private land that was surrounded by thousands of acres of BLM, no road access, no water, nothing special that was apparent. So maybe we need to talk more about the mismanagement of our natural resources.
- I have hunting in the White River area for 18 of the last 21 years. I used to be able to harvest, or at least hunt a doe every year. During the last 5 or 6 a doe license has been more difficult to obtain, yet I have never seen more does in the area than ever before.
- I'd like to see the herd managed in a way that allows people to hunt with some regularity but that allows those that hunt hard to find a trophy. This likely mean limited 4th season tags. At the end of the day, priority number one is the health of the herd. Then balancing opportunity and trophy potential. Appreciate all you guys/gals do.
- Stop w/ the new draw system. That does nothing to give residents a fair chance at getting tags. These units were flooded by out of state hunters who had very little regard for our laws, safety, regulations or the environment!!!

- Consider having more 2-weekend seasons. It is hard to give younger hunters and families enough time in the field with single weekend seasons. If we can't grow hunter participation, you will be forced to market only to out-of-state hunters for revenue (management costs) and they won't travel for only 5 days because of planning windows being too tight. Less family=less advocates!
- We have been hunting that area for years, over 20 years. It took me 5 points to get a tag for this area and most of the people there were non-residents. Why?
- resident should be able to hunt his own state every year vs draw against non-resident
- Seems like I have seen a lot of does the last few years (units 23 and 24) but it still takes points to get a doe tag. I believe there are now wolves in Units 23 and 24.
- Youth need more opportunity to hunt right here in our back yard. More youth hunts need to be in place. I understand about deer but mainly for elk either in units 21, 22 because there are too many cow elk hunts and they are hunted from August to Jan 15. This is way too long. Remember back in the 80s and 90s there were two 10-day seasons for rifle deer and elk? That's what we need.
- In the 1980s when I first started hunting in Colorado. We bought deer tags over the counter then we applied for the draw and got our tags every year. Now every 3-4 years.
- I feel fortunate to have had the opportunity to hunt in Colorado and would hope future generations enjoy the same.
- I appreciate the opportunity to hunt on public land especially in units 11, 211 and 22. I do not have funds available to hunt on private lands or to hire a guide.
- Considering the price of non-resident tags and licenses and the fact that non-residents bring outside revenue to local Colorado areas, please re-consider your tag allocation numbers to non-residents by increasing opportunities to hunt your state. Thank you!
- Stop late season hunts where locals kill them from highways. I bought my 1st deer tags 30 years ago for \$50 and my elk tag for \$75. You are fucking out of state hunters. I've been told 3/4 of Colorado land is either state or federal. I own as much of the federal land as the guy living in Meeker who gets his license for \$28. Get a bigger envelope.
- I've seen some tremendous bucks over the years. It would be nice if I could get at least a buck tag while I'm elk hunting to make the trip a little more cost worthy. It's only happened once or twice in the last ten years. We primarily elk hunt, but I would like to easily get a mule deer buck tag just in case the opportunity would arise to tag a trophy sized mule deer. The times I had a tag I passed on small bucks/does.
- Over the last 12 or 13 years I have seen Craig , CO restaurants and hotels go from packed to half empty during 3rd season elk/deer. It is a shame that drawing a deer tag is tough. Most folks need the tag to motivate them to go spend time outdoors and most never kill a deer. It kind of follows 2 rules from what I see 1)no tag-no go-no deer-no money spent in CO. 2) tag - go hunting-probably not shoot a deer-spend money on food and fun, think about going back next year and try again
- Making me buy a small game license to apply for preference points for big game is ridiculous. If that doesn't change I may find a new state to hunt in.
- To be out hunting more important than harvest. Ok if you wanted to put minimal antler count to harvest like on elk 4 point or better.
- The deer season dates are finally skewing in the right direction to allow out of state people the opportunity to harvest a mature buck during rut during 3rd seasons. 10 years ago out of

state hunters wouldn't draw a license during the rut and lots of hunters moved to other states because of that.

- Have family with land hunted deer and elk for 39 years in the White River units have seen the herd come and go just wish it didn't take 5 years to get tags.
- As an out of state hunter, I've seen price increases on deer and elk tags. Deer have increased every year since we started hunting in Colorado, same with elk. Tags continue to increase and make it harder to afford. We've been going to Colorado since 1989. We have our 4th generation starting to hunt there and would really like to see some kind of price break for non-resident.
- I enjoy the opportunity to hunt elk and mule deer in the same season.
- The ranching for wildlife should have to play by the same I do. Season dates etc I do not get hunt buck in DECEMBER!!!

Hunter Crowding

- In the west side of area 12 it is elbow to elbow hunters. Can you split that area into 2 season and ensure doe tags for one of the areas; more doe tags mean more hunters but less deer/ car accident. if you could see your way to giving more tags in 12 and 23 (public land) just for 2 or 3 years I believe that might help both CWD and deer/car accidents
- Is difficult to answer since deer season and elk season are concurrent I can't tell deer hunters from elk hunters. However, there are a lot of hunters in the units I hunt.
- I hunted 11/211 in 2018 3rd season. The amount of deer hunters was reasonable but having OTC elk hunt simultaneously leads to over-crowding. Especially considering how few elk I saw during the week. I recommend moving this elk season to a 1-2 point draw at minimum.
- over the past two years it seems this area is being overrun with out of state hunters in large hunting camps
- I have been an avid Colorado hunter for 21 years, mot years in the white river (area 12). In that, time hunting has become increasingly difficult due to the massive amount of elk hunters. I know this survey is for deer, but obviously, the seasons are the same. Limiting the bull elk tags for private and public would severely help with overcrowding, and help some of these animals mature further.
- Been hunting there with my family since I was 12. Gotten more crowded and the ranch owners are aggressive and rude
- So I'm not sure if the crowd was because of the fire or if there were that many more people hunting but I saw more hunters than animals. I will not be hunting there any more if the crowd is as big this coming season.
- New people coming into the area are setting up camps in the daily nightly game routes, which disrupts game movement.
- Too many hunters!
- too many hunters in 2 season for deer
- Over the last 3 years, I have hunted in the Oakridge Area. Hunter numbers seem to be high. Mostly out of state hunters.
- Had a good hunt, saw a handful of mature bucks. The only thing I did not care for was there were people everywhere! Almost every spot I would glass there would be orange.

