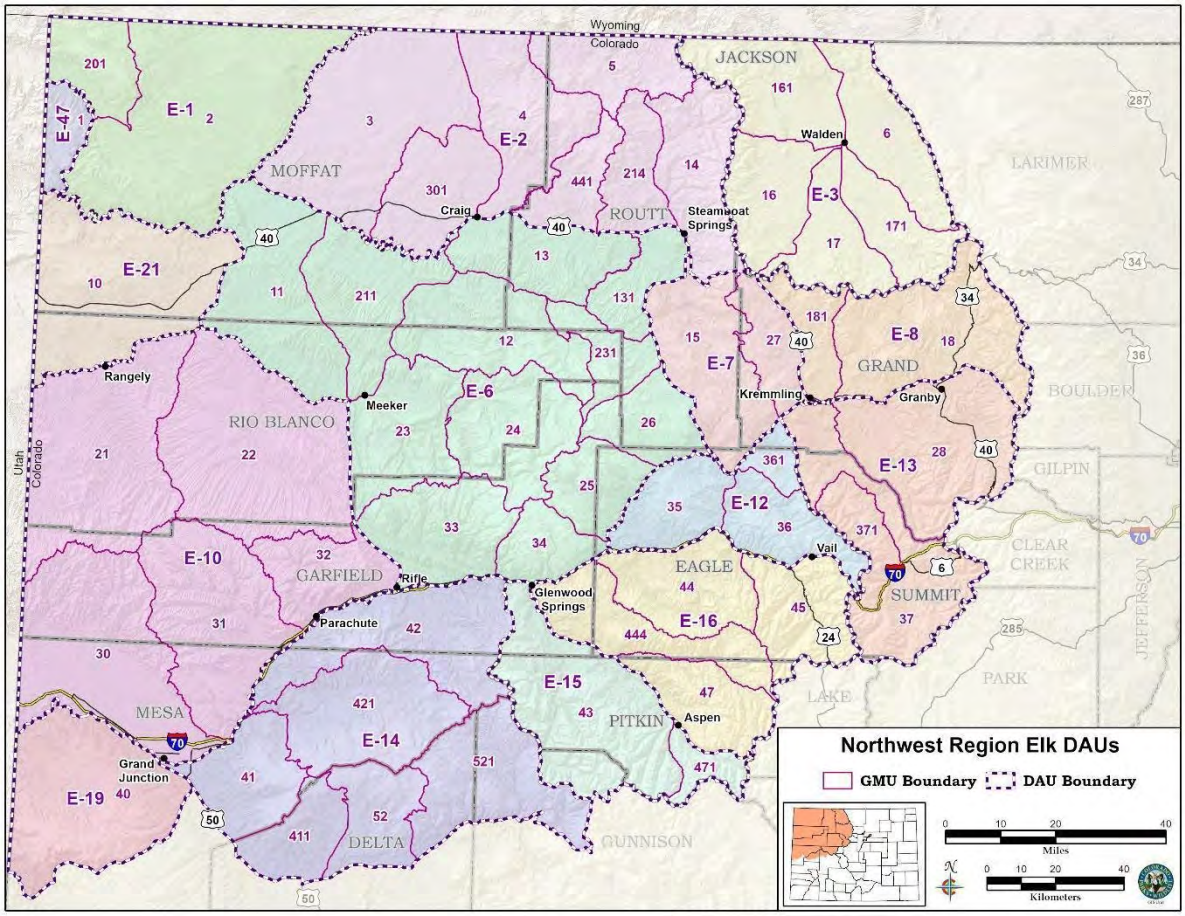
DRAFT

Northwest Colorado

Elk Herd Management Plans

Data Analysis Units:
E-01, E-02, E-03, E-06, E-07, E-08, E-10,
E-12, E-13, E-14, E-15, E-16, E-19, E-21, E-47



PREPARED FOR
COLORADO PARKS AND WILDLIFE

BY
NORTHWEST TERRESTRIAL BIOLOGISTS
NW AREA STAFF

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

Executive Summary

The 2023 post–hunt population estimate for Rocky Mountain elk (*Cervus elaphus*) in the Northwest Region of Colorado totaled 115,390, which represented almost 38% of the elk in all of Colorado. The elk populations in NW Colorado have been relatively stable over the last 10 years, however, the winter of 2022-23 severely impacted populations in the NW part of the NW Region to the point that some of the historically largest herds in Colorado are now below objective. There are 15 elk data analysis units (DAUs) across northwest Colorado, with 2 herd management plans (HMPs) that are up-to-date with approved population and sex ratio objectives in the last 4 years. The other thirteen HMPs are either out-of-date or have never had official plans approved. Traditionally, Colorado Parks and Wildlife (CPW) staff have presented one HMP at a time for approval to the Parks and Wildlife Commission (PWC). In order to address the large numbers of HMPs that need to be updated, staff have taken a new approach to develop a Regional roll-up of all HMPs in a CPW region for a single big game species to update or establish new population and sex ratio objectives. This document presents the final objectives for all 15 northwest elk DAUs, including the new proposed and recently approved objectives. Table 1, below lists the 13 DAUs with objectives to be updated and the 2 DAUs that have been approved in the last 4 years that we propose extending. The plan also describes the significant management issues for elk herds in the northwest part of the state as well as what public input was used to develop proposed objectives and the individual HMPs for each of the elk herds.

While elk populations are down from recent historic high numbers around 170,000 in the early 2000's, populations in northwest Colorado are still some of the largest in the state and North America. Concerted efforts to increase license quotas were implemented across the state in the early 2000's to attempt to bring down elk populations to objective and minimize conflict with agricultural producers, especially during the severe drought years. Since then populations have been closer to objective ranges, with some populations dropping below objectives causing managers to change licensing strategies to attempt to grow elk populations. Severe droughts and above average winter snow depths and cold temperatures on elk winter ranges have also impacted populations through direct mortality as well as impacting available forage quantity and quality.

Through all of the monitoring efforts, research, and public input, we have identified a list of issues that impact elk populations and herd health in northwest Colorado. Calf survival and recruitment is one of the biggest factors to monitor when managing elk populations. Habitat quality and quantity is the biggest factor affecting the potential for elk population size and growth based on carrying capacity, nutritional value, competition for forage with other grazers, and protection from disturbance, weather, and predators. Oil and gas development, renewable energy development, recreation, and residential development can impact elk populations through direct loss of habitat and indirectly by affecting behavior and use of quality habitat. There's also competition with free-roaming horses and livestock. Chronic Wasting Disease (CWD) prevalence has been increasing in northwest Colorado and has become one of the greatest issues affecting deer survival. While CWD prevalence isn't as high in elk, it is still a factor to consider for elk management. Highway fencing and crossing structures have become a greater focus on elk and deer management, as fencing is being used to minimize vehicle collisions, but those fences create barriers to migration and suitable habitat. Finally, predation is always a factor for elk management with lions and bears on the landscape, as well as wolves following the passing of Proposition 114 and natural migration.

Public outreach and associated input have been conducted and evaluated to help establish proposed population objectives. Evaluation of newly available optional hunter satisfaction data from our annual hunter harvest surveys as well as public meetings held around the state have been invaluable to understanding hunter perspectives. The optional hunter satisfaction data will also be valuable information to gauge hunter satisfaction in the different elk DAUs from year to year since these questions will be asked every year. In addition, the draft plan will be posted for 30 days for a public comment period to evaluate the proposed objectives. Ultimately, most hunters in public meetings and in the harvest data would like to see more elk across the landscape, but also recognize the challenges of habitat conditions, habitat loss, predators, competition for forage, and game damage conflict. The plan will be presented this July to the Colorado Parks and Wildlife Commission in a two-step process to approve the plan and adopt new population and sex ratio objectives.

Based on habitat conditions with variable drought and above average winter conditions, public input, competition for forage, disturbance on important seasonal habitats, chronic wasting disease, and changes to population models, most proposed population objectives are going to be the same or just slightly different from historic objectives (Table 1). Additionally, some sex ratio objectives have increased in range as they are expected ratios in DAUs with Over-the-Counter (OTC) licensing where it is difficult to manage for specific male harvest (Table 1).

Table 1. Population and management status of 15 elk herds occurring in NW Colorado. There are thirteen herds in the table with plans greater than 10 years old (clear rows), while objectives for the other 2 plans completed since 2020 are proposed for extension (shaded rows). (*DAUs E-1, E-21, and E-47 are minimum count observations for population estimates and objectives.)

DAU	Elk Herd	Current DAU Plan Approved	Current Population Objective	2023 Post-hunt Population Estimate	Current Sex Ratio Objective	3-Yr Avg Observed Sex Ratio	Male CWD Prevalence	Proposed Population Objective	Proposed Observed Sex Ratio Objective
E-1	Cold Springs	2013	700-1700	1,130*	40	41	Not detected	1000-2000	>40
E-2	Bears Ears	2008	15,000-18,000	10,567	20-25	14	2%	Status quo	15-25
E-3	North Park	2008	4,000-4,500	5,794	20-23	15	2%	Status quo	20-25
E-6	White River	2005	32,000-39,000	30,376	22-27	21	5%	Status quo	15-25
E-7	Gore Pass	2020	4,000-5,000	3,759	24-28	25	4%	Extension	Extension
E-8	Troublesome Creek	2010	3,600-4,300	3,611	21-26	30	0%	3,400-4,400	23-29
E-10	Yellow Creek	2022	8,500-10,500	16,114	18-25	26	0%	Extension	Extension
E-12	Piney River	2013	3,000-4,600	3,852	22-44	20	Not detected	3,000-5,000	15-43
E-13	Williams Fork River	2010	4,700-5,500	2,887	24-31	27	0%	4,000-5,000	23-29
E-14	Grand Mesa	2010	15,000-19,000	15,406	20-25	22	0%	Status quo	18-25
E-15	Avalanche Creek	2013	3,600-5,400	4,237	17-27	22	Not detected	Status quo	19-30
E-16	Frying Pan River	2013	5,500-8,500	9,823	18-30	22	Not detected	Status quo	17-29
E-19	Glade Park	2010	2,800-3,800	5,554	30-35	30	Not detected	Status quo	30-40
E-21	Rangely/Blue Mountain	None	1200	2623*	40	47	1%	1000-2000	>40
E-47	Green River	None	170	99*	30	140	Not detected	150-250	>40

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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 elk 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, sportspersons, 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. Secondarily, the HMP collects and organizes most of the important management data for the herd into one utilitarian planning document; determines elk herd 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, each big game population is managed as a herd, which is called a Data Analysis Unit (DAU). Generally each DAU is composed of multiple game management units (GMUs); however, in some cases a DAU is composed of just a single GMU. DAU boundaries are drawn in an effort to approximate the year-round range of that herd to include the areas where the majority of the animals in that population are born and raised and where they die, with minimal interchange between other herds.

CPW uses a "management by objective" approach to manage the state's big game populations (Fig. 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 through a computer modeling analysis. The population 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.

The purpose of this document is to set management objectives for all elk herds (DAUs) in the Northwest Region of Colorado. There are 15 individual elk DAUs in the Northwest Region, two of which have HMP objectives that have been approved by the CO Parks and Wildlife Commission since 2020, while the remaining DAUs have HMP's that are expired or have never

been written. The goal of this regional planning process is to establish current population and sex ratio objectives for all of the elk DAUs in the Northwest Region with the intent of having these objectives set for the next 10 years. The two HMPs approved recently will be extended for another 10 years. Management objectives can always be updated sooner, if the need arises. . If big game season structure changes to limited licensing for archery and rifle, or individual DAUs are proposed for license limitation, expected sex ratio objectives will remain sex ratio objectives until new HMPs are updated.

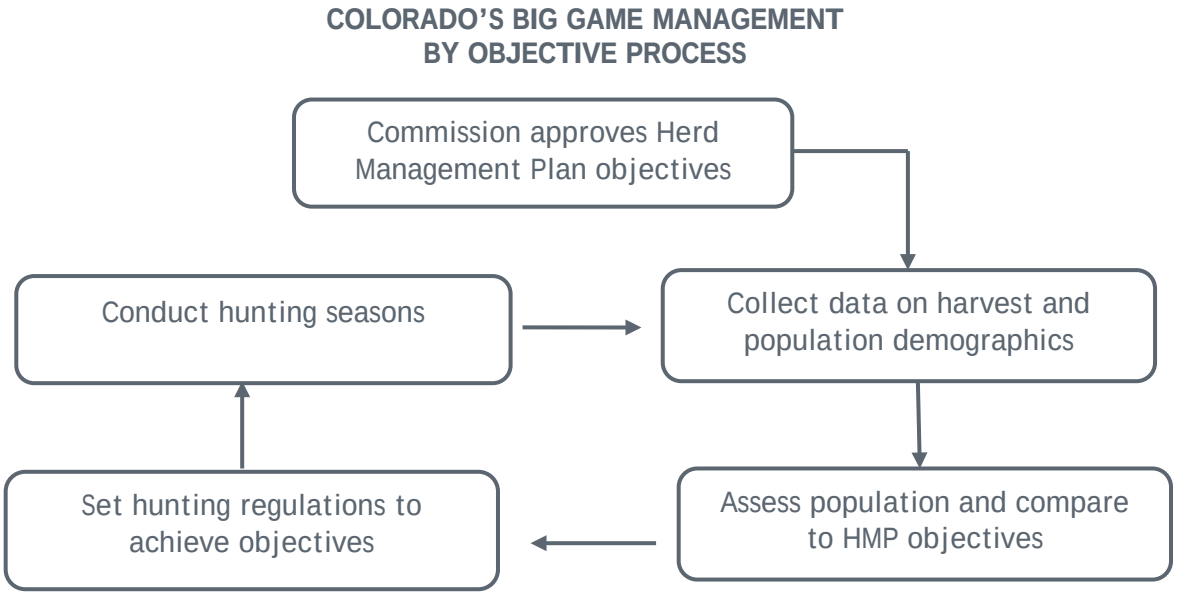


Figure 1. Management by objectives process used by the CPW to manage big game populations on a DAU scale.

Description of the Northwest Region Elk Data Analysis Units

There are 15 elk DAUs managed out of the Northwest Region of Colorado. The herds are spread across the counties of Delta, Eagle, Garfield, Grand, Jackson, Mesa, Moffat, Pitkin, Rio Blanco, Routt, and Summit, and a small portion of Gunnison County. The DAUs span 15,197,549 acres with a total human population of approximately 416,549. The major cities, towns, and communities in NW Colorado include Grand Junction, Rifle, Glenwood Springs, Meeker, Craig, Steamboat, Walden, Kremmling, Hot Sulphur Springs, Silverthorne, Frisco, Breckenridge, Vail, and Aspen. The elk DAUs span large expanses of public lands (Fig. 2) managed by the Bureau of Land Management (BLM, 31.9%), United States Forest Service (USFS, 29.7%), National Park Service (1.8%), State-managed lands (CO Parks and Wildlife-managed State Parks and State Wildlife Areas, 0.72%, as well as State Trust Lands, 2.7%). Private lands make up 32.5% of the land ownership.

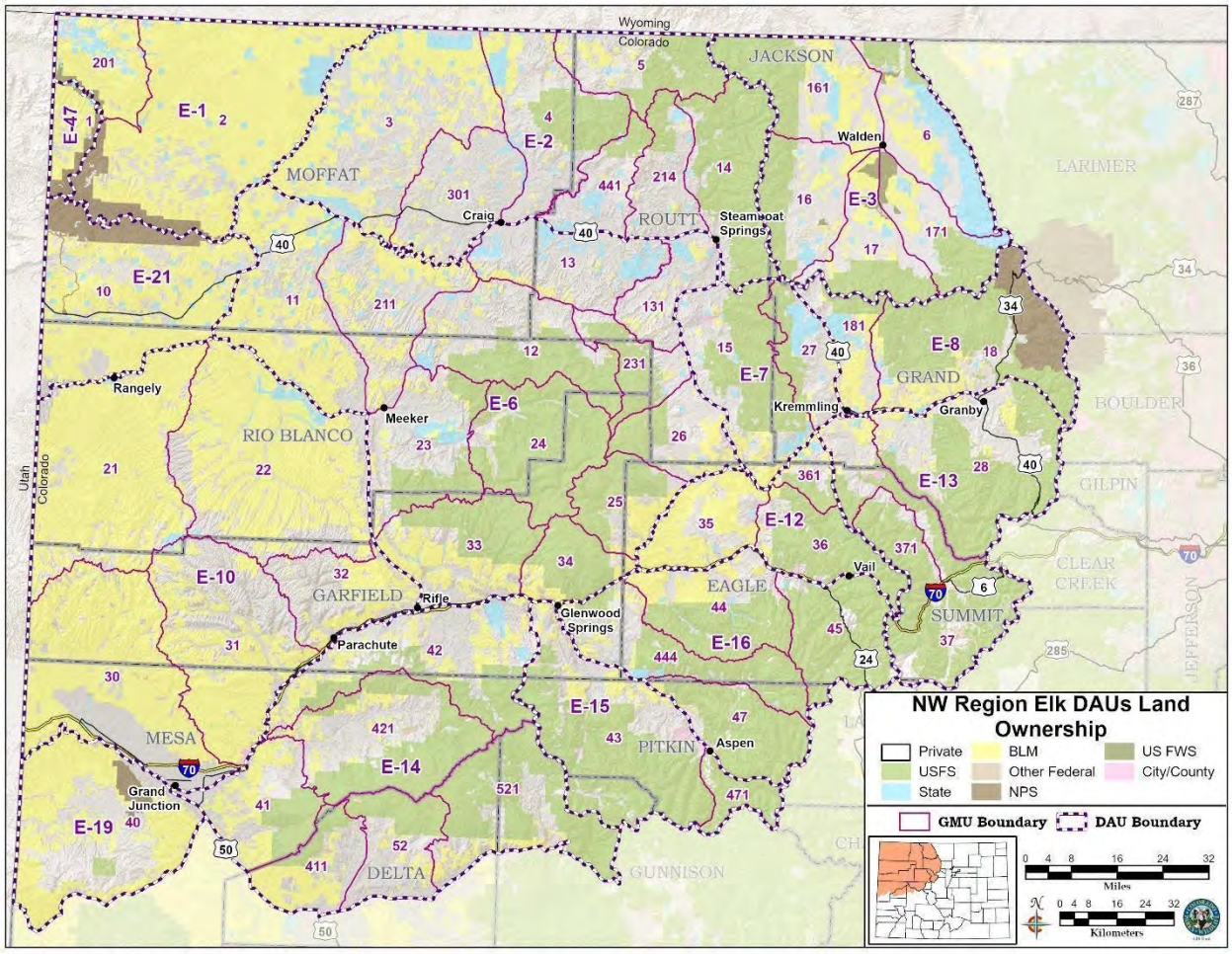


Figure 2. Land ownership across CPW's Northwest Region in relation to elk herds.

Common Management Issues and Strategies

Elk populations in the 15 elk herds existing in the northwest region of Colorado and included in this document peaked at a combined high population estimate of over 170,000 elk in the early 2000s. Since that time, these elk populations have been reduced intentionally via hunting harvest in an effort to adjust for rangeland impacts from persistent long-term drought, habitat loss, or to limit game damage on private properties. Most recently, mortality that occurred during the severe winter of 2022-23 has reduced the current combined population estimate to 115,000 elk. Calf recruitment (calves surviving to one year of age) in the northwest portion of Colorado has been stable to slightly declining in recent years, however, calf ratios have not shown the same drastic declines observed in the southwest part of the state (Fig. 3). The human population on Colorado's western slope is projected to grow by 67% between 2020 and 2050 (US Census Bureau 2021), presenting increasing pressures on wildlife and the habitats they rely on. With a growing human population comes increased housing developments, infrastructure, traffic, and recreation activities. Table 2 provides a matrix depicting the primary and secondary management issues affecting the growth or productivity of the 15 different elk populations in the Northwest Region.

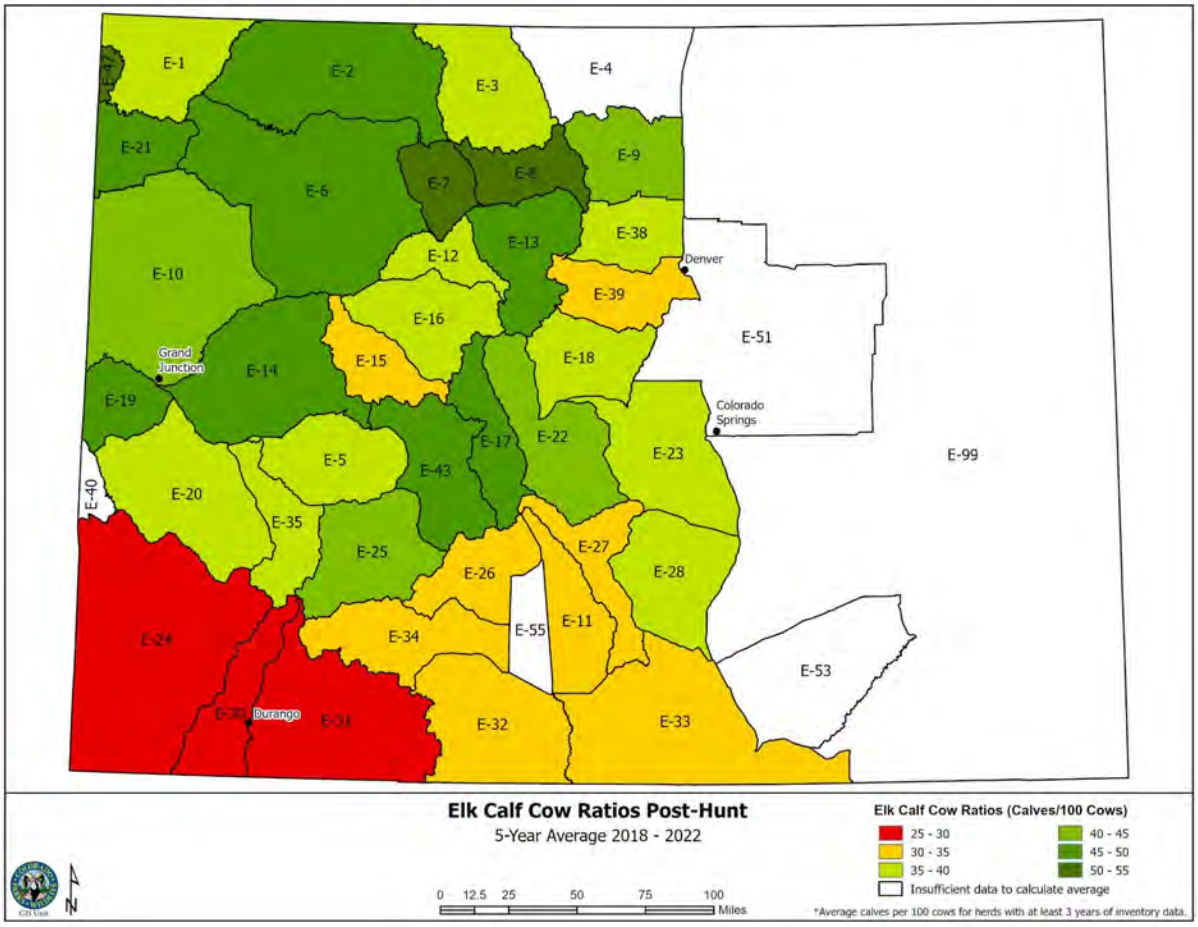


Figure 3. Average post-hunt (winter) calf:cow ratios for Colorado elk herds, 2018-2022.

Table 2. Issues affecting elk populations in northwest Colorado, rated as either primary (dark blue) or secondary (light blue) concerns for each elk herd (DAU).

	Data Analysis Units (DAU)														
Elk Management Issues	Cold Springs E-1	Bears Ears E-2	North Park E-3	White River E-6	Gore Pass E-7	Troublesome Creek E-8	Yellow Creek E-10	Piney River E-12	Williams Fork River E-13	Grand Mesa E-14	Avalanche Creek E-15	Frying Pan River E-16	Glade Park E-19	Rangely/Blue Mountain E-21	Green River E-47
Oil and Gas Development															
Predation/Wolves															
Residential Development															
Drought/Severe Winter/Climate															
Habitat quality/quantity															
Roadkill															
Free-roaming horses															
Agricultural game damage / forage competition															
Recreation															
Chronic Wasting Disease															
Wind/Solar Development															
Fencing															
Calf recruitment															

Chronic Wasting Disease

Chronic wasting disease (CWD) is a fatal neurological disease of deer, elk, and moose. CWD has likely been in Colorado since the 1960's; however, it was not confirmed in Northwest Colorado till 2002. Prevalence was low in the early 2000's (Table 3), and at that time was not found throughout many areas of the NW Region. Since 2017, CPW has been conducting mandatory CWD testing across different deer herds to determine prevalence and then for the first time conducted mandatory elk testing in 2021 (Fig. 4).

Table 3. Chronic wasting disease prevalence in northwest Colorado elk herds with the year it was first detected in hunter harvest from mandatory testing.

DAU	Elk Herd	Male Prevalence	Mandatory Testing
E-1	Cold Springs	**N/A**	
E-2	Bears Ears	2%	2021
E-3	North Park	2%	2021
E-6	White River	5%	2021
E-7	Gore Pass	4%	2021
E-8	Troublesome Creek	0%	2021
E-10	Yellow Creek	0%	2021
E-12	Piney River	**N/A**	
E-13	Williams Fork River	0%	2021
E-14	Grand Mesa	0%	2021
E-15	Avalanche Creek	N/A	
E-16	Frying Pan River	N/A	
E-19	Glade Park	**N/A**	
E-21	Rangely/Blue Mountain	1%	2021
E-47	Green River	**N/A**	

CPW developed the Colorado Chronic Wasting Disease Response Plan in 2018 to provide direction for CWD surveillance and management of mule deer and elk herds in response to the growing detection and prevalence of CWD across the state (CPW 2018). The plan established a schedule to monitor elk herds every 5 years for prevalence rates. In addition, if prevalence is determined to be at 5% or greater in the 2 year old and older adult male segment of the population, then management actions should be taken to reduce that prevalence to below the 5% benchmark. The primary recommendations to manage CWD prevalence in deer and elk herds are: 1) Reduce population and density, 2) Reduce male/female ratios, 3) Change age structure, 4) Maximize ability to remove diseased animals at the smallest scale possible (hot spot management), 5) Remove motivations that cause animals to congregate, 6) Minimize prion point sources, and 7) Incorporate CWD management actions and prevalence threshold into herd management plans.

The Northwest elk management plan objectives have been developed to reflect the recommendations from the CWD response plan and attempt to reduce prevalence rates to or below the 5% benchmark. In deer, the primary tool for CWD management at the herd level is to manage for lower buck:doe ratios as bucks carry CWD at approximately 2 times the rate of females. Elk prevalence to date, has been lower than rates found in deer populations and the male and female prevalence relationship has not been as significant. Managing for lower population densities can also help reduce the prevalence of CWD. When possible, license allocation will be directed to later seasons and locations to best address hot spots of higher

CWD prevalence. When harvest is sufficient and sustained, it can be a tool for attenuating CWD prevalence in adult male mule deer and possibly elk, especially early in the course of an epidemic (Miller et al. 2020,Conner et al. 2021). Increasing male harvest reduces male and overall deer abundance and density, male age structure, and the number of infected deer, all of which appear to reduce disease. Likewise, timing hunting seasons closer to the breeding season when mature males are more vulnerable to harvest is another strategy to reduce CWD prevalence (Miller et al. 2020,Conner et al. 2021).

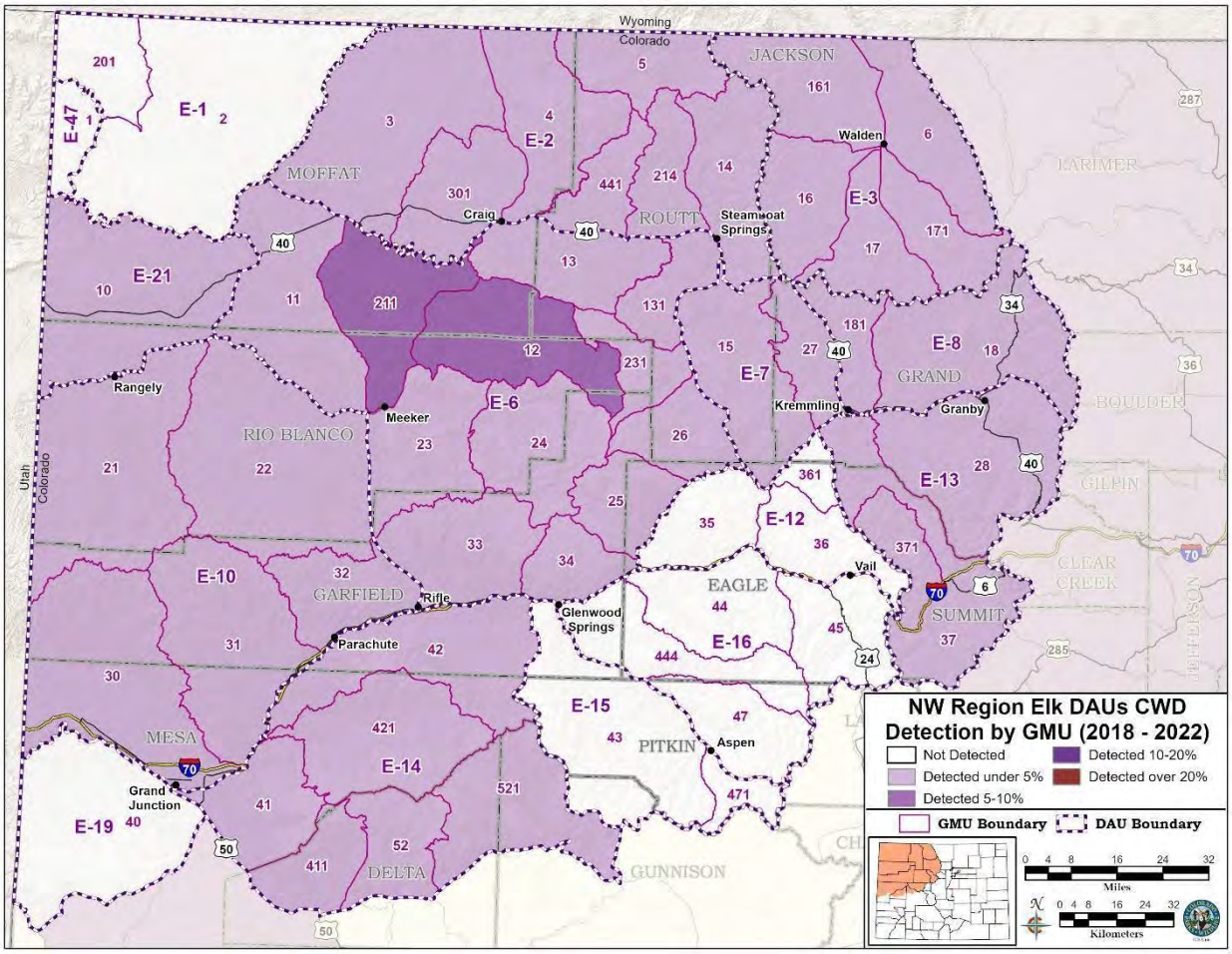


Figure 4. Chronic wasting disease detection rates in Northwest Region mule deer herds from mandatory testing efforts between 2017 and 2021.

Habitat Quality

Altering habitat quality and quantity through land use activities can have significant and long-term impacts (both positive and negative) on all big game habitats and populations (Johnson et al. 2016). Examples of habitat alteration include, but are not limited to, land use conversion from agriculture to residential, habitat type change by natural causes such as wildfires, habitat quality change as a result of domestic grazing practices, habitat fragmentation, and climate change. Human recreation and energy development, which are occurring at unprecedented levels in Colorado, are two examples of human uses on the landscape that increasingly overlap with, fragment, and negatively impact big game habitats. Elk, for example, preferentially use areas devoid of motorized activity and require large

blocks of non-motorized habitat for security (Rowland et al. 2000). Numerous studies also indicate elk avoid popular human recreation areas (Wisdom et al. 2018). This avoidance results in habitat compression. Human-induced disturbance can also reduce calf survival and recruitment (Phillips and Alldredge 2000, Shively et al. 2005). Additionally, elk may move to lower elevation private lands due to the excess recreation activity occurring in higher elevation public-land habitats. When planning new trails or trail improvements, federal land management agencies should consult the 2021 Trails with Wildlife in Mind Guide (Trails with Wildlife in Mind Task Force 2021) to aid in management decisions. Seasonal closures can also benefit elk and other wildlife in the winter months and during calving when they are most vulnerable.

Drought/Winter Weather Impacts

Weather and climate conditions also affect elk populations. Severe weather can manifest in the form of severe winter conditions or extreme drought, and these conditions can have both direct and indirect impacts on elk populations.

Until the winter of 2022-23 it was generally thought that elk were less impacted by severe winter conditions than smaller ungulates like deer and pronghorn. However, that winter showed elk can also be vulnerable to winter mortality when conditions are extreme. Persistent deep, crusted snow limited access to forage during this winter and resulted in significant winter mortality.

The impacts of extreme summer drought are less immediate. During periods of prolonged drought, the nutritional characteristics of forage are compromised and successional stages of the habitats change. These factors can lead to lower nutritional carrying capacity of the range. Figure 5, below illustrates the percent of the Upper Colorado Watershed that falls in the different drought index categories from the year 2000 to present. This watershed includes the entire Upper Colorado River Drainage, which covers the western slope of Colorado, southwest Wyoming, Utah, and small parts of New Mexico and Arizona. The graph is similar to graphs for higher level watersheds in Colorado.

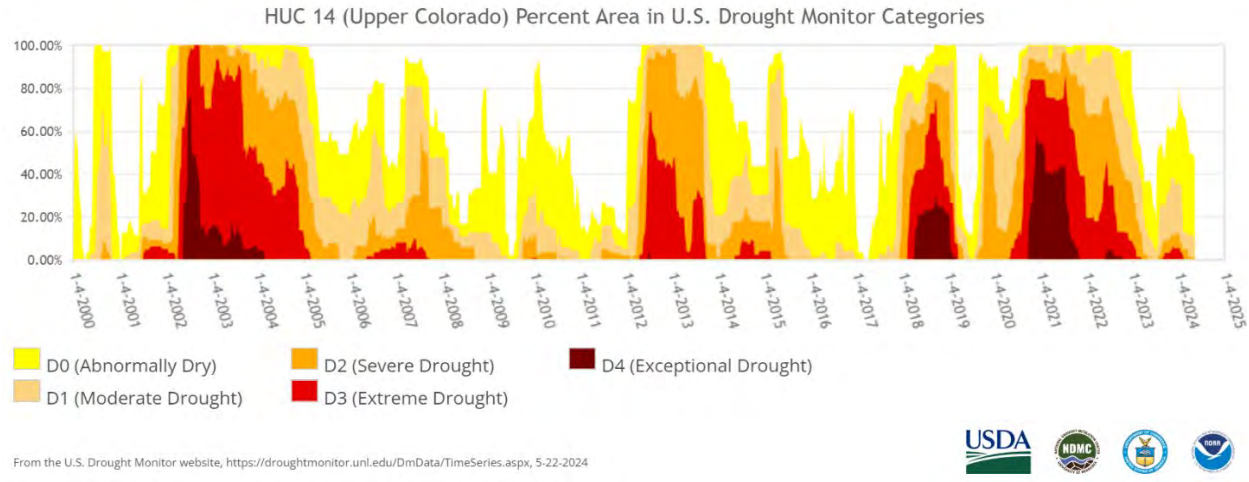


Figure 5. Times series drought monitoring graphing depicting the percentage of the watershed in different drought categories from the year 2000 to present. (https://droughtmonitor.unl.edu/)

Habitat Quantity

Preserving landscapes that elk rely on for habitat, and facilitating safe passage along migration and movement routes both within and between seasonal ranges, are priorities for wildlife and land managers in Colorado as well as other western states. CPW relies heavily on federal land management agencies as well as private property owners to conserve and enhance habitats for elk and other wildlife species. In 2017 and 2018, several secretarial orders issued by the U.S. Department of Interior (DOI) directed federal land managers to work with states to protect big game species and their habitat within the region. Secretarial Order (SO) 3356: Hunting, Fishing, Recreational Shooting, and Wildlife Conservation Opportunities and Coordination with States, Tribes, and Territories, and SO 3362: Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors, respectively, provided direction to federal land managers for improving access to lands for recreational activities, particularly hunting and fishing. SO 3362 also directed DOI agencies to improve habitat quality to ensure the long-term viability of big game and other wildlife populations, particularly migration corridors and sensitive winter ranges for elk, deer, and pronghorn. A variety of solutions are being considered at all levels of government and by private sector stakeholders to better protect big game winter ranges, and migration and movement routes. These policies aim to foster collaboration, expand data collection and research, incentivize participation in habitat connectivity programs, and implement targeted infrastructure solutions.

Oil and Gas Development

Extraction of oil and gas has the potential to affect elk populations directly through habitat loss from pad, road, and pipeline development and associated spread of noxious weeds, or indirectly from the increased human presence at pads and use of roads. Oil and gas development activity in NW Colorado has remained at relatively low levels over the past decade compared to the high volume of activity experienced between 2006 and 2010. Recent market conditions and commodity price increases have resulted in slight upticks in the number of permits being submitted; however, active drilling rig counts have not increased significantly. The figure below (Fig. 6) depicts the number of wells drilled annually in the Northwest Region from the year 2000 to 2022.

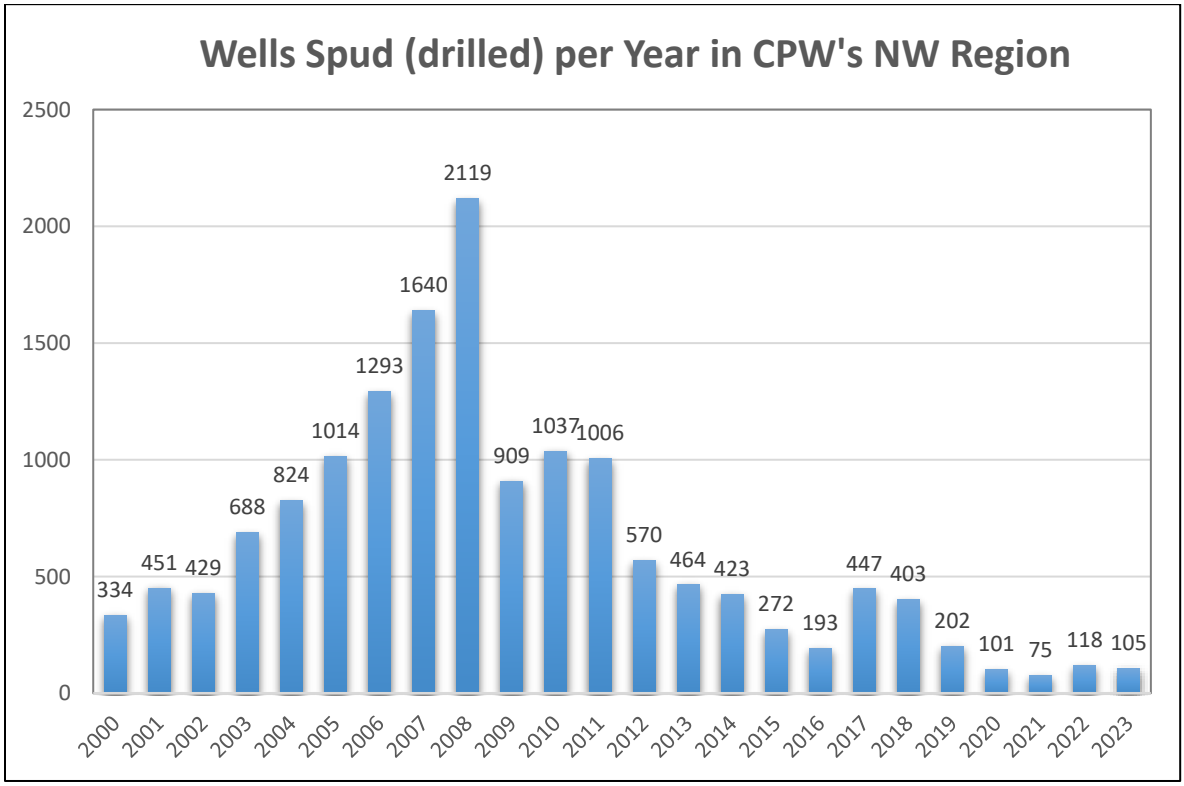


Figure 6. Wells drilled annual in northwest Colorado counties from 2000-September 2023.