- To whom it may concern: I have not hunted in this area for over 8 years. Too many hunters! I do not have any valid inputs for you concerning this area
- There are too many outfitters and out of state hunters that crowd the areas and make it difficult to hunt.
- The deer hunting would be more enjoyable if there were not so many OTC elk hunters in the field and a person could feel like they could get away from the pumpkin patch some. There is more orange out there than at a Bronco's game.
- I believe that the number of elk hunters has increased. As far as crowded hunting, maybe it is time to separate the deer and elk hunters.
- 4 years ago, this unit had far fewer hunters resulting in a better experience and better deer quality. This last season had far too many hunters for the amount of public land available.
- Hunting pressure drops to near zero after opening weekend.
- I feel like some of the issues with crowding of other hunters while hunting is do to less public land than there used to be.
- Overall the hunting is fun and enjoyable in the area. It is somewhat crowded, with all of the elk and deer hunters there at the same time. I wish there was a way for everyone to get their chance to enjoy the outdoors without the added pressure of everyone there at the same time.
- OTC elk hunters are hunting deer during the 3rd rifle. Too many people riding through areas that are off limits to driving. Too many points for a non-resident to have OTC elk hunters stomping the place flat.
- It takes too long to draw a tag. Too many nonresident hunters

Habitat

- I think all the drilling for gas has affected the animals
- I have noted a decline in the deer herd since the drilling for gas started up especially in Unit 22!
- I believe loss of habitat is of major concern to the white river deer herd. This and disruption to migration habits has effected the herd. Thank you for the opportunity to comment on our wildlife. Pease keep politics out of this.
- Managing for the long term with regard to habitat and population would be my priority.
- Habitat is decreasing due to oil and gas. Migration is affected by increased road travel and new roads.
- too much gas production in good feeding and water areas
- I believe with more prescribed burns to bring back better feed and kill off diseases in the ground would help with CWD.

Predation

- Predation. I've seen more bears and mountain lions chasing deer while bow hunting. Elk too especially young cows/calves
- Predation is out of control: I have hunted the same place for 25+ years lots less deer way more coyotes and bears.

- I feel that predation is effecting the deer numbers more than CWD. I have hunted both private and public land in units 12 & 211 for 25 years straight and have seen a constant increase in the numbers of lions, bears, coyotes. It is too much for the deer herd to suffer high winter kill rates and then deal with the high number of predators on top of it and increases the rebound time
- The white river deer herd is more affected by predation mainly coyotes and road collisions than by sport hunting. In my opinion, the deer and fawn survival could be greatly improved by killing coyotes, best tool aerial gunning which does cost money but the trade-off will be more animals to hunt and possibly greater license sales should more than offset the cost.
- Cougars are a big problem. Coyotes are a big problem put out more tags for predators and put a bounty on coyotes. We should be hunting lions in April. Silly were not.
- I believe the amount of tag's given and not enough concentration on predator control is playing a big role in the decline of our deer herd.
- My observations on deer herds, too many dry does. This area has too many bear, coyote, and mountain lion. For example, 21 does in field, only 2 fawns. This is not for lack of habitat, it is predation!! When the spring bear hunting stopped, the decrease due to predation is very evident.
- I have talked to sheep ranchers that tell me they know exactly when the mule deer does are fawning - the bears leave the sheep and go for the fawns. Like clockwork.
- More concerned in predation if wolves are introduced.
- The deer herd is in bad shape too much hunting pressure: coyotes need to be reduced
- The potential damage to deer and elk herds as well as livestock due to wolf introduction would be devastating!! All you have to due is look at what's happened in surrounding states to elk and moose populations from wolves. Huge loss in revenue as well as game populations! DON'T CUT OFF THE HAND THAT FEEDS YOU!!!!
- I believe CPW does a great job overall in wildlife management. I do believe predation is an increasing problem and possibly under estimated.
- I believe predators are the #1 problem creating a decline in our deer herd. My observation is that very few fawns survive due to predator kills. It is rare to see a doe with a fawn by her side at summers end.
- reduce lions and coyotes, as too much depredation
- predators are biggest problem that needs addressed by DOW.
- Get a better handle on predators. Kill more lions and coyotes.
- No wolves
- You need to control bear, mountain lion, and coyote populations - they are killing to many fawns
- Wolves should not be allowed anywhere in Colorado. Mule deer cannot get away from them
- Your predator population is out of control, to include lions, bears, coyotes and bobcats! This should be the most critical factor in management of these units! You need to start standing up for us the hunters and not the environmentalist whackos before all of us native Colorado residents find another state that will stand for us!
- to many predators
- Keep wolves out of CO!
- Increasing number of lion tags would help with predation.

- coyote predation is out control. Own 20 acres in Area 33 coyotes are killing mature deer and fawns (all year) UT has a \$50 bounty we should too.
- I am extremely concerned about the effects that wolves will have a devastating effect on the herds even more so that the increase in the bear population after management was taken away from CPW by the ballot measure to remove spring hunting and the use of hounds and baits.
- Keep wolves out of the state.
- I don't hunt predators and don't believe in the unethical hunting of treeing cats and shooting them out of a tree but the cats need to be controlled, along with all predators to help increase or maintain the deer and elk population. (please DO NOT introduce the wolf to Colorado) They DO NOT belong in Colorado! Our elk and deer herds are already having a hard time with their populations and introduction of the wolf would be very detrimental to our herds! The idea of taking our hunting away and introducing natural predation with introducing the wolf is absurd! NO INTRODUCTION OF WOLVES IN COLORADO, PLEASE! Thank you!
- In the past predator control was help to ranchers but without the foot hold traps coyotes are hard to catch. So best predator control tools have been reduced along with baiting bears and using dogs. The deer and elk both get overwhelmed with predators during calving and fawning season. And I am not in favor of Front Range being able to vote on ballots for issues that they know nothing about on this side of the state. P.S. thank you for what you do
- old timers rancher said in the 50s we didn't have many deer but when the government came in and removed coyotes, lions and bears the deer herd exploded and deer hunting was great in the 60s and 70s in the 80s you could still go for a 2 hour ride and see 500 or more deer now your lucky to see 20. Game wardens in our area say its because the sage brush is to old. Well let's do some burns and replant and get rid of predator. Utah's bounty on coyotes has helped greatly on the numbers in their herd in the last several years and lets fight the anti-hunting group that are always changing what's good for our animal herd healthy recovery.
- I saw several predator kills.
- I have hunted deer and elk in unit 12 for the past 16 years and have seen the herd decrease due to predation from coyote and bear.
- This year I saw more black bears than mature mule deer bucks....
- Predation is out of control: I have hunted the same place for 25+ years lots less deer way more coyotes and bears.
- Also, all of the debate over introducing the wolves.... Please, send surveys out to the people, the sportsman, landowners... Ask if they them... I do not!! I have not had one person that hunts deer/elk say they want wolves or see the benefit of having them. Please do not introduce wolves!!
- You need to control bear, mountain lion, and coyote populations - they are killing to many fawns
- Wolves should not be allowed anywhere in Colorado. Mule deer cannot get away from them.

CWD

- Test all deer taken for CWD. Must understand magnitude of problem.
- CWD has an ever-widening effect on the deer/elk population.