Colorado's recently enacted (January 2021) Senate Bill 19-181 (SB-181) oil and gas regulations contain new provisions and requirements for the protection of wildlife resources during oil and gas development. In particular, the new regulations contain measures to: reduce noise and light impacts, require compensatory mitigation to offset direct and indirect impacts to big game high priority habitats (HPH), limit the density of oil and gas development within big game seasonal ranges, and analyze alternative development locations to minimize adverse impacts. Figure 7, illustrates where active wells overlap with mule deer HPH layers. These new regulations result in significantly greater wildlife protections compared to the State's previous House Bill 1298 oil and gas regulations, and expand CPW's involvement and consultative role during the Colorado Oil and Gas Conservation Commission (COGCC) permitting process.

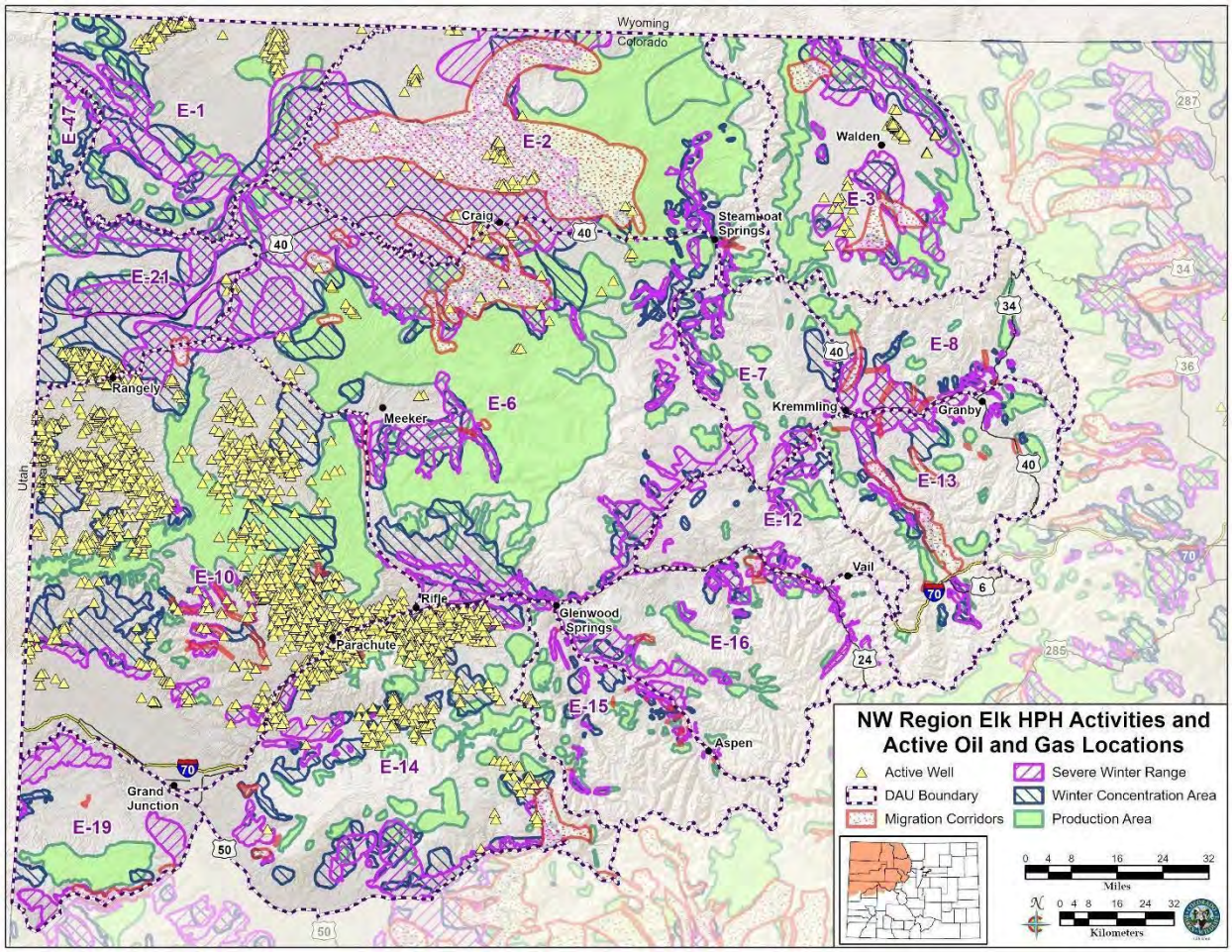


Figure 7. Map of deer DAUs in northwest Colorado overlaid with high priority habitat (HPH) layers and active oil and gas wells.

Renewable Energy

Proposed renewable energy projects have increased significantly in the past several years, with a focus on utility-scale photovoltaic (PV) solar projects in Western Colorado. CPW's Northwest Region has consulted on approximately six proposed solar projects that are greater than 1,000 acres in size during calendar years 2021 and 2022. Of particular concern for big game species, the National Electric Code (NEC) requires that solar energy facilities be fenced for security purposes. This exclusionary fencing requirement results in a complete loss of habitat for big game, and oftentimes creates a significant barrier to daily and/or seasonal movement patterns.

When siting locations for utility-scale solar projects, developers typically seek areas close to existing electrical transmission lines and substations, flat topography, southern exposures, and limited forest canopy cover. Frequently, these landscape characteristics are also representative of high-quality winter range areas for big game in Western Colorado. Additionally, to avoid lengthy federal permitting processes, most of these proposed projects have been located on privately owned lands with 20-30 year lease agreements.

Urban/Residential Development

Over the past 50+ years, private lands in large portions of Northwest Colorado have transformed from undeveloped or rural/agricultural landscapes into increasingly suburban and even urban areas, dominated by residential and commercial developments and fragmented by roads, highways, and recreational trail networks. These private lands typically lie at lower elevations, coinciding with big game winter ranges. The human population in Northwest Colorado has grown consistently since the 1960s, with marked increases in the 1970s and 1990s-2000s (Fig. 8). In the 1970s and 1980s, the growth of the ski industry in Aspen and Vail, and later in Steamboat Springs and Granby, brought an influx of visitors and new residents into these areas, facilitated by the construction of Interstate-70 starting in the late 1960s through the 1990s.

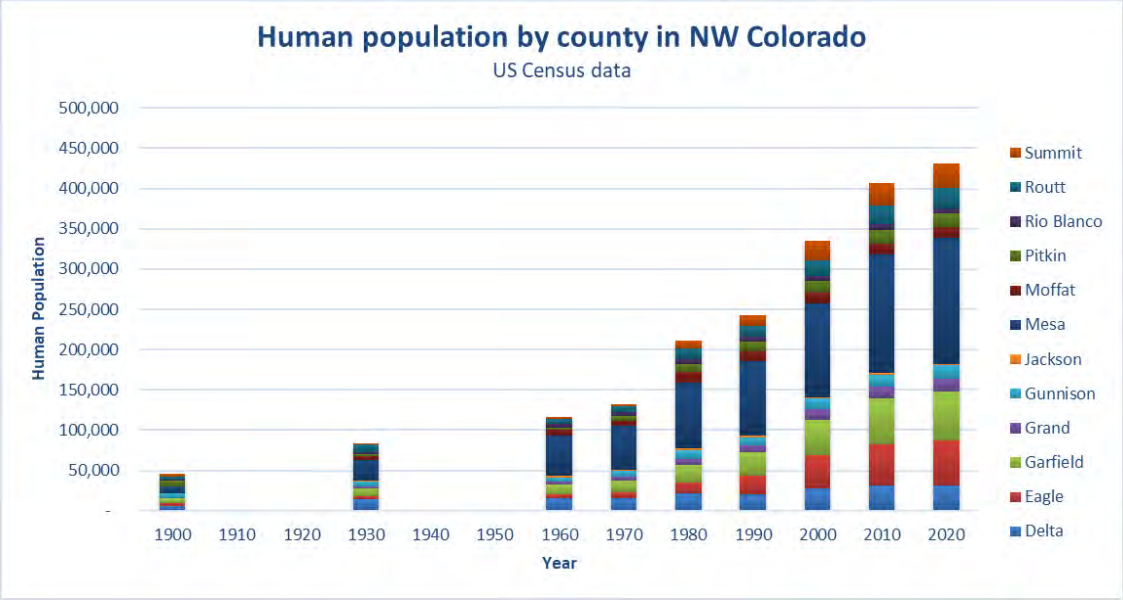
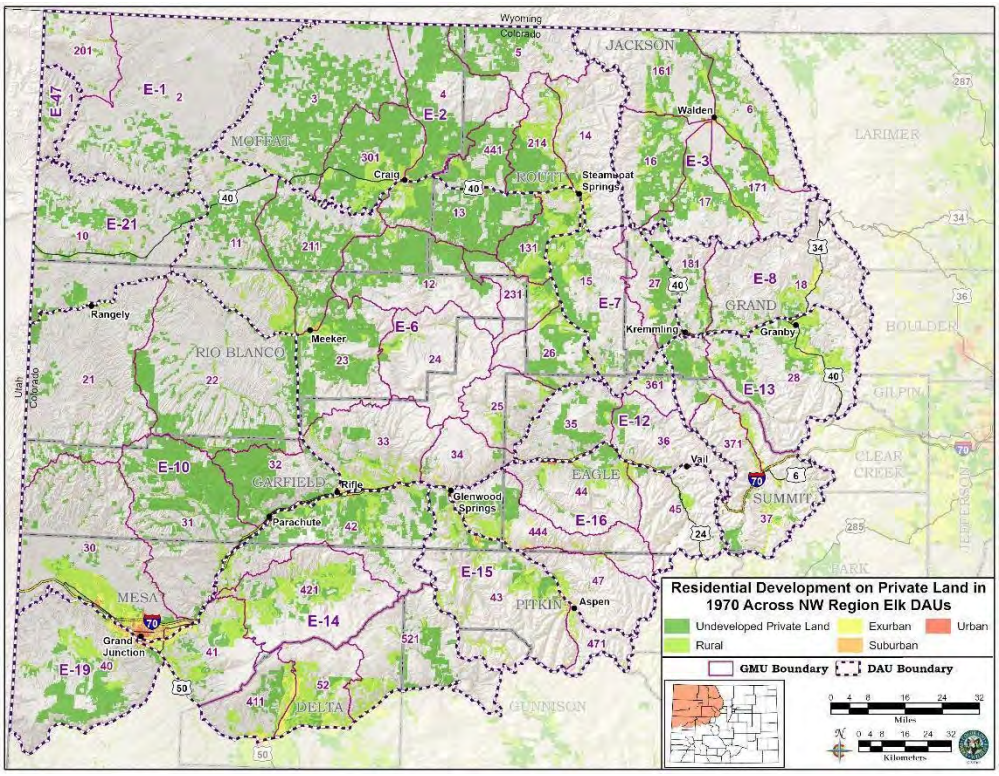


Figure 8. Human population from 1900-2020 based on US Census data in counties overlapping CPW's Northwest Region.

Construction and real estate development are now among the major industries in Northwest Colorado, especially along the Interstate-70 and State Highway 40 corridors. In 1970, 13,242 km^2 (74%) of private lands on mule deer overall range and 7,274 km^2 (77%) of mule deer winter range in Northwest Colorado were considered undeveloped (0 housing units/km^2). By 2020, almost 30% of undeveloped private land was converted, leaving only 9,492 km^2 (53%) of mule deer overall range and 5,146 km^2 (54%) of mule deer winter range left as undeveloped. Increasing residential housing development has been shown to correlate with declining mule deer recruitment rates (Johnson et al. 2016). Figures 9a-f, illustrate the changes in residential development overlaid within elk DAU's in NW Colorado.

a.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SUMMIT
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Walden
Craig
Steamboat Springs
Rangely
Meeker
Kremmling
Granby
Vail
Rifle
Glenwood Springs
Parachute
Aspen
Grand Junction
Residential Development on Private Land in 1970 Across NW Region Elk DAUs
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Suburban
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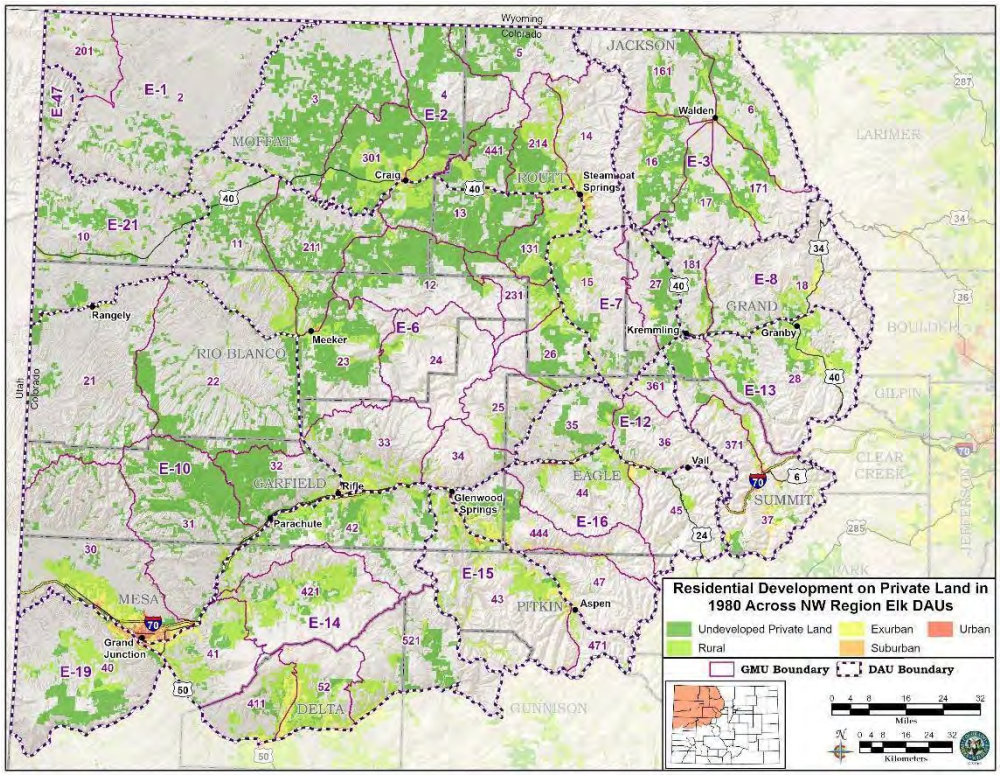
Wyoming
Colorado
Utah
Colorado
JACKSON
MOFFAT
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LARIMER
BOULDER
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PARK
SUMMIT
EAGLE
PITKIN
GARFIELD
RIO BLANCO
MESA
DELTA
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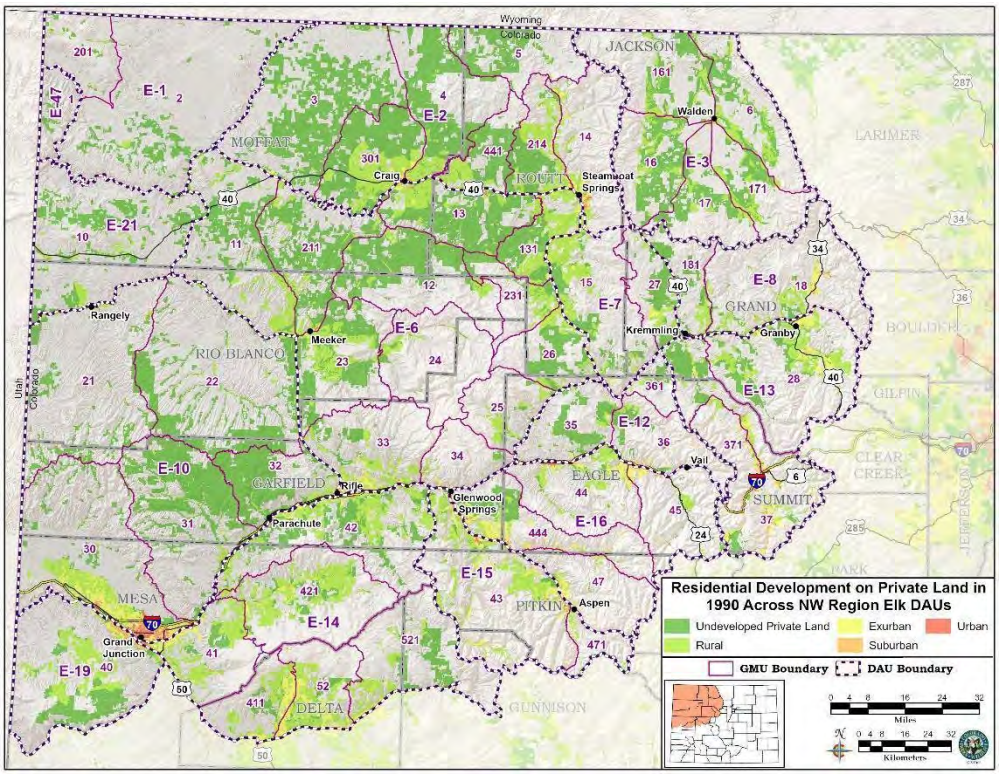
E-21
E-47
Walden
Craig
Steamboat Springs
Rangely
Meeker
Kremmling
Granby
Vail
Rifle
Glenwood Springs
Parachute
Aspen
Grand Junction
Residential Development on Private Land in 1980 Across NW Region Elk DAUs
Undeveloped Private Land
Exurban
Urban
Rural
Suburban
GMU Boundary
DAU Boundary
Miles
Kilometers

c.


Residential Development on Private Land in 1990 Across NW Region Elk DAUs
Undeveloped Private Land
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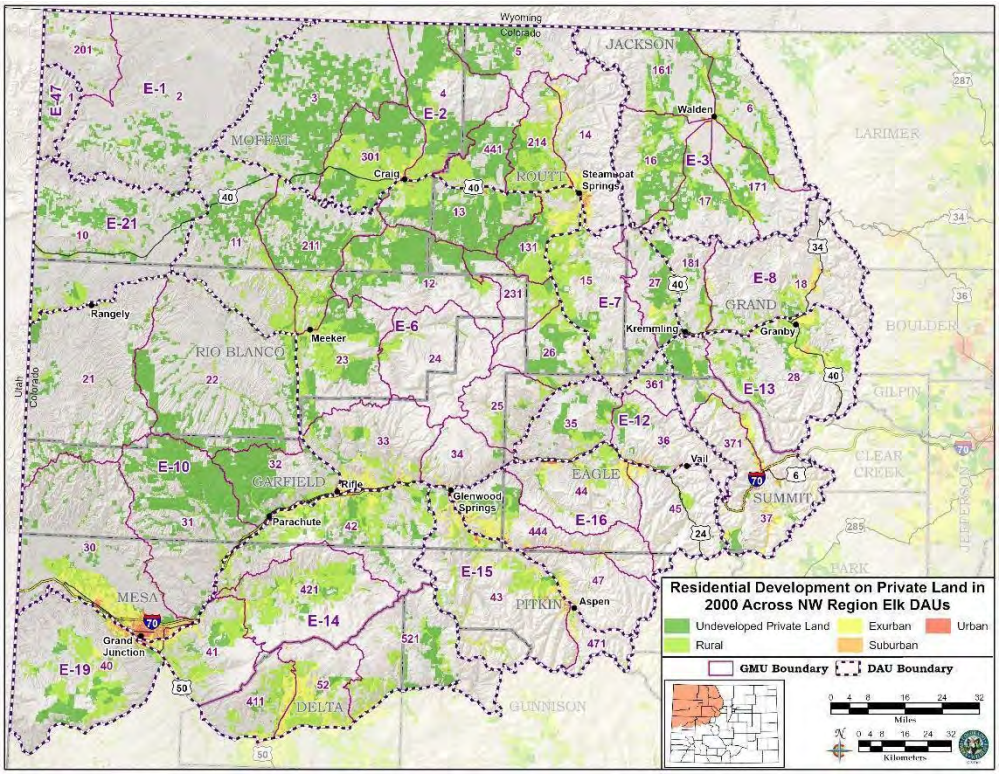
d.


Residential Development on Private Land in 2000 Across NW Region Elk DAUs
Undeveloped Private Land
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Urban
Rural
Suburban
GMU Boundary
DAU Boundary
Miles
Kilometers
Wyoming
Colorado
Utah
JACKSON
MOFFAT
ROUTT
LARIMER
RIO BLANCO
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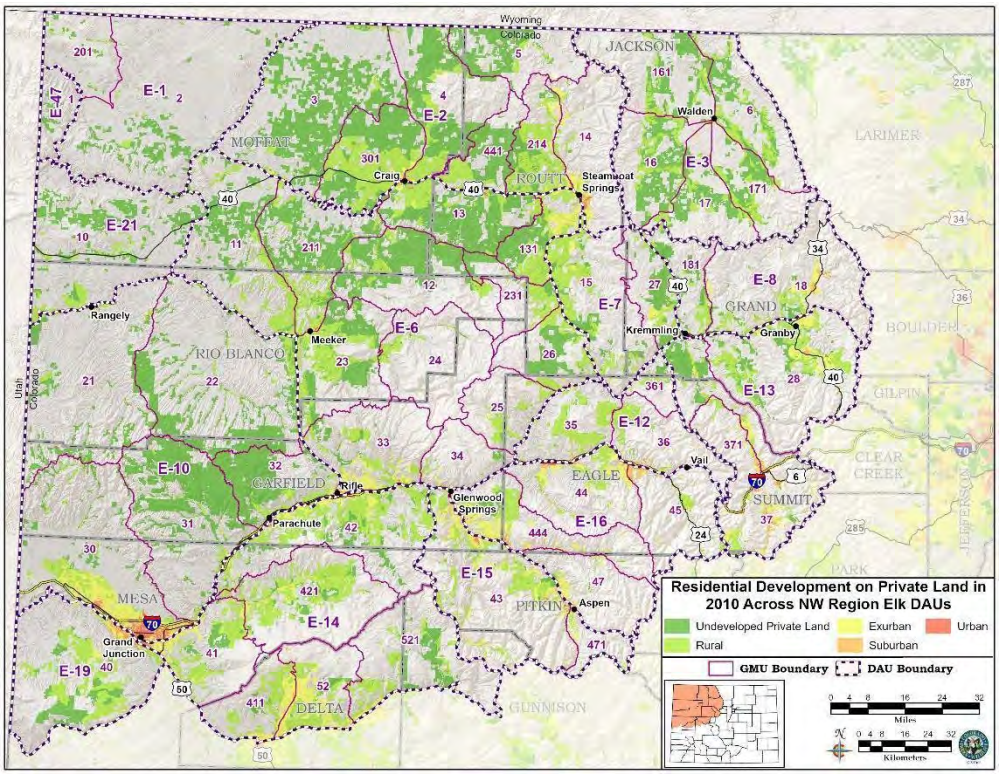

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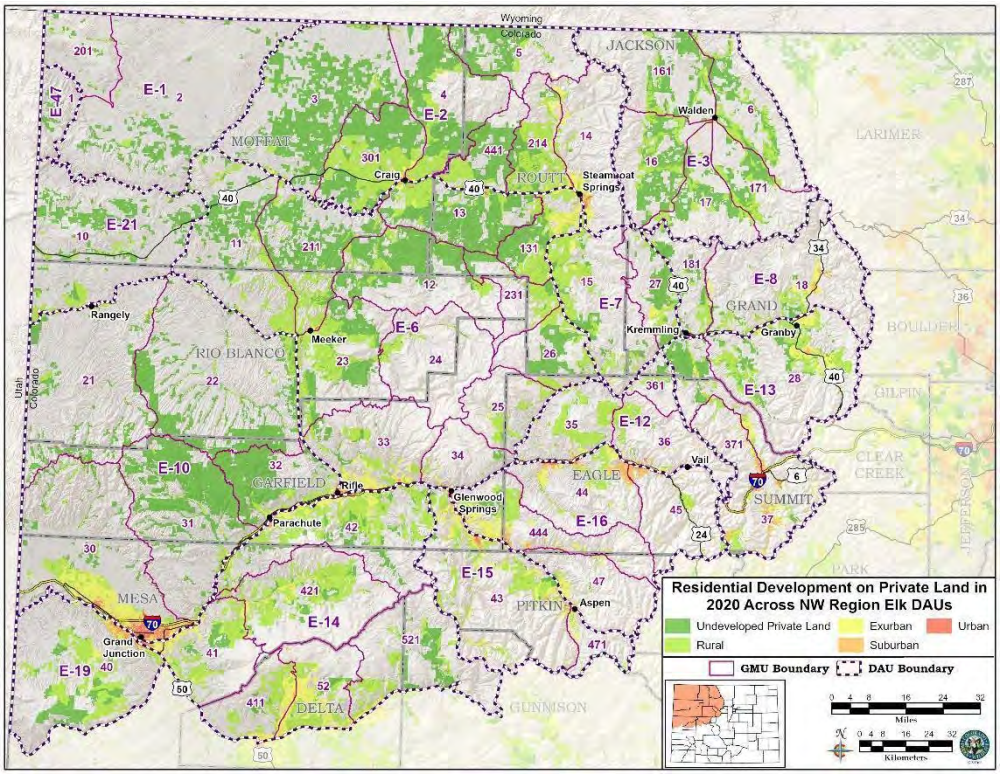


Figure 9(a-f). Maps of housing densities on private lands in Northwest Colorado from 1970-2020. Undeveloped = 0 housing units/km^2, Rural = <3 units/km^2, Exurban = 3-59 units/km^2, Suburban = 60-500 units/km^2, Urban = >500 units/km^2 based on Shushinky et al. 2014.

Along with the growth of the human residential population has come higher vehicle traffic on roadways, leading to more roadkill of wildlife. Beyond the immediate footprint of habitat loss through land development, there are also larger-scale, indirect effects on the landscape: ever-increasing demand for outdoor recreational access has led to development of trail systems, campgrounds, and access roads, and therefore more human activity on both private lands and surrounding public lands.

Converting rural and agricultural lands that once functioned as wildlife habitat amounts to effectively a permanent loss of habitat. Real estate values have increased exorbitantly, so the financial incentive for ranch owners to subdivide and sell their properties has been immense. The cost to deer and other wildlife is the likely irreversible loss of habitat and therefore decreased carrying capacity across the landscape for many wildlife species.

Conservation of private lands should be a priority in order to protect and maintain connectivity of the remaining undeveloped lands for wildlife use. The Colorado Wildlife Habitat Program (“Habitat Stamp”) and Great Outdoors Colorado (GOCO), as well as federal programs and non-governmental organizations such as land trusts, provide funding and mechanisms to help private landowners set up conservation easements. The challenge, however, is that conservation easement efforts must compete with the extremely high real estate prices in the region.

Free-roaming Horses

The Bureau of Land Management manages over 82,000 feral horses and burros on 42,300 acres across 10 Western states, including Colorado. The Wild Horse and Burro Program's goal is to manage healthy feral horses and burros on healthy public rangelands. Areas that are managed for feral horses are designated as Horse Management Areas (HMAs). Areas with free-roaming horses and burros but not managed for them are designated as Horse Areas (HAs). The BLM determines the Appropriate Management Level (AML), or the number of feral horses the habitat can support with on a given HMA. Since HAs are not managed for feral horses and burros, and they are not intended to be present on these lands, AMLs are not designated for these areas.

The BLM in Colorado manages four wild horse herd management areas on 424,505 acres with an additional five Horse Areas where horses are not managed ranging 426,770 acres (USDI Bureau of Land Management 2023) (Fig. 10). These areas cover critical deer habitat, specifically winter ranges. As of September 2023, combined populations in Colorado were estimated at 1,527 horses which is 185% of the with the appropriate management level for all HMAs in the state set at 827 animals.

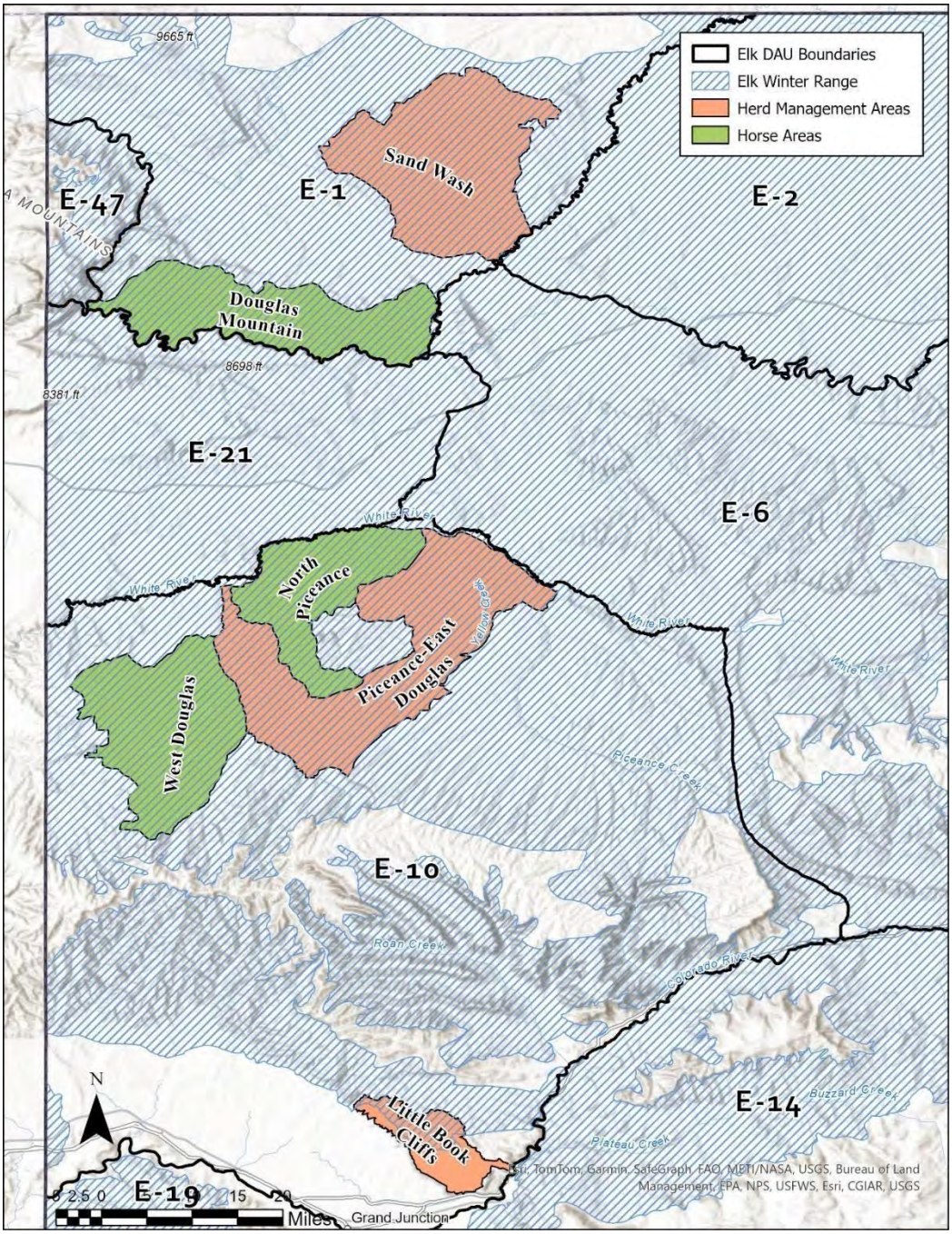


Figure 10. Map of all Herd Management Areas (HMAs) and Horse Areas (HAs) in Colorado with elk DAUs and winter ranges.

As part of their management strategy, BLM gathers horses from HMAs that exceed appropriate management levels and allow adoption to the public (Table 4). Some HAs have also had gathers in recent years. The West Douglas Creek HA horses were gathered in 2021. The BLM gathered 451 horses there, when they expected the population to be about that number. Their goal was to remove horses from that HA. The HMAs have also seen some gathering projects in recent years (Table 4).

Table 4. Statistics on Herd Management Areas (HMAs) in Colorado as of September 2023(BLM). *Spring Creek Basin HMA is located in the Southwest Region.

Herd Management Area Name	Affected Elk DAUs	Total Acres	High Horse AML	2023 Estimated Horse Population	% of AML	Year of Last Gather	Horses Removed
Little Book Cliffs Wild Horse Range	E10	52,634	150	192	117%	2018	96
Piceance-East Douglas Creek	E10	160,841	235	759	323%	2022	867
Sand Wash Basin	E1	156,502	362	375	104%	2021	10
Spring Creek Basin*	E10	54,528	80	76	Within AML	2019	166
Totals		424,505	827	1402			1813

Negative impacts from free-roaming horses to wildlife and wildlife habitat include spatial, water source, and forage competition, and habitat degradation (Hall et al. 2016, Boyd et al. 2017, Danvir 2018). The areas used by horses overlap with elk winter range, winter concentration areas, and severe winter range (Fig. 10). These areas are critical to the sustainability and resilience of elk herds and the high levels of non-designated horse use contribute directly to habitat degradation. Free-roaming horses degrade sagebrush habitats and riparian areas and can impact the amount of forage available to elk and other grazing ungulates (Baur 2016).

Management of free-roaming 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.

Recreation

The ecological impacts on elk from recreation are well documented in the literature (Trombulak et al 2000, Hebblewhite 2008). Elk preferentially use areas devoid of motorized activity and require large blocks of non-motorized habitat for security (Rowland et al. 2000). Numerous studies also indicate elk avoid popular human recreation areas; contrary to popular opinion, elk generally do not habituate to hiking or mountain biking. This avoidance results in habitat compression and loss of functional habitat. Due to avoidance of human activities and increased vigilance associated with roads and trail based recreation (both motorized and non-motorized), elk increase their daily activity levels and movements which reduces the time spent feeding or resting (Edge 1982, Wisdom 2004, Naylor et al. 2009, Rogala et al. 2011, Cuiti et al. 2012, Preisler et al. 2013, and Wisdom et al. 2018). This increased energy expenditure, decreased forage intake, and displacement to areas with poorer quality forage results in a decrease in body condition, which affects individual health, survival and reproduction (Bender et al. 2008, Johnson et al. 2014). Human-induced disturbance can also reduce calf survival and recruitment (Phillips and Alldredge 2000, Shively et al. 2005). Additionally, elk may shift to lower-elevation private-lands due to the intensive recreation activity occurring in higher-elevation public-land habitats, potentially creating game damage conflicts.

Research has demonstrated strong avoidance of human recreational activity by elk, with *minimum* separation (avoidance) distances between trail users and elk of approximately 560-880 meters, and elk flight distances ranging from 500 meters to 1.5 km when startled by recreationists (Wisdom et al. 2018). Route density is an important consideration to maintain habitat effectiveness, migration permeability, and use, as habitat is directly lost from the conversion of infrastructure (roads, trails, trailheads, parking, etc.) and additionally through behavioral avoidance (Sawyer et al. 2017). When route densities increase to the point that elk avoidance zones overlap or intersect with one another, habitat effectiveness is severely reduced or eliminated over substantial areas and this cumulative effect can result in barriers to both daily and seasonal movements. A recent analysis (Theodore Roosevelt Conservation Partnership 2022) indicates that 40% of the most critical elk habitats in Colorado are already affected by recreational trail use. Figure 11, illustrates the densities of roads and trails across northwest Colorado.

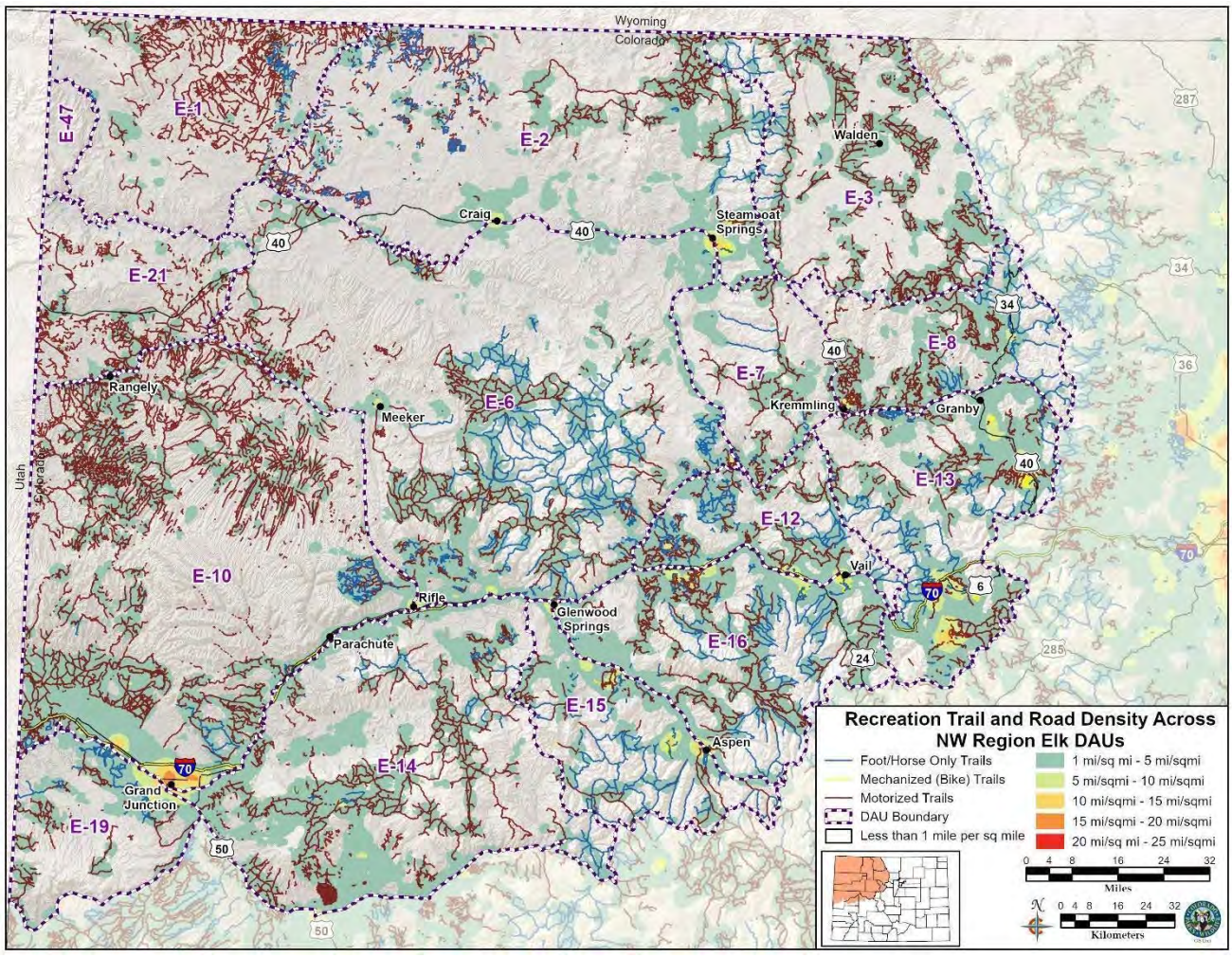


Figure 11. Recreation trail and road density across northwest Colorado.

To ensure that essential habitats remain connected and usable for elk and other big game animals, CPW recommends that land management agencies and trail organizations should consult the 2021 Trails with Wildlife in Mind Guide (Trails with Wildlife in Mind Task Force

2021) to avoid and minimize impacts to local elk populations when planning new trails, re-routes or improvements. Strategies include avoidance of the highest-priority elk habitats including production areas and critical winter habitats, limiting density of motorized and non-motorized roads and trails in elk habitat, and implementing seasonal closures in areas that overlap elk habitats, particularly during the winter and during spring calving when the young are most vulnerable. Strategic seasonal closures of motorized routes should be considered during annual hunting seasons to promote big game use of, and fidelity to, public lands where they are available for harvest.

Predation

Elk are prey animals for the mid to large-sized predators of western North America. In Colorado, the primary predators of elk have been mountain lions and black bears over the last century. Following the passing of Proposition 114 and natural immigration, Colorado also has wolves on the west slope. Predators may limit or regulate elk populations, primarily through calf recruitment. All predators are opportunistic and will take advantage of individual prey that provide the easiest opportunity for a meal. Black bears and coyotes predate primarily on young-of-the-year during spring and mountain lions will prey on all sex/age classes of elk. Numerous studies across the United States and Canada have attempted to determine effects of wolf predation on elk populations, but have found it a difficult factor to isolate. There is no way to know how wolves will affect elk population dynamics in the long term and in what way. There are likely to be different effects on different elk herds across the state. Impacts to elk could be both directly mortality or through shifts in distribution to refuges safer from wolves.

Elk are the primary prey species of wolves in many Rocky Mountain wolf populations. In Yellowstone National Park, where wolf predation has been studied extensively, about 90% of detected wolf kills were identified as elk predation even with mule deer, moose and bison plentiful on the landscape (Hebblewhite 2010, Peterson 2014). Wolves in a couple of North American populations have been shown to select for calves, old cow elk and any elk that are ill or struggling to maintain high nutritional health (Mech 2005). Additionally, elk may use their habitat differently with wolves present, selecting for more cover or traveling in smaller groups to avoid detection by wolves (Ripple 2004, Creel 2005).

The influence of predators on elk populations is variable and based on several factors:

- The relationship of the elk population to the amount and quality of forage on seasonal ranges,
- The presence and location of hiding and stalking cover relative to feeding and resting areas,
- Abundance and distribution of alternate prey populations, and
- Number, abundance, and distribution of predator species that inhabit the elk range.

Fencing

Highway fencing is becoming more of an issue to ungulates. While highway fencing can help with reducing vehicle collisions with deer and elk, the fencing can also inhibit elk and mule deer migration corridors and access to important seasonal habitats. Under-passes and overpasses can help mule deer move over or under highways to access important seasonal habitats, while still minimizing vehicle collisions.

While supporting large and diverse wildlife populations, the region is also important agriculturally and supports numerous cattle and domestic sheep operations. As such, hundreds of miles of wire fence crisscross the landscape, allowing for a sustainable livestock industry which can effectively manage grazing, but also posing a hazard to wildlife. In the only published study on fence-related ungulate mortality, Harrington and Conover (2006) conducted research in northwest Colorado and northeast Utah and documented one ungulate (elk, deer, or pronghorn) mortality for every 4 km (2.5 miles) of fence. Multiplied out across this vast landscape, potential fence-related ungulate mortality becomes staggering. Fences can also have sub-lethal effects on big game species by causing injury or hair loss during crossing efforts, separating calves/fawns from adults where crossings are difficult, inhibiting seasonal migration activities, and increasing the energetic costs of moving through the landscape. Several recent published studies (e.g. Jones et al. 2019, Segar and Keane 2020) have addressed and highlighted the magnitude of potential sub-lethal effects of wire fences on ungulates inhabiting rangelands in the American West. While fences provide necessary infrastructure to manage grazing effectively, which ultimately supports quality wildlife habitat, numerous miles of old abandoned and obsolete fences that no longer serve a management purpose currently exist in northwest Colorado.

Calf Recruitment

Survival of newborn calves into the yearling age-class is a key factor of population growth. All the elk management issues discussed previously can play a factor in calf survival. While predation may limit calf survival, hiding cover and disturbance can indirectly affect the ability of a calf to avoid predators. Figure 13, illustrates the 5-year average observed calf/cow ratios for the NW elk herds. Generally, calf recruitment in NW Colorado is faring better than elk herds to the south, however, we are seeing some trends in declining ratios across most elk herds with some herds seeing a significant decrease in ratios.

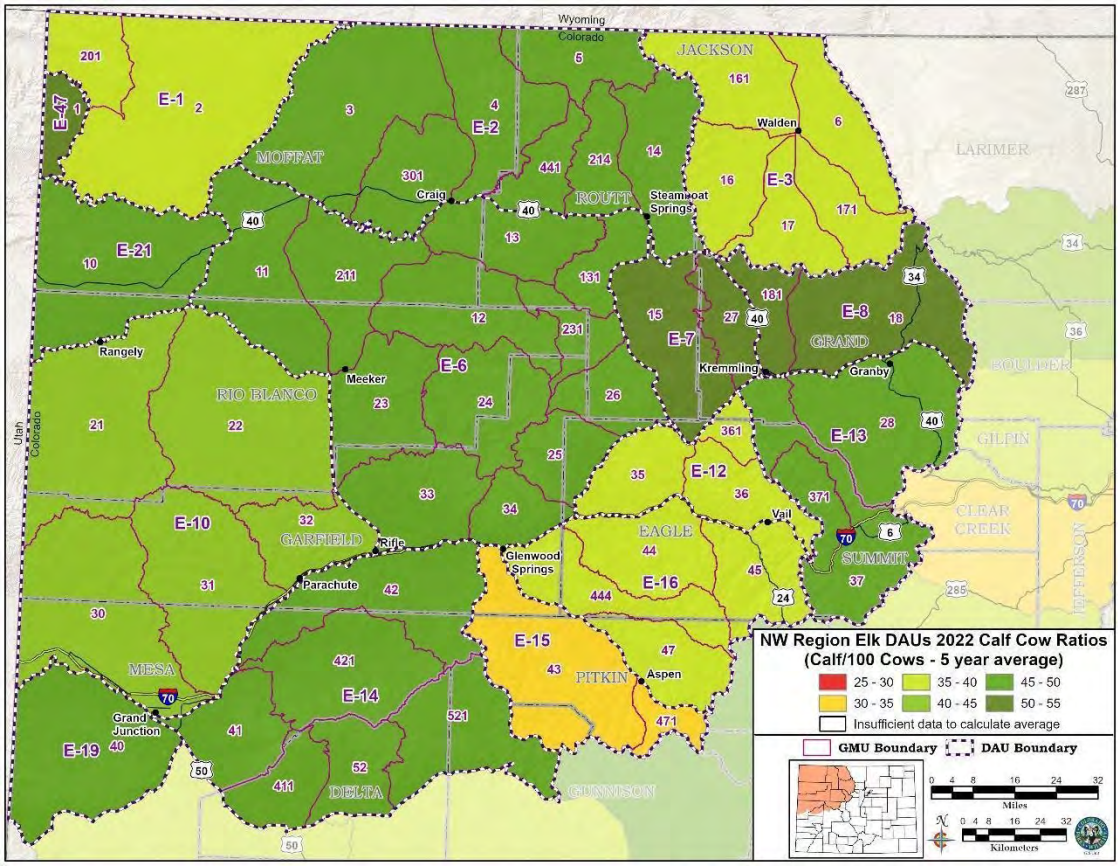


Figure 13: Map depicting the 5-year average calf:cow ratios for each elk herd in the NW Region.

Elk Herd Management Plans for Northwest Colorado

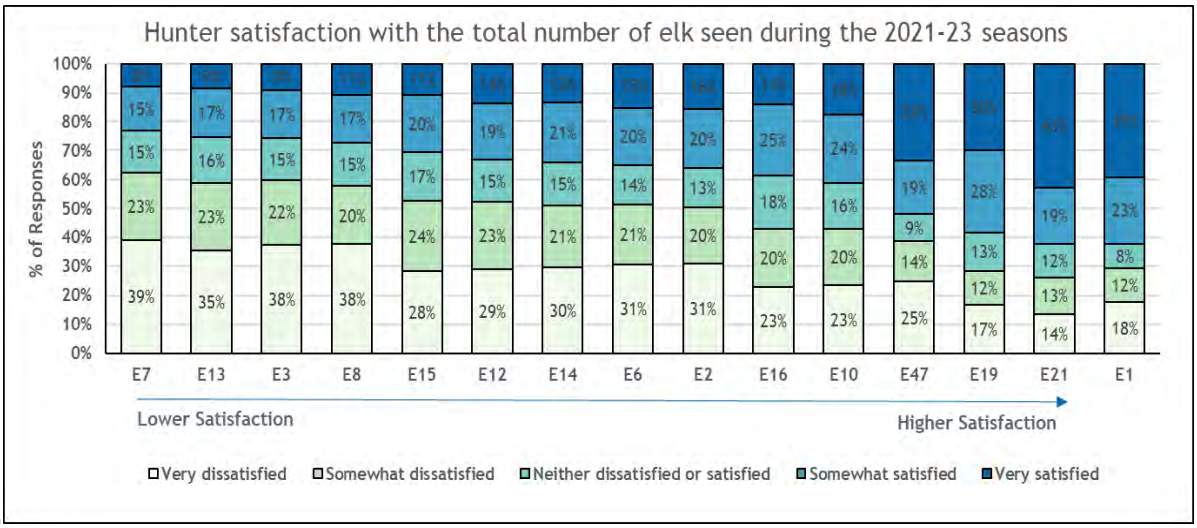
Public Input

There are 15 elk DAUs in northwest Colorado. The following section comprises the 15 individual elk HMPs with proposed objectives and justification. Two of the fifteen elk herd management plans have been approved since 2020 and will be extending those objectives as status quo. The other thirteen HMPs have proposed population and sex ratio objectives. Public meetings have been held in Grand Junction, Gypsum, Hayden, Hot Sulphur, Kremmling, Meeker, Roaring Fork and Walden to collect input on the status of local elk populations, management concerns, and provide direction for future management.

In addition to the public meetings, CPW staff have reviewed new optional hunter harvest attitude survey data to capture input from hunters on their experience averaged across the 2021-2023 hunting seasons. Of the 197,625 limited elk license holders and additional over-the-counter license holders who reported hunting in northwest Colorado during the 2021, 2022, and 2023 seasons, 71,815 hunters opted in for the additional hunter harvest attitude survey. The seven graphs below depict the hunters' responses to seven questions relating to their hunting experience and observations in the 15 different DAUs in northwest Colorado (Fig.13). The DAUs in each graph are ranked from least satisfied to most satisfied.

The draft plan will be posted for 30 days for the public to provide additional comments on the proposed objectives for each DAU from late May to late June 2024. The plan has been presented to county commissioners, Habitat Partnership Program (HPP) committees and federal agencies for additional input. The final draft plan will be presented to the Colorado Parks and Wildlife Commission this summer with a tentative plan to present the first time in July and for approval in August.

a.



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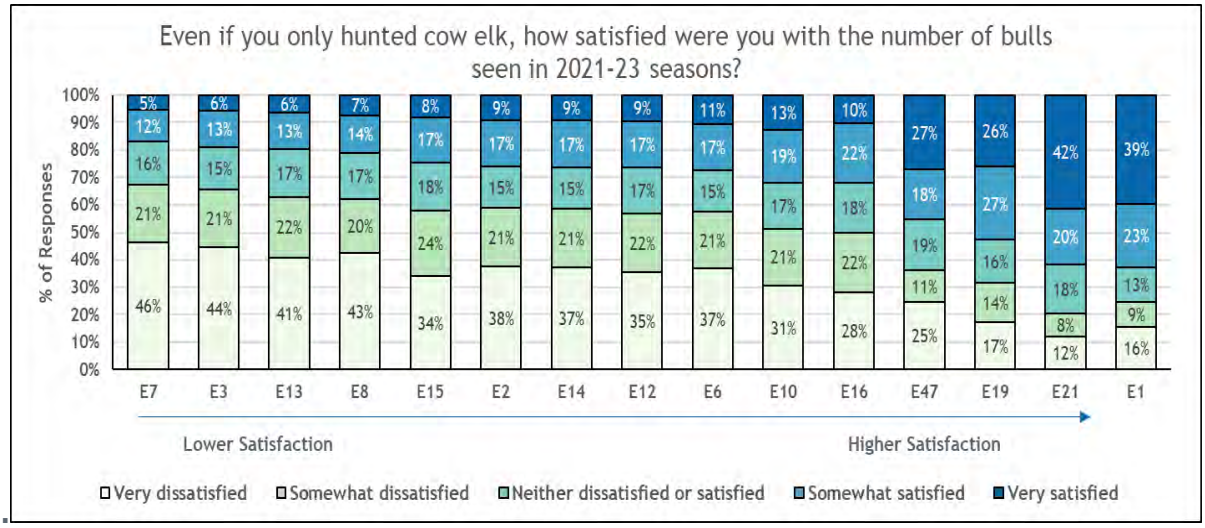
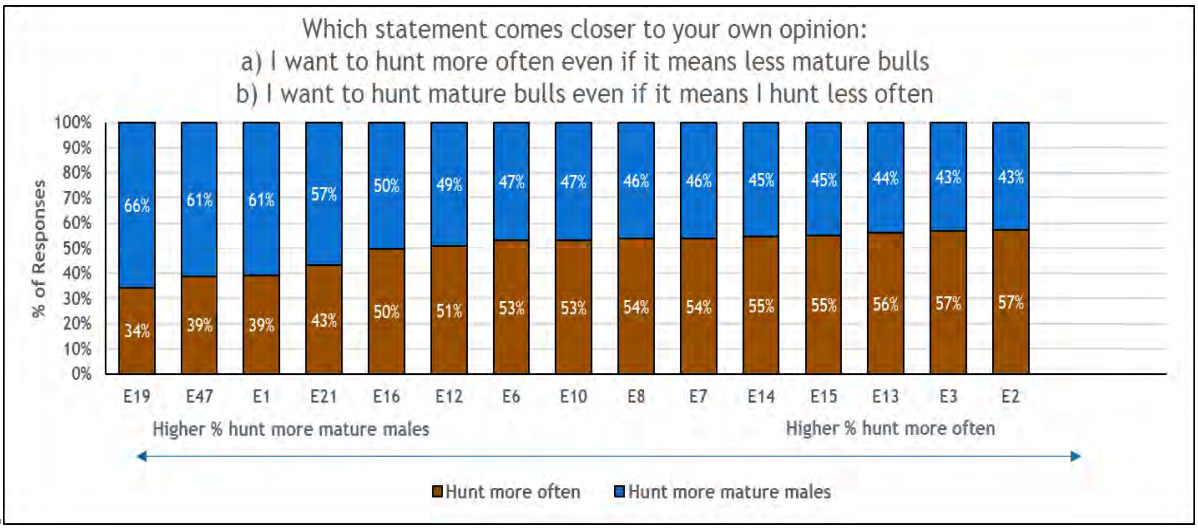
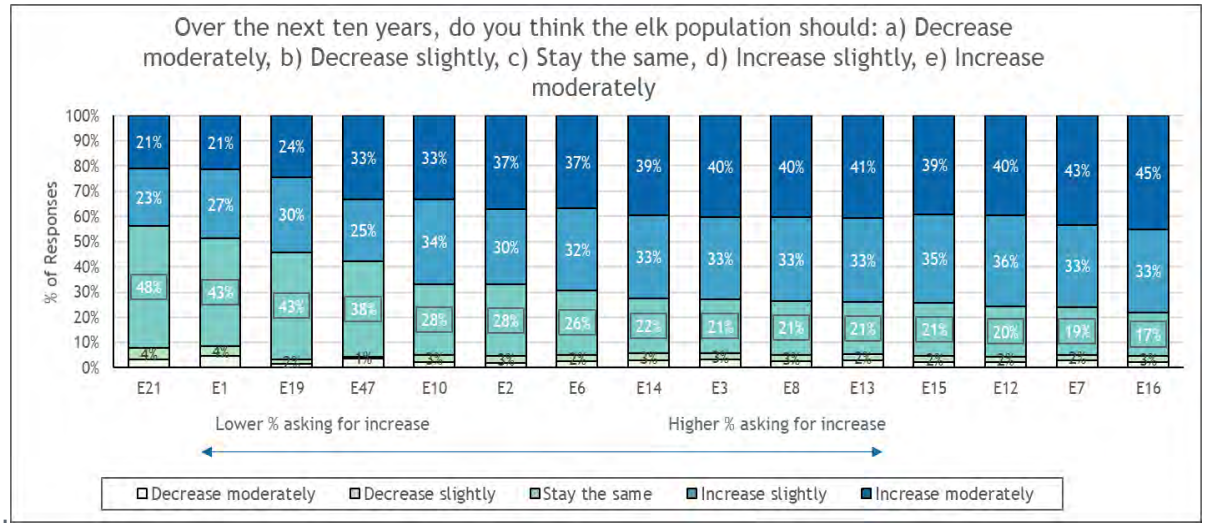

Even if you only hunted cow elk, how satisfied were you with the number of bulls seen in 2021-23 seasons?
% of Responses
E7 E3 E13 E8 E15 E2 E14 E12 E6 E10 E16 E47 E19 E21 E1
Lower Satisfaction
Higher Satisfaction
Very dissatisfied
Somewhat dissatisfied
Neither dissatisfied or satisfied
Somewhat satisfied
Very satisfied

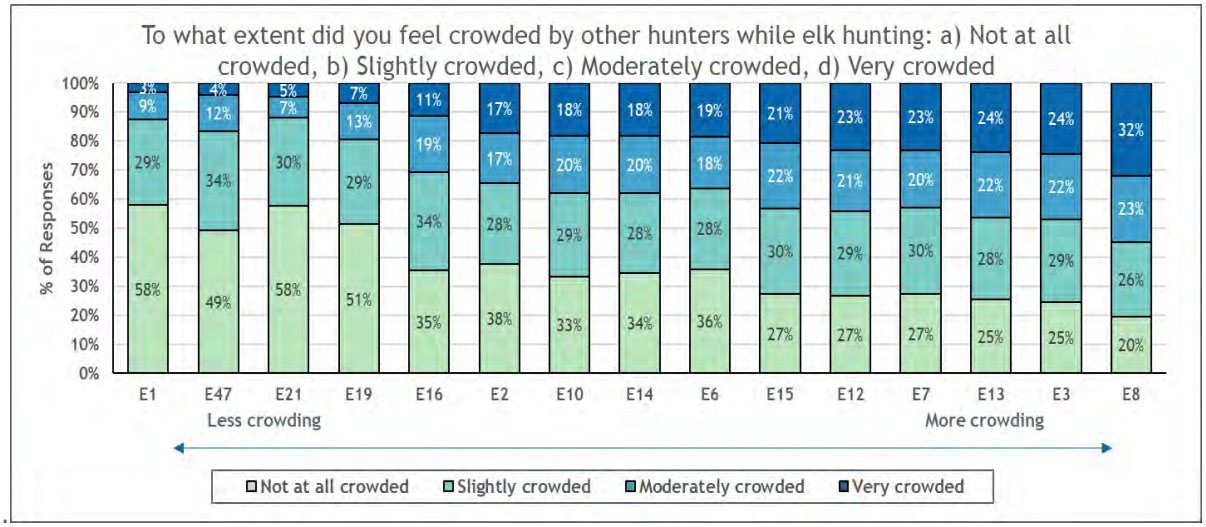
c.


Which statement comes closer to your own opinion:
a) I want to hunt more often even if it means less mature bulls
b) I want to hunt mature bulls even if it means I hunt less often
% of Responses
E19 E47 E1 E21 E16 E12 E6 E10 E8 E7 E14 E15 E13 E3 E2
Higher % hunt more mature males
Higher % hunt more often
Hunt more often
Hunt more mature males

d.


Over the next ten years, do you think the elk population should: a) Decrease moderately, b) Decrease slightly, c) Stay the same, d) Increase slightly, e) Increase moderately
% of Responses
E21 E1 E19 E47 E10 E2 E6 E14 E3 E8 E13 E15 E12 E7 E16
Lower % asking for increase
Higher % asking for increase
Decrease moderately
Decrease slightly
Stay the same
Increase slightly
Increase moderately

e.



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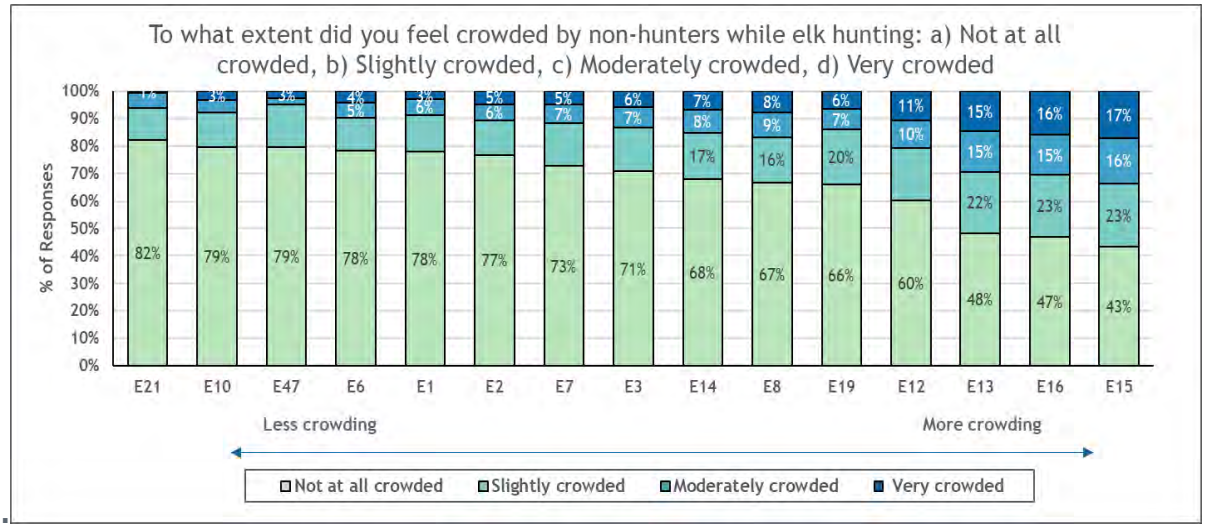

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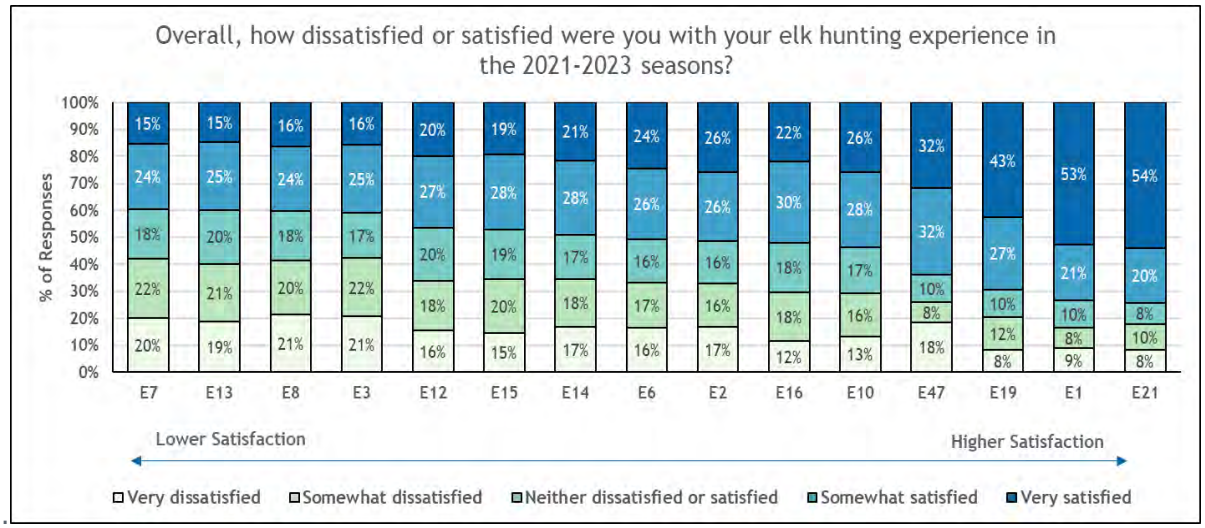


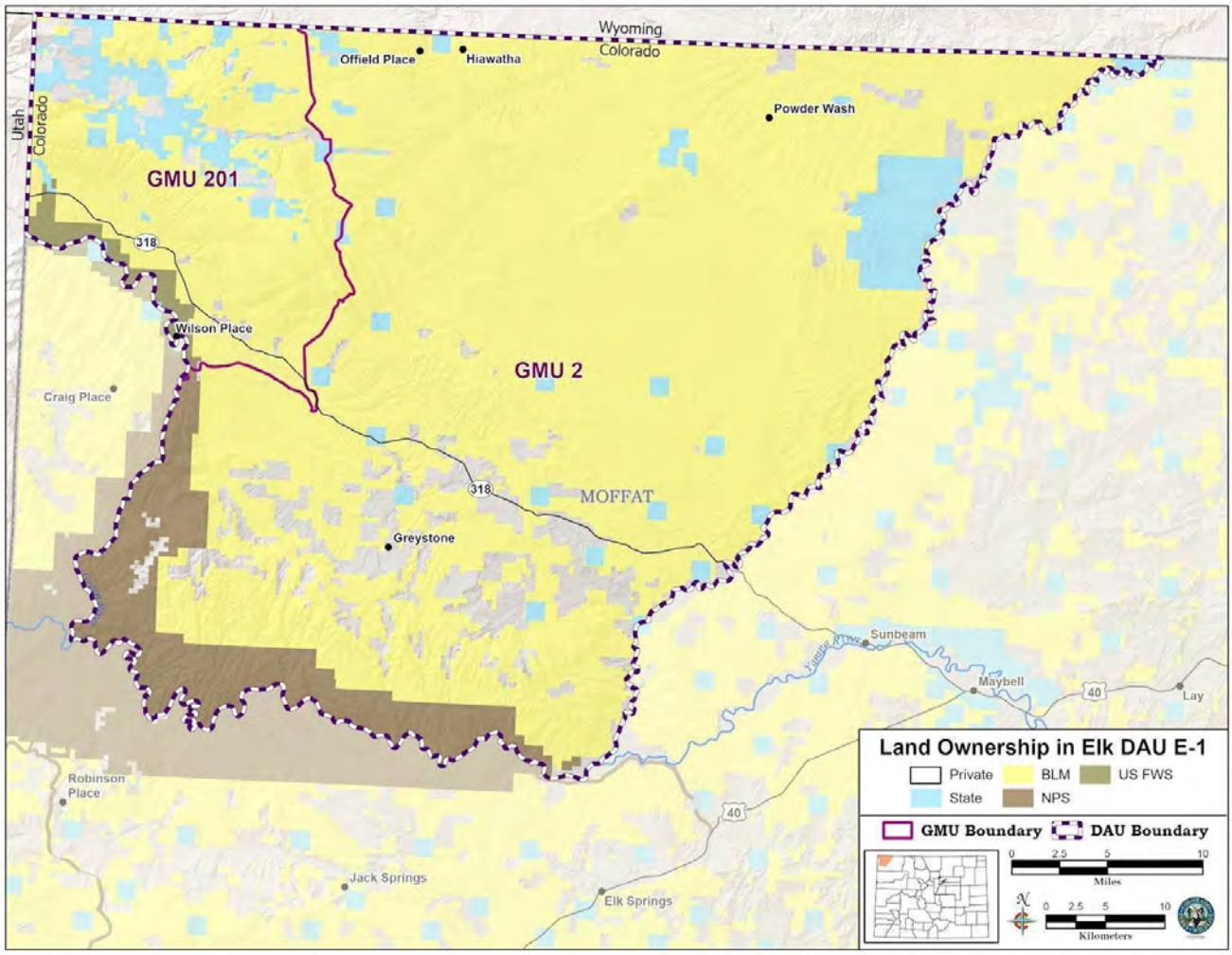
Figure 13 (a-g). Hunter harvest attitude survey questions and 3-year averaged results (2021-2023) for the 15 elk DAUs ranked from low DAU to high DAU (left to right) in relation to the specific question.

COLD SPRINGS ELK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-1

Darby Finley, Wildlife Biologist, Meeker

Cold Springs Elk Herd (DAU E-1) **Approval Year for last HMP: 2013**	**GMUs: 2, & 201**
Post-hunt population:	
Current (2013 plan) Population Objective:	700 – 1,700 elk
Post-hunt 2023 Minimum Count:	1,130 elk
Proposed Population Objective:	**Minimum count 1,000 – 2,000 elk**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2013 plan) Sex Ratio Objective:	40 bulls per 100 cows
Post-hunt 2023 Sex Ratio:	observed: 78; modeled: NA
Proposed Sex Ratio Objective:	**>40 bulls per 100 cows (status quo)**



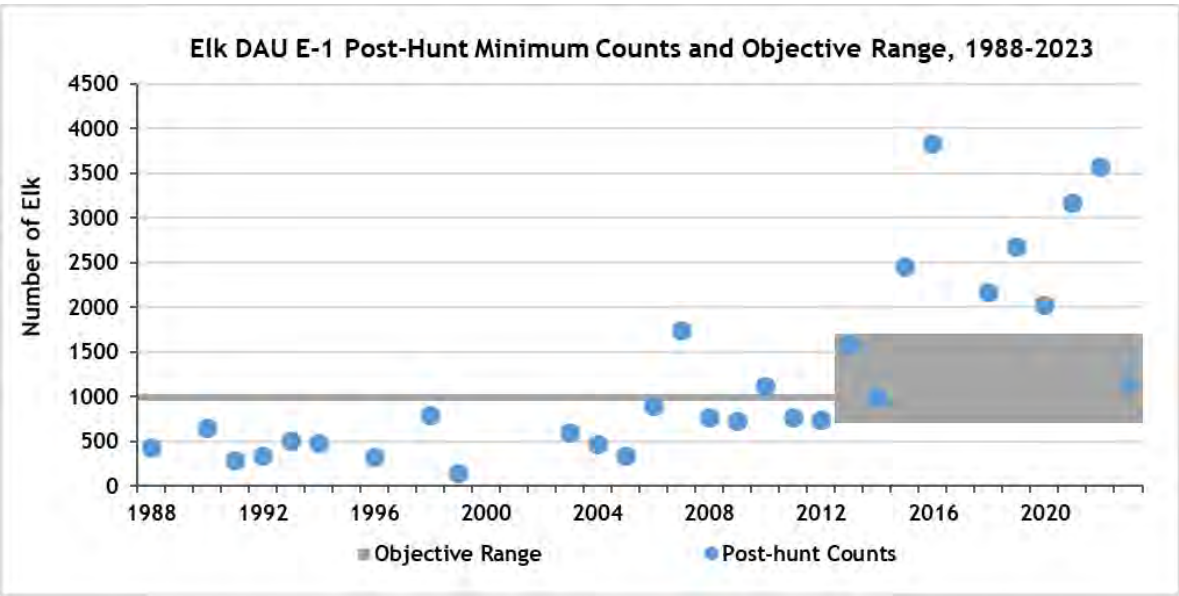


Figure 1-1. Elk DAU E-1 post-hunt minimum counts and objective range, years 1988-2023.

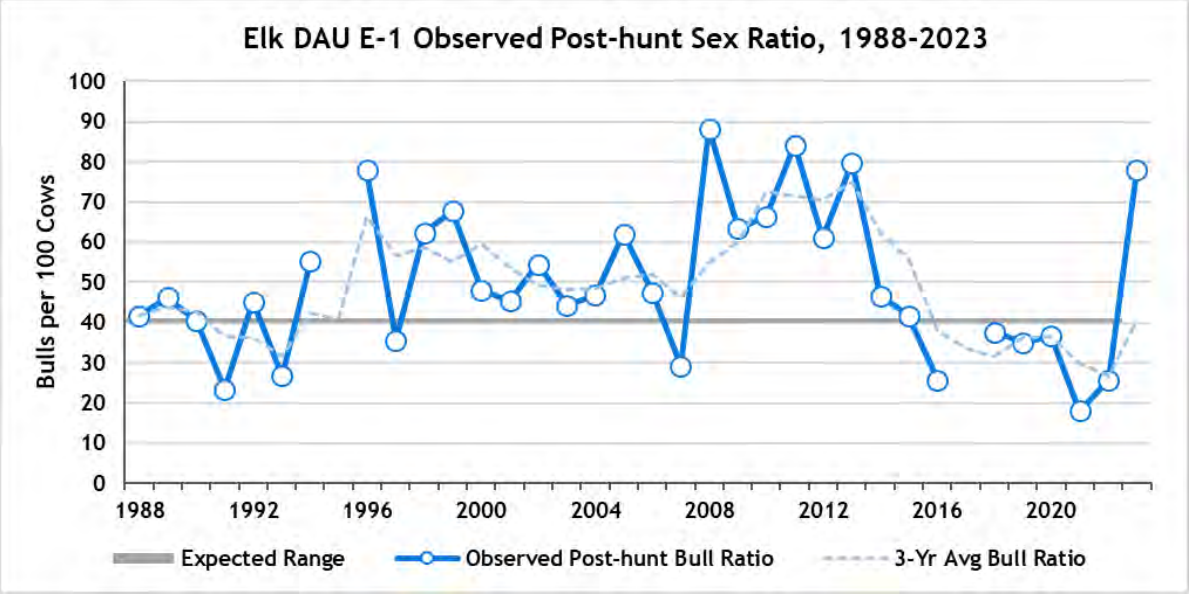


Figure 1-2. Elk DAU E-1 observed post-hunt sex ratio (bulls:100 cows), years 1988-2023.

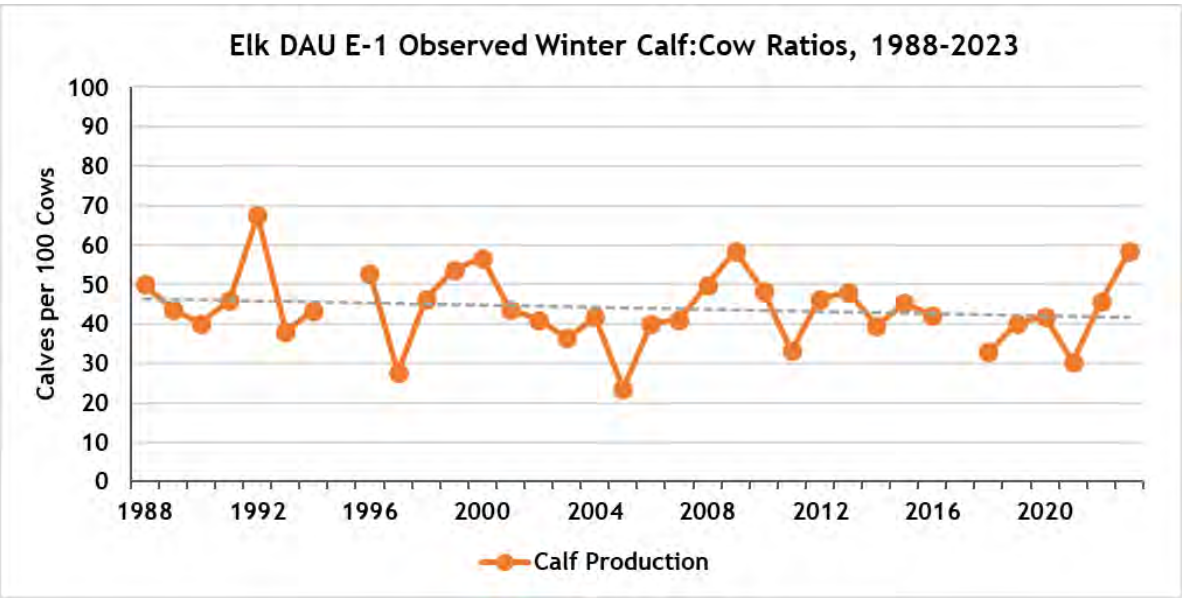


Figure 1-3. Elk DAU E-1 calf production (observed post-hunt calves:100 cows), 1988-2023.

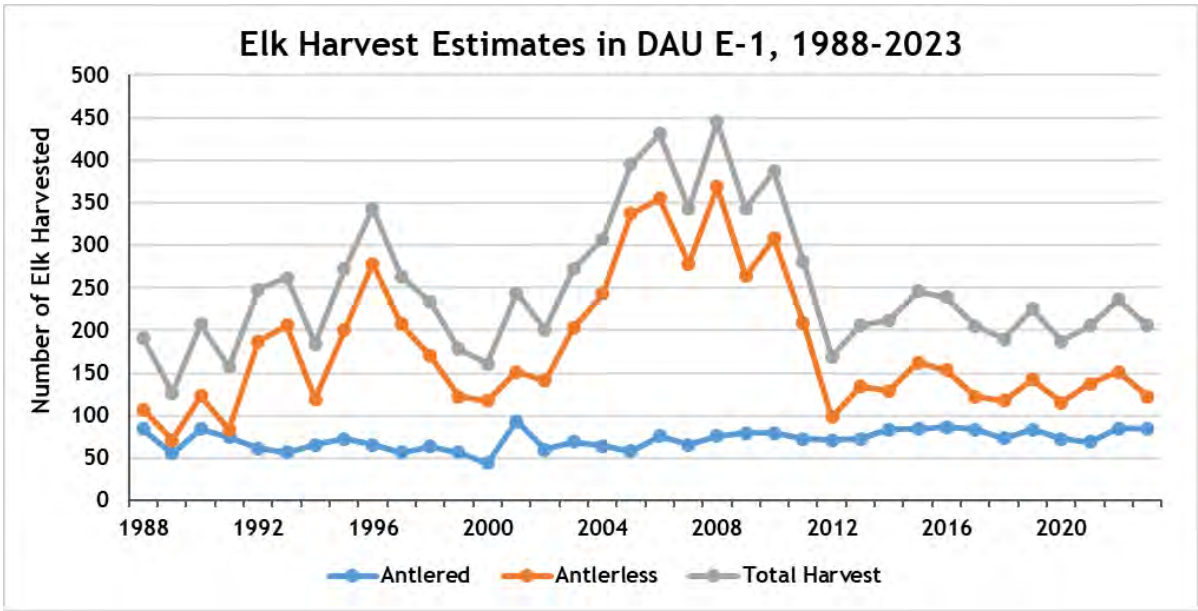


Figure 1-4. Elk harvest estimates in E-1, years 1988-2023.

Background

The Cold Springs Elk Data Analysis Units (DAUs), E-1 is located in the remote northwest corner of Colorado in Moffat County. DAU E-1 includes Game Management Units (GMUs) 2 and 201. Public lands within DAU E-1 include 1107 square miles of land managed by the Bureau of Land Management (BLM) (77% of the DAU), 125 square miles of private land (9%), 98 square miles of Dinosaur National Monument (7%), 87 square miles of State Land Board owned land (6%), 12 square miles of the Brown's Parks National Wildlife Refuge (1%), and 4 square miles of State

Wildlife Areas managed by CPW (<1%). Private land accounts for 124 square miles (8%) of the DAU.

The entire landscape of DAU E-1 has the potential to be elk winter range, however, most years elk will concentrate at lower elevations and south facing slopes throughout the DAU. Generally, elk will be found at higher elevations throughout the spring, summer, and fall, although elk can be found in more arid lower elevations throughout GMU 2 year-round.

The current population objective for DAU E-1 is 700-1700 elk. This population objective was set in the E-1 DAU management plan approved in 2013. The 5-year average post-hunt elk minimum count estimate for E1 is 2500 elk. The management objective for the E-1 elk herd has been to maintain the sex ratio at 40 bulls:100 cows since 1979. E-1 is one of the premier DAUs in the state managed for high bull ratios. To manage for these high bull ratios, antlered license numbers are extremely limited to allow for higher rates of recruitment of bulls to older age classes. Long-term bull ratios have averaged 49 bulls:100 cows. Over the past five years, the average observed sex ratio has been 39 bulls:100 cows. The long-term post-hunt age ratio (calves:100 cows) has averaged 44 since 1988. The highest age ratio was 67 calves:100 cows in 1992 and the lowest was 23 calves:100 cows in 2005. The average age ratio from 2019-2023 has been 43 calves:100 cows. The long-term trend for the cow:calf ratios shows a slightly declining trend. Calf ratios showed a more drastic decline from 2000-2006, which coincided with the onset of drought conditions in this area, and the peak of the elk population, but has stabilized since then. Observed sex and age ratios can fluctuate significantly within the DAU based on timing of flights and winter conditions. Radio collar location data has shown significant inter-DAU immigration into E-1 from adjacent DAUs E-2 and E-6 when winter conditions are severe. This can result in lower observed bull ratios due to the increased number of cow-calf groups observed within E-1. In addition, significant winter movement also occurs across the Green River into DAU E-47. Generally, these movements include large cow-calf groups from GMU 201. For these reasons, interpreting post-hunt elk population statistics within the E-1 herd presents some challenges with varying annual winter conditions.

Significant Issues

The management issues identified in these DAUs are primarily associated with elk distribution, winter range habitat capability, and early spring elk use on public lands as elk migrate back to summer ranges. Online survey results identified high bull:cow ratios, low cow numbers, bull quality, shed antler hunting, and preference point creep affecting hunter opportunity as the most common issues with elk hunter satisfaction.

Elk distribution is the biggest challenge in achieving annual cow harvest objectives in the DAU. Hunter pressure and elk distribution are an annual management concern when setting license numbers for the DAU. Elk seek refuge within Dinosaur National Monument to avoid hunting pressure in GMU 2, whereas interstate and inter-DAU elk movement is an issue in GMUs 1 and 201. GMU 201 is bordered on the north by Wyoming and west by Utah. A telemetry study was initiated in 2012 to better understand interstate elk movement and its effect on elk distribution, harvest and population management. In addition, more of an emphasis has been placed on late season hunts to achieve antlerless harvest objectives. It is important for the CPW to work cooperatively with private landowners, federal land management agencies, Wyoming Game and Fish, Utah Division of Wildlife Resources, and Dinosaur National Monument to manage this population to the long term DAU objective.