- Have CWD in our area; Shot CWD not a problem too much. Landowner/farmer/rancher have whitetail crop damage because overpopulation. Believe CWD is an overpopulation disease.
- CWD is number one problem statewide!
- CWD =s no more hunting Stop CWD! Stop CWD! 1. Stop CWD in CO. Should be top priority though out state!
- I have hundred deer in this area my whole life with family and friends and have not a single time seen a deer that showed any symptoms of CWD.
- 2018 season I noticed no visible CWD in deer taken by fellow hunters
- "Teach" ranchers, hunters, and other wildlife volunteers to recognize CWD and cull from the herds and relay the info. The herd has dropped from 12000-2000 animals. 3 out of 4, 3 year old bucks tested positive for CWD.
- I would like to get information on eating CWD deer and elk. CWD has been a issue for 50 years in other places in the U.S. We have been eating deer for decades and no one has gotten sick so what us the real facts.
- CWD needs to be managed. Killing all the deer is not the answer. The deer are stressed we start hunting in august and stop hunting them in December.
- Does CWD cause by charged particle (ie. any type of reaction)? Just wondering how does deer end up with CWD?
- I am glad to see that CWD has not been a huge factor in mule deer population and human health. If it is ever proven to be passed on to humans, it will be the end of deer hunting.
- I trust and respect greatly CPWs efforts regarding all the hunting opportunities all to include conservation and management. I am not sure I truly believe that CWD is a real threat but am also aware I am uniformed greatly. Thank you
- Please do not kill off this deer herd. You tried that back in the 90s with no effect on the spread of the disease. I have harvest deer from this area for most of 28 years. I have eaten these deer, all of which have been bucks. My children grew up hunting deer in this area. It is one of the few areas of the state where the deer herd is stable or increasing.
- I operate in GMU 22 mainly. CWD was not found to be present that much in 22. I don't feel we should try and kill deer out in 22 like the other units.
- The CWD in Area 13 is out of control. Last year at my place of work on private land we had 1 out of 9 deer killed positive!!! My 12 yr old son killed his first buck of his life and it came back positive for CWD. I don't know the answer to the problem but something has to give. Only thing I can think of is give out more tags to get a handle on this mess. Thanks
- I continue to see more and more deer testing positive for CWD. I am very concerned that if we don't get a handle on this disease we will not have a huntable population of mule deer for future generations. I support efforts to minimize or eliminate CWD in this area.
- CWD has been around since the 1960s. No state has been able to control the disease!
- I have hunted most of my adult life. I used to enjoy eating the meat we got (mostly from elk) I don't think I will ever eat another wild game animal because of CWD. I'm sure I don't need to tell you if CWD crosses the human barrier say good bye to your job and all the game that's affected.
- Contain or eliminate CWD. You want to have mature deer or healthy herds if they die to illness.
- I would like to see free head testing again like you did a couple years ago. I am always willing to partake in that, for it helping research to find out where this came from, how to stop it,

and the spread of it to humans or animals (CWD). Perhaps more emphasis on this would lead to better understanding of CWD. I would like to thank all of you for your work in managing these units. This is the greatest country and the greatest sport in this country.

- Hunters should be notified of negative or positive results to any possible testing
- If CWD is a problem facing the units I would rather have a healthy population in the lower numbers.
- I have lived in Rio Blanco county my entire life. In that time (65 yrs) I have seen the deer herd shrink in size considerably. I also believe that CWD has always been here. I can remember deer occasionally exhibiting the symptoms when I was a teen and into adulthood. I am also concerned that the herds moving to towns and setting up residency is detrimental to their health.
- I have had one deer test suspect for CWD out of this herd. The test came back suspect. When the sample was pulled at the Meeker Office (DOW) the agent just used any dirty used instrument that was available. Leads me to question if the Meeker Office is cross contaminating the samples. Table also had blood from other deer all over it. Not how I would think a study/sample should be collected. Then, I did not get to eat my deer (doe).
- I was lucky enough to harvest an old buck on private land this past season. The guide took the deer for processing and taxidermy. In the rush of the moment, he did not recommend testing for CWD. Upon packing up the meat, the processor told me there was testing positive at a rate of 23% for CWD. So I paid for all the services but ultimately disposed of the all the meat (instead of risking my family's health). I believe the guide took advantage of my naïveté to help himself and his local buddies. You should require the guide or processor to test all harvests through CPW in the future.
- I believe that CWD needs to be managed and that people that are just out for trophy bucks. They need to go to trophy areas. I don't believe that trophy areas need to be but everywhere.
- I am in the WR herd 60-70% of September 1 through Jan. The number of visually identifiable CWD deer is maybe 7-8 over the last 20 years since paying attention to it.
- Thank you for trying to find a balance between promoting trophy deer and eliminating CWD
- Two people in my party did manage three small bucks the last two years and sadly, they all tested positive for CWD. CWD is obviously a growing problem.
- Any incentives for encouraging hunters to test their harvested deer for CWD are appreciated
- I guide for Superior Guide Service all thru the general seasons in GMU 12. Spending a lot of time in the woods. I am fortunate to see more deer than most hunters. Although the numbers of deer seem up, we have had a mild winters until this year. Additionally, whenever the first bit of snow happens up there the deer start migrating in droves now. I also guide in Unit 301 for Walz Guide Service in the RFW program on Deakins Ranch from Nov 21 til Jan 30. We consistently gain migratory deer as the season goes on and a lot of our incoming deer will winter on that ranch. That being said, a lot of our incoming deer are coming directly from Unit 12. I personally strongly believe that a containment of CWD in specific units is attainable in a migratory deer and elk herd. If anything, before another mass slaughter of deer for testing by CPW, make it mandatory for all deer harvested, statewide, to be tested and either give multiple tags or more licenses to hunters and let the paying hunter do the work for the CPW at their expense and all along CPW is making more money for other endeavors rather than spending 10s of 1000s to go kill deer just to test for CWD. An

additional thought would be an "earn a buck" program like many other states have done or "earn another tag" program. Have a successful hunter bring their deer in for testing. Then they can get another tag at a discounted price (1st tag full price). Lastly, with all the deer harvested, tested and consumed nationwide, it is my understanding that no human has contracted CWD. States should not eradicate deer and elk herds in the hopes of stopping CWD. It's always been there in mother nature, we just now have a name for it.

- I have been told that CWD hasn't been transferred to humans. I don't know to what extent CWD is found in deer in the White River herd. I have not seen any deer that appear to be sick.
- CWD is huge concern for me. I would like to see mandatory testing expanded to more GMUs. I feel that this disease needs managed so that we can have animals to harvest in the future. I support rate increases as needed if it will directly help manage CWD.
- Concerned for overall hunting productivity in the near future 5-10 years. CWD has a ever-widening affect on the deer/elk population.
- Me, like a lot of other hunters that I know from California that hunt in CO are seriously thinking of not hunting CO any more due to the way CPAW has handled the reimbursement of cost after pay out a lot of money to hunt there then have our animals tested. We ask biologists there and they tell us that CO would like to deplete the herd completely cause of CWD so why should we spend our time and money when this is the case.
- As far as CWD I haven't seen any deer with symptoms but agree with CPW concerns for future of herd.
- lived in CO until age 24, Interested in more information on other wildlife in the area elk, moose, bighorn sheep, black, bears, predators and how CWD may be affecting them. Also interested in how to look for/id CWD in animals and harvesting best practices (better to de-bone your deer?) Has there been any impact to people by eating the meat of deer that had CWD?
- From WI; Have CWD in our area; Shot CWD not a problem too much. Landowner/farmer/rancher have whitetail crop damage because overpopulation. Believe CWD is an overpopulation disease.
- I recognize that CWD is a threat to herds across the west but do not believe it to be the biggest problem.
- When someone buys a license there should be an opportunity to donate to CWD research or other wildlife challenges.
- disappointed that 25% positive for CWD. My buck 2019 was positive we threw it away got no compensation from DOW. I think your license fee and processing fees should be returned when CWD positive so far I have not got anything returned. I applied for \$200 processing fee returned last fall still didn't get money. In PA if you shoot a diseased deer at least they give you a new license I have hunted in CO for mostly elk about 35 yrs.