In addition to elk distribution, changes in elk behavior have resulted in range expansion and, in some cases, year round elk use on winter ranges. Elk movement across state lines and the Dinosaur National Monument boundary create refuge situations that make achieving harvest objectives difficult. The arid climate that characterizes this DAU, and cyclical drought conditions also create challenges in managing elk populations within nutritional carrying capacities of the range. Mild winter conditions and summer drought cycles prevailed across the DAU during the early 2000's causing concern about range conditions and the sustainability of elk numbers which were at peak population levels during this time. Concerns regarding drought-stressed range conditions amongst management agencies and livestock operators resulted in a concerted effort to reduce elk numbers across the DAU. Management efforts implemented to reduce elk numbers to allow for range rest and recovery included designating additional cow licenses and implementing a late cow elk season in the DAU. These efforts proved successful in reducing elk numbers across the DAU.

Major concerns regarding historical and current elk population levels in DAU E-1 are centered on competition between elk and livestock. Federal land management agencies and livestock operators support the quality management strategy for elk, but have expressed concern about overall numbers of elk in the DAU. These concerns are focused on spring and summer grazing competition between elk and cattle. In contrast, outfitters and some landowners are in support of current or slight increases to population levels.

Stakeholder Outreach and Input

Public meetings were held on October 9th and 11th, 2023 in Hayden, CO and Meeker, CO, respectively. Forty-four people attended these meetings. Public comment forms were available for attendees to fill out at the meeting. One person submitted a comment form after the meeting pertaining to E-1. A QR code was also provided to people that attended the meeting as a way to comment electronically. Two people commented using the QR code. One hundred percent of the respondents were Colorado residents.

In addition to the comment forms available through the local public meetings, opt-in big game hunter attitude surveys have been conducted the past two years while conducting the big game harvest survey. These surveys have allowed CPW to gather input from hunters on an annual basis. Based on survey results, the majority of respondents were satisfied with their overall hunting experience in E-1. Two-thirds of hunters were satisfied with the overall number of elk they saw while hunting. Respondents were very satisfied with the total number of bulls they saw while hunting in E-1. The majority of hunters responded that they would prefer to hunt mature bulls than they would to hunt more often. Additionally, the majority of respondents also preferred to see the elk population stay the same over the next 10 years.

Overall, the majority of hunters responded to not feeling crowded by other hunters when hunting in E-1 and an overwhelming majority responded to not feeling crowded by non-hunters.

Management Alternatives

There are three basic management strategies that CPW is currently using for elk DAUs. Ideally, all units within a DAU are managed using the same strategy. These basic

management strategies consider various types of hunting opportunities including ease of participation, quality of hunting experience, level of success rates, and opportunity to harvest a quality male animal.

Methods to achieve these various opportunities include offering readily available licenses, spatial and temporal distribution of hunters and license limitations. These different management strategies afford various types of hunting opportunities and are often mutually exclusive and therefore must be balanced among the desires of hunters, landowners, and economic interests.

The DAU management strategy recommendation by the CPW is status quo. Currently, E-1 is totally specified for all seasons and managed for quality bull elk hunting. Season structures within DAU E-1 include limited archery and muzzleloader seasons, an early rifle bull elk season, and 4 limited regular season antlerless hunts. In addition, late season antlerless hunts were established in 2008 as a management tool to maintain elk populations within the objective range. Hunter success in the DAU will remain relatively high under this strategy. The management recommendation is to maintain this DAU as a quality bull elk hunting unit with limited bull license quotas.

Post-hunt Population

Minimum count 1000 - 2000 elk

This objective range seeks to maintain the E-1 elk herd within the stated population objective range which will be assessed through the minimum counts observed during post-hunt sex and age classification flights. The population objective range is consistent with public desires and allows the herd to be managed at a population level in-line with carrying capacities given variable range conditions.

Post-hunt bull ratio

>40 bulls per 100 cows

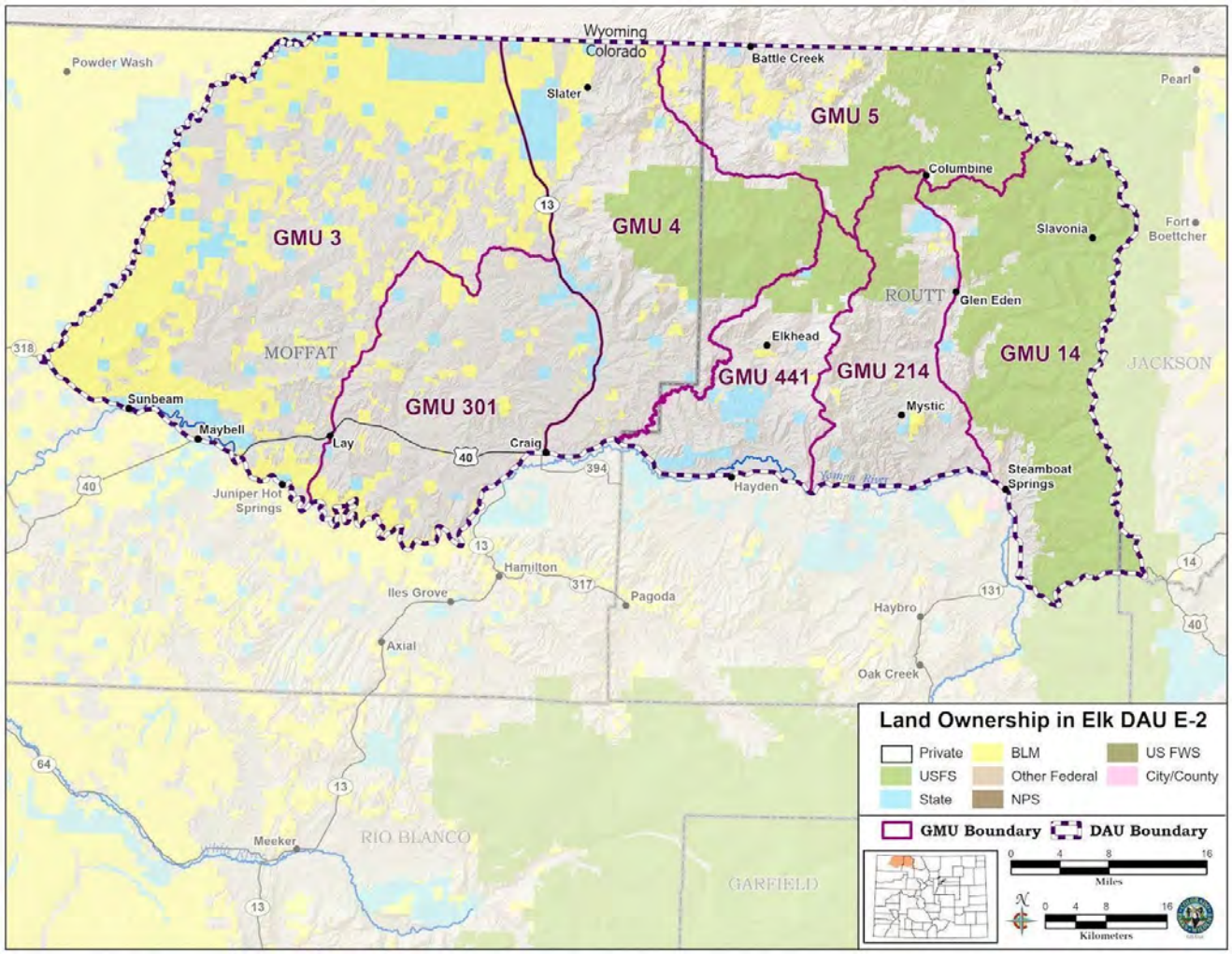
The CPW recommendation is to manage the sex ratio to maintain >40 bulls:100 cows. During the past 5 years (2019 - 2023), the herd has averaged 39 bulls:100 cows with a range of 18 – 78 bulls:100 cows. Bull ratios can vary widely from year to year based on the number and composition of elk classified. Since bulls traditionally occupy the same winter ranges every year, observers generally get a representative sample of bulls. However, bull ratios can fluctuate annually due to interstate and inter-DAU movement of cow-calf groups. For example, if a representative sample of cow-calf groups is not obtained due to emigration out of the DAU or if an influx of cow-calf groups immigrate into the DAU it can influence post-hunt observed bull ratios. Managing for >40 bulls:100 cows will allow for continued recruitment of older age class bull elk within this DAU.

BEAR'S EARS ELK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-2

Darby Finley, Wildlife Biologist, Meeker

Bear's Ears Elk Herd (DAU E-2) Approval Year for last HMP: 2008	GMUs: 3, 4, 5, 14, 214, 301 & 441
Post-hunt population:	
Current (2008 plan) Population Objective:	15,000 – 18,000 elk
Post-hunt 2023 Population Estimate:	10,567 elk
Proposed Population Objective:	15,000 – 18,000 elk (status quo)
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2008 plan) Sex Ratio Objective:	20-25 bulls per 100 cows
Post-hunt 2023 Sex Ratio:	observed: 11; modeled: 14
Proposed Expected Sex Ratio Objective:	15-25 bulls per 100 cows



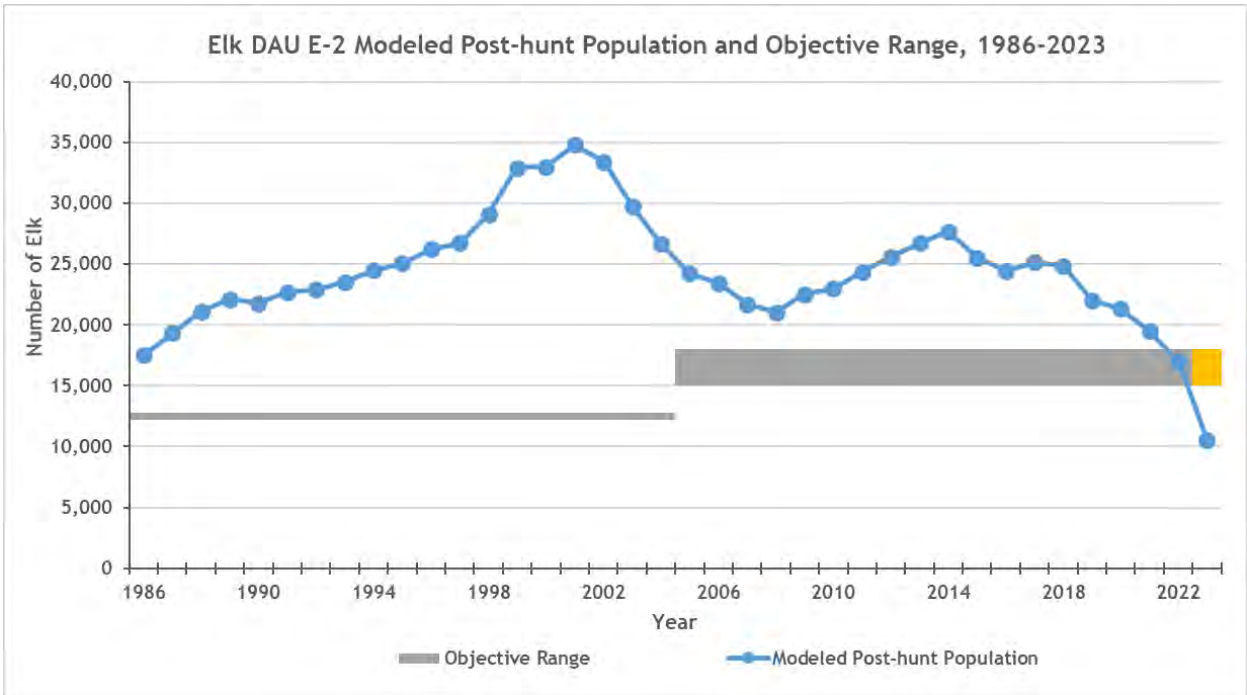


Figure 2-1. Elk DAU E-2 modeled post-hunt population and objective range, years 1986-2023.

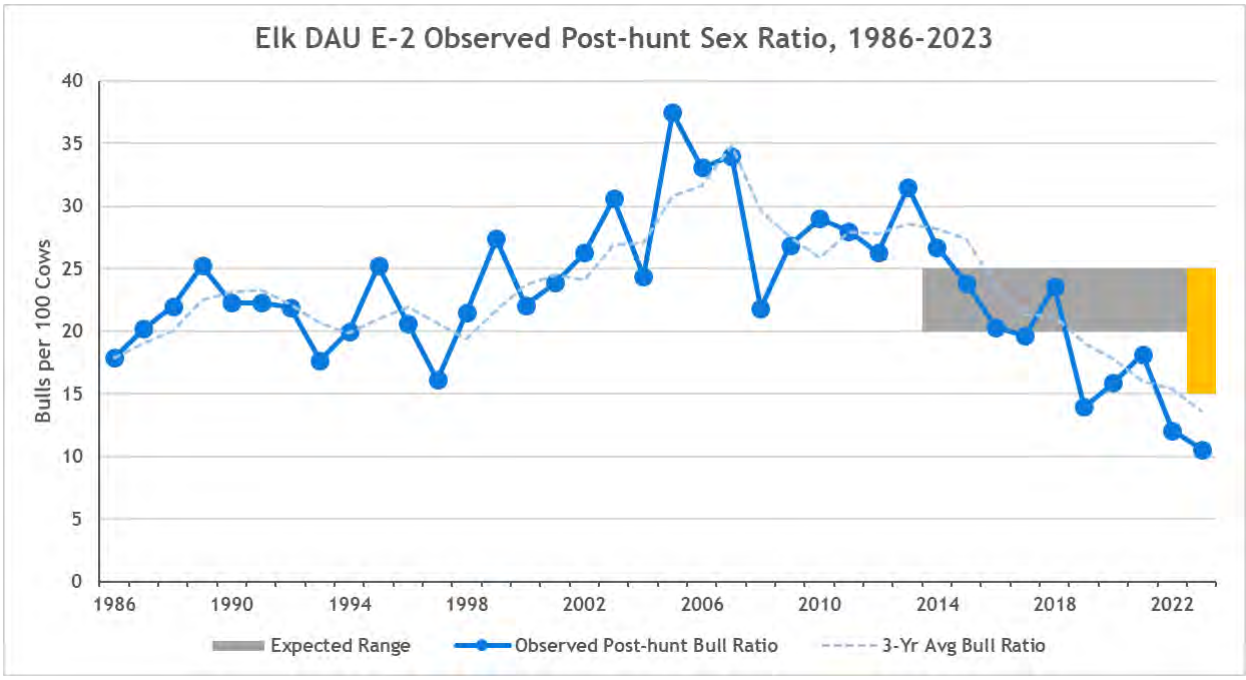


Figure 2-2. Elk DAU E-2 observed post-hunt sex ratio (bulls:100 cows), years 1986-2023.

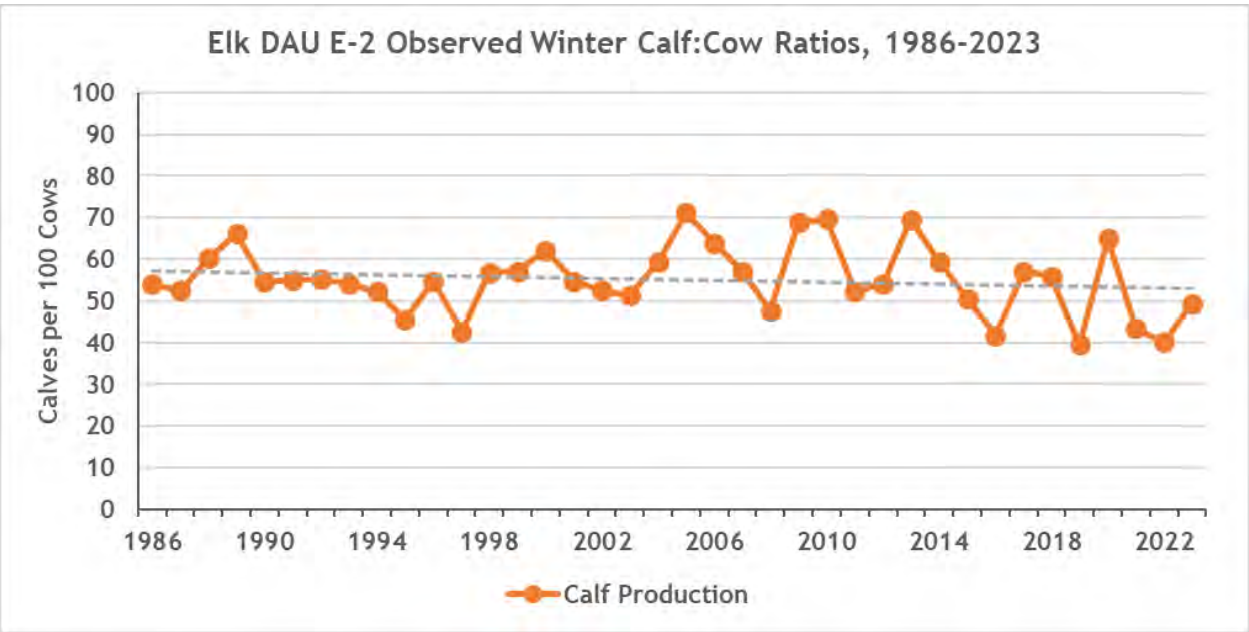


Figure 2-3. Elk DAU E-2 calf production (observed post-hunt calves:100 cows), 1986-2023.

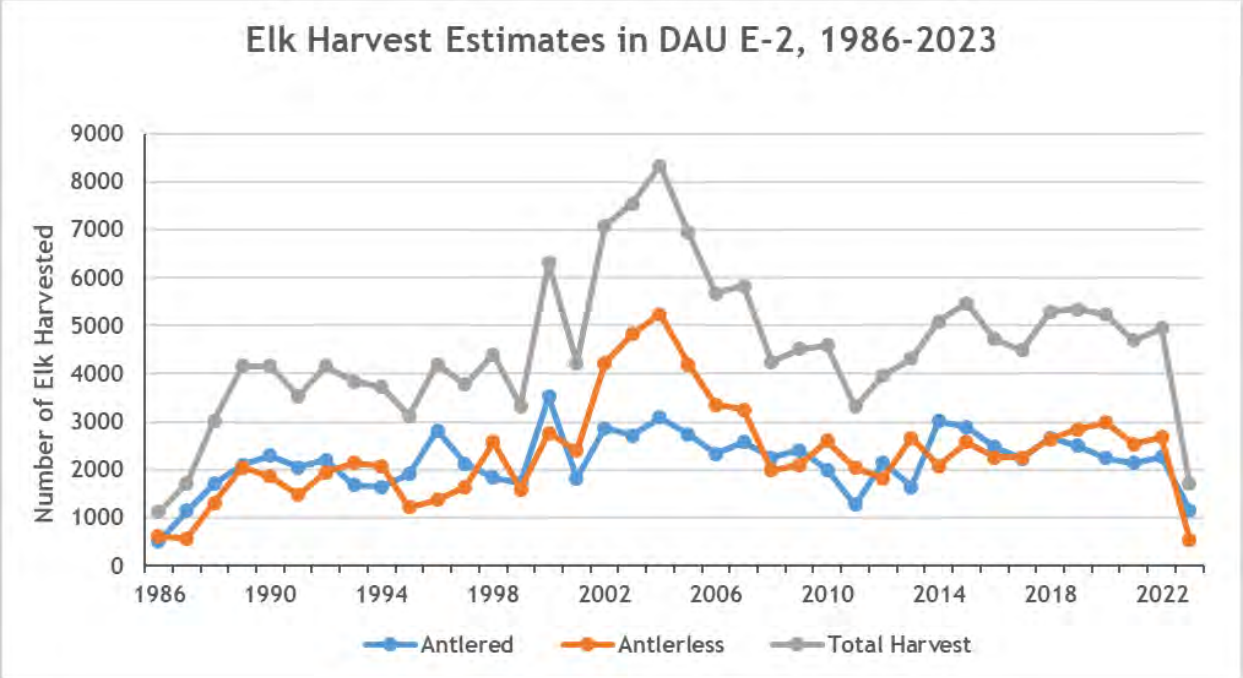


Figure 2-4. Elk harvest estimates in E-2, years 1986-2022.

Background

The Bear's Ears Elk DAU, D-2, is located in northwest Colorado and includes portions of Routt and Moffat counties. The DAU is composed of 7 Game Management Units (GMUs): 3, 4, 5, 14, 214, 301, and 441. The towns of Craig, Steamboat Springs and Maybell are located on the southern periphery of the DAU. Ownership patterns vary across elk seasonal ranges within the

DAU, comprising private, state and federal lands. Fifty percent of all elk winter range within the DAU is on private property, 40% is managed by BLM, and the remaining 10% is a mix of state and county owned lands. Summer range includes the entire DAU.

Elk within E-2 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 elk moving 60 to 70 miles between seasonal ranges while others move relatively short, elevational distances.

Since the mid-1980s the elk population within the E-2 herd steadily grew to its peak level of more than 34,000 elk in the early 2000s. The peak in the elk population coincided with persistent drought conditions leading to shared concerns about range health from public land managers, private landowners, and CPW. Out of concern for long-term range and herd health, CPW made a concerted effort to drastically reduce the E-2 elk population. From 2002 to 2007, hunters harvested more than 25,000 antlerless elk, achieving antlerless harvest rates of 30% which reduced the E-2 elk herd by a third. The reduction in the elk population was achieved by liberalizing antlerless elk harvest through limited either-sex elk licenses, list B licenses, and various antlerless hunts outside the regular seasons. Antlerless hunts outside the regular seasons included extended private land only, early, late, damage, and distribution hunts. Since 2008 elk populations in E-2 have remained fairly stable fluctuating between 20,000 and 25,000 elk. However, the severe winter of 2022-2023 resulted in significant, unprecedented winter mortality across all age classes causing the elk population to fall below the long-term objective range of 15,000-18,000. It will take time for the elk population to recover from such significant losses. Fortunately, the E-2 elk herd has proven to be incredibly productive with a long-term stable to slightly declining trend in calf ratios. Calf ratios have averaged 54 calves per 100 cows since 1986. The most recent 5-year average calf ratio has been 48 calves per 100 cows. After implementing the 4-point antler restriction (APR) for bull elk in E-2 in 1986, observed post-hunt bull ratios averaged 21 bulls per 100 cows. Bull ratios within over-the-counter (OTC) units can vary widely. Observed post-hunt bull ratios reached a high of 37 bulls per 100 cows in 2005 and low of 11 bulls per 100 cows in 2023. Factors that play a role in the fluctuation of observed bull ratios are all dependent on elk distribution within the DAU as it relates to weather and timing of weather events during the hunting seasons. The migration of elk in E-2 is driven by weather. Significant snowfall events during the hunting season can trigger elk to migrate to lower elevation, open sagebrush winter ranges making them more vulnerable to harvest. When the sequence of these events align, along with OTC licenses, harvest rates on bulls can be higher and can cause ratios to fluctuate. More recently, multiple factors have played a role in lower bull ratios. Since 2019, severe winter conditions have resulted in low calf survival in 2019 and 2022, thus, lower recruitment of bulls to the yearling age class. Additionally, weather events during 3 of the last 5 hunting seasons have triggered elk movement resulting in bull elk being more vulnerable to harvest. The combination of these factors has resulted in lower observed bull ratios. The management strategy of reducing the E-2 elk herd over the past 20 years with liberal antlerless hunting licenses suddenly changed after the 2022-2023 severe winter event, and has now become a strategy of recovering the herd back to within the long-term population objective range.

Significant Issues

Currently, the most immediate issue facing the E-2 elk herd is the recovery of the elk population to within the long-term population objective following the 2022-2023 severe

winter. Management concerns over the past two decades primarily revolved around elk distribution and abundance. For example, elk-livestock competition, especially early spring elk use on public lands as elk migrate back to summer ranges, impacts of elk overabundance on drought-stressed winter ranges, the ability to achieve antlerless harvest objectives to address elk abundance, and chronic wasting disease. Through the implementation of various harvest management tools the E-2 elk herd was gradually reduced to levels more in-line with range carrying capacity about the time the severe winter of 2007-2008 occurred. Some of the same elk distribution issues continue to persist even now with lower population levels. Distribution hunts and game damage licenses are being used more strategically to target those specific problem areas.

In more recent years, outdoor recreation has become more of a concern, especially in the Steamboat Springs area in the eastern portion of E-2. Motorized and non-motorized trail development north of Steamboat Springs and in the Rabbit Ears and Buffalo Pass areas has introduced significant disturbance during the spring calving period and throughout the summer months. The popularity of outdoor recreation has increased the volume of activity associated with these trails exponentially, to the point of displacing wildlife from the areas the trail development is occurring and is likely contributing to lower elk calf recruitment within the subherds that have traditionally utilized these areas for calving.

Rural residential development is a concern across several areas in E-2. Specifically, the Elk River valley north of Steamboat Springs, the rural mountain subdivision developments around Quaker Mountain north of Hayden, the Wilderness Ranch and Baker's Peak mountain subdivisions southeast of Baggs, WY, and the rural residential subdivisions north of Craig all pose challenges to the E-2 elk herd. These developments fragment the landscape and have introduced disturbances to traditional elk production areas and altered elk migration between seasonal ranges.

The most recent potential land use change in E-2 is the potential of large solar and wind developments. Two large transmission lines are currently being constructed through the western portion of E-2 with completion dates of 2023 and 2025. Along with those transmission lines is the prospect of wind and solar development as two large coal mines are scheduled to cease coal production by 2028 with the closure of the Craig power plant. The extent to which solar and wind development will occur is unknown but these developments have the potential to occupy large tracts of critical winter range and impact big game migration routes.

Another issue of concern for the E-2 herd is the degradation and loss of winter range due to drought, wildfire, and overuse. The cyclical weather pattern of summer drought and above average winter snowfall has been consistent since 2007 resulting in reduced nutritional carrying capacities across winter ranges especially when above average snow depths occur. A series of large-scale wildfires has occurred across winter ranges in the western portion of the E-2. These large-scale fires have converted sagebrush and bitterbrush dominated landscapes to open grasslands. This type conversion has benefitted elk when winter conditions are mild and allow for elk to access the herbaceous forage under the snow. However, when winter conditions are more severe and snow depths are greater, the energy costs are too great to paw through the deep snow and elk are forced to move to brush dominated landscapes where browse is available above the snow line. Oftentimes this puts elk in direct competition with mule deer and pronghorn. This scenario played out in an extreme way during the severe

winter of 2022-2023 resulting in significant elk mortality that reduced the E-2 population to historically low levels.

Chronic wasting disease was discovered on the western slope of Colorado in 2002. CWD was first discovered in E-2 through voluntary head submission by hunters that same year. Voluntary head submissions by hunters were used as a surveillance tool to identify the distribution and prevalence of CWD in DAU E-2. Through those surveillance efforts CWD has been detected in all GMUs within the DAU. Prevalence estimates during the early 2000s were less than 1%. After the development of the CWD Response Plan in 2018 a revolving mandatory sampling effort was established for all mule deer and elk DAUs statewide. In 2021 mandatory CWD testing in E-2 resulted in a prevalence rate of 2%. Surveillance efforts will be important in monitoring CWD prevalence levels to ensure appropriate management actions are applied to maintain low CWD prevalence in E-2.

Stakeholder Outreach and Input

Public meetings were held on October 9th and 11th, 2023 in Hayden, CO and Meeker, CO, respectively. Forty-four people attended these meetings. Public comment forms were available for attendees to fill out at the meeting. Three people submitted comment forms after the meeting pertaining to E-2. A QR code was also provided to people that attended the meeting as a way to comment electronically. Eleven people commented using the QR code. Eighty-six percent of the respondents were resident and 14% were non-resident.

Twelve of 14 (86%) respondents would prefer the herd to be managed for a greater number of elk relative to the current estimated population. Two of 14 (14%) respondents preferred to manage for the same number of elk relative to the current estimated population. The impacts of the 2022-2023 severe winter likely influenced how respondents answered this question given the significant elk mortality that occurred resulting in a historically low estimated population.

When asked which management issues most significantly affect the E-2 elk herd respondents selected calf recruitment as the number one issue. Second was drought and severe winters and habitat quality and quantity. Predation was the third most selected issue. Recreation and trail development as well as residential development were the fourth most selected issue. Renewable energy development and fencing was fifth. Followed by roadkill and agricultural game damage. Lastly, was mining and oil and gas development.

Elk Management Issues	Percent of Respondents
Calf Recruitment/Declining Elk Numbers	86%
Drought/Severe Winter/Climate	79%
Habitat Quality/Quantity	79%
Predation	64%
Recreation and Trails	43%
Residential Development	43%

Renewable Energy Development (Wind/Solar)	36%
Fencing (entanglement, movement barriers)	36%
Roadkill	29%
Agricultural Game Damage	29%
Mining, Oil and Gas Development	21%

The following written comments were submitted:

- Recent winter kill should have a serious place in determining the number of permits issued. This will require better population survey techniques in the process of license allocation.
- Access to public land is limited due to being landlocked and surrounded by private land. We need corridors through the private land to access the vast public land in holdings.
- I would like to see 15,000 to 20,000 elk in E2 and 20-25 bulls per 100 cows.
- Bring the elk numbers back up to 15,000-18,000 elk and 20-25 bulls per hundred.
- I would like to see the Bear's Ears Herd back up to 15,000-18,000 Elk with a bull to cow ratio of 25-30 bulls per 100 cows.
- Would like to see an elk population at 30,000-35,000 and a bull-to-cow ratio of 20-25/100.
- Terrible herd management.
- We have to stop hunting elk this late. Move your season dates back into Oct. Only use of November should be herd objectives on the female side.
- I would like to see the herd objective to be set at 13,000-15,000 for E-2 with sex ratio of 20-25 bulls -100 cows. I believe the sex ratio is currently much lower than stated by CPW.
-

In addition to the comment forms available through the local public meetings, opt-in big game hunter attitude surveys have been conducted the past two years while conducting the big game harvest survey. These surveys have allowed CPW to gather input from hunters on an annual basis. Based on survey results, the majority of respondents were satisfied with their overall hunting experience in E-2. However, hunters were split 50/50 when it came to the overall number of elk they saw with an almost equal percentage of satisfied and dissatisfied hunters. Respondents were more dissatisfied than satisfied with the total number of bulls they saw while hunting in E-2. Although the majority of hunters responded being dissatisfied with the number of bulls they saw, they consistently responded they would prefer to hunt more often, even if it meant fewer mature bulls. In contrast to the public meetings held after the 2022-2023 severe winter, where respondents selected that they would like to see a greater number of elk, respondents to the 2021 and 2022 big game harvest survey responded to wanting elk numbers to stay the same or a slight to moderate increase. Based on the responses to both surveys it appears there is support for the current population objective range of 15,000-18,000 elk.

Overall, the majority of hunters responded to not feeling crowded by other hunters when hunting in E-2 and an overwhelming majority responded to not feeling crowded by non-hunters.

Management Alternatives

There are three basic management strategies that CPW is currently using for elk DAUs. Ideally, all units within a DAU are managed using the same strategy. These basic management strategies consider various types of hunting opportunities including ease of participation, quality of hunting experience, level of success rates, and opportunity to harvest a quality male animal.
Methods to achieve these various opportunities include offering readily available licenses, spatial and temporal distribution of hunters and license limitations. These different management strategies afford various types of hunting opportunities and are often mutually exclusive and therefore must be balanced among the desires of hunters, landowners, and economic interests.
The current management strategy for DAU E-2 is to maximize hunter opportunity and local economic benefits and minimize landowner conflicts. This management strategy is characterized by a large number of bull hunters, low hunting success for bulls, and high annual removal of 2+ year old bulls resulting in post-hunt bull:cow ratios ranging from 15-20 bulls:100 cows. Archery and muzzleloader seasons are limited on the National Forest to lessen the effects of hunters moving elk off of public lands prior to the 1st rifle season. Rifle licenses during the 1st season are limited and the season is managed for a quality hunting experience. Antlerless elk are limited and issued in numbers necessary to achieve population objectives, bull licenses during 2nd and 3rd rifle seasons are unlimited in number and sold over-the-counter (OTC). Licenses for the 4th season are limited to focus harvest efforts on cow elk.

CPW recommends maintaining this management strategy. However, due to the impacts from the 2022-2023 severe winter, a conservative approach with antlerless licenses will be needed to recover the population back to within the desired objective range of 15,000-18,000 elk.

Post-hunt Population

15,000 – 18,000 elk

This objective range seeks to recover the herd back to population levels prior to the 2022-2023 winter. The population objective range is consistent with public desires and allows the herd to be managed at a population level in-line with carrying capacities given variable range conditions.

Post-hunt bull ratio

15 – 25 bulls per 100 cows

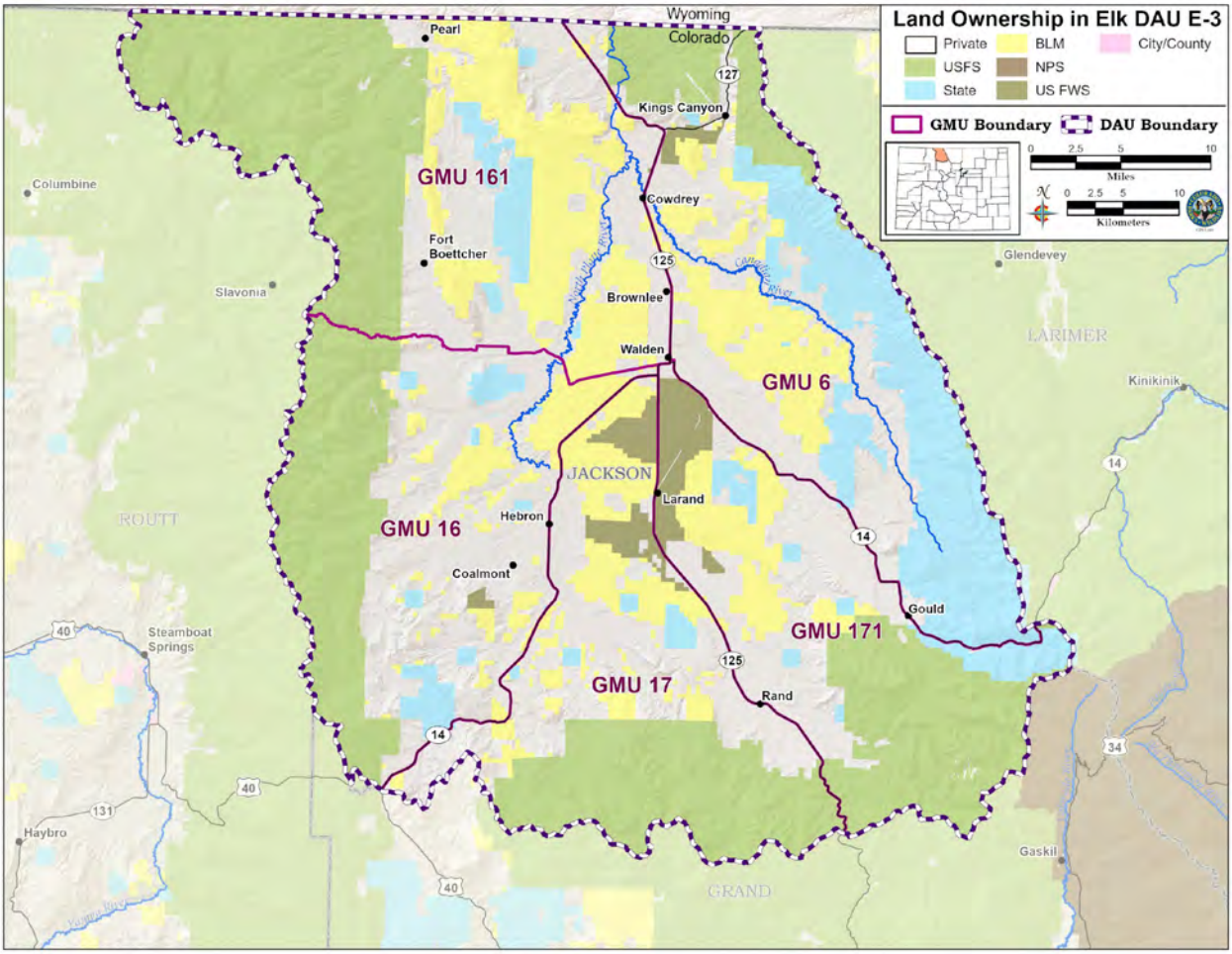
Although bull:cow ratios in E-2 have gone as high as 37 bulls:100 cows, they are generally within or near the sex ratio objective range of 15-25 bulls:100 cows, which reflects the over-the-counter management strategy employed in E-2. It will take time to recover bull ratios back to the proposed objective range after the 2022-2023 winter with conservative license recommendations.

NORTH PARK ELK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-03

Eric VanNatta, Wildlife Biologist, Steamboat Springs

North Park Elk Herd (DAU E-03) **Approval Year for last HMP: 2008**	**GMUs: 6, 16, 17, 161, 171**
Post-hunt population:	
Current (2008 plan) Population Objective:	4,000 – 4,500 elk
Post-hunt 2023 Population Estimate:	5,794 elk
Proposed New Population Objective	**4,000 - 4,500 elk**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2008 plan) Sex Ratio Objective:	20 - 23 bulls per 100 cows
2023 3-year Average of Observed Sex Ratio:	15.1 bulls per 100 cows
Proposed New Expected Sex Ratio Objective:	**20-25 bulls per 100 cows**



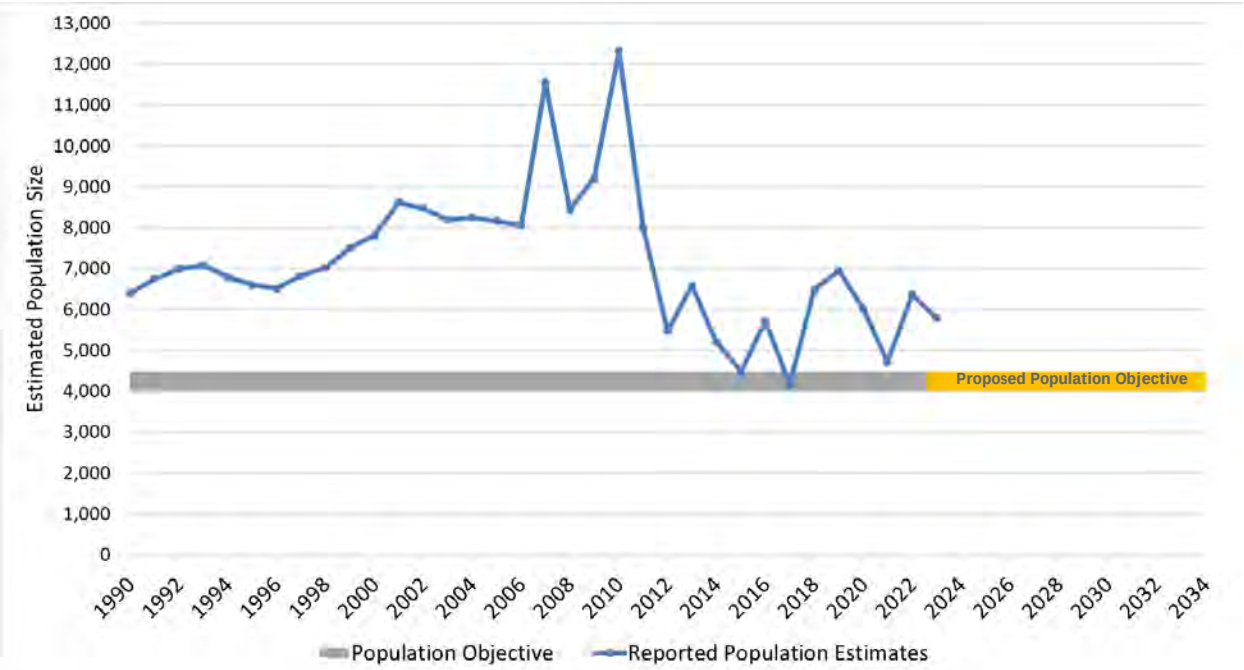


Figure 3-1. E-3 modeled post-hunt population and objective range, years 1990-2023. Note: Classification flights were not conducted in 2010, estimated population exceeding 12,000 animals is likely inaccurate from the lack of sufficient data.

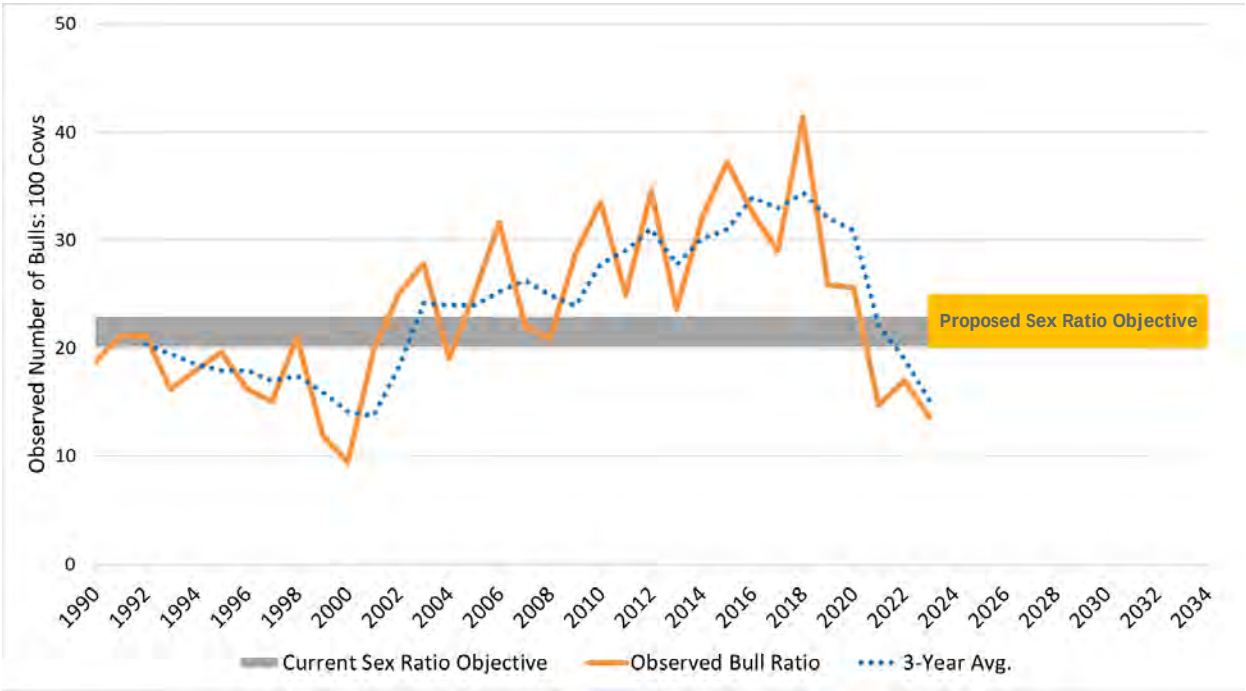


Figure 3-2. E-3 observed post-hunt sex ratio (bulls:100 cows), years 1990-2023.

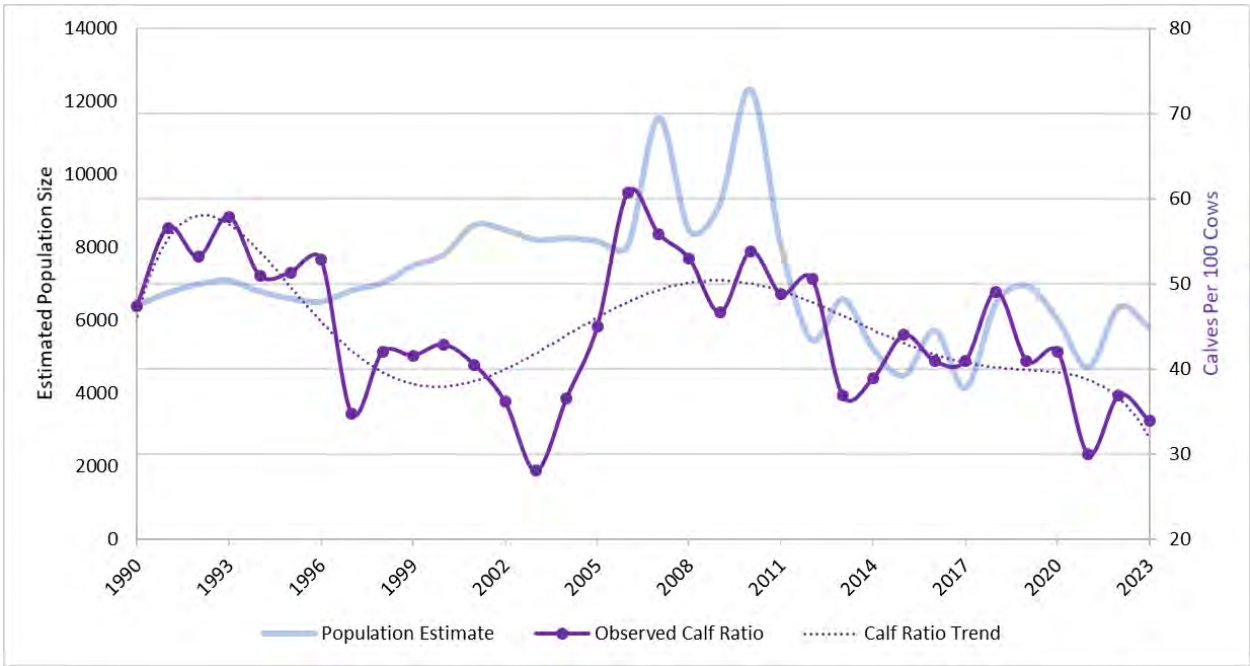


Figure 3-3. E-3 calf production (observed post-hunt calves:100 cows) compared to E-3 population estimates, years 1990-2023.

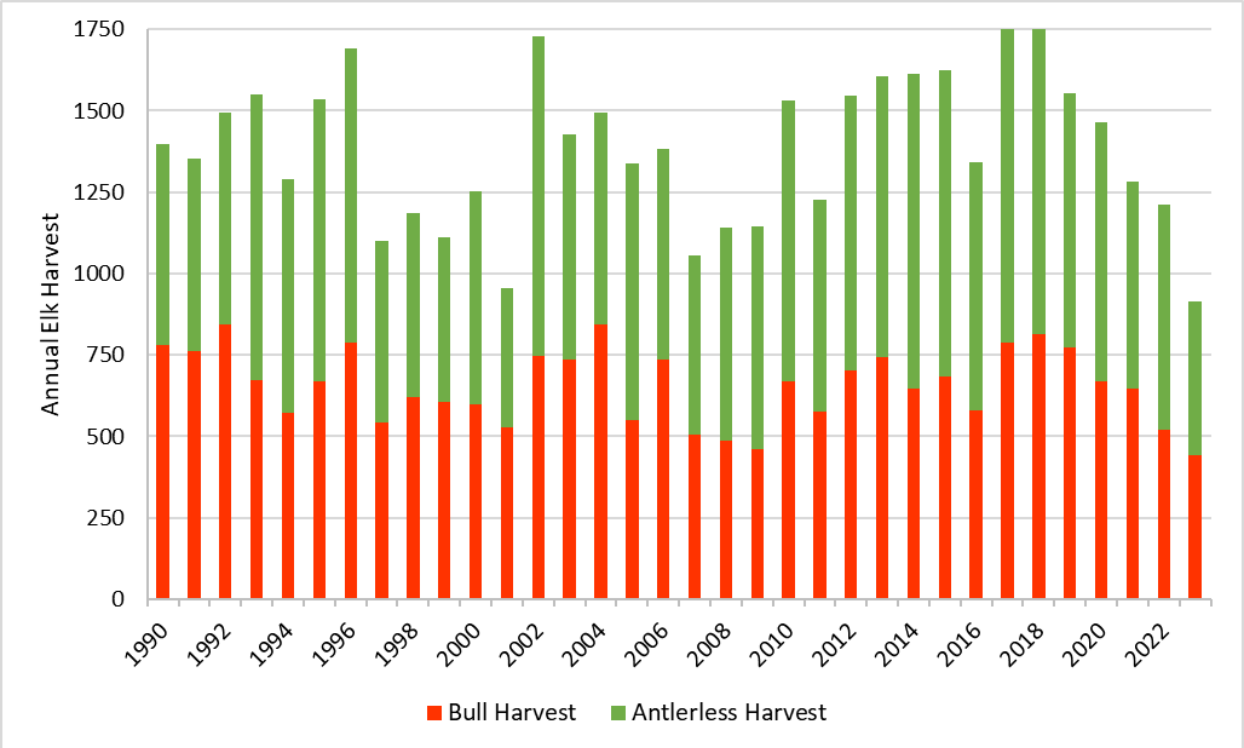


Figure 3-4. Elk harvest estimates in E-3, years 1990-2023. Average across years: 655 bulls and 732 antlerless elk (includes cows and calves).

Background Information

The North Park Elk Herd, located in North Central Colorado and encompassing all of Jackson County (commonly referred to as North Park), constitutes DAU E-3. This area contains Game Management Units 6, 16, 17, 161, and 171.

North Park, situated on the east side of the Continental Divide, is an intermountain park with elevations ranging from approximately 7,800 to 13,000 feet. This basin represents the headwaters of the North Platte River, including many significant tributaries such as Grizzly Creek, the Illinois River, the Michigan River, the Canadian River, and the North Fork of the North Platte River. North Park is geographically bounded by the Wyoming state line to the north, the Medicine Bow and Never Summer Ranges to the east, the Rabbit Ears Range to the south, and the Park Range to the west. E-3 covers 1.04 million acres (1,618 square miles) and features diverse land ownership, including 35.9% private land, 31.9% USFS, 18.2% BLM, 12% State, and 1.7% USFWS (Arapaho National Wildlife Refuge). E-3 also includes portions of the Mt. Zirkel, Platte River, Rawah, Neota, and Never Summer Wilderness Areas.

During summer months, elk are distributed throughout the entire DAU, with higher densities observed in the periphery of the park in forested and alpine habitats above 8,500 feet. After the first heavy snowfalls in December, most elk migrate to winter range on the valley floor, generally below 8,500 feet. Elk in E-3 are short to mid-distance migrants, covering distances of 5-30 miles between summer and winter ranges. By mid-winter, significant elk congregations are found on winter range near Independence Mountain, Camp Creek, and the Arapaho National Wildlife Refuge. Additionally, a subset of the population likely migrates northward along the North Platte River drainage into Carbon County, Wyoming.

Cattle ranching and hay production have historically been, and continue to be, the primary land uses in North Park. This high-altitude, semi-desert environment supports an agricultural foundation consisting of irrigated hay meadows and grazing pastures. The combination of these features, along with extensive natural riparian areas, results in some of the most productive wildlife habitat in the state.

Following reintroductions from Wyoming and decades of conservative management in the early 20th century, the North Park elk population has rebounded from an effective extirpation in the late 1800s. Currently, the estimated elk population is approximately 5,800 animals (post-hunt 2023), and has fluctuated between 4,000 and 9,000 animals since 1990 (Fig. 1). The sex ratio in E-3 has ranged between 20 - 40 bulls per 100 cows, and the current 3-year average is 15.1 bulls per 100 cows (post-hunt 2023; Fig. 2). Calf:cow ratios during this period have ranged from 30 - 60 calves per 100 cows, with a current ratio of approximately 34 calves per 100 cows (Fig. 3). E-3 is managed as an opportunity DAU, offering over-the-counter (OTC) either sex archery, cow archery, and bull rifle licenses during 2nd and 3rd rifle seasons. All remaining muzzleloader and rifle licenses have limited quotas. Since 1990, total annual harvest from all hunting seasons has ranged between approximately 1,000 – 1,800 elk (Fig.4).

Significant Issues

Interstate Movements

Our annual E-3 population model generated a 2023 post-hunt population of approximately 5,800 elk, and relies heavily on data collected from annual winter classification flights. However, population models assume DAUs are closed populations, with no annual immigration

or emigration from adjacent DAUs. Observations from North Park mule deer (D-3) migration studies have revealed that a significant proportion of North Park mule deer winter in Wyoming, and it may be reasonable to believe a number of North Park elk do too. Despite this potential violation of our modeling assumption, local CPW field staff believe model estimates align well with ground observations.

Hunter Distribution, Overcrowding, and Low Harvest Success

While North Park provides good hunting access to public land, harvest success rates for all seasons in E-3 have consistently remained below those in other opportunity elk DAUs in the Northwest Region. For instance, the 5-year average success rate (2018-2022) across all Northwest Region opportunity elk DAUs was approximately 14.5%, while success rates in E-3 alone have consistently remained below 12%. CPW staff hypothesize lower success rates in North Park are the result of two primary, interrelated factors: high hunter numbers during OTC seasons and private lands functioning as refuges during all hunting seasons.

As an opportunity unit, CPW does not control the total number of hunters, and North Park's proximity to I-80 and the densely populated Front Range makes OTC hunting highly attractive, especially to non-resident hunters from the Midwest. Despite ample public land, elk often inhabit remote, rugged country where many hunters are physically unable or unwilling to travel through. As such, overcrowding may be exacerbated on public land closer to road systems with less rugged terrain, leading to fewer successful hunters.

Additionally, large swaths of private land with suitable habitat adjacent to public land often act as refuges for elk during periods of high human activity, further limiting the success of public land hunters. This refuge effect may be intensified in years with heavy snowfall during rifle seasons when elk move quickly from the high country to the valley floor, which is primarily private land. In an effort to address lower overall harvest success, discourage large numbers of elk from occupying private land, and achieve management objectives, CPW has expanded the private land only (PLO) antlerless season in North Park. As of 2021, a single antlerless PLO license is now valid for all GMUs from August 15 to January 31. Additionally, limited elk hunting opportunities are now available on the Arapaho National Wildlife Refuge.

Habitat Condition

Currently across E-3, both summer and winter range appear to be in good condition. North Park typically receives sufficient moisture at higher elevations, and the Park’s expansive riparian complexes on the valley floor retain water sources year-round. However, the absence of wildfire activity has been identified as a contributing factor to stalled forest succession on summer range. With the exception of the Mullen Fire (GMU 6; 2020), Beaver Creek Fire (GMU 161; 2016), and the Burn Ridge Fire (GMU 161, 2002), no significant, expansive wildfire activity has occurred in the park during the last 20 years. As a result, many large stands of dense, single-age spruce/pine forests exist, and provide little forage utility for elk and other ungulates. While some managed timber harvests and habitat treatments have occurred, additional forest disturbance is likely needed to benefit the long-term net productivity of this landscape.

Game Damage

Game damage caused by elk, particularly winter hay consumption in stackyards, was historically a significant concern in E-3 and influenced previous HMP population objectives. Widespread and consistent damage in the early 2000s led to extensive funding and

construction of 8' tall stackyard fencing projects by CPW and the North Park Habitat Partnership Program (HPP). As a result, elk damage has declined to a more acceptable level. CPW field staff and North Park HPP continue to assist landowners with occasional hay depredation issues, and work with private land hunters to reduce the extent of elk congregating near these areas.

Outdoor Recreation

Another significant management issue for elk in E-3, as well as for elk across their range in the western United States, is outdoor recreation. Over the last decade, outdoor recreation has increased dramatically and can have many impacts including functional loss of adequate habitat, changes in migration patterns, and potentially lower survival rates. In North Park, areas near the North Sand Dunes, Willow Creek Pass, and the Continental Divide Trail have witnessed a large increase in motorized and non-motorized recreation, especially during snow-free months. Disturbance during this time period may be particularly concerning as elk are calving and building fat reserves for winter survival. As such, continued development of recreation infrastructure and activity within the DAU may further reduce habitat capability, and warrants further attention.

Management Objective Recommendations

CPW staff recommend maintaining the current E-3 elk population objective range of 4,000 - 4,500 elk. This goal was first set in 1990 due to game damage concerns and habitat conditions in North Park and has been the desired objective for the last two herd management plans. Efforts to achieve this objective have utilized various harvest strategies, such as either-sex, antlerless, and PLO licenses. However, meeting this management goal has proven challenging. Since 2012, the E-3 population has consistently ranged between 5,000 and 6,500 elk, indicating some resilience to current harvest levels. While the objective may have been reached in 2015 and 2017, the ability of E-3 to bounce back may hinder a stable, long-term presence within the desired range.

CPW staff hypothesize that the biological carrying capacity of E-3 may exceed this population objective range, where annual calf recruitment compensates for any reductions made during harvest. Simultaneously, E-3 may have reached a point of diminishing returns on public licenses, where, under current conditions, additional licenses may not significantly contribute to additional harvest. Challenges associated with hunter access to remote areas of public land exacerbate this issue, although anecdotal trends in increased hunter effort (i.e. venturing further into the backcountry) may mitigate this impediment in the future.

A key factor in CPW's recommended population objective is the current level of social tolerance for maintaining an elk population below 4,500 animals, which has not notably changed over time. Following two public meetings in the North Park community, stakeholders overwhelmingly support retaining the current objective of 4,000 – 4,500 elk. CPW recognizes the importance of local relationships and is committed to collaborating with all stakeholders to meet this objective.
CPW staff also recommend a minor adjustment to E-3's sex ratio objective, increasing the upper limit from 23 bulls per 100 cows to 25 bulls per 100 cows, thus updating our preferred sex ratio objective to 20-25 bulls per 100 cows. While achieving precise sex ratios is difficult in DAUs with OTC licenses, CPW aims to expand this range for a more practical and achievable goal. This slight modification will have minimal effects on CPW's management strategies, including license setting.

Stakeholder Outreach and Input

CPW staff presented proposed herd management objectives to the public and the North Park HPP committee in Walden, CO on October 5th, 2023. CPW staff also presented these objectives to the North Park Stockgrowers Association on December 9th, 2023. We received letters of support for these objectives from the USFS Parks District, BLM Kremmling Field Office, the Arapaho National Wildlife Refuge, and the Jackson County Board of County Commissioners.

Strategies for addressing management issues and achieving objectives

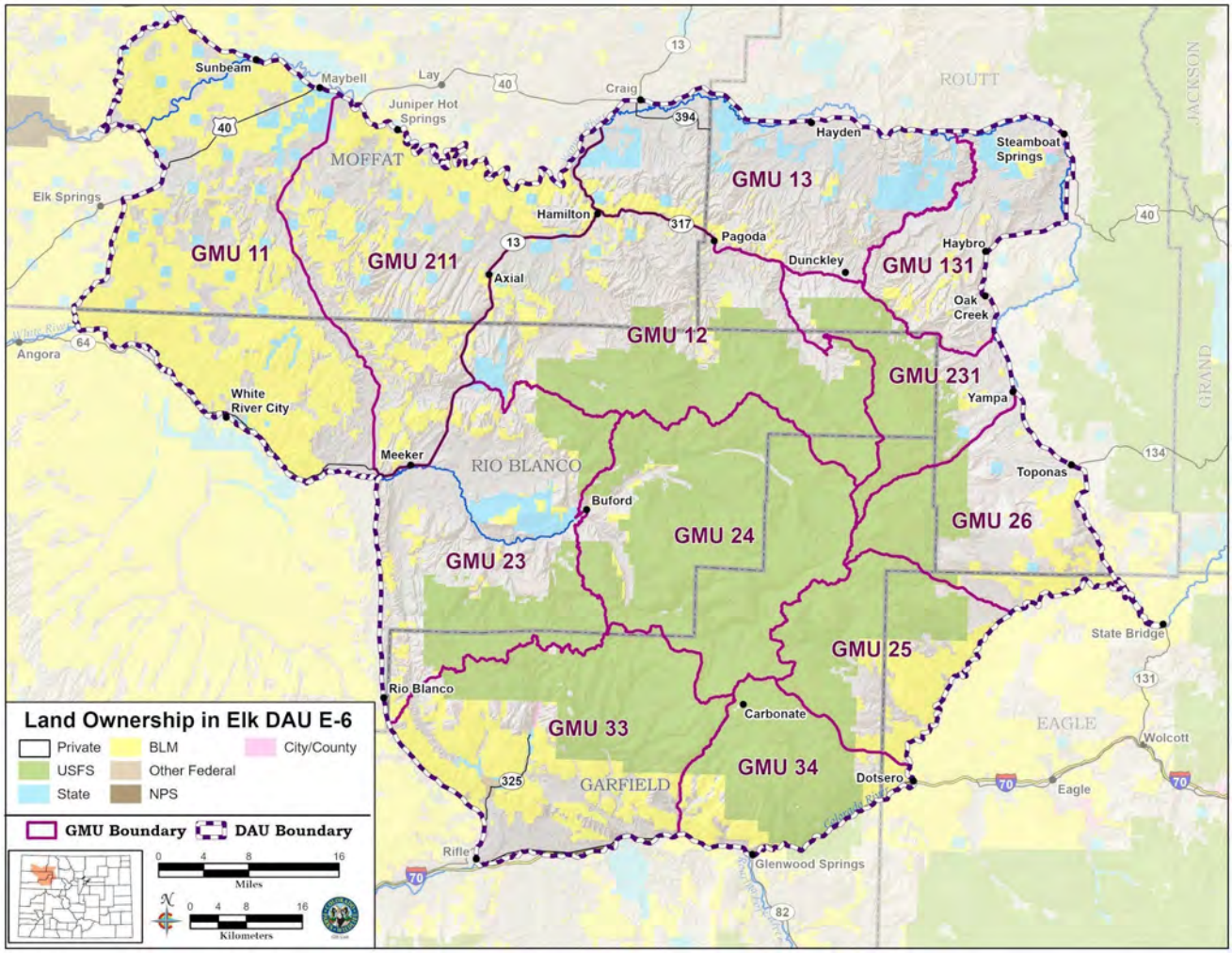
CPW staff will continue to manage E-3 as an opportunity DAU, with OTC archery and rifle opportunities as well as limited muzzleloader and rifle opportunities. To achieve the recommended HMP objectives, CPW will continue to work collaboratively with our partners in the federal land management agencies (USFS, USFWS, and BLM), private landowners, county governments, local municipalities and NGOs to protect and enhance elk habitat. Important habitat conservation methods include forest management treatments (timber harvest and prescribed burns), conservation easements or land acquisitions, maintaining landscape connectivity and movement corridors, and adhering to seasonal recreation closures during calving season and on winter range. In addition, CPW will continue to set licenses annually to provide sufficient elk hunting opportunities while also managing to meet herd objectives. CPW will continue to support an extended, DAU-wide, PLO antlerless season as a tool for redistributing elk during winter months and mitigating potential game damage issues.

WHITE RIVER ELK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-6

Darby Finley, Wildlife Biologist, Meeker

White River Elk Herd (DAU E-6) **Approval Year for last HMP: 2005**	**GMUs: 11, 12, 13, 23, 24, 25, 26, 33, 34, 131, 211 & 231**
Post-hunt population:	
Current (2005 plan) Population Objective:	32,000 – 39,000 elk
Post-hunt 2023 Population Estimate:	30,376 elk
Proposed Population Objective:	**32,000 – 39,000 elk (status quo)**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2005 plan) Sex Ratio Objective:	20-25 bulls per 100 cows
Post-hunt 2023 Sex Ratio:	observed: 20; modeled: 19
Proposed Expected Sex Ratio Objective:	**15-25 bulls per 100 cows (status quo)**



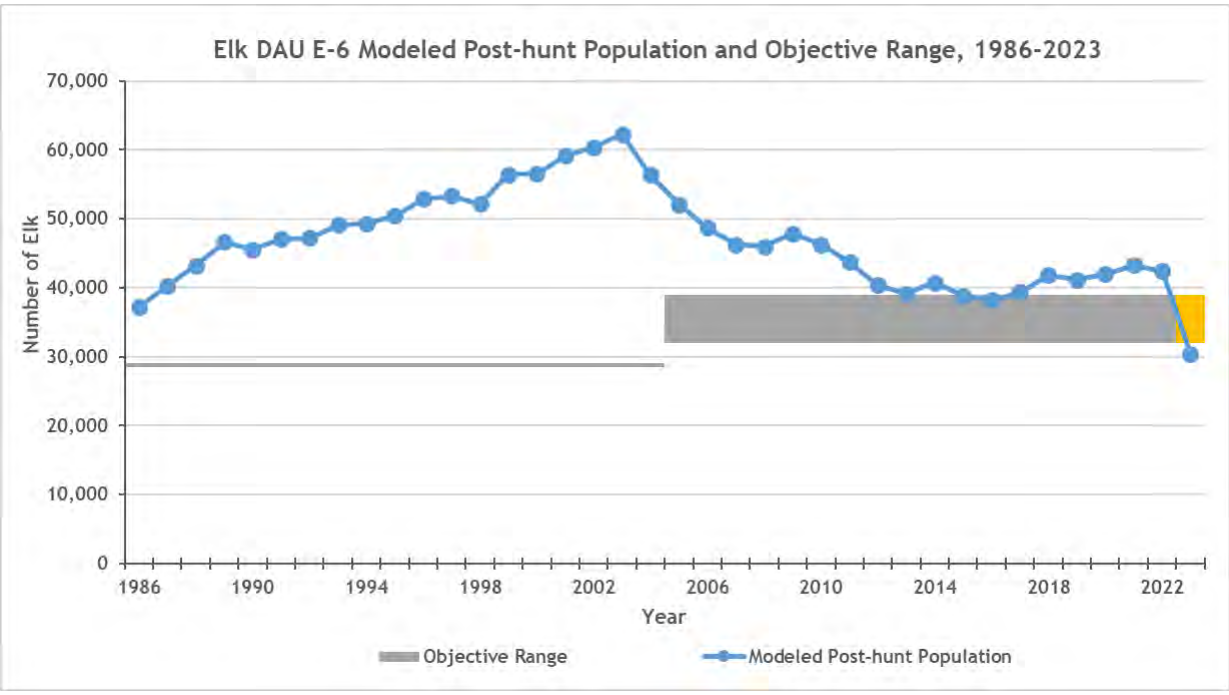


Figure 6-1. Elk DAU E-6 modeled post-hunt population and objective range, years 1986-2023.

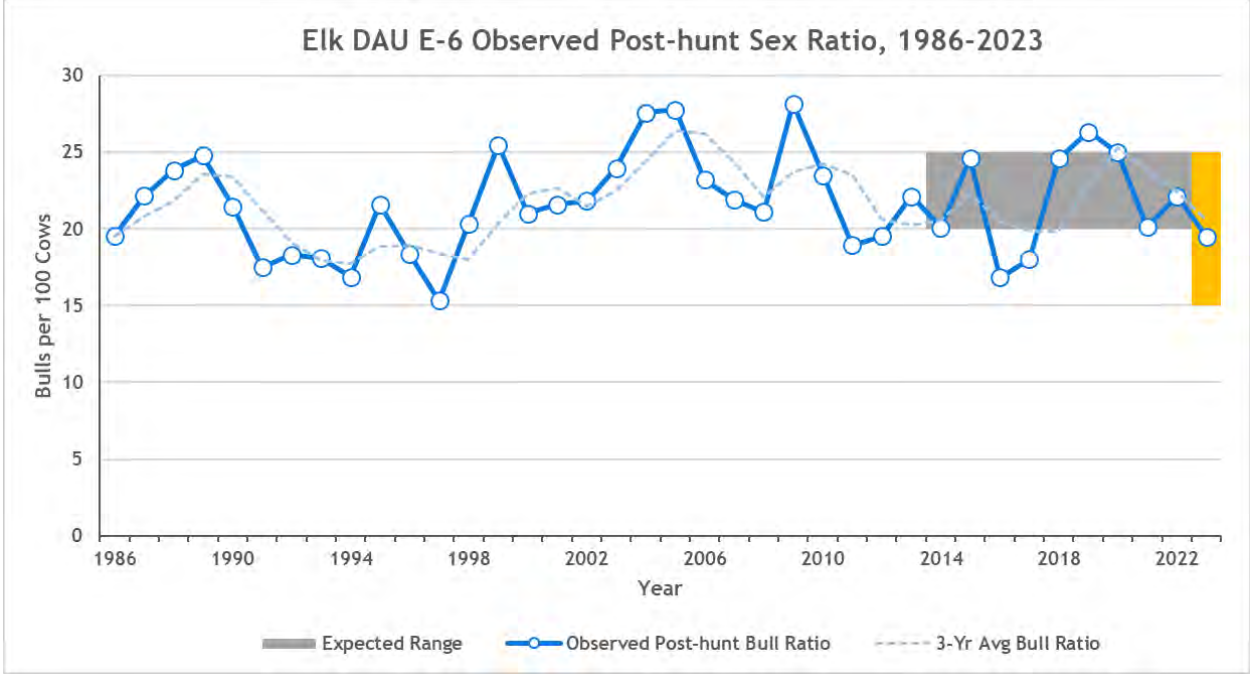


Figure 6-2. Elk DAU E-6 observed post-hunt sex ratio (bulls:100 cows), years 1986-2023.

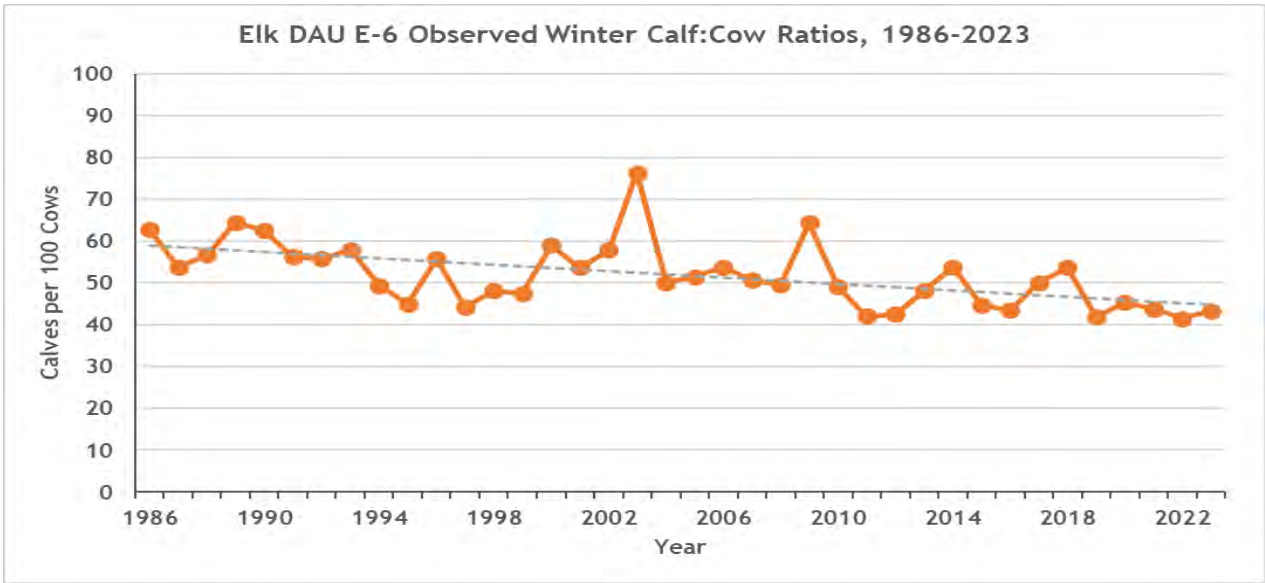


Figure 6-3. Elk DAU E-6 calf production (observed post-hunt calves:100 cows), 1986-2023.

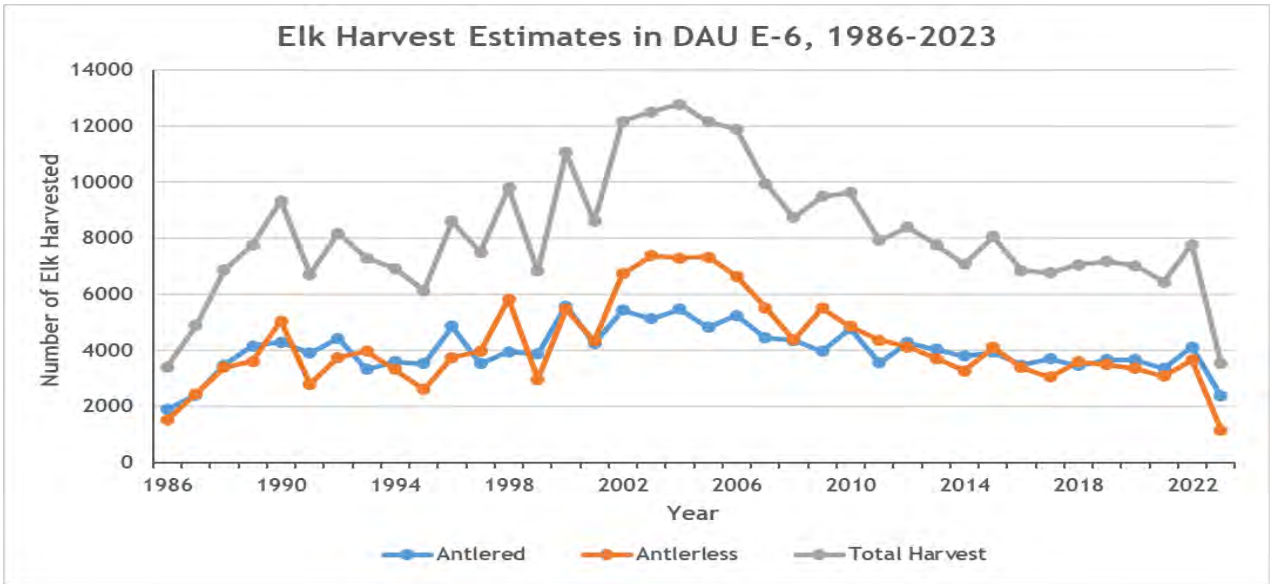


Figure 6-4. Elk harvest estimates in DAU E-6, years 1986-2023.

Background

The White River elk DAU includes portions of Routt, Moffat, Rio Blanco, Garfield, and Eagle counties in northwest Colorado and consists of 12 Game Management Units (GMUs): 11, 211, 12, 13, 131, 231, 23, 24, 25, 26, 33 and 34. The towns of Craig, Steamboat Springs, Yampa, Oak Creek, Glenwood Springs, Rifle, Silt, New Castle, and Meeker can be found on the periphery of the DAU. DAU E-6 covers 4,188 square miles. Ownership patterns vary across elk seasonal ranges within the DAU, comprising private, state and federal lands. Forty-one percent of the DAU is private property. Federal lands within the DAU include 21% BLM and 33% USFS. The remaining 4% is a mix of state and county owned lands. Fifty-eight percent of

the winter range is privately owned, 30% is managed by the BLM, 6% by the USFS, and the remaining 6% is managed by the state.

Elk within E-6 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 elk moving 60 to 70 miles between seasonal ranges while others move relatively short, elevational distances.

Since the mid-1980s the elk population within the E-6 herd steadily grew to its peak level of more than 60,000 elk in the early 2000s. The peak in the elk population coincided with persistent drought conditions leading to shared concerns about range health from public land managers, private landowners, and CPW. Out of concern for long-term range and herd health, CPW made a concerted effort to drastically reduce the E-6 elk population. From 2002 to 2012, hunters harvested more than 64,000 antlerless elk, achieving antlerless harvest rates as high as 23% which reduced the E-6 elk herd by a third. The reduction in the elk population was achieved by liberalizing antlerless elk harvest through limited either-sex elk licenses, list B licenses, and various antlerless hunts outside the regular seasons. Antlerless hunts outside the regular seasons included extended private land only, early, late, damage, and distribution hunts. Since 2012, elk populations in E-6 have stabilized at about 40,000 elk. However, the severe winter of 2022-2023 resulted in significant, unprecedented winter mortality across all age classes causing the elk population to fall below the long-term objective range of 32,000-39,000. It will take time for the elk population to recover from such significant losses.

Fortunately, the E-6 elk herd has proven to be incredibly productive with a long-term stable to slightly declining trend in calf ratios. Calf ratios have averaged 52 calves per 100 cows since 1986. The most recent 5-year average calf ratio has been 43 calves per 100 cows. After implementing the 4-point antler restriction (APR) for bull elk in E-6 in 1985, observed post-hunt bull ratios averaged 20 bulls per 100 cows. Bull ratios within over-the-counter (OTC) units can vary widely. Observed post-hunt bull ratios reached a high of 28 bulls per 100 cows in 2009 and low of 15 bulls per 100 cows in 1997. Factors that play a role in the fluctuation of observed bull ratios are all dependent on elk distribution within the DAU as it relates to weather and timing of weather events during the hunting seasons. The migration of elk in E-6 is driven by weather. Significant snowfall events during the hunting season can trigger elk to migrate to lower elevation, more open winter ranges making them more vulnerable to harvest. When the sequence of these events align, along with OTC licenses, harvest rates on bulls can be higher and can cause ratios to fluctuate. The management strategy of reducing the E-6 elk herd over the past 20 years with liberal antlerless hunting licenses suddenly changed after the 2022-2023 severe winter event, and has now become a strategy of recovering the herd back to within the long-term population objective range.

Significant Issues

Currently, the most immediate issue facing the E-6 elk herd is the recovery of the elk population to within the long-term population objective following the 2022-2023 severe winter. Management concerns over the past two decades primarily revolved around elk distribution and abundance. For example, elk-livestock competition, especially early spring elk use on public lands as elk migrate back to summer ranges, impacts of elk overabundance on drought-stressed winter ranges, the ability to achieve antlerless harvest objectives to address elk abundance, and chronic wasting disease. Through the implementation of various harvest management tools the E-6 elk herd was gradually reduced to levels more in-line with range carrying capacity. Some of the

same elk distribution issues continue to persist even now with lower population levels. Distribution hunts and game damage licenses are being used more strategically to target those specific problem areas.

In more recent years, outdoor recreation has become more of a concern, especially on the White River National Forest in the eastern portions of E-6. Motorized and non-motorized trail development have introduced significant disturbance during the spring calving period and throughout the summer months. The popularity of outdoor recreation has increased the volume of activity associated with these trails exponentially, to the point of displacing wildlife from the areas where trail development is occurring and is likely contributing to lower elk calf recruitment within the subherds that have traditionally utilized these areas for calving.

Rural residential development is a concern across several areas in E-6. Specifically, the Colorado, Yampa, and White River valleys. The rural residential development in these valleys all pose challenges to the E-6 elk herd. These developments fragment the landscape and have introduced disturbances to traditional elk winter ranges and have the potential to influence migration patterns.

The most recent potential land use change in E-6 is the potential of large solar and wind developments. Two large transmission lines are currently being constructed through the western portion of E-2 and northwestern corner of E-6 with completion dates of 2023 and 2025. Along with those transmission lines is the prospect of wind and solar development as two large coal mines are scheduled to cease coal production by 2028 with the closure of the Craig power plant. The extent to which solar and wind development will occur is unknown but these developments have the potential to occupy large tracts of critical winter range and impact big game migration routes.

Another issue of concern for the E-6 herd is the degradation and loss of winter range due to drought, wildfire, and overuse. The cyclical weather pattern of summer drought and above average winter snowfall has been consistent since 2007 resulting in reduced nutritional carrying capacities across winter ranges especially when above average snow depths occur. A series of large-scale wildfires has occurred across winter ranges in the northwestern portion of the E-6. These large-scale fires have converted sagebrush and bitterbrush dominated landscapes to open grasslands. This type conversion has benefitted elk when winter conditions are mild and allow for elk to access the herbaceous forage under the snow. However, when winter conditions are more severe and snow depths are greater, the energy costs are too great to paw through the deep snow and elk are forced to move to brush dominated landscapes where browse is available above the snow line. Oftentimes this puts elk in direct competition with mule deer and pronghorn. This scenario played out in an extreme way during the severe winter of 2022-2023 resulting in significant elk mortality that reduced the E-6 population to historically low levels.

Chronic wasting disease was discovered on the western slope of Colorado in 2002. CWD was first discovered in E-6 through voluntary head submission by hunters that same year. Voluntary head submissions by hunters were used as a surveillance tool to identify the distribution and prevalence of CWD in DAU E-6. Through those surveillance efforts CWD has been detected in all GMUs within the DAU. Prevalence estimates during the early 2000s were less than 1%. After the development of the CWD Response Plan in 2018 a revolving mandatory sampling effort was established for all mule

deer and elk DAUs statewide. In 2021 mandatory CWD testing in E-6 resulted in a prevalence rate of 4.5%. Surveillance efforts will be important in monitoring CWD prevalence levels to ensure appropriate management actions are applied to maintain low CWD prevalence in E-6.

Stakeholder Outreach and Input

Public meetings were held on October 9th and 11th, 2023 in Hayden, CO and Meeker, CO, respectively. Forty-four people attended these meetings. Public comment forms were available for attendees to fill out at the meeting. Two people submitted comment forms after the meetings pertaining to E-6. A QR code was also provided to people that attended the meeting as a way to comment electronically. Eight people commented using the QR code. All of the respondents were Colorado residents.