Population Management

- From what I can tell the deer herd in the White river area has decreased a lot. I mostly hunt in unit 22 but the number of bucks I believe are way down from 10 years ago
- The deer herd has now decreased more than 50% since the 1960s and 1970s. Since I live in Rangely all my life I have seen this first hand.

- Over the past few years the deer herd on our ranch has decreased significantly. I don't harvest a deer every year by choice but I love to have a tag to take my kids hunting with me. I am extremely concerned with our state government's conversations around introducing wolves. Our deer and elk herds will be destroyed. This should be a MAJOR concern of yours as well. Please help protect Colorado.
- Seemed like 3 years ago, or so, the population was through the roof and tags were at a minimum. Now tags seem more evenly distributed, but population is down. Have to assume a herd die off. Game wardens where I hunt indicated that we would see this. Old deer monopolizing food supply to die of old age while young deer starved.
- Deer and elk numbers are way down
- The number of deer has decreased tremendously from 2005-2008 the deer population has diminished. On 3,000 acres of land our group will be lucky if we see 5 deer. Before we used to see 50-75 deer on the mountain and along the river.
- Cross breed, the deer with deer from other areas (strengthen the bloodline). Keep deer away from cattle.
- The deer herd has definitely decreased over the years. Not sure why. I have never seen a deer with CWD but have seen one cow elk about 5 years ago affected. I hunt close to Milner, CO for the last 25 years. Good luck with all your efforts.
- My main concern would be controlling the doe population. Texas has a strong management program on its doe herd but then again I don't believe whitetail migrate like a large portion of the mule deer seem to.
- I believe based on my experience over the last ten years the quantity and quality of deer has decreased. I feel an antler size restriction would help the quality of the herd improve.
- I have witnessed the population of mule deer decrease dramatically over the last 20 years
- Deer population is low in the public hunting areas
- buck have increased 10x fold in the last 20 years. It has changed a lot.
- We need to get the bucks into a 4 point range to make hunting exciting again. Put in a rule that 2-3 point bucks can only be harvested by youth hunters. 4 point or better by 18 up. I've started to see a lot of 2-3 pointers and no bigger bucks so they are harvested with no chance to grow up
- I think you should stop doe hunts all together. Deer herds are low in my area
- I am very disappointed in the number of deer. I have land in Unit 11 and deer numbers are way down. I would also like to see point restrictions and the end to shooting does.
- Fences today are like a fortress. Fawns born in a 600 acre pasture can't escape a woven wire fence. They will be killed by predators. You can't control that. Only thing DOW can control is number of licenses issued. Needs to be cut in half. We are overhunting deer and elk way too much. We need NO doe killing and more limited cow elk killing. Time to take a look at outfitting. Don't have an answer, but it needs to be phased out somehow. Only a landowner should be allowed to make a little money. No guides and outfitters, no leasing. Bottom line - quit hunting them so hard, and I have been a hunter all my life. Thank you.
- I think the White River deer herd is strong and growing and healthy. The game and fish is doing a great job. You need to worry more about the antelope. In the whole northwest corner. If you think there is too many deer, five more tags out. But monitor very closely. Too many tags and a bad winter could really hurt the deer herds. It is a very fine line. Good luck and God bless.

- There seems to be a lack of trophy bucks
- Where I have hunted, the herd seems to be in good shape
- Few trophies left as may be too much hunting pressure. Need to promote female deer hunting for meat to control herd size.
- Have deer tags OTC instead of draw only.
- Since 98 it's fewer. Temperature raised. The head are moving to area 21 and others. Herds have diminished. Keep trying guys.
- The herd has been destroyed by winterkill, industry, and management.
- The deer herd in area 23 seems to have decreased significantly since I began hunting in Colorado. approx. 30 years ago.
- DEER HERD THROUGHTOUT THE YEARS SEEMED TO BE INCREASING. LAST YEAR (2018) BECAUSE OF FIRES VERY FEW DEER OR ELK WERE SEEN. HOPEFULLY 2019 WILL BE A BETTER SEASON.
- I would like to see a horn restriction on bucks. Such that there would be more trophy bucks. I would also like to see more does harvested as it is out of balance as the does far outnumber the bucks.
- I have been hunting this area for 25 years and the deer herd has been getting smaller but the last 3 years I have seen a great improvement more and bigger deer. The elk population is now getting smaller. We have seen the bear and mountain lion population increase in the past 10 years also.
- Reduce tag quantities in all GMUs to help deer herds rebound. Too many tags and too many hunters are chasing big bucks. The deer don't have a chance these days.
- Piceance Creek herd is in trouble worst seen in my lifetime
- deer numbers have always been good
- Numbers are low! Doe hunts should not happen when your trying to rebuild your herd
- I also think there needs to be an antler point restriction on deer. 75% of the deer I see harvested are immature deer, these are not first time hunters, but the same people every year that "just want something to shoot" after they didn't harvest elk meat. I think antler point restrictions would severely help that problem. My family and I have hunted the White River forest for a long time, please take some of this into consideration. Keep the White River thriving for reasonable/ethical hunters. Thank you.
- Too many tags given out in White River area 2nd season.
- It is very alarming that while deer hunting in 2018 I did not see single buck over 2 1/2 years old. In unit 23 at our residence we do not have any bucks over 2 1/2 and mostly fork horns. Lots of does and fawns but no bucks. This mostly on Oakridge area 5 plus years ago we had multiple larger bucks and many over 170".
- It would be nice to see the herd built up again. Time was one could see 100 deer opening day and now we are lucky to see a few. The winter of 07 and 08 wiped them out due to winterkill.
- Maintain or grow herd. Shrinking herds are bad for Colorado!
- There are fewer deer the last 3 years than in years past. I have hunted the same area for the past 12-15 years and there are fewer animals in general. I only buy a deer tag for meat. I primarily hunt elk. The Cabin Lake fire really screwed things up this year.
- I believe the amount of tags given and not enough concentration on predator control is playing a big role in the decline of our deer herd.
- We need to build up the deer herd