Nine of 10 (90%) respondents would prefer the herd to be managed for a greater number of elk relative to the current estimated population. One of 10 (10%) respondents preferred to manage for the same number of elk relative to the current estimated population. The impacts of the 2022-2023 severe winter likely influenced how respondents answered this question given the significant elk mortality that occurred resulting in a historically low estimated population.

When asked which management issues most significantly affect the E-6 elk herd respondents selected predation as the number one issue. Second was recreation/trail development and renewable energy development. Drought, severe winter, climate and residential development was the third most selected issue. Habitat quality and quantity as well as roadkill were the fourth most selected issue. Oil and gas development was fifth. Followed by fence entanglement and agricultural game damage. Calf recruitment was the next most selected and lastly, was chronic wasting disease.

Elk Management Issues	Percent of Respondents
Predation	90%
Recreation and Trails	80%
Renewable Energy Development (Wind/Solar)	80%
Drought/Severe Winter/Climate	70%
Residential Development	70%
Habitat Quality/Quantity	60%
Roadkill	60%
Mining, Oil and Gas Development	50%
Fencing (entanglement, movement barriers)	40%

Agricultural Game Damage	40%
Calf Recruitment/Declining Elk Numbers	30%
Chronic Wasting Disease	10%

The following written comments were submitted:

- E-6 I would like to see an objective set at 30,000-35,000 elk with 20-25 bulls per 100 cows. I do not believe the current numbers stated by CPW regarding the population numbers to be correct, our herds are considerably lower than stated. The current late season structure needs to be moved to earlier seasons to help grow our herds back and over-the-counter seasons need to be eliminated and made into draw tags for everyone (resident and non- resident)
- Need to lower the amount of non resident permits
- I would like to see 32,000-38,000 elk in E6 and 20-25 bulls per hundred cows
- I picked wanting to see more elk but I would really like to see a few more bulls per 100 cows
- Like 23 to 33 bulls per 100 cows. I am ok with status quo on overall population as long as we have enough feed to support them. I hunted the 2023 1st rifle season and feel like in the areas I was hunting was short on bulls and I have noticed over the last couple of seasons bull numbers seem to be down some what in numbers and quality in the areas of public land I hunt on . I don't know if that's a result of record numbers of otc hunting or I just suck at it.
- 38,000 - 42,000 would be good

In addition to the comment forms available through the local public meetings, opt-in big game hunter attitude surveys have been conducted the past two years while conducting the big game harvest survey. These surveys have allowed CPW to gather input from hunters on an annual basis. Based on survey results, the majority of respondents were satisfied with their overall hunting experience in E-6. However, hunters were split 50/50 when it came to the overall number of elk they saw with an almost equal percentage of hunters satisfied as dissatisfied. Respondents were more dissatisfied than satisfied with the total number of bulls they saw while hunting in E-6. Although the majority of hunters responded being dissatisfied with the number of bulls they saw, more than half responded they would prefer to hunt more often, even if it meant fewer mature bulls. Similar to the public meetings held after the 2022-2023 severe winter, where respondents selected that they would like to see a greater number of elk, respondents to the 2021 and 2022 big game harvest survey responded to wanting elk numbers to stay the same or a slight to moderate increase. Based on the responses to both surveys it appears there is support for the current population objective range of 32,000-39,000 elk or potential slight increase to the objective.

Overall, the majority of hunters responded to not feeling crowded by other hunters when hunting in E-6 and an overwhelming majority responded to not feeling crowded by non-hunters.

Management Alternatives

There are three basic management strategies that CPW is currently using for elk DAUs. Ideally, all units within a DAU are managed using the same strategy. These basic management strategies consider various types of hunting opportunities including ease of participation, quality of hunting experience, level of success rates, and opportunity to harvest a quality male animal.

Methods to achieve these various opportunities include offering readily available licenses, spatial and temporal distribution of hunters and license limitations. These different management strategies afford various types of hunting opportunities and are often mutually exclusive and therefore must be balanced among the desires of hunters, landowners, and economic interests.

The current management strategy for DAU E-6 is to maximize hunter opportunity and local economic benefits and minimize landowner conflicts. This management strategy is characterized by a large number of bull hunters, low hunting success for bulls, and high annual removal of 2+ year old bulls resulting in post-hunt bull:cow ratios ranging from 15-20 bulls:100 cows. Archery and muzzleloader seasons are limited on the National Forest to lessen the effects of hunters moving elk off of public lands prior to the 1st rifle season. Rifle licenses during the 1st season are limited and the season is managed for a quality hunting experience. Antlerless elk are limited and issued in numbers necessary to achieve population objectives, bull licenses during 2nd and 3rd rifle seasons are unlimited in number and sold over-the-counter (OTC). Licenses for the 4th season are limited to focus harvest efforts on cow elk.

CPW recommends maintaining this management strategy. However, due to the impacts from the 2022-2023 severe winter, a conservative approach with antlerless licenses will be needed to recover the population back to within the desired objective range of 32,000-39,000 elk.

Preferred Post-hunt Population Objective

32,000 – 39,000 elk

This objective range seeks to recover the herd back to population levels prior to the 2022-2023 winter. The population objective range is consistent with public desires and allows the herd to be managed at a population level in-line with carrying capacities given variable range conditions.

Preferred Post-hunt bull ratio objective

15 – 25 bulls per 100 cows

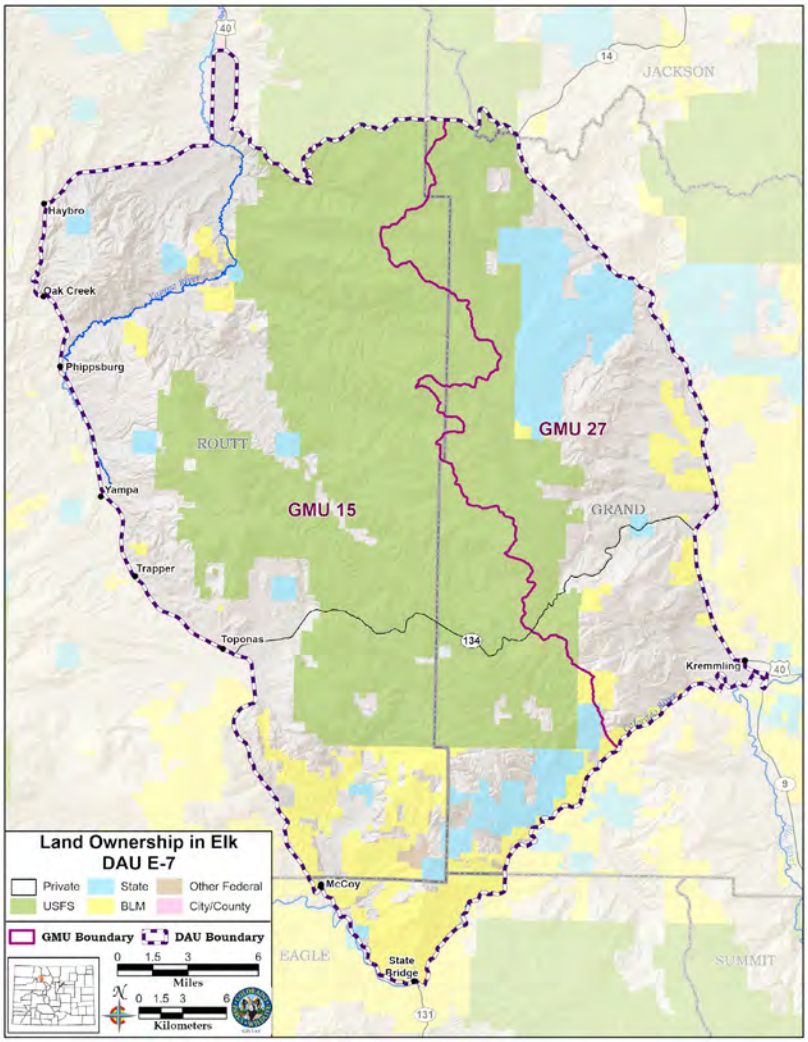
Although bull:cow ratios in E-6 have gone as high as 28 bulls:100 cows, they are generally within or near the sex ratio objective range of 15-25 bulls:100 cows, which reflects the over-the-counter management strategy employed in E-6.

GORE PASS Elk HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-07

Eric VanNatta, Wildlife Biologist, Steamboat Springs

Gore Pass Elk Herd (DAU E-07) **Approval Year for last HMP: 2020**	**GMUs: 15 & 27**
Post-hunt population:	
Current (2020 plan) Population Objective:	4,000 – 5,000 elk
Post-hunt 2023 Population Estimate:	3,759 elk
Extension Population Objective:	**4,000 – 5,000 elk**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2020 plan) Sex Ratio Objective:	24 - 28 bulls per 100 cows
2023 3-year Average of Observed Sex Ratio:	25 bulls per 100 cows
Extension Expected Sex Ratio Objective:	**24 - 28 bulls per 100 cows**



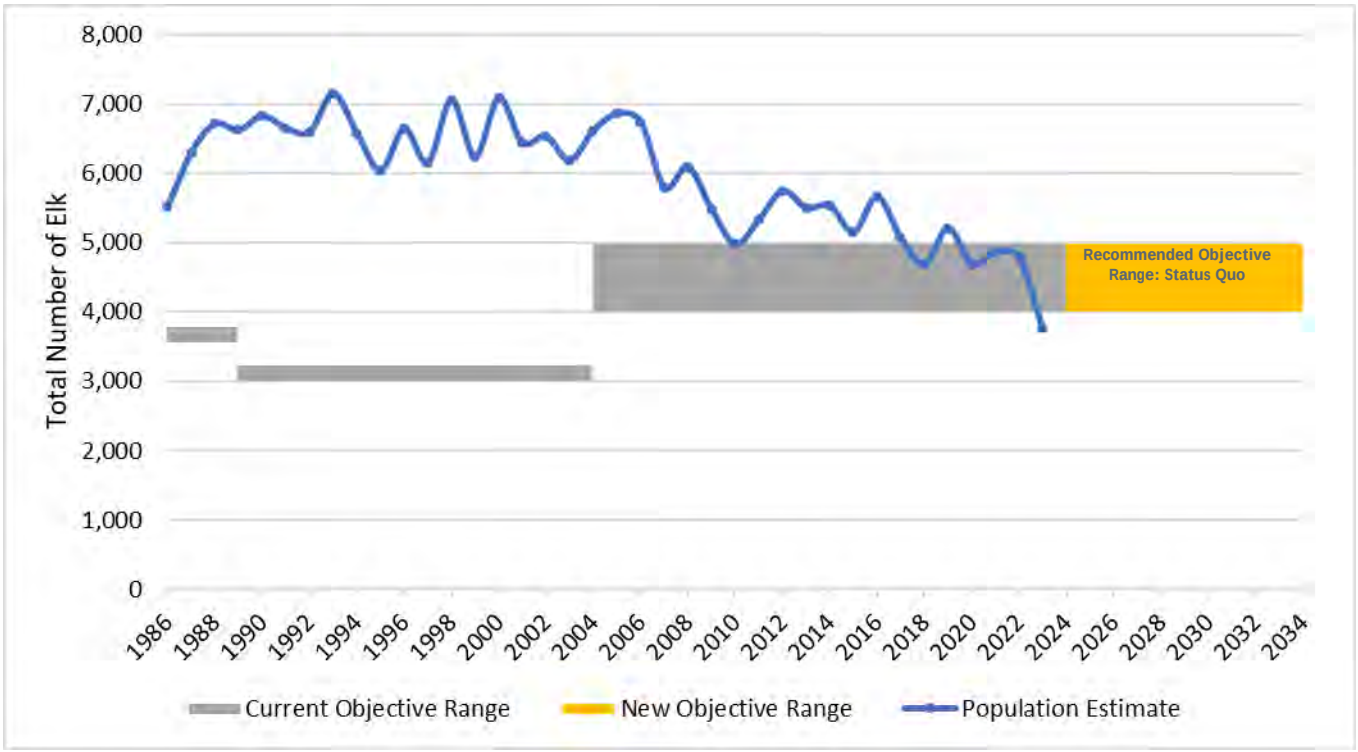


Figure 7-1. E-7 modeled post-hunt population and historic objective ranges, 1986 – 2023.

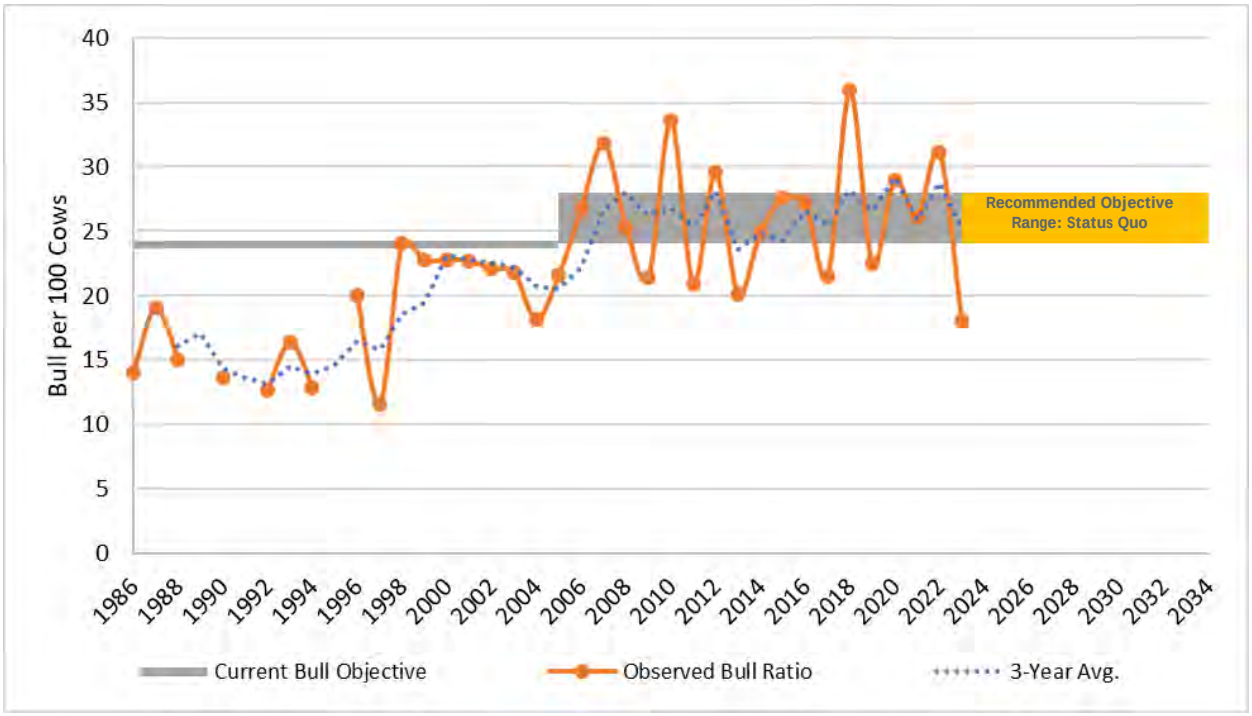


Figure 7-2. E-7 observed post-hunt sex ratio (bulls per 100 cows), years 1986 - 2023.

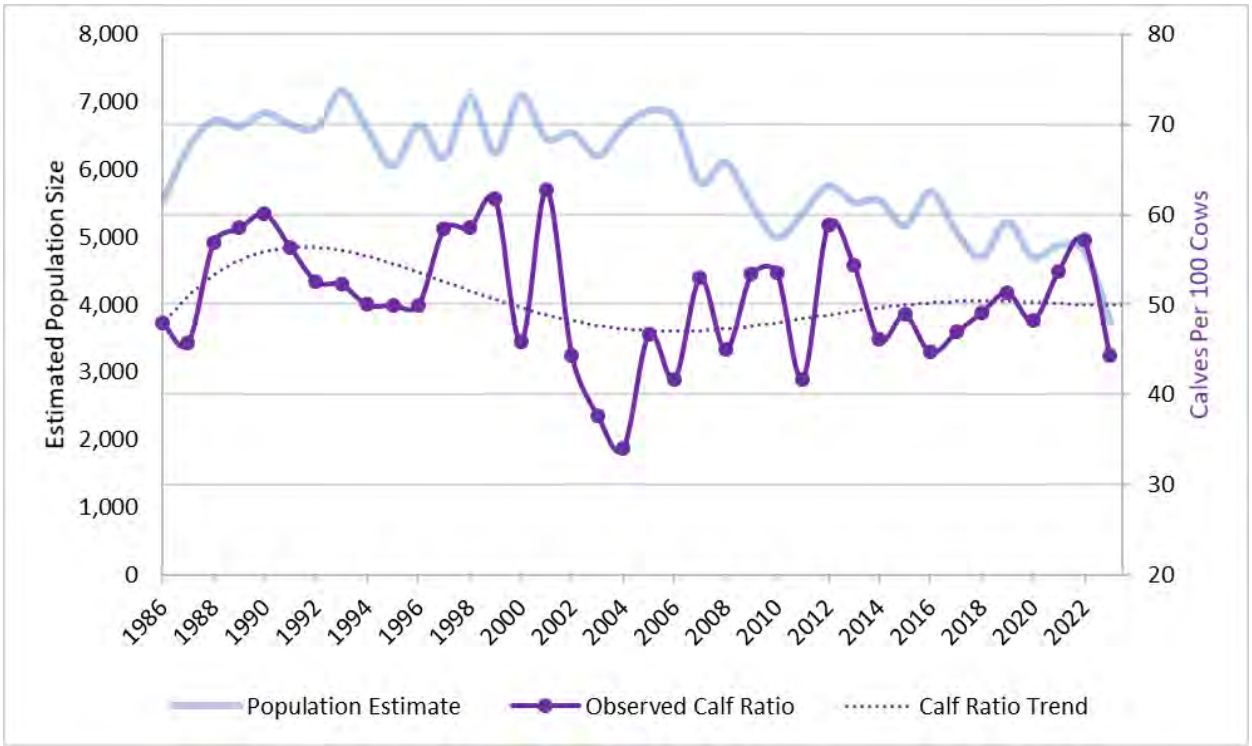


Figure 7-3. E-7 calf production (observed post-hunt calves per 100 cows) compared to E-7 population estimates, years 1986 - 2023.

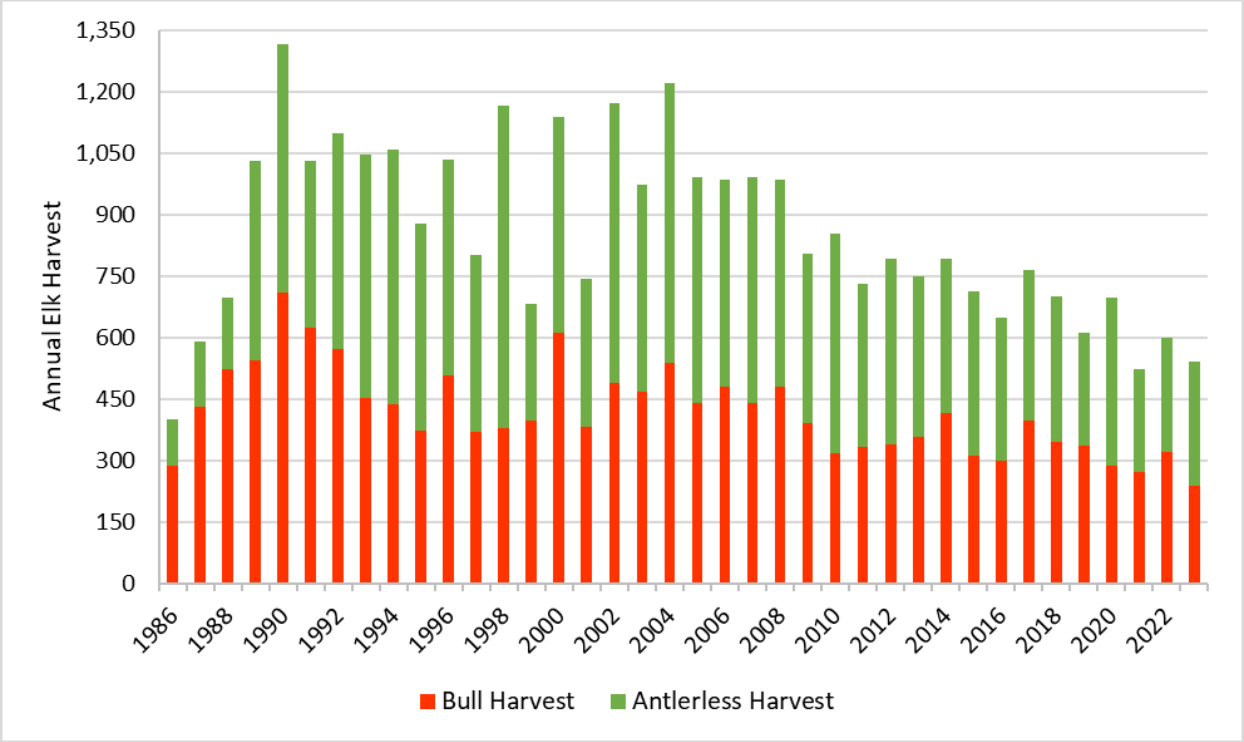


Figure 7-4. Elk harvest estimates in E-7, years 1986 - 2023. Average across years: 417 bulls and 439 antlerless elk (includes cows and calves).

Background Information

The Gore Pass Elk Herd, encompassing parts of Routt and Grand counties in Northwest Colorado, constitutes DAU E-7. This area contains Game Management Units 15 and 27.

In the Northern portion of the DAU, E-7 spans Gore Divide between the Yampa River (GMU 15) and Muddy Creek (GMU 27) drainages. To the south, Canyon Creek divides GMU 27 and GMU 15. E-7 is bounded on the north and east by U.S. Highway 40 from Rabbit Ears Pass to Kremmling, on the south by the Colorado River and Colorado Highway 9, and on the west by Colorado Highway 131 from Steamboat Springs to State Bridge. Elevations range from 6,744 feet at State Bridge to 10,811 feet at Red Dirt Peak. Of the 689 square miles in E-7, approximately 37% (254 mi^2) is privately owned, 47% (322 mi^2) is managed by the US Forest Service (USFS; Routt National Forest), 9% (64 mi^2) is managed by the Bureau of Land Management (BLM), 5% (36 mi^2) is managed by the State Land Board (SLB), and 2% (13 mi^2) is managed by Colorado Parks and Wildlife (CPW). Sarvis Creek Wilderness Area also comprises 21% (74 square miles) of the National Forest land in E-7.

During the summer months, elk are widely distributed throughout E-7, although fewer animals are found along the eastern and southern edges of the unit. High elevation Douglas fir, aspen, and aspen/conifer stands, interspersed with sagebrush mixed grasslands, provide excellent forage and cover during summer and fall. In the winter, elk in this unit typically migrate short distances to elevations below 9,000 feet to avoid heavy snowpack in the mountains. In the northern portion of GMU 15, elk migrate into Pleasant Valley, which extends between Steamboat Springs and Lake Catamount. Further south, larger congregations of elk winter on the south facing slopes of Thorpe and Blacktail Mountains near Stagecoach Reservoir, as well as along Green Ridge from Oak Creek to Toponas. In the southernmost portion of GMU 15, elk winter from Toponas to State Bridge, including Radium State Wildlife Area. In GMU 27, most elk will winter on the east side of the unit from Whiteley Peak down to the Colorado River near Kremmling. While there is some inter-DAU exchange of elk between E-7 and E-8 along U.S. Highway 40, and between E-7 and E-12 along the Colorado River near Radium, the majority of animals remain within their respective DAUs.

Agriculture, in the form of hay and livestock production, is the primary private land use in the two mountain valleys in this DAU. However, recreation and tourism are rapidly becoming the economic emphasis in local communities, especially in the area around Steamboat Springs. The main focus of winter recreation is skiing, with widespread camping, and mountain biking activities occurring in the summer. However, all forms of summer and winter recreation are expanding rapidly, including hiking and motorized recreation. Hunting is still an important land use, with big game hunting bringing in the largest number of hunters. Logging and timber harvest are historically important uses of forested land.

The population distribution of elk E-7 is weighted more heavily on the western half of the DAU, with approximately 75% of the population in GMU 15 and 25% in GMU 27. The E-7 elk population reached its peak at over 7,100 individuals in 1993. In 1998, unlimited either-sex licenses were offered in an effort to mitigate the effects of severe drought, and the population stabilized around 5,000 – 6,000 animals. Cow harvest has also increased with the implementation of either-sex licenses that have replaced bull specific tags for many limited license hunt codes. Since 2011, E-7 has been at or just above its population objective range of 4,000 - 5,000 individuals, although the severe winter of 2022-2023 recently reduced this herd

below objective. As of 2024, the E-7 population estimate (post-hunt 2023) is approximately 3,800 elk (Figure 7-1).

In 1985, CPW instituted an antler point restriction on elk to increase both bull age class and the overall number of bulls in the population. The sex ratio (bulls/100 cows; i.e. bull ratio) has increased substantially since that regulation was put into place. In 2018, the bull ratio in E-7 peaked with approximately 36 bulls/100 cows observed during post-season classification flights. For the last 20 years, the observed sex ratio has fluctuated annually between 20 and 30 bulls/100 cows, with an average of 24 bulls/100 cows. Currently, the 3-year average observed bull ratio in E-7 is approximately 25 bulls/100 cows (Figure 7-2).

The long-term calf:cow ratio in E-7 has been declining slightly. The 1986-2000 calf:cow ratio averaged 54 calves/100 cows, and the 2001-2023 ratio has averaged 49 calves/100 cows. In 2004, E-7 saw its lowest calf: cow ratio at 34 calves/100 cows. Since then recruitment has increased and has been fluctuating between 40-60 calves/100 cows. Currently, the 3-year average calf:cow ratio is approximately 51 calves/100 cows, and this ratio, an indicator of herd productivity, appears relatively stable (Figure 7-3).

Since a record harvest of approximately 1,200 elk in 1990, annual harvest has gradually decreased. From 1986, sex-specific harvest has averaged 422 bulls and 442 antlerless elk. As of 2023, the past 5 years saw an average harvest of 289 bulls and 305 antlerless elk (Figure 7-4). Although the number of limited licenses increased slightly during this time, the number of elk hunters in E-7 has remained stable at around 5,900 licensed hunters each year. The decline in harvest is likely influenced by a shift in hunter interest from rifle hunting to archery hunting, with the proportion of rifle hunters decreasing from 78% to 67% and archery hunters increasing from 16% to 27% from 2000 to 2020. Given the inherently lower success rates with archery equipment, this change in hunter pursuit likely contributes to the decreased harvest.

Significant Issues

Residential Development and Recreation

Much of the private land in GMU 15 is undergoing a transformation, shifting away from family-operated livestock ranches towards housing developments or part-time ranchettes. This shift is likely driven by the proximity of ski resort communities, including Steamboat Springs and the Vail-Eagle Valley. From a wildlife perspective, the transition from passive agriculture (such as pastoralism and hay farming) to widespread housing development, which include roads and other infrastructure, results in a reduction of habitat for many species. Consequently, this process has led to habitat compression, where animals are confined to smaller patches of habitat, raising concerns about compromised forage resources and a subsequent reduction in the biological carrying capacity for elk.

In addition to local population growth, tourism has steadily increased in recent years. This trend, characteristic of many mountain communities, continues to expand year-round, and the duration of quiet periods between winter and summer (i.e. “mud season”) appears to be decreasing. Public demand for increased winter and summer recreation is likely adversely affecting the distribution and population resiliency of wild animals. As we anticipate sustained growth in local tourism and recreation, the effects of additional human activity on the landscape to wildlife are expected to intensify over time.

Balancing Hunting Opportunity with Agricultural Conflict

The ongoing challenge of human-wildlife conflicts persists in the management of wild animal populations. While some landowners appreciate the presence of elk on their property, desiring more for hunting or wildlife viewing opportunities, others argue that the elk population is too large and should be reduced. The majority of the E-7 winter range is located on private land, posing challenges with game damage conflicts as elk tend to gather near haystacks, consuming and damaging hay intended for private use. Over the past decade, CPW has disbursed over $30,000 in game damage claims, averaging around $2,500 annually. However, recent wildfire activity and mountain pine beetle outbreaks on USFS lands have set back succession, resulting in improvements in habitat conditions in E-7. Presently, CPW believes habitat conditions adequately support the current elk population, and conflicts with agricultural operations on elk winter range are limited.

On USFS land, the Yampa and Hahns Peak/Bears Ears Districts oversee livestock grazing allotments on the Routt/Medicine Bow National Forest. The grazing season typically spans from July 1 to September 10, and as of 2018, the USFS allocates 2,224 AUMs for sheep and 9,251 AUMs for cattle. Rangeland specialists from the Forest Service in Yampa and Steamboat Springs currently report no conflicts between elk and livestock or any resource damage from elk in this part of the National Forest.

Management Objective Recommendations

CPW recommends maintaining both the current population objective range of 4,000 – 5,000 elk, and the current sex ratio objective range of 24 – 28 bulls per 100 cows, which were established in the recent 2020 draft herd management plan. This population objective is believed to be a reasonable balance between biological carrying capacity and social tolerance under current habitat and land use conditions. Although managing for a specific sex ratio objective is challenging in DAUs with OTC licensing strategies (i.e. opportunity units), CPW has been able to meet this objective most years since 2006. Comments from public surveys and in-person conversations with field staff generally support keeping this objective status quo. Under current licensing strategies and allocations, the population and sex ratio of E-7 appears stable.

Stakeholder Outreach and Input

This herd management plan was last updated in 2020. Before receiving approval from the CPW Commission, an initial public survey was conducted in August 2018, engaging landowners, hunters, and other stakeholders in E-7. This survey received responses from five stakeholders, with the majority expressing support for the recommended population and sex ratio objectives. Additionally, a 30-day public comment period was administered on the CPW website. CPW also distributed a draft of this HMP to the Upper Yampa and Middle Park HPP Committees, the USFS Yampa District, and Colorado State Land Board Personnel, all of whom provided letters of support for the proposed herd management objectives.

Strategies for addressing management issues and achieving objectives

CPW employs a multifaceted approach to manage DAU E-7 as an opportunity DAU, offering over-the-counter (OTC) archery and rifle opportunities, as well as limited muzzleloader and rifle opportunities. In pursuit of the newly proposed herd management plan objectives, CPW is committed to collaborative efforts with federal land management agencies (USFS and BLM), private landowners, county governments, local municipalities, and NGOs. Our agency's focus

is on safeguarding and enhancing elk habitat through various conservation methods, including forest management treatments such as timber harvest and prescribed burns, conservation easements or land acquisitions, maintaining landscape connectivity and movement corridors, and implementing seasonal recreation closures on winter range. Simultaneously, CPW will annually set licenses to ensure sufficient elk hunting opportunities while managing towards herd objectives. PLO antlerless seasons will be used as a tool to redistribute elk during winter months and to address game damage issues.

The existing herd management objectives, which align with the 2024 recommended objectives, have successfully struck a balance between game damage and hunting opportunity. Over the years, PLO tags and extended seasons have proven effective in mitigating elk damage on private lands. This approach will be sustained as needed to protect landowners who provide critical winter range for elk and year-round security cover from human disturbance on public lands.

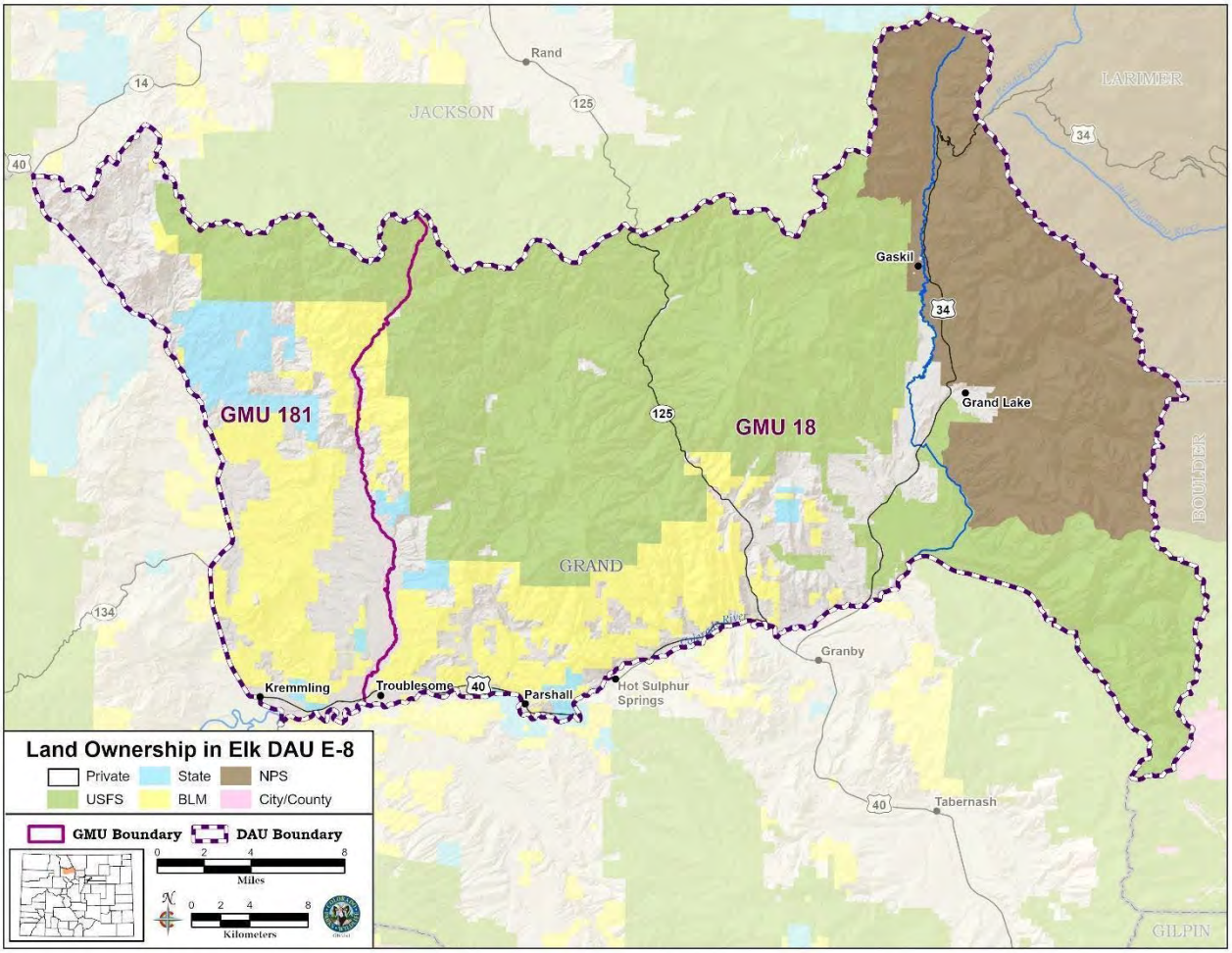
CPW has strategically acquired land and holds conservation easements on key winter range areas beneficial to elk in E-7. Properties such as the Radium State Wildlife Area (SWA) on the Colorado River, the Leroux property with a perpetual conservation easement adjacent to Radium SWA, and the Hill Ranch with a perpetual conservation easement in GMU 27, contribute significantly to big game winter range. The Adams SWA on Blacktail Mountain, near Stagecoach Reservoir, was procured for elk winter range in a rapidly developing area south of Steamboat Springs. Adjacent to Adams SWA, CPW received a perpetual conservation easement from the Upper Yampa Water Conservation District. The Sarvis Creek SWA, near Sarvis Creek, Green Creek, and Morrison Creek drainages, along with Routt County's *Sarvis Creek Area Plan*, play crucial roles in ensuring adequate year-round habitat for elk populations in DAU E-7. To address potential future development threats near Thorpe Mountain, Green Ridge, and Morrison Creek, CPW will actively engage with Routt County planning staff to safeguard these vital winter ranges.

TROUBLESOME Elk HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-08

Elissa Slezak, Wildlife Biologist, Hot Sulphur Springs

Troublesome Elk Herd (DAU E-8) **Approval Year for last HMP: 2010**	**GMUs: 18 & 181**
Post-hunt population:	
Current (2010 plan) Population Objective:	3,600 – 4,300 elk
Post-hunt 2023 Population Estimate:	3,611 elk
Preferred Population Objective:	**3,400 - 4,400 elk**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2010 plan) Sex Ratio Objective:	21-26 bulls per 100 cows
Post-hunt 2023 Sex Ratio:	observed: 26; modeled: 41
Preferred Expected Sex Ratio Objective:	**23-29 bulls per 100 cows**



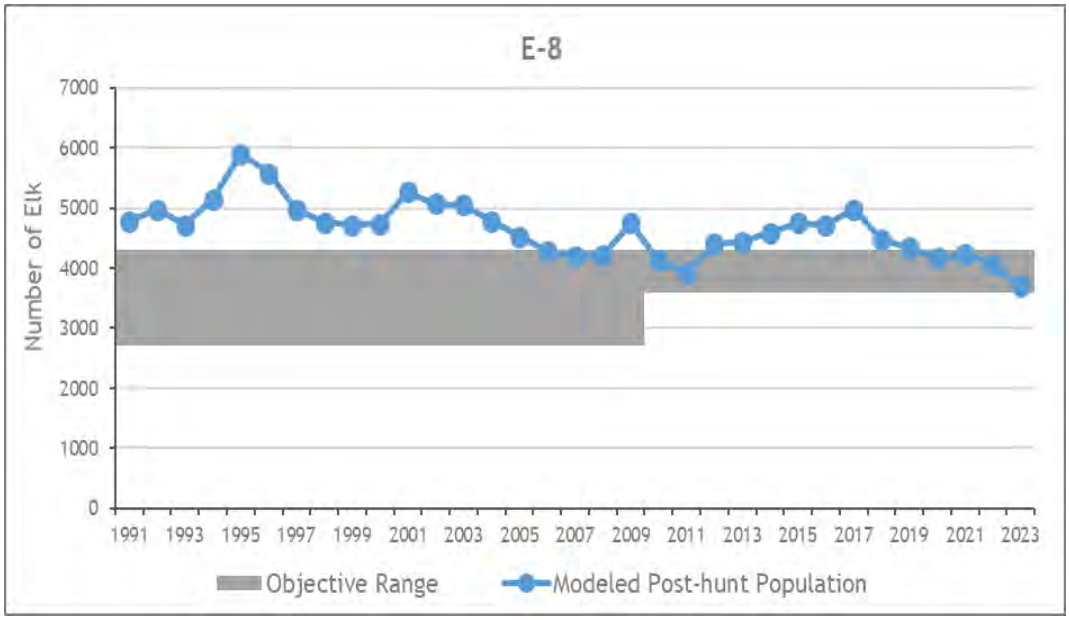


Figure 8-1. Elk DAU E-8 modeled post-hunt population and objective range, years 1991-2023.

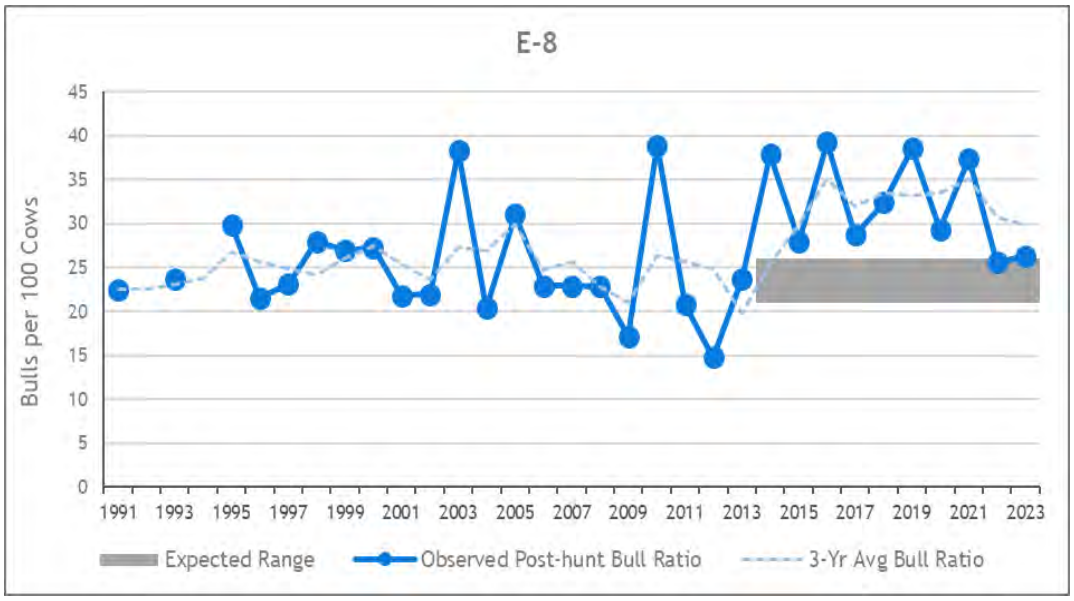


Figure 8-2. Elk DAU E-8 observed post-hunt sex ratio (bulls:100 cows), years 1991-2023.

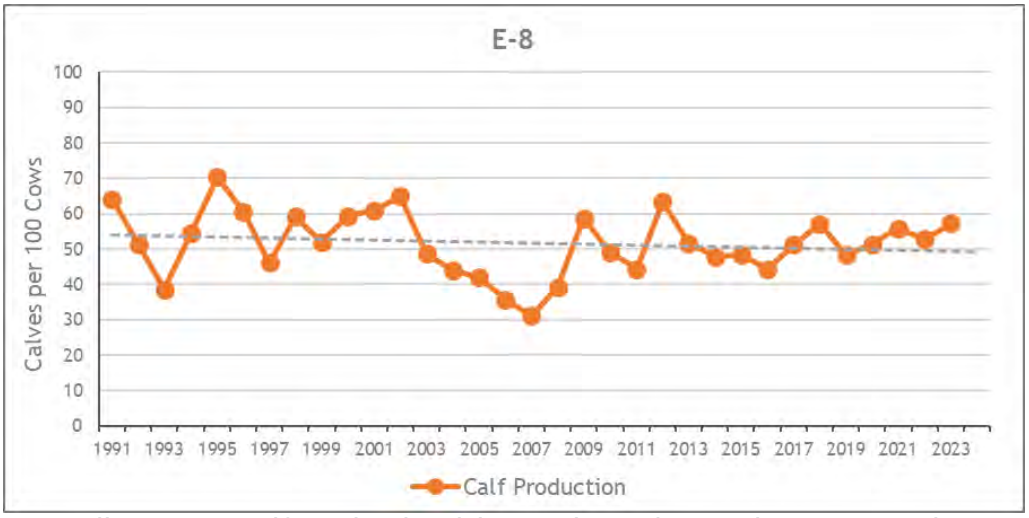


Figure 8-3. Elk DAU E-8 calf production (observed post-hunt calves:100 cows), 1991-2023.

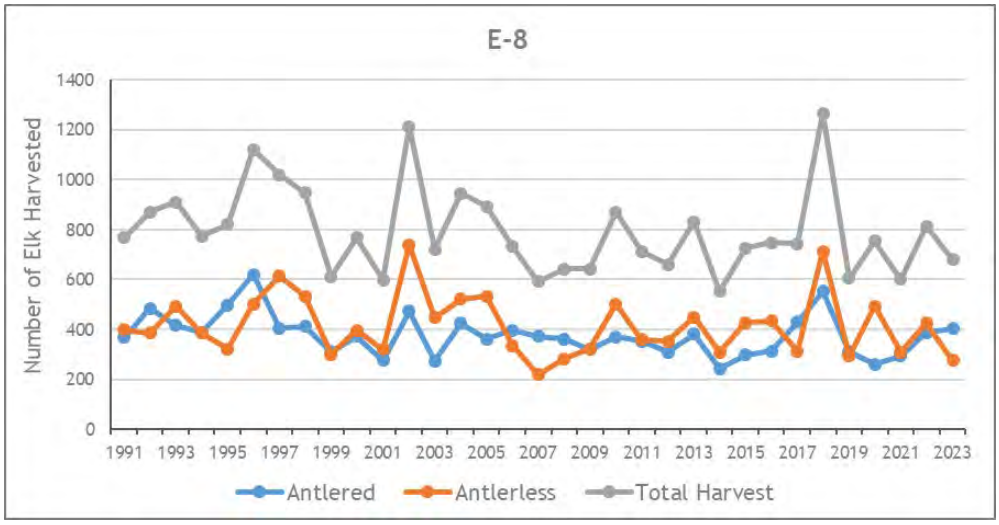


Figure 8-4. Elk harvest estimates in E-8, years 1991-2023.

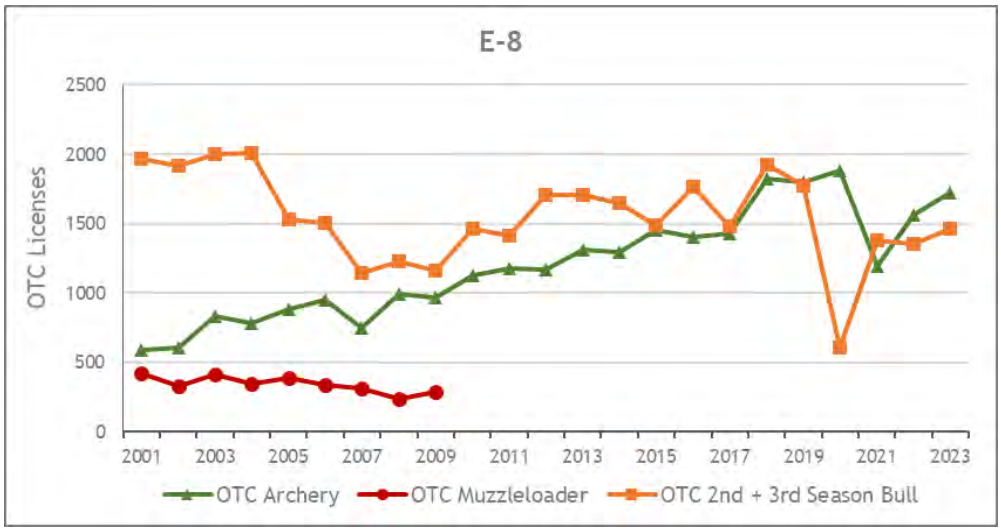


Figure 8-5. Over-the-counter (OTC) license numbers in E-8, years 1991-2023.

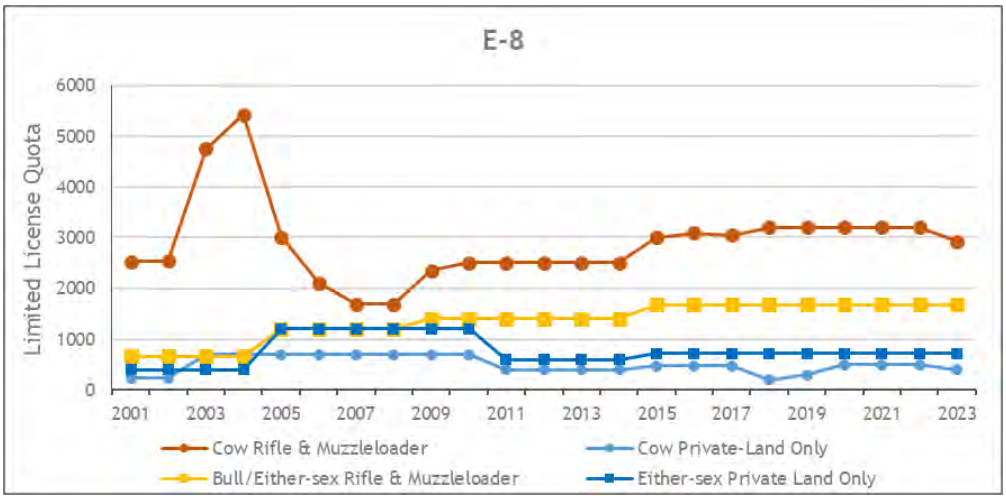


Figure 8-6. Limited license numbers in E-8, years 1991-2023.

Description

The Troublesome Elk DAU (E-8) is located west of the Continental Divide in north-central Colorado and consists of GMUs 18 and 181. It is bounded on the north and east by the Continental Divide and Rocky Mountain National Park (RMNP), on the south by Arapahoe Creek, Lake Granby and the Colorado River, and on the west by US Highway 40. The DAU encompasses slightly less than half of Grand County. Major towns include Kremmling and Grand Lake, and the northern portions of Hot Sulphur Springs and Granby. Elevations range from 7,300 feet along the valley floor in Kremmling to over 13,000 feet along the Continental Divide; highest point being Arapaho Peak at 13,502 feet in the southeast corner of the DAU. E-8 contains the headwaters of the Colorado River; other major drainages include Muddy Creek, Troublesome Creek, Antelope Creek, Corral Creek, Ute Bill Creek, Sheriff Creek, Drowsey Water Creek, and Willow Creek. E-8 covers approximately 529,395 acres (827 square miles, and land ownership is 45% USFS, 18% NPS, 18% Private, 15.5% BLM, and 3.5% State Land Board and CPW (State Wildlife Areas).

Climate

The Middle Park is a high elevation inter-mountain park surrounded by high mountain ranges. The climate is generally dry and cold; however, persistent drought conditions have contributed to significant wildfires in recent years. The most notable in E-8 was the East Troublesome Fire that burned nearly 200,000 acres in 2020. Extreme winter temperature inversions with average nighttime low temperatures between -20º to -30ºF are common, with records as low as -64º F. The growing season is extremely short and variable. Summer daytime temperatures at lower elevations can reach into the 90º F range; however, valleys become significantly cooler than uplands during the night as colder air settles.

Precipitation

Middle Park typically gets between 11 inches of moisture per year in Kremmling to 20 inches per year in Grand Lake, with the majority falling as snow between October and April. Winter

snow accumulations of 30" are typical at 9,000 to 10,000 feet, and at higher elevations more than 20 feet of snow can fall over the course of winter.

Vegetation

Vegetation in Middle Park can be categorized into five broad types: cropland; wetland/riparian; rangeland (sagebrush steppe and mountain shrub); forestland (piñon-juniper, lodgepole pine, aspen, and spruce-fir); and alpine tundra.

Grazing

The BLM Kremmling Field Office administers 61 grazing allotments on public land within E-8, totaling almost 98,000 acres; 57 of the allotments are currently active. The USFS Sulphur Ranger District administers three livestock grazing allotments on National Forest land within E-8, totaling approximately 52,000 acres. Currently, only one USFS cattle grazing allotment is active on approximately 500 acres.

Seasonal Ranges

Elk select high quality forage habitat adjacent to cover and water for calving in the spring, typically from mid-May through early July. Less than 9% of the DAU is considered suitable production habitat for elk to birth and rear their calves. During the summer months, elk are generally at higher elevations and concentrate in areas of high quality forage and low disturbance, avoiding areas of high human activity, including trail networks and dense human developments. Less than 12% of the DAU is considered to be intact elk summer concentration habitat. Suitable, undisturbed calving and summer habitats are limiting factors for elk in this DAU.

In the fall, elk migrate down to lower elevations as snow accumulates, seeking south facing slopes or wind-blown ridges where the snow dissipates more quickly. Winter habitats are the most limiting habitats for elk within this DAU and much of the available winter range in E-8 occurs on private lands and BLM. While there are some relatively large contiguous blocks of suitable winter habitat in E-8, many of these areas are in poor condition due to ongoing drought, extensive downfall, senescence and succession of plant communities. While approximately 38% of the DAU has been historically considered to be overall winter range for elk, less than 14% provides winter concentration habitat, and only 10% is considered severe winter range These habitats are critical to elk survival during average to severe winters, when snow depth is higher and temperatures are lower than on average. During recorded severe winters over the past forty years including 1983-84, 1992-1993, 2007-2008, 2013-14, 2015-16, 2021-2022, & 2022-2023, estimated winter calf survival rates were significantly lower than average. It is notable that 4 of the 7 most severe winters since 1980 have occurred within the past 10 years.

History

Since 1991, the average population of E-8 has fluctuated between 3,900-5,900 animals. The first E-8 management plans in 1991 and 1999 set a population objective of 2,700, when elk numbers were significantly higher and underestimated. Starting in 2000, new modeling techniques, consistent aerial classifications, and more accurate survival rate estimation from

research projects provided improved data, and the most recent 2010 management plan adjusted the population objective to 3,600-4,300 elk, closer to the estimated population size.

The post-season population in E-8 reached a high of approximately 6,000 elk in 1995, and fluctuated between 4,000 and 5,300 elk through 2018. Antlerless harvest, including a late season and extended Private-Land Only (PLO) season, has been utilized to reduce the population and it fell within the objective range in 2019. Numbers have remained at approximately 4,000 elk over the past 5 years, with a current post-hunt estimate of 4,064 (Figure 1).

Both antlerless and either-sex (ES) limited licenses are available in E-8. Quotas peaked in 2004, then decreased through 2008. Regular season limited licenses were held at status quo for a few years while PLO licenses were decreased to stabilize the population, which started to climb again through 2017, reaching nearly 5,000 animals. Regular season antlerless and ES licenses were increased in 2015, antlerless licenses were increased again in 2018, and have remained status quo as the population has come back to within the objective range (Figure 6).

E-8 is over-the-counter (OTC) for either-sex and antlerless archery, as well as 2nd and 3rd rifle season bull. The DAU has seen a steady increase in OTC archery hunting pressure over the past decade. In 2010 when the previous DAU plan was approved, the 10-year average number of archery hunters per year in E-8 was approximately 850 hunters. In 2020, the 10-year average number of archery hunters per year increased by 70% to approximately 1,475 hunters. The current 10-year average (2013-2022) is approximately 1,500 archery hunters per year (Figure 5), and peaked at nearly 1900 archery hunters in E-8 in the fall of 2020.

E-8 is over-the-counter (OTC) for either-sex and antlerless archery, as well as 2nd and 3rd bull rifle seasons. The DAU has seen a steady increase in OTC archery hunting pressure over the past decade. In 2010 when the previous DAU plan was approved, the 10-year average number of hunters per year in E-8 was approximately 850 OTC archery hunters and 1,380 OTC rifle hunters. In 2020, the 10-year average number of archery hunters per year increased by 70% to 1,400 and the average number of OTC rifle hunters increased by 12% to 1,550. The current 10-year average (2013-2022) for archery hunters is approximately 1,500 and peaked at nearly 1,900 in the fall of 2020 (Figure 5).

In 2010, the 10-year average number of OTC bull hunters was approximately 1,380 per year. Since then, it has fluctuated between 600 to 1,900 hunters annually, and the current 10-year average has increased by 12% to approximately 1,500 OTC bull hunters per year. The total number of OTC archery hunters has exceeded the total number of OTC rifle bull hunters in three of the past five years (Figure 5).

Sex Ratios

Since 1991, CPW has conducted aerial classifications in E-8 for post-hunt sex and age ratios. The current plan has a sex ratio objective range of 21-26 bulls per 100 cows; the previous 1991 and 199 plans had a sex ratio objective of 24 bulls:100 cows. Observed sex ratios have averaged 27 bulls:100 cows from 1991 to 2022, and 29 bulls:100 cows from 2011 to 2022. Implementation of antler point restrictions, limiting 1st and 4th rifle seasons, and liberal antlerless harvest have increased bull:cow ratios over time, providing a balance between opportunity and quality in this DAU. The proposed sex ratio objective of 23-29 bulls per 100

cows captures the current average observed bull:cow ratios in E-8, and aligns with the proposed objective for E-13, the other Middle Park elk DAU.

Age Ratios (Production)

Elk production in E-8 has ranged between a low of 31 calves:100 cows over the winter of 2007-2008, and a high of 70 in 1995. Overall, production has remained consistent in E-8, averaging 52 calves:100 cows from 1991 to 2022 and 51 calves:100 cows from 2011 to 2022. Post-hunt observed calf:cow ratios in 2022 were 53 calves:100 cows (Figure 3). E-8 currently has one of the highest average post-hunt calf:cow ratios in the state; it is one of only four DAUs with greater than 50 calves:100 cows.

Harvest

Elk harvest in E-8 has been relatively consistent over time, varying annually with weather conditions. The 30-year averages for harvest are approximately 375 bulls and 420 cows/calves (antlerless) annually (Figure 4). The three-year average is approximately 315 bulls and 410 cows/calves. Antlerless harvest has exceeded bull harvest 8 of the past 10 years.

Significant Management Issues

Loss of habitat due to human residential development.

From 1990 to 2023, the human population in Grand County has doubled, growing from approximately 8,000 to over 16,000 residents. The population is projected to grow to over 17,500 in the next ten years (Appendix C). Habitat continues to be converted to housing and associated development (roads, utilities, commercial infrastructure).

Roadkills- Highways/Trains

-Roadkill (highway and train) accounts for a significant portion of non-hunting mortality in Middle Park radio-collared elk
-Approximately 10% of cow elk mortalities during year 1 of the Middle Park Elk Survival Monitoring Study were attributed to highway and train roadkill.

Predation

-Predation on elk, primarily by mountain lions, accounts for a significant portion of non-hunting mortality in Middle Park radio-collared elk for cows and calves.
-Approximately 20% of cow and calf mortalities during year 1 of the Middle Park Elk Survival Monitoring Study were attributed to predation.

Recreation and Trails.

-80% of E-8 is public land, managed by the USFS, BLM or NPS. Increasing trail development and associated use by hikers, bikers, ATVs, people with dogs, backcountry skiers and snowmobiles continue to have cumulative impacts on elk populations by causing disturbance during critical time periods (winter, spring, summer). Elk are re-distributed into less suitable habitats, lowering the overall carrying capacity.

-Grand County is a popular destination for summer recreation users, with extensive trail networks, campgrounds, dude ranches and resorts.
-Rocky Mountain National Park draws many people to Grand County, receiving an average of 4.3 million visitors annually since 2015, which is a 30% increase from 2.9 million in 2010 (https://www.statista.com/statistics/254212/number-of-visitors-to-rocky-mountain-national-park-in-the-us/)
-The USFS Sulphur Ranger District administers the Arapaho National Recreation Area, Indian Peaks and Never Summer Wilderness Areas and Bowen Gulch Protection Area, all popular summer destinations.
-The Colorado River Water Conservation District administers Wolford Mountain Reservoir and associated developed recreation sites, also popular destinations.

Decline in habitat quality due to climate (drought, wildfire, severe winters)

-Climate: Temperatures across Colorado have warmed over the last century. Weather extremes are more frequent, less precipitation is falling as snow; annual snowpack is decreasing, snowmelt occurs earlier, evaporation is increasing, and less water flows into the Colorado River.
Drought: persistent high temperatures and drought across the region have dried out soils; enabled the mountain pine beetle epidemic, and increased the severity, frequency, and extent of wildfires.

-Wildfire: Before the twenty-first century, Colorado had not seen a fire grow beyond 100,000 acres. Since 2000, however, there have been six, and three of them occurred in 2020, including the East Troublesome Fire. Fire suppression has led to exclusion of fires where it historically played an important role on landscape, leading to overly dense stands of trees that provide abundant fuels for wildfire and extreme wildfire conditions. As summers and droughts last longer and winter snow melts off earlier, bigger, later fires at higher altitudes are more likely to occur.
Mountain Pine Beetle: Since 1998, mountain pine beetle infestation has significantly altered the vegetation type in this DAU, leading to massive stands of dead lodgepole pine trees. These dead stands initially provided more ground forage, resulting in increased use by elk and contributing to a reduction in game damage conflicts. However, increased blowdown in recent years has created impassable areas to elk, and re-distribution of elk (due to multiple factors) has resulted in increased game damage and winter competition with livestock for hay on private lands. Post-fire recolonization of plant species may lead to improved ground forage in some areas depending on future drought conditions.

-Range Conditions: In addition to the ongoing drought and pine beetle infestation, a reduction in livestock grazing and fire suppression have degraded overall range health, leading to senescent climax plant communities and ultimately lower quality forage for elk.
Severe Winters: Weather extremes are more frequent, leading to increased weather severity and snow crusting events. The Middle Park Winter Severity Index (snow depth and temperature) has been above average 4 of the past 10 years, contributing to below average over-winter calf (and likely adult) survival during those years.

Calf Recruitment/Declining elk population.

E-8 post-hunt calf:cow ratios observed in December are among the highest in the state; however, over winter calf survival has been lower than average in recent years, leading to fewer calves being recruited into the adult population.

Low recruitment in recent years is likely due to a combination of factors including loss of quality winter habitat to development, disturbance from human recreation, winter severity, and poor winter range habitat conditions.

Fencing (Entanglements/Barriers).

Old fencing on the landscape causes entanglement and mortality for elk, and non-wildlife friendly fencing for horses, livestock, pets or private land present movement barriers for elk. Fencing entanglement accounted for approximately 3.5% of calf mortalities and 8% of cow elk mortalities during year 1 of the Middle Park Elk Survival Monitoring Study.

Agricultural- Game Damage/Livestock Competition

Re-distribution of elk due to human development, forest degradation and other factors has resulted in increased game damage/winter competition with livestock for hay on private lands.

Ingress/Egress

DAUs are delineated on the assumption that there is very limited interchange with adjoining areas. Elk numbers may be fluctuating in this DAU due to movements of elk to and from adjacent DAUs including E-3, E-7, E-12, E-13 and Rocky Mountain National Park. Influx or departure of animals greatly increases the difficulty of maintaining the elk population at the predetermined number.
Recent GPS collar data has shown that there is some movement across the DAU boundaries, but a majority of the elk in E-8 spend most of their life cycle within the DAU. The ongoing Middle Park Elk Monitoring Study will continue to evaluate movements and seasonal distribution of elk in E-8.

Chronic Wasting Disease

The first positive detection of CWD in E-8 was in 2002. Since then, 20 additional elk in E-8 have tested positive for CWD. Between the years 2002-2022, 1701 samples were submitted with 21 total positive samples (12 cows and 9 bulls). The current prevalence is estimated at <1% (CI 0.0% - 33.6%).

Strategies for Addressing Management Issues and Achieving Objectives

E-8 is managed through limited licenses for antlerless and either-sex harvest for all muzzleloader and rifle seasons. Currently, antlerless and either-sex archery licenses, and antlered 2nd and 3rd rifle season licenses are available over-the-counter. Limited antlerless late rifle season licenses provide additional hunting opportunities to help achieve desired antlerless harvest. Private land only (PLO) licenses are available to help address game damage issues and disperse elk. The current management strategy has been effective at maintaining a productive herd with good calf:cow ratios (>50 calves:100 cows), offering plentiful hunting opportunities and consistent bull:cow ratios.

The preferred management alternative of 3,400 – 4,400 elk maintains E-8 at the current population level, and expands the objective range slightly to allow for more management flexibility. The current population level, which has been maintained for over a decade, would continue to provide opportunity for antlerless and bull elk hunters. The expanded objective range would allow for management flexibility in adjusting licenses to address population

fluctuations (i.e. low winter survival years), game damage issues, crowding and hunter satisfaction.

In the winter of 2022-2023, CPW initiated a long-term elk survival monitoring study in Middle Park (DAUs E-8 and E-13) to gather data on elk survival, movement, and cause specific mortality. CPW plans to maintain GPS collars on adult cows and 6-month old calves annually to collect adult cow and winter calf survival rates and cause specific mortality rates. This data will improve modeled elk population estimates, which rely on annual survival rates of adults and winter calf survival rates to estimate population size. Additionally, marked GPS collars allow for mark-resight population estimation to directly assess elk abundance. This study was implemented one year prior to the December 2023 wolf reintroduction deadline, in order to aid in estimating the effects of wolves in addition to the impacts of other predators, human disturbance, recreation, development, highways and disease on the elk populations in Middle Park, and evaluate the behavioral responses of elk by monitoring distribution, movements, and migration.

CPW works with federal, county, state and municipal land management agencies to avoid, minimize and mitigate the impacts of residential and recreational developments in important wildlife habitats and migration corridors. CPW also collaborates with those agencies to implement seasonal closures on trails and open space areas to protect winter range and calving ranges during critical times of the year for elk. CPW, CDOT and other partners are continuously working to identify and prioritize locations for highway crossing projects (fencing, crossing structures) to minimize roadkill impacts. CPW also supports conservation easements to protect wildlife habitat in perpetuity. Currently, two conservation easements exist within E-8, protecting approximately 18,815 acres.

Stakeholder Outreach and Input

In 2021 & 2022, hunters were randomly selected to complete the Elk Hunter Attitude Survey after the completion of their hunting seasons. In 2022, overall responses were higher and between 1,111 and 1,405 hunters from E-8 answered each of the opt-in survey questions. 52-59% of hunters were dissatisfied with the total number of elk and number of bulls seen in 2022, while 23-31% were satisfied. Slightly more than half (55%) would prefer to hunt more often, versus hunting bigger bulls less often (45%), including a majority of resident respondents. 72% of respondents wished to see a slight to moderate increase in the E-8 elk population over the next 10 years. 54% of respondents felt moderately-to-very crowded during their hunt; 20% felt slightly crowded; and residents felt much more crowded than non-residents. Overall satisfaction improved from 2021 with approximately 44% of the respondents were satisfied with their hunt, while 37% were dissatisfied; among residents 20% were neutral and the remaining 80% were equally satisfied and dissatisfied. Hunters that harvested elk in 2021 expressed higher satisfaction; however satisfaction was higher among hunters that did not harvest than in 2021.

In August 2023, CPW held a public meeting in Kremmling to share information and obtain public input on the E-8 elk population. Sixteen people attended the meeting, and 14 people commented on E-8. 80% of the respondents indicated that they would like to see a greater number of elk than currently in E-8; 20% would prefer to see the same number maintained. Respondents identified the following issues, in order of importance, as impacting the elk herd in E-8: residential development, habitat quality/loss of habitat, roadkills (highway/train), calf recruitment/declining population, predation, recreation & trails, climate (drought, fire,

severe winter conditions), overhunting, fencing (barrier, entanglement) and agriculture (game damage, livestock competition).

Management Alternatives

Preferred Alternative: 3,400 – 4,400 elk and 23 – 29 bulls per 100 cows.

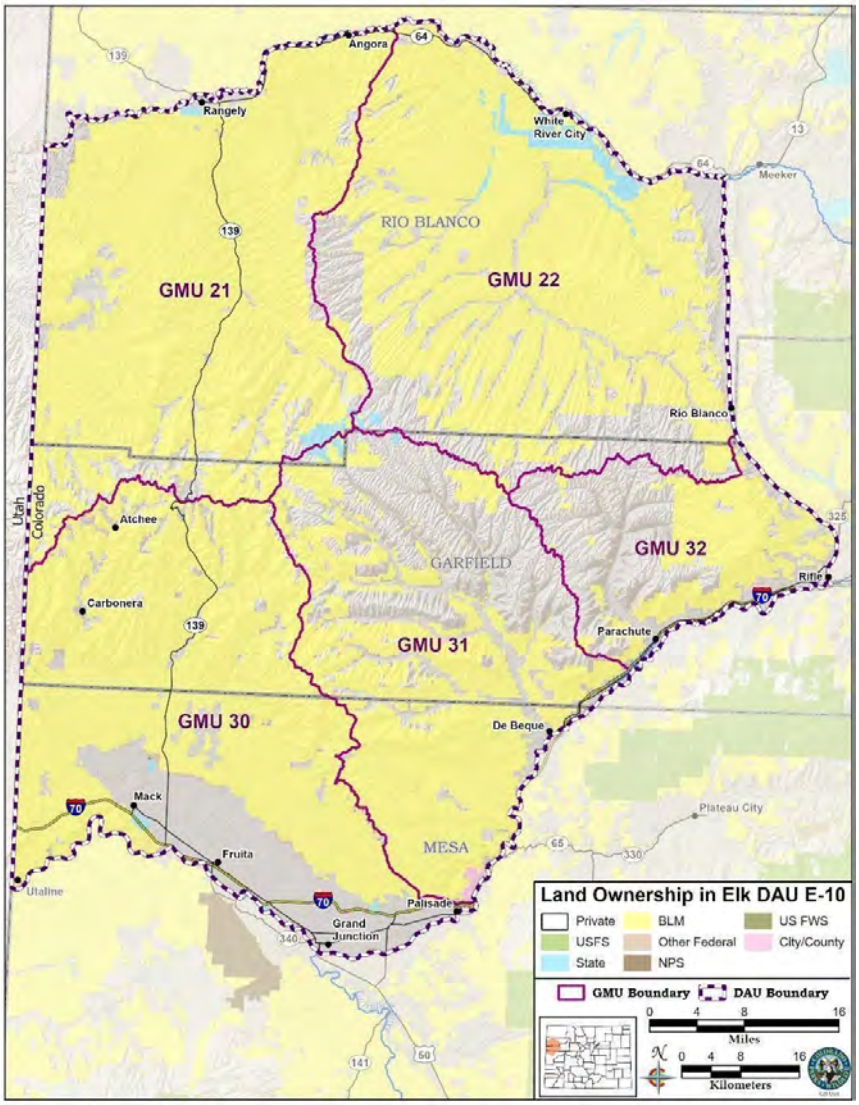
Status Quo: 3,600 to 4,300 elk and 21 – 26 bulls per 100 cows.

YELLOW CREEK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-10

Genevieve Fuller, Wildlife Biologist, Grand Junction

Yellow Creek Elk Herd (DAU E-10) **Approval Year for last HMP: 2021**	**GMUs: 21, 22, 30, 31 and 32**
Post-hunt population:	
Current (2021 plan) Population Objective:	8,500 – 10,500 elk
Post-hunt 2023 Population Estimate:	16,100 elk
Extension Population Objective:	**8,500 – 10,500 elk (status quo)**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2021 plan) Sex Ratio Objective:	18 - 25 bulls per 100 cows
Post-hunt 2023 Sex Ratio:	observed: 25.6; modeled: 24.2
Extension Expected Sex Ratio Objective:	**18 - 25 bulls per 100 cows**



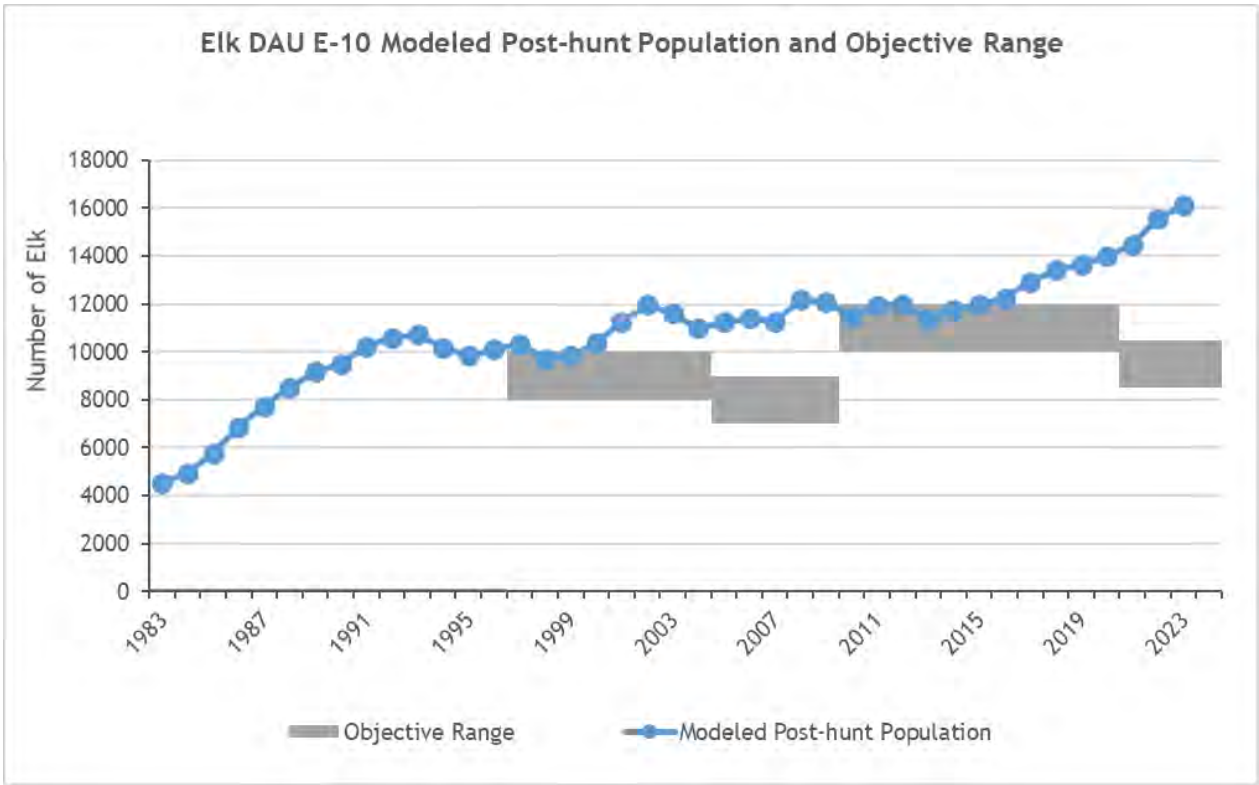


Figure 10-1. Elk DAU E-10 modeled post-hunt population and objective range, years 1983 - 2023.

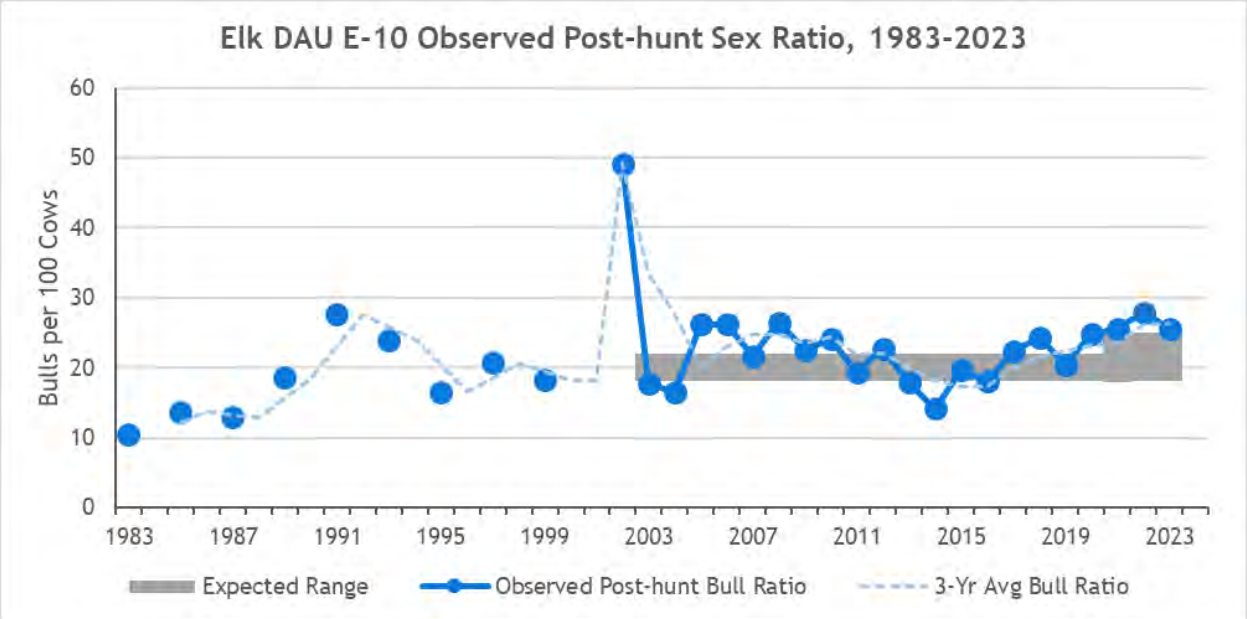


Figure 10-2. Elk DAU E-10 observed and modeled post-hunt sex ratio (bulls:100 cows), years 1983 - 2023.

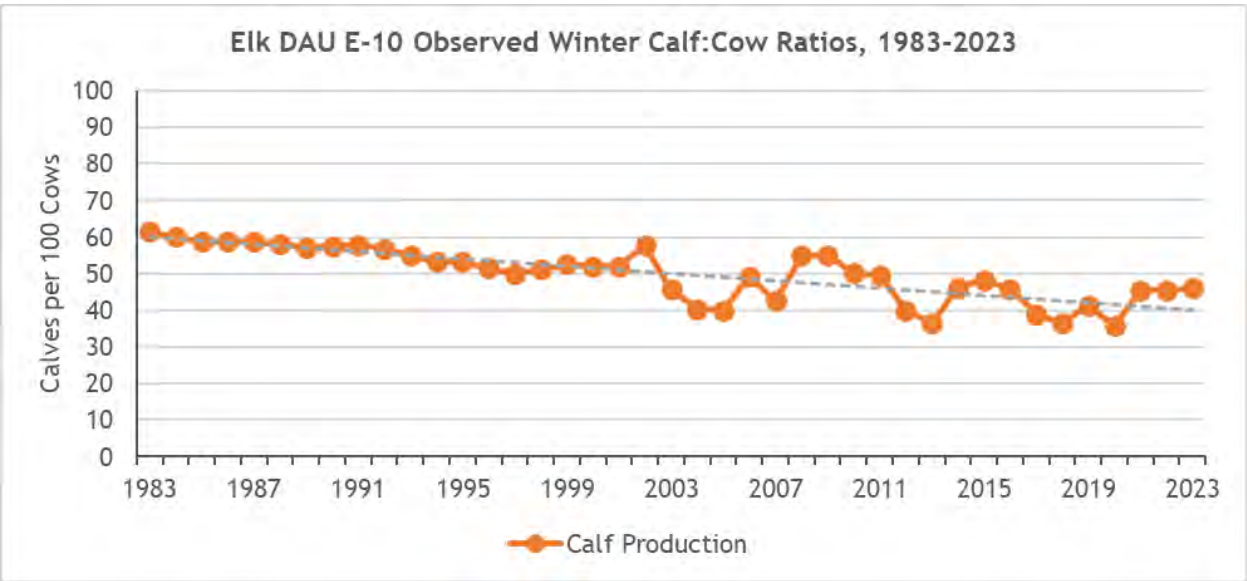


Figure 10-3. Elk DAU E-10 calf production (observed post-hunt calves:100 cows ratio, years 1983-2023)

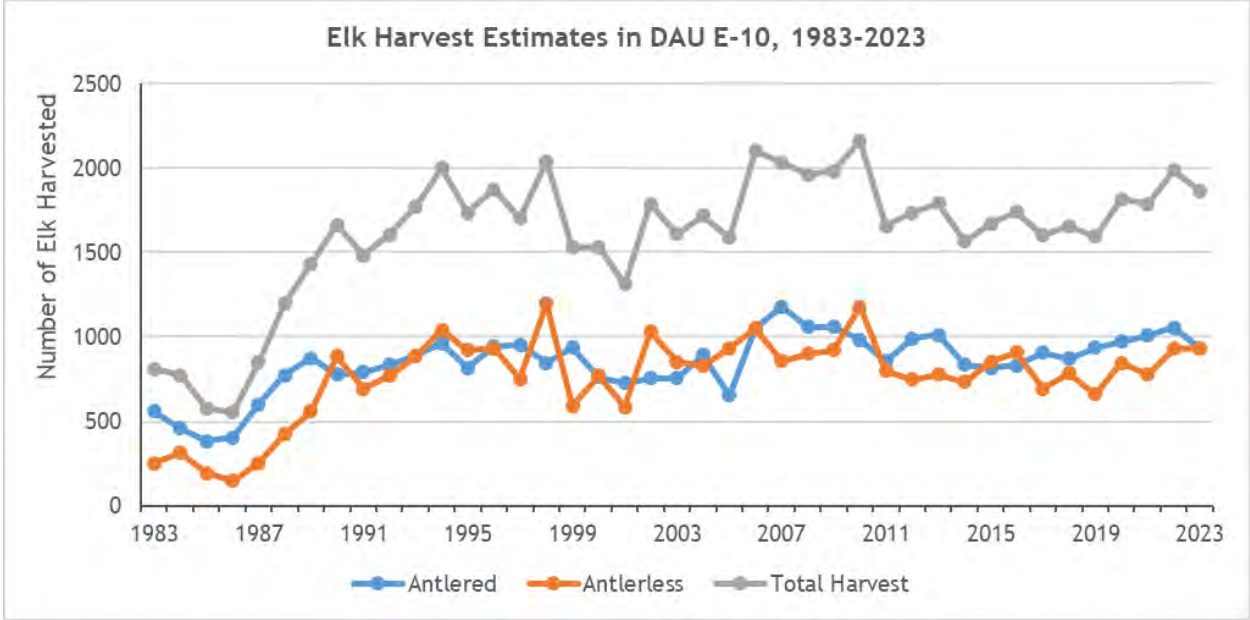


Figure 10-4. Elk harvest estimates in E-10, years 1983-2023.