- Hunting seasons (late) are way too long. All seasons (big game) should end Dec 15. You're running game off public land onto private. This is about our herds, not your money. More limits (increased on all doe tags). Deer and elk herds have plummeted; I border BLM between Harvey Gap and Rifle Gap. DOW = poor management or management for profit. Disgusting!
- Over last 3 years, deer numbers have remained unchanged over this period. However, mature bucks, 3 plus, have seemed to decrease in my experience hunting this area.
- I have lived in Rio Blanco county my entire life. In that time (65 yrs) I have seen the deer herd shrink in size considerably.
- Hunt Morapos area. Elk herd good. I've seen some nice four point buck last two years no trophies but healthy looking maybe this year. Lots of does.
- I have hunted and fished, lived and worked among the WR deer herd for 61 years. I have only hunted bucks (not only trophy but mainly for meat). Buck quality was small and sparse 20 years ago - almost to zero on public lands 15 years ago - but over the past 5-6 years has improved in number, size and quality. On the same plots of public land, you can see 5 point bucks starting to gain mass where 12 years ago we would be lucky to see only does.
- Deer and elk numbers are way down
- I have noticed a large decrease in the total number of deer on our property in the past 3 years. It's my opinion that the buck to doe ratio too low. I think the state should consider incentives to harvest doe mule deer while keeping the draw odds low for buck tags. Mule deer are a trophy species and should be managed accordingly.
- I would like to see either sex licenses for the public land in the White River GMUs. I think it would keep the herd healthier.
- suggest you increase the licenses increase both buck and doe tags
- It has been obvious the party I hunt with that we have seen less deer the last 5 years.
- The Division of Wildlife also should consider carefully watching areas 22, 21, 10 for deer management, area 21, deer quality is very poor, there has to less tags given out for both seasons. I have switched to area 10. The deer in unit 10 are much better quality these days. I would focus more time with units 22, 21, 10 rather than the White River herd. These units are managed for better quality. Thanks for your hard work.
- The father of a guy in our group has hunted units 11 and 22 since the 1950s. He has told us of the population cycles. After hunting unit 11 last year, I believe that the deer numbers are in an upswing in the cycle.
- Place horn limit on deer on locals also to help increase deer age and size reduce the # of elk cows
- Where I have hunted, the herd seems to be in good shape.
- The bucks have gotten much bigger.
- Colorado has to be one of the most beautiful states in the Americas. 70% of the time hunting 3rd season deer population is good or above average. My main concern would be controlling the doe population. Texas has a strong management program on its doe herd but then again I don't believe whitetail migrate like a large portion of the mule deer seem to.
- Too many young bucks taken each year!
- Hope to see the hunting future to be as high quality as possible for my family in the future. Really fun to hunt in Colorado. Thanks
- I've only hunted deer last year for the very first time in Colorado. I believe I've hunted your beautiful elk for the last six years. During those years the herd has increased in numbers. I

believe the herd has pretty healthy numbers. There were plenty of bucks to choose from, sizes from spikes to one eleven point (4x4 with 3 stickers). We did not see any deer that were in poor health. I'm a hunter that appreciates taking a trophy animal. I'd rather pass on a small buck; preferring to watch them and allow them to grow larger.

- I believe that I have seen an increase in both the quantity and quality of bucks since the draw.
- First don't shoot does, second control all predators.
- When I was at that unit I noticed the hay pens were empty. I really worried about another bad winter and another big deer die-off. Just something I noticed. Thanks
- The deer numbers are still not up to where they were about 14 years ago. Winter weather and predators does hurt.
- I've only hunted unit 22 one time. I used 10 points to draw it, seemed as if there are plenty of deer but need to have youth hunt and reduce the number of three points. I saw 150 bucks of them 120 were three points or "management bucks" young herd.
- I have witnessed the population of mule deer decrease dramatically over the last 20 years
- Deer population is low in the public hunting areas
- I think the deer herd has been sustained at the same level for the last 15 years
- I also feel there were less mature bucks the last 3 years. Each year I have seen less trophy quality deer.
- I've been hunting deer in the white river region for our 20 years. My concern is a healthy population - whatever it takes
- There should be either sex hunt when doe to buck ratio is too high.
- Seems to me that quality and quantity are both down in recent years.
- Numbers are low! Doe hunts should not happen when you're trying to rebuild your herd.
- Place horn limit on deer on locals also to help increase deer age and size reduce the # of elk cows
- The overall health of our Wildlife and Wilderness areas are Paramount!! - Although, I all too often see human intervention Backfire. - We can all do better.

Access

- Because of physical disabilities, I would like to see more and easier access to public lands such as BLM lands that are surrounded by private property without having to hike miles. Also I have seen numerous instances of private landowners DRIVING and hunting on state lands where we, the public, are not allowed to drive. I see this every year on BLM land State Trust Lands where we hunt. They also harass us as to how we gained access!! We hiked in - they drove in and I am tired of it and it is festering into a confrontation!!
- The area I hunt is adjacent to several private hunting ranches. Their harassment of the herds, to keep them on their property, and the harassment of hunters, is at an all-time high in the 16 years I have hunted this area. Regulation and enforcement of these profiteers selling horn hunting should also be a priority.
- Get Cross Mountain Outfitters to pick up their signs and shut the hell up
- As in every area of the state, the majority of animals are on private property. The Division sells large numbers of licenses but majority of hunters have no access to the animals. The

status quo favors guides and private property owners that want \$3,000 to hunt or 7L Ranches that don't allow hunting at all.

- Due to a large portion of unit 22 being closed off to hunters (private property and outfitters) south of road 122, and along road 103 toward Cathedral Bluffs, there now are way too many hunters hunting on the north side of road 122. along the Calamity Ridge/Monument Gulch. Constant vehicle traffic, and hunters now camping along Ridge road right where deer cross from unit 21 into unit 22.
- Being non-resident, provide easier access to hunting in all areas of Colorado made easier. "Not just for the rich and famous!" Very unfair!
- 1) The actual public hunting land is getting smaller and smaller each year due to sale of certain areas sold to Colowyo mining company. There are not enough areas available to hunt in unless I pay a small fortune to hire an outfitter. (2) It is so difficult when in the field, for me to actually know where I can hunt i.e. which is public or private land. There are not enough signs or fences. (3) Also, when out in the field (for example road 51), a lot of times there is small pockets of public land that is impossible to get to because there is privately owned land surrounding it (land locked).
- You sold BLM land and now it is closed to some ranch. Closure of the old Shell lease area ranch that has closed down 80 to 70 on county rd 103? I have hunted those bluffs for 32 years. Now a couple of years ago a ranch sign went up and is now closed WTF? How can they do that? It was Shell originally out there for oil. Now its a ranch that has public land in it but the road is closed because it is private? Please let me know why.
- Landowners are bottling up herds for private gain and impeding access.
- Create better access to state and BLM land especially for resident hunters and include access routes on website.
- Reduce # tags for landowner resale creates private reserve hunting at public expense. Landowners used to grant access but are now selling access. Hunting is public resource and not be privatized!
- Non-resident hunters no following rules (ex) driving on closed roads / road hunting
- My access to BLM properties are limited.
- Please keep the bikes out of the wilderness areas! The whole reason I came to CO is to go to these areas free of wheeled vehicles. On some of the trails, it would be very dangerous for a string of horses to get buzzed by some dumbass on a mountain bike. Thanks for listening
- Open up more roads to ATV's so deer viewing can happen stop closing camping and 4x4 trails to the public. Offer more hunting tags for archery deer and use the added revenue to open more roads to ATV's.
- My concern is to many guide and outfitters took the fun out of the hunt do to you can't even stop on county roads and look without someone wondering what you're doing. I'm not putting in for hunting this year. Out of state hunters have taken over the little BLM we have. thanks to who ever
- Do to private property ownership in and around public grounds, it appears to me the deer have plenty of safe place's to be. It's pretty much private all along the white river and seem the dear deer know where the boundaries are. The elk also.
- I hunt the 3rd rifle and most deer are on private land and ranchers tend not to allow you to hunt because of their HIGH DOLLAR hunters. This game belongs to Colorado and not to THE RANCHERS

- You asked how much I care about the economic losses to ranchers/farmers due to deer. I put the lowest possible concern because I feel if these said landowners are so concerned about the economic loss there are a whole bunch of hunters that would be glad to help them out. They should allow access for free. No trespass fee, no fees at all. If they need help, we will be more than happy to take deer off the property. If they are unwilling to allow access there should be NO damage money going to them. They do not own the deer... they just feed them.
- The large number of deer that I saw were on private land. These folks refused to allow anyone to hunt. The state needs to stop this somehow. We farm and will let people hunt if they ask. Landowner tags are given and the relationship between the state and the landowner needs to improve. Incentives should be given to landowners who participate in walk-in.
- I think more people could enjoy the white river deer herd if more public access was also secured. Too many public tracts have named/numbered BLM roads blocked by private property. The state should find ways for the public land hunter to access their public lands and enjoy the opportunities available.
- It's being doing a good job, but there's always space to improve a bit.
- The deer herd seems to be less but that might also be because the landowners have landlocked public lands and we as hunters have trouble getting to them and get harassed when we do.
- Sometimes hunters are about BLM land zone. Few hunters were stopped entering BLM land. Citizen agency may not know up to date public hunting zone. Almost every time got there. We stop by DOW office to look at map.
- The ranchers feed the deer and elk to keep them on their land and then last year one rancher told us you can hunt on my property for \$4000 because I have about 2400 head of elk and deer on my property.
- many ranchers get lots of money from hunting, too much private and state lands tied up by outfitters.
- Area 22 locked gates preventing access across private to public. Restriction and reduction of access to public (BLM) leased by oil or ranching or private enterprise. We seem to be continually losing access to BLM hunting ground.
- I hunt the 3rd rifle and most deer are on private land and ranchers tend not to allow you to hunt because of their HIGH DOLLAR hunters. This game belongs to Colorado and not to THE RANCHERS
- Most of the deer and elk are on private property
- I am disturbed by the amount of land either leased or sold to Colowyo Coal company and how completely locked up and off limits to hunter use for deer/elk. It seems every visit to Axial Basin it presents fewer access opportunities.
- We hunted third season last year in the White River area for deer. The reason I marked VERY DISSATISFIED on your questionnaire is because although we saw deer, they were all on private land and didn't move to public or BLM land. Many of the ranchers won land all around BLM land and have blocked access to the BLM property with no way for the average hunter to be able to hunt this property. Average hunters have no recourse to get on the BLM land unless they want to pay ranchers an exorbitant amount to cross on to property that they pay their hunting fees to be able to hunt. How can the deer and elk herds be managed by the DOW

when they do not move off of private property? This is extremely unfair to the average hunter that can't afford to pay to hunt on private property or to pay the land owners to cross their land. My future hunting days look very bleak, to say the least.

- More walk-in access less driving like the back side of Duffy
- Also being disabled makes it hard to hunt when more and more trails are closed.
- The large number of deer that I saw were on private land. These folks refused to allow anyone to hunt. The state needs to stop this somehow. We farm and will let people hunt if they ask. Landowner tags are given and the relationship between the state and the landowner needs to improve. Incentives should be given to landowners who participate in walk-in.
- Put a limit on ATV/UTV use on public land. They are running hunting in Colorado.
- Very disappointed that the game department let the shell oil land in Unit 22 to fall into private hands. It was a very important piece of land, critical to the winter migration.
- I hunt in the southern area of Unit 22 on the west branch of Cow Creek. Last summer I called the Meeker CPW and BLM offices for a determination of the possibility of land closures in the area we hunt 3 times and the local game warden. Even 1 week before our hunt no one knew anything. When we go there every place we hunt was posted and both offices had maps of all the posted land for us. Seems to me they both lied to us. What's up with that? Probably won't be back.
- Again, road closures, cable on road 211, make it very hard to bring in a deer on foot to ATV and other roads being closed off.
- I think more people could enjoy the white river deer herd if more public access was also secured. Too many public tracts have named/numbered BLM roads blocked by private property. The state should find ways for the public land hunter to access these public lands and enjoy the opportunities available.
- I am most concerned about hunters sneaking onto property. We have run across people walking thru areas they don't belong.
- Too much BLM ground not available due to private lands. Sometimes only a 1/2 mile piece separates 2 BLM grounds.
- Also show public access to non-private or leased hunting areas accessible to people of moderate physical ability and post it with restricted camping availability. Last time we were there all land was either bordered by private land or leased by guided outfitters with no access to open indication of public land access.
- The ranch I hunt manages the deer populations well with cattle. Harvest of male deer is limited to only mature bucks of five years and older. Excellent for trophy hunters.
- Most of the deer and elk are on private property we need to build up the deer herd
- Hunted in 2018 muzzleloader season. Was very disappointed to find hunting area closed in unit 22 Cow Creek area. Calls were made to the BLM office prior to leaving to CO but no answers were available about land closures.

Highway Crossing

- Also traffic collisions could be greatly reduced by lowering speed limits at night and instilling more public awareness type signs for wildlife crossing. 1 or 2 signs between Rifle and Meeker and 1 or 2 signs between Meeker and Craig are insufficient. Maybe lighted signs would be more noticeable. Solar technology could be an answer.

- I live in Meeker and it is hard not to hit a deer. They are all does.
- I think we have more deer than rabbits. Maybe thin down the doe population a little to keep the herd healthy and have less car/deer accidents. Install electronic signal devices on highways like Hayden to Craig, Craig, to Meeker, Craig to bags to signal when animals are crossing areas like they had in Wyoming north of Rock Springs.
- Hwy 64 is horrible for vehicle deer kills. No one will shut the speed limit down when the deer hit the highway.
- Managing deer to vehicle accidents can be prevented. Not with bridges but fences. I think the overhead by passes are a waste of money.
- My property and hunting experience is south of Craig on Highway 13. Would like to see water resources on both side of the Highway 13 to help keep deer from crossing highway to get to water. I feel this would be great in preventing deer and vehicle accidents, which will help people and deer populations.

Law Enforcement

- Minimize poaching/unnecessary waste
- Over the last 4-5 years we have watched those who own/work at the hunting lodges, private hunting clubs, harass wildlife in order to keep the "elk" on their property. Wildlife officer try to help us, however, they are few and very busy.
- *I feel that Enforcement of Littering violations should be one of the highest priorities of all. *
GO GET THEM TRASHY BASTARDS

Livestock

- The sheep and cattle in unit 23 during the muzzleloader hunt is excessive. I believe ranchers should have ALL their livestock out by Labor Day
- sheep herding interferes with hunting season

General

- Too many to list: The point fee increases for moose. Killing our fish in the Yampa for a sucker, wolves, shed hunting season on us, just to name a few!
- Upset with the new licensing of purchasing a small game license. It's bad enough that way pay a habitat fee.
- I hunt mainly in unit 11. During the last 10 years I have noticed a lot less of all species, mostly pronghorn.
- Really the biggest concern for me is watching deer suffer in the city limits of Craig from them being hit by cars to being sick. Seems like it isn't a big concern to DOW.
- Fix the application process where I apply for a license, am not successful and there ends up multiple tags remaining and cannot get access for the left over tags!
- Shed hunters are disturbing deer and elk in spring. May 1 opening needs to be enforced. I have seen shed hunters and turned them in and no action was taken. I had pictures of sheds in vehicles in closed shed hunting areas.
- FYI - I have verified 3 sightings of whitetail does in WR herd area. One outside of Meeker and two Unit 13 (Yampa River).

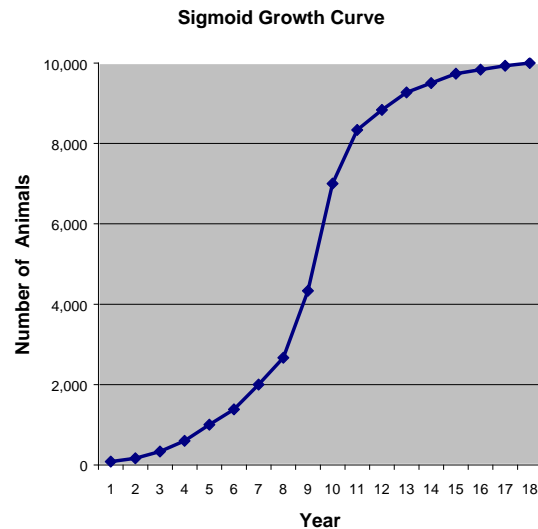
- Please be careful with your management. Remember the sage grouse lived in the same areas and range degradation almost got them listed land out of our states control.
- Protect earth please, protect animals please, protect Colorado please, limit the number of people moving to Colorado. Thank you for all you do for Colorado.
- Your survey is poorly worded and difficult to understand what you are asking in the questions. Putting this survey in the envelope provided, by folding I in half is a joke. More though should be put into the survey before using precious monies sending it out.
- Not happy about 2019 requirement to purchase a qualifying license if unsuccessful in draw or applying for preference point. Paying for something that won't be used (+/- \$100) would rather CPW raise cost of preference point to (+/- \$50) Seems like CPW is trying to find way to make money
- the interaction I have had with our department of wildlife officers has been good Thanks
- To buy a small game tag is out of line \$87.25 for what
- I didn't care much for the small game tag, \$81.00, that I had to purchase this year in order to put in for large game tag. Why didn't you just save the permit?
- Stop raising the hunting fees!!
- Since DOW became CPW I have noticed a major change in the folks who are now in CPW by their many contacts I have had with the change-over in personnel. I have seen how their attitudes of many in the field are indifferent to hunters I have seen from local hunters, to out-of-state hunters. I am not happy with the taking of our hunting and fishing revenues, which have taken funds away from support for mule deer at the cost of elk over deer (brings more money from out-of-state hunters buy #680 tags to hunt elk) etc. The funding's we had in place have been subjected by parks people to be used in parks directives and building parks in areas where the hunters cannot hunt in the same area anymore because of restrictions against hunting but everything else as recreation is "okay". I have hunted, fished and traveled out of state to hunt in Colorado since the 1950's so I am aware of how the times, herd populations, etc have changed. (I have my degrees and experience as a mule deer/trout/lion wildlife manager and warden). I talk to every CPW person I meet and I have noted that many of the cross-over personnel who once parks people now wear the patch of old DOW (with modifications) and have promoted over other former DOW folks due to politics and ambition, not all which show a positive, or even supportive stance for hunters in Colorado. This is sad, I am concerned that my grandchildren's future in one of the best hunting states in our USA is being politicalized to do-away with their hunting rights and outdoor rights in Colorado. I am fully aware of agenda's 21 & 30, have decreased it with USFS/BLM, CPW field folks and see our access to vast areas being decimated; roads closed off; to our recreational uses (including hunting) and yet open to ranchers who lease our lands, use the waters for sheep and cattle at pennies on the dollar. I also see oil companies who are gracious enough to allow limited hunting of which CPW keeps raising the preference points out of sight. Loggers can use the roads, but the gates are locked to keep hunters off the public lands during hunting season. CPW closes most parks for camping facilities as does the BLM and USFS tourist/local campgrounds during hunting season 95% off limits behind locked gates and campsites toilets etc...all claiming "lack of funds" to operate or "our camp hosts have gone home" - poor planning? or is it an implied directive against hunters having a nice place to camp during hunting seasons? by adding hardship to the equation, if the same access was denied (during prime summertime-moneymaking season) to campers, fishermen, tourists et al - there would

be a vast public outcry and the availability of "no camping" or "campsite closed signs and gates would be stopped immediately by such an outcry. So here is where the facts summarize. CPW needs to represent our hunter's grievances with hunter-supportive policies - not "anti-hunter" agenda's. Not all hunters are uninformed, uneducated, buffoons no slobs - we do keep track of how we influence others and our image in the eyes of the public and CPW employees at large. I cover my legally taken harvest under a tarp. I use ALL of my game, consuming edible portions, tanning the hides, mounting the antlers/horns, and I share the "gut pile" (which I cover with brush and dirt with predator wildlife. Often I take the bonded carcass to our world sanctuary nearby. After fighting wars for 40 years for our country and people, all I wish to do is to be able to hunt and fish and explore our beautiful Colorado created by God almighty with my family until my wounds catch up with me one day. Think about it....freedom.

APPENDIX C

Population Dynamics, Maximum Sustained Yield, and Density Dependence

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



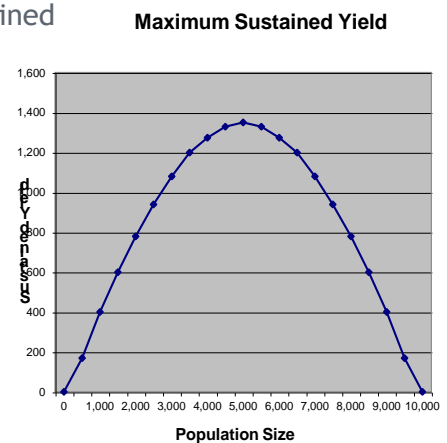
The second phase occurs when the population number is at a moderate level. This phase is characterized by high reproductive and survival rates. During this phase, food, cover, water and space are not a limiting factor. During this phase, for example, animals such as white-tailed deer have been known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

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

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

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

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



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

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

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

Literature Cited

Bartmann, R.M., G.C. White, L.H. Carpenter. 1992. Compensatory mortality in a Colorado mule deer population. Wildlife Monographs No. 121. 39 pp.

Bishop, C.J., G.C. White, D.J. Freddy, B.E. Watkins, and T.R. Stephenson. 2009. Effect of enhanced nutrition on mule deer population rate of change. Wildlife Monographs No. 172. 28 pp.

Appendix D



July 30, 2020

Darby Finley
Colorado Parks and Wildlife
73485 Hwy 64
Meeker, CO 81641

RE: White River (WR), Northwest CO (NWCO), and Upper Yampa River (UYR) Habitat Partnership Program Comments - Deer HMP D-7

Dear Darby:

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 WR, NWCO, and UYR committees have discussed your presentation, reviewed the draft alternatives and offer these comments for consideration.

The three HPP committees had previously been presented with comprehensive information about D-7. At the July 29th video conference, the committees were represented by five members and, after your summary presentation, were in agreement with the following comments pertaining to proposals for the population range and sex ratio objectives for the above HMP plan.

The WR, NWCO, and UYR committees support the preferred alternative 2, to decrease the population range objective to better reflect the current population estimate. We believe this alternative responsibly balances local range and habitat conditions with sportsmen desires and landowner concerns. While there are concerns about the current population and a desire to increase the local herd size we believe the preferred alternative is appropriate given the increasing trend in CWD prevalence, concerns over adequate winter range and the other factors you identified. Any issues we do have are more likely related to distribution of the herds in the area and not the overall population size.

The three HPP committees also discussed the proposed sex ratio alternative. We support a moderate reduction in the current sex ratio objective to a range that would ultimately increase the opportunity for more hunters in the field but would still allow for the ability to address high CWD prevalence rates.

As stated above, HPP is also directed by statute to assist the Division to meet game management objectives. The WR, NWCO, and UYR committees have worked with both public land managers and private landowners to improve the quality and quantity of the habitat in D-7. Adequate habitat is critical to meeting game management objectives and we remain committed to maintaining and improving habitat in this area.

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

On behalf of the White River, Northwest CO, and Upper Yampa River HPP Committees

Sincerely,

A handwritten signature in blue ink that reads "Bailey L. Franklin". The signature is written in a cursive style with a large initial 'B' and 'F'.

Bailey Franklin, CPW Rep-WRHPP

Appendix E



BOARD OF COUNTY COMMISSIONERS
OF RIO BLANCO COUNTY, COLORADO
RIO BLANCO COUNTY HISTORIC COURTHOUSE
555 MAIN STREET, P.O. BOX 599
MEEKER, COLORADO 81641
970-878-9430

August 4, 2020

Bill de Vergie
Colorado Parks and Wildlife
Meeker Service Center
PO Box 1181
Meeker, CO 81641

Re: White River Herd Management Plan – Unit D-7

Dear Bill,

The Board of County Commissioners of Rio Blanco County, herein "County", support the White River Herd Management Preferred Plan. The analysis shows significant degradation of the deer population based on numerous factors which will negatively impact northwest Colorado if immediate action is not taken.

The County urges CPW to provide ongoing information specific to the impacts on the herd due to the existing wolf population as well as a potential increase in the population of wolves pursuant to a forced wolf introduction. Additionally, to enhance the survival of the deer population, predation in general should be closely monitored and managed to maintain or decrease existing mountain lion, coyote, bobcat and bear populations.

The County is obligated to protect and ensure the local socioeconomic wellbeing, the culture and customs of the constituents, and conservation of natural resources of the County. The County adopted the 2016 Rio Blanco County Land and Natural Resources Plan, herein "RBC LNRP" with the intent to address issues at a federal level, however, the County relies on this document to guide all of our natural resource actions. After a thorough review of the proposed Herd Management Plan, the plan appears to be consistent with the RBC LNRP. Section 4.14.3 paragraphs 3 and 4 of the RBC LNRP address wildlife management plans:

3. Consultation and coordination should occur with the Districts and County where federal monies or resources are committed for the development of management plans, population objectives, wildlife introductions (e.g., moose or big horn sheep), or other decisions that may affect the economic viability of Rio Blanco County.


4. Peer-reviewed science, or those meeting the agency data specifications, should be used in the management of disease spread between native and domestic species, with consultation and coordination of local government.

We invite you to review the RBC LNRP in its entirety by visiting the following address or by clicking on the following hyperlink: <https://www.rbc.us/578/Natural-Resources>. Should you have questions or require additional information, please do not hesitate to contact us. Our email address is bocc@rbc.us.

Sincerely,



Jeff Rector
Chairman



Si Woodruff
Commissioner



Gary Moyer
Commissioner

Appendix F



United States Department of the Interior



BUREAU OF LAND MANAGEMENT
White River Field Office
220 E Market Street
Meeker, Colorado 81641

In Reply Refer To:
1170 (LLCON05000)

August 2, 2020

Colorado Parks and Wildlife
ATTN: Bill de Vergie
Area Wildlife Manager
73485 CO-64
Meeker, CO 81641

Dear Bill,

Thank you for the opportunity to review the Draft 2020 White River Herd Management Plan for Data Analysis Unit D-7. Our office has completed a comprehensive review of the plan and has concluded the plan to be consistent with our approved Resource Management Plans. We fully support Colorado Parks and Wildlife's Preferred Alternative for both mule deer population and sex ratio objectives that would allow for modest reductions in current herd numbers and sex ratio objectives. BLM supports the management flexibility inherent in proposing a desired population range as outlined in the Preferred Alternative.

If you have questions concerning our response to your White River Herd Management Plan, please contact myself or Lisa Belmonte of my staff at 970-878-3816.

Sincerely,


Kent Walter
Field Manager

Appendix G



Forest
Service

Blanco Ranger District

220 E Market St
Meeker, CO 81641
970-878-4039
Fax: 970-878-5173

Date: August 6, 2020

Darby Finley
Terrestrial Biologist
Colorado Parks and Wildlife
73485 Hwy 64,
Meeker, CO
81641

Dr. Mr. Finley

The Blanco Ranger District of the White River National Forest has reviewed the Draft D-7 Herd Management Plan. I would like to submit full support for the preferred alternatives identified in the plan. The preferred alternatives allow CPW the most ability to effectively manage ever changing conditions and challenges while still maintaining a viable mule deer population in the D-7 Management area.

The Blanco Ranger District is committed to providing use of public lands to a variety of users while at the same time, managing effective wildlife habitat for a variety of wildlife species including mule deer. Management objectives for the Forest Service is not to manage populations but to manage existing habitat. The D-7 Herd Management Plan will be used as a point of reference as we plan new vegetation treatment projects on the Blanco District. Herd management plans provide important information on goals and population objectives so we can ensure we are in alignment with our vegetation management.

The majority of the mule deer habitat on the district would be classified as summer and transition range. Vegetation treatment projects takes into consideration effects to big game and non-game species and focuses to improve habitat conditions as much as possible. It is our commitment to continue treating habitat effectively through but not limited to: timber harvest, prescribed fire, wildfire management, noxious weed treatments and active livestock grazing management.

Recent wildfires on the district include the Lost Solar and Cabin Lake Fires. Monitoring of these two fires has shown a dramatic increase in aspen regeneration. This is a promising result that benefits a variety of species including elk and mule deer. We will continue to look for opportunities to allow fire to take a natural role on the landscape while still providing for public safety and protection of private property.

The Blanco Ranger District has completed an analysis in our mountain brush vegetation communities to allow for Prescribed (Rx) burning to enhance wildlife habitat while reducing fuel loads. We plan to continue these treatments when conditions allow. We are also working to include an analysis to provide opportunities for mechanical treatments in our mountain shrub species to increase our opportunity for habitat improvement projects on the district.



CPW has always been an active partner and supporter of activities on the Blanco Ranger District. We are committed to maintaining this partnership as we work together to provide hunting and wildlife viewing opportunities to members of the public as they enjoy our public lands. While we continue to maintain and improve wildlife habitat conditions.

Thank you for the opportunity to review and provide support to the management of our mule deer population and this plan.

Sincerely,

A handwritten signature in blue ink that reads "Curtis Keetch". The signature is written in a cursive, flowing style.

CURTIS KEETCH
District Ranger