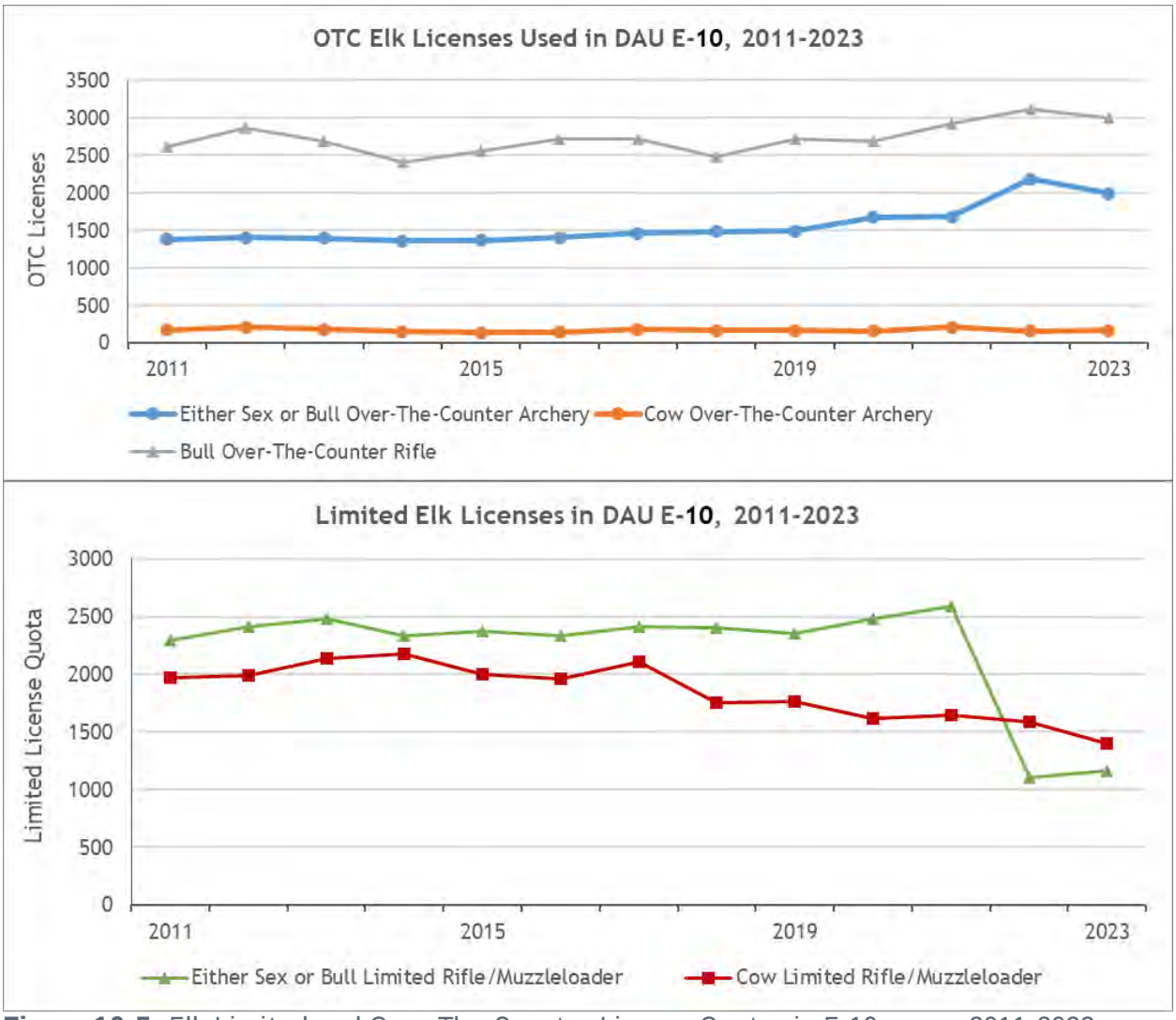


Figure 10-5. Elk Limited and Over-The-Counter License Quotas in E-10, years 2011-2023.

Background

The Yellow Creek elk herd (DAU E-10) is comprised of GMU's 21, 22, 30, 31, and 32 located in portions of Mesa, Garfield, and Rio Blanco Counties. Approximately 29% of E-10 is privately owned while the Bureau of Land Management manages most of the remaining land. Major geographic features include the Bookcliffs and the Roan Plateau and significant drainages include Yellow, Roan, Piceance, and Parachute Creek. Elevations range from 4,600 ft. to nearly 9,300 ft. Lower elevations are used for agricultural production and residential developments while higher elevations are grazed by livestock during the spring, summer and fall. Population centers include Grand Junction, Rangely, Palisade, Parachute, and Rifle. The elk population in E-10 remained extremely low through much of the 20th century but grew steadily through the 1980s and early 1990s. Since the mid-1990s, the growth has slowed because of increased harvest to better manage the herd. Calf:cow ratios have declined steadily from over 60 calves:100 cows in the early 1980s to 46 calves:100 cows in 2023. It is

likely that the low calf:cow ratios are due to overall degraded condition of the habitat, habitat fragmentation, and increasing recreational activities.

Significant Issues

Elk management in E-10 is affected by habitat quality decline, competition with feral horses, long-term drought, increasing recreational activity, oil and gas development, large-scale wildfire, and the resulting changes in herd distribution. Additionally, hemorrhagic, and chronic wasting diseases have been documented in E-10 and may be impacting the population. Predation may also be affecting calf survival.

Distribution of elk across E-10 has evolved over time as the elk herd has increased in size and the habitat conditions have changed, but changes have accelerated in recent years. There has been significant and increasing dispersal of elk from GMUs 21 and 22 into GMUs 30, 31, and 32. The elk distribution issue will likely be exacerbated by the Pine Gulch fire. Elk may first move away from burned and barren areas followed by a return to those areas as they revegetate and provide high quality forage. Although these distributional shifts occur naturally and are not necessarily detrimental to overall herd health, they likely contribute to and exacerbate the public perception in the northern GMUs that the overall elk herd is declining. To help address this, a shift was made in 2022 to how licenses were distributed between GMUs to address differences geographically between the northern two units (22 and 23) and the southern units (30, 31 and 32).

DAU boundaries are, from a management perspective, intended to be finite geographic areas between which there is no movement of animals between herds. Due to the realities of wildlife movement, interchange is inevitable and most DAUs, including E-10, have interchange with other herds. The majority of inter-DAU movement in E-10 occurs to the west across the CO-UT state line and to the north across the White River into DAU E-21. There is also some migration of elk from DAU E-6 across the northern portion of E-10 as animals move from the high elevation summer ranges in the Flat Tops to their lower elevation winter ranges. The movements are likely not additive long-term and have minimal impacts to overall management. In an effort to minimize vehicle collisions, highway fencing along I-70 from Glenwood Canyon to DeBeque impedes virtually all elk movement to the south.

The Bureau of Land Management manages the majority of habitat in E-10 (~ 70%). The BLM monitors its rangelands using an Assessment, Inventory, and Monitoring (AIM) Strategy and the Land Monitoring Framework. In E-10, the BLM monitors 526 sites, most of which have some degree of departure from reference condition in key indicators including biotic integrity, noxious weed cover, and functional/structural condition. Additionally, most sites have one or more species of noxious weed and at least 10% noxious weed cover. These indicators all suggest that the habitat in E-10 is over-utilized and unable to support additional animals on the landscape.

The degraded habitat quality may be mirrored by the ungulate reproduction measured in E-10. Calf:cow ratios have declined from 61.5 calves:100 cows in 1983 to 35.7 calves:100 cows in 2020. Similarly, fawn: doe ratios in D-11, along the western edge of E-10, have declined from 70 fawns:100 does in 1981 to 51.6 fawns:100 does in 2020.

Outdoor recreation is a popular and increasing activity in E-10 on both winter and summer ranges during critical times for elk. Significant recreational centers include the North Fruita

Desert and face of the Bookcliffs in GMU 30, the area around Fravert Reservoir in GMU 32, and the top of the Roan Plateau. Common activities include mountain biking, feral horse viewing, motorized touring (snowmobile, ATVs, and 4WD vehicles), dispersed camping, shooting, hiking, and horseback riding.

Feral horses roam throughout much of the elk range in E-10 in two Herd Management Areas (managed for horses) and two Herd Areas (not managed for horses). Habitat damage resulting from feral horses in E-10 is readily observable. Twenty-five written comments submitted through the E-10 public survey specifically identified feral horses as adversely affecting the elk herd and habitat in E-10. During the summer of 2021 and 2023, the BLM implemented a round up and removal of feral horses in the West Douglas HA in an effort to remove horses from the area entirely.

Much of E-10 lies atop significant deposits of natural gas and oil shale and much of that is open to mineral extraction. Energy development is concentrated on the Roan Plateau, the Bookcliffs, Parachute Creek, near the town of Rangely, and in the Piceance Basin. Although inherent fluctuations in commodity prices as well as political considerations affect the demand for oil and gas and resulting development intensity, oil and gas wells and the associated infrastructure have increased dramatically across E-10 since 1970. The footprint of just oil and gas wells in E-10 is significant; 50% of the elk summer range in E-10 is within 2 km of active oil and gas wells and 32% of summer range is within 1 km of active oil and gas wells. These calculations do not account for the impact of major roads but solely for the oil and gas wells themselves.

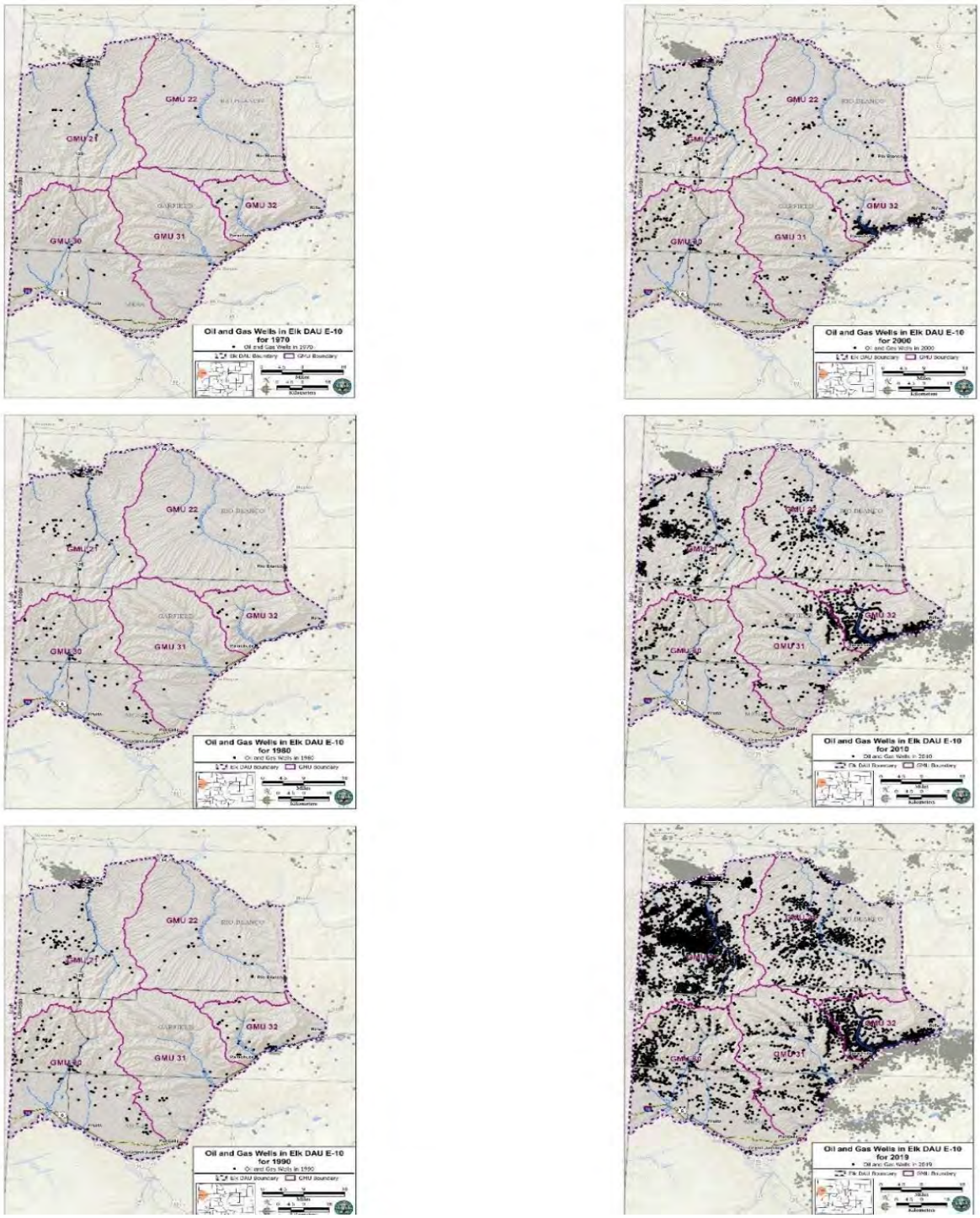


Figure 10-6. Oil and gas wells in Data Analysis Unit E-10 in northwestern Colorado, 1970-2018. Locations compiled from (Johnson et al. 2017) and the CPW GIS unit.

In E-10, an average of 40% of the landmass in Mesa, Garfield, and Rio Blanco on a weekly basis is impacted by some level of drought. The longest duration of drought (D1–D4) in E-10 lasted 204 weeks beginning on February 12, 2002 and ending on January 9, 2006. During July of 2002, an average of 90% of E-10 was affected by exceptional drought. The most intense drought in E-10 began on October 6, 2020 and continued through November 202. More than

50% of the land area in Mesa, Garfield, and Rio Blanco counties was experiencing exceptional drought during this time (National Integrated Drought Information System NIDIS - Drought.gov 2023).

Pine Gulch Fire

The Pine Gulch Fire, the third largest wildfire in state history, was sparked by lightning on July 31, 2020. The fire burned more than 567 km^2 before it was fully contained in late September. The entirety of the fire burned in E-10 and affected approximately 6% of the total elk range in the DAU (Figure 6). The fire affected approximately 437 km^2 of winter range and approximately 387 km^2 of summer range in E-10. More importantly, 27 km^2 of winter concentration areas and 11 km^2 of calving range burned.

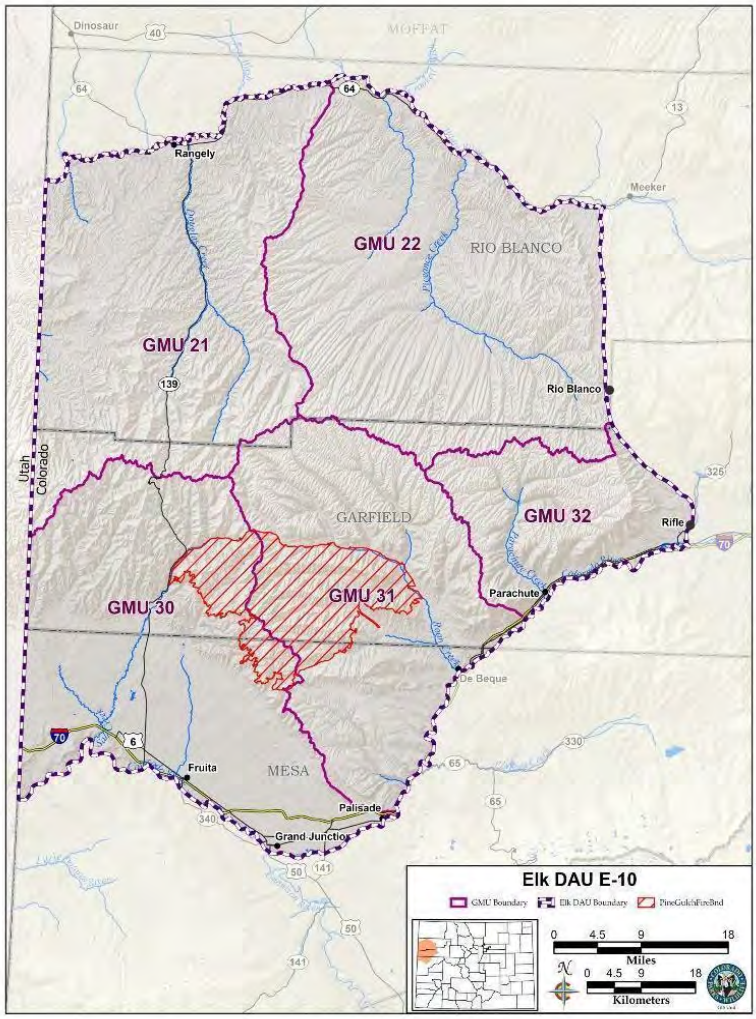


Figure 10-7. Pine Gulch burn location and extent in Data Analysis Unit E-10 in west-central Colorado.

In late 2020, BLM, CPW and private landowners collaborated to identify approximately 20,000 acres of the burned area for re-seeding with native vegetation. Approximately 1,500 acres were identified as high-priority wildlife habitat and received a higher proportion of forb and shrub seeds to have the greatest benefit to deer and elk.

Stakeholder Outreach and Input

The public outreach process for the E-10 HMP revision was extensive and yielded significant public input. During summer 2020, a random subsample of 3000 successful elk applicants were contacted to solicit their input and participate in a virtual meeting held in August 2020. This same group then received the link to submit feedback on the draft plan through a 30-day online survey. Key individual stakeholders including private landowners, outfitters, and other members of the public were also encouraged to participate in the survey, which was open to anyone interested in providing input.

CPW posted the draft plan with identified preferred alternatives online and accepted comments for 30 days between January 21 to February 21, 2022. The full comments submitted are available in Appendix VI. CPW also sent a draft to the Bureau of Land Management, and presented it to the Mesa, Garfield, and Rio Blanco County Commissioners, and the White River Habitat Partnership Program Committee.

Public comments on the draft plan addressed a number of concerns about the management of the E-10 population. There was some support for the preferred alternatives as well as concerns about reducing and attaining the objectives for this herd based on skepticism regarding current population estimates. Concerns included poor habitat conditions, highway crossings, predation impacts, and feral horses.

Management Alternatives

The preferred alternatives of 8,500 to 10,500 elk and 18 – 25 bulls:100 cows were approved by the commission in May of 2022. We are seeking to extend the objectives for E-10 at this time.

2022 CPW Commission Approved Objectives:

Post-hunt Population

8,500 – 10,500 elk
This objective range seeks to decrease the current elk herd in E-10 slightly to address issues related to habitat quality tied to feral horses, drought, fire, and fragmentation from energy development. A herd reduction would alleviate elk pressure on the habitat until fire scars recover and/or drought abates. This alternative would also decrease resource competition with mule deer. Improved public access across private lands would facilitate attaining this management alternative.

Post-hunt bull ratio

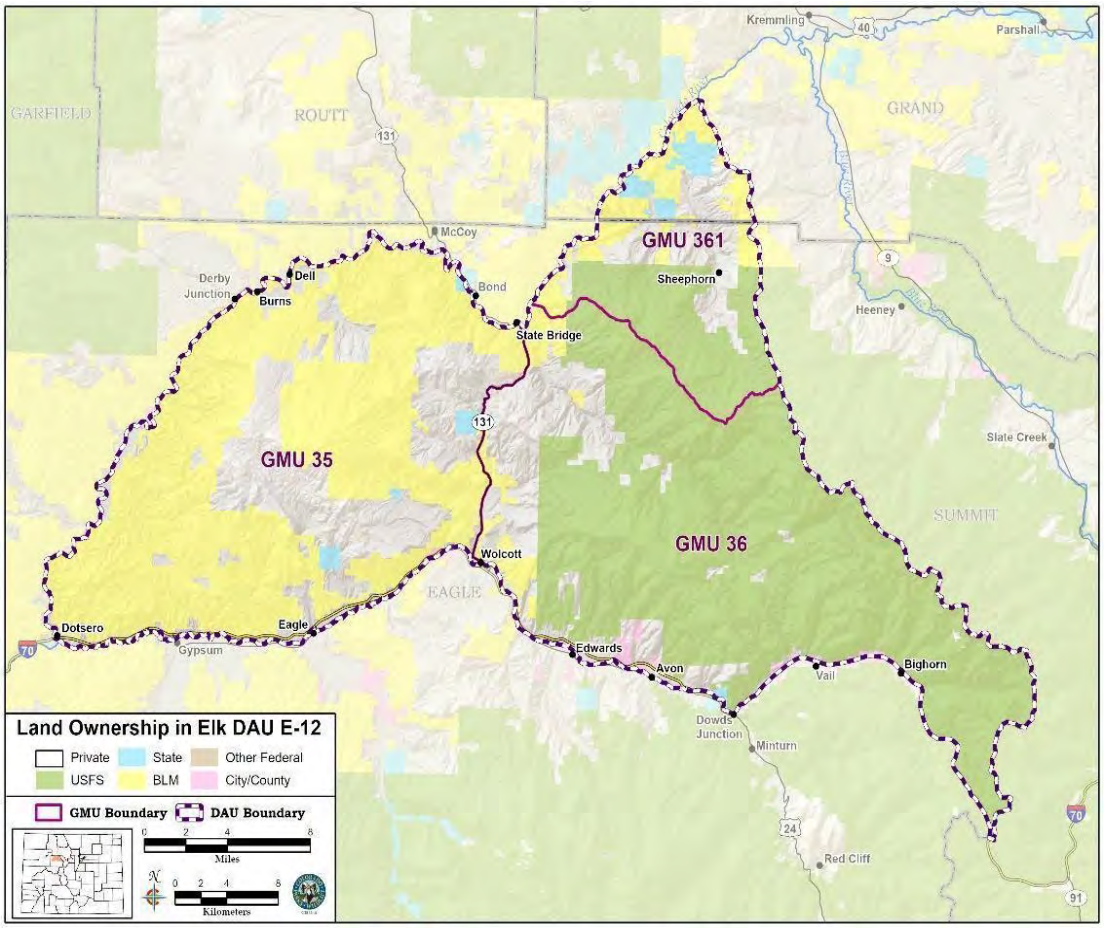
18 – 25 bulls per 100 cows
Although bull: cow ratios in E-10 have gone as high as 25 bulls:100 cows, they are generally within or near the existing sex ratio objective range of 18-22 bulls:100 cows (Figure 17), which reflects the over-the-counter management strategy employed in E-10. Changing the license allocation from “over-the-counter” (OTC) to “limited” requires a public petition to the Parks and Wildlife Commission. Since licenses are still available over-the-counter, the bull:cow ratio is expected to stay within the same objective range, and will be kept as status quo.

PINEY RIVER ELK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-12

Julie Mao, Wildlife Biologist, Glenwood Springs

Piney River Elk Herd (DAU E-12)	**GMUs: 35, 36, 361**
Post-hunt population:	
Current (2013 plan) Population Objective:	3,000-4,600 elk
Post-hunt 2023 Population Estimate:	3,850 elk
Proposed New Population Objective	**3,000-5,000 elk**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2013 plan) Expected Sex Ratio:	22-44 bulls:100 cows
Most Recent 3-year Average of Observed Sex Ratio:	20 bulls:100 cows
Proposed New Expected Sex Ratio Range:	**15-43 bulls:100 cows**



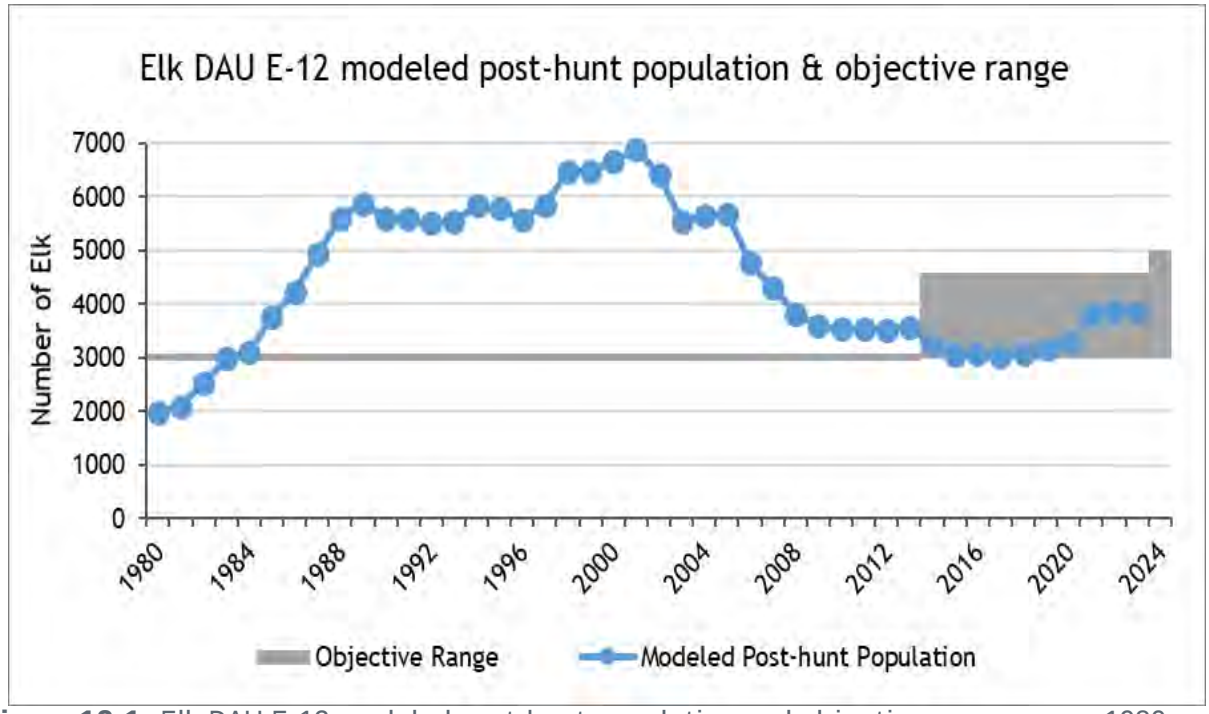


Figure 12-1. Elk DAU E-12 modeled post-hunt population and objective range, years 1980 - 2023.

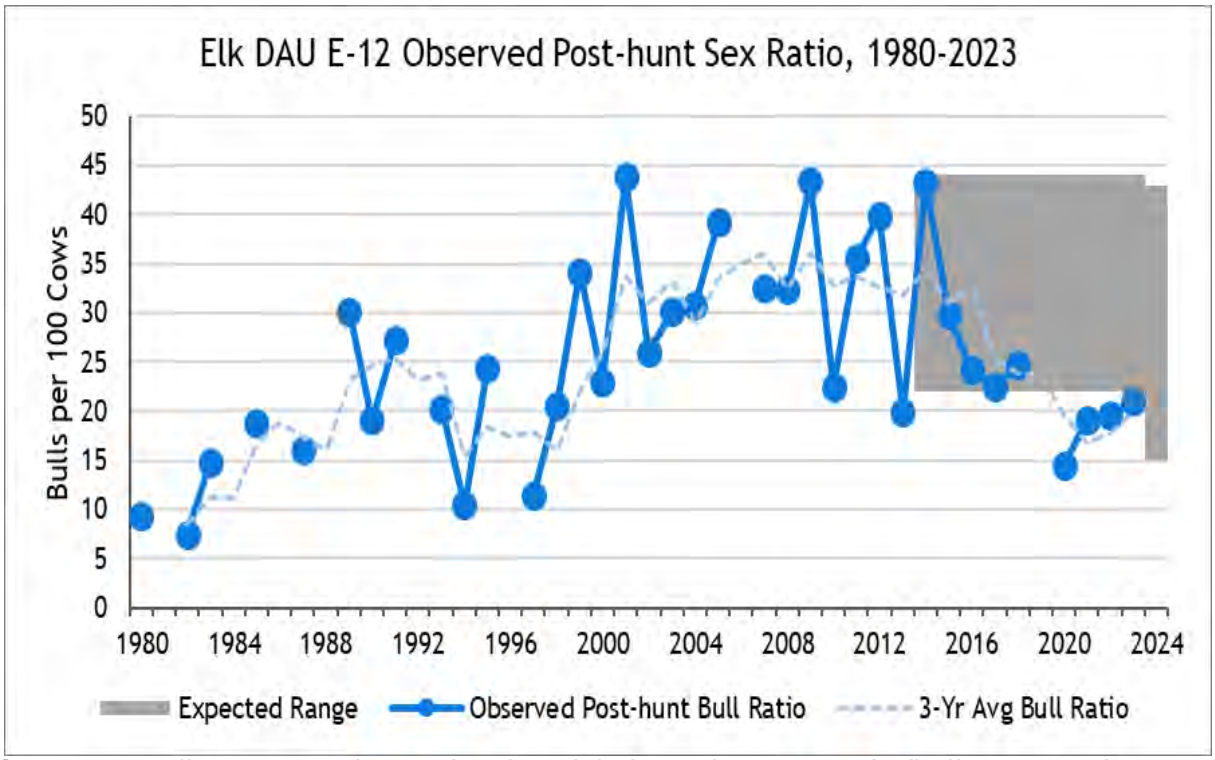


Figure 12-2. Elk DAU E-12 observed and modeled post-hunt sex ratio (bulls:100 cows), years 1980 - 2023.

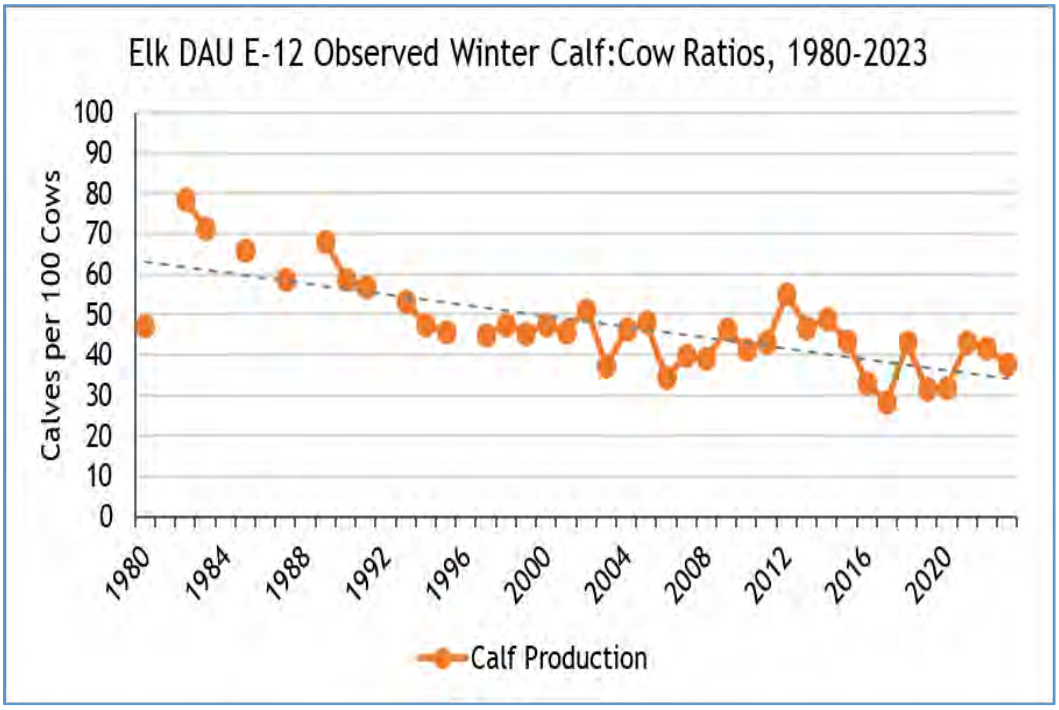


Figure 12-3. Elk DAU E-12 calf production (observed post-hunt calves:100 cows ratio, years 1980-2023)

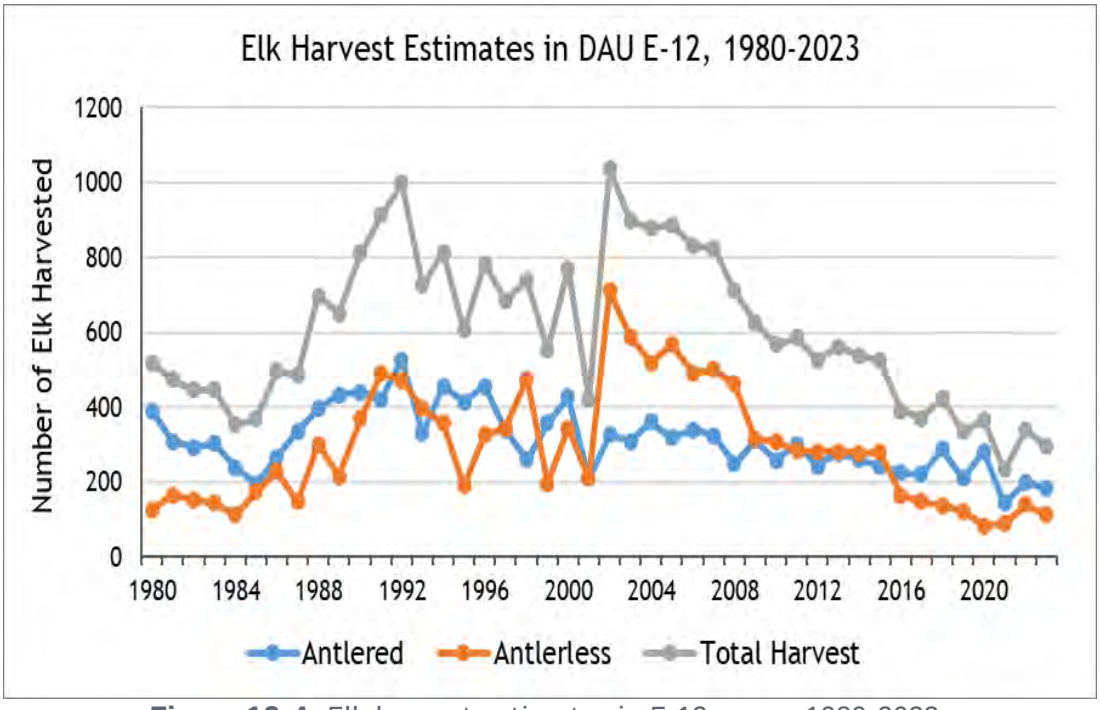


Figure 12-4. Elk harvest estimates in E-12, years 1980-2023.

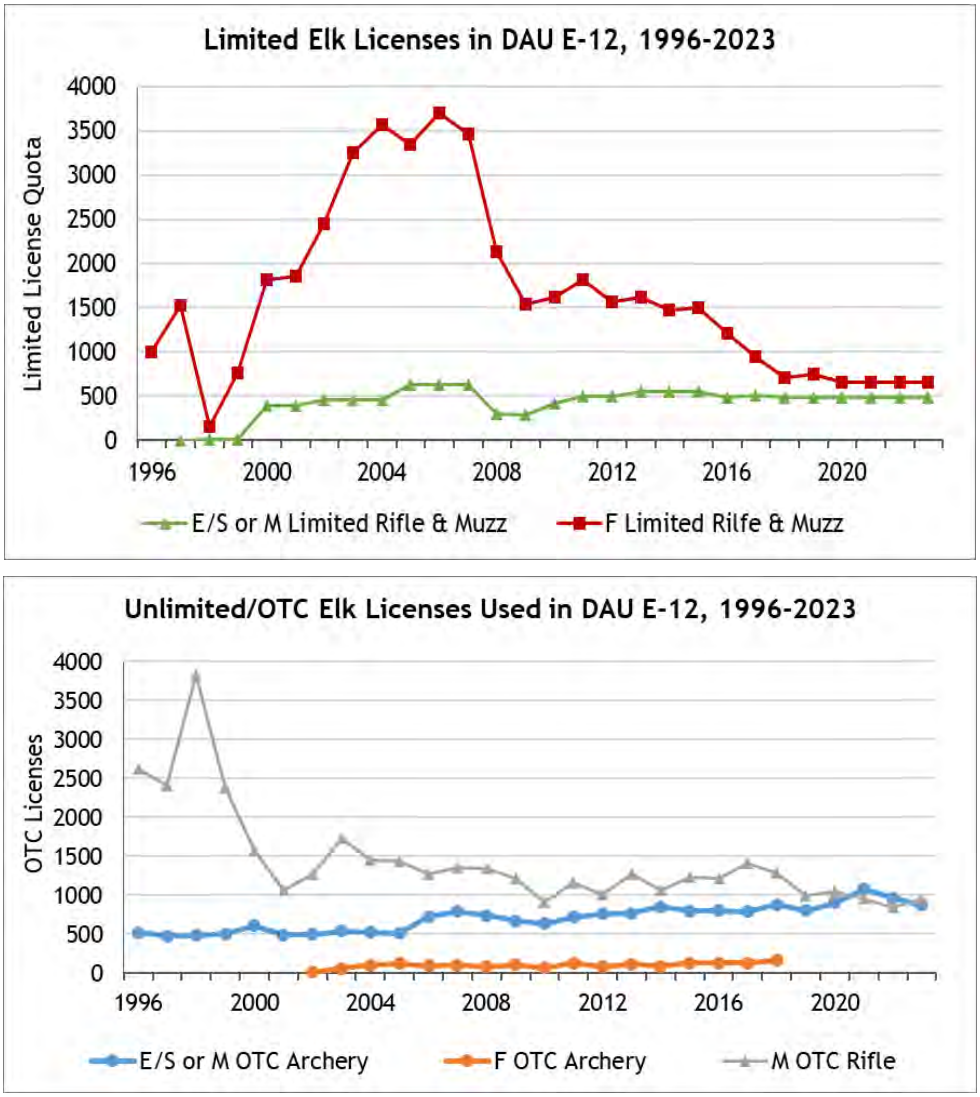


Figure 12-5. Elk Limited and Over-The-Counter License Quotas in E-12, years 1996-2023.

Background

The Piney River elk herd, Data Analysis Unit (DAU) E-12, is located in northwest Colorado and consists of Game Management Units (GMU) 35, 36, and 361. This DAU is located in Eagle and Grand Counties. Major towns in and near E-12 include Eagle, Edwards, Avon, and Vail. Burns, McCoy, and State Bridge are small communities on the northern edge of DAU E-12. E-12 covers 1,600 km^2 (~395,000 acres) of land area. Three-fourths of the DAU is public land and one-fourth is private. Elk winter range within the DAU is 69% public and 31% private land. The Bull Gulch and Castle Peak Wilderness Study Areas and the western half of the Eagles Nest Wilderness Area lie within this DAU.

The 2013 herd management plan for E-12 updated the population objective to a range of 3,000-4,600 elk. Cow licenses were reduced over several successive years in the mid-2010s in order to curb the declining population trend. In recent years, the population has climbed into

the middle of the objective range under the reduced antlerless license quotas. E-12's population estimate as of post-hunt 2023 was 3,850 elk.

Winter calf:cow ratios, which represent a measure of calf recruitment and the herd's productivity, have declined over the past 40 years, dropping by 6.7% per decade. The average over the past 10 years is 38 calves:100 cows, compared to 65 calves:100 cows in the 1980s. The herd's potential for population growth and its resilience to environmental and ecological stressors is much lower compared to in past decades.

As an over-the-counter (OTC) DAU with unlimited either-sex archery and unlimited bull licenses in 2nd and 3rd rifle seasons, E-12 is not specifically managed for a sex ratio objective, but rather to provide ample bull hunting opportunities. In the 2013 herd management plan, the expected sex ratio range based on the minimum and maximum observed ratios in the preceding 10 years was 22 to 44 bulls:100 cows. Over the past 10 years, the observed bull:cow ratios have declined. The current (2021-2023) 3-year average is 19 bulls:100 cows, and the observed values over the past 10 years has been highly variable, ranging from 15 to 43 bulls:100 cows.

Harvest over the past 10 years has been lower than in previous decades. Lower antlerless harvest has been primarily due to the reduction in cow licenses. Lower bull harvest is due to a combination of the overall population being smaller than in the past and also lower hunter participation in bull rifle seasons. Archery season participation, on the other hand, has slowly but steadily climbed. In fact, in the past 2 years, archery hunters have exceeded OTC rifle bull hunters in E-12, although harvest success rates in archery seasons are, not surprisingly, lower than in rifle seasons.

Significant issues

All of the management issues involving habitat loss and fragmentation that were discussed in the 2013 E-12 herd management plan are still relevant today and may be even more significant as the number of people residing, visiting, and recreating in this area continues to increase and to impact elk and other wildlife and their habitat. The Piney River/State Bridge area, which includes all of elk DAU E-12, has been identified as a priority landscape in Colorado's State Action Plan for the Department of Interior's Secretarial Order 3362 (Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors).

The human population in Eagle County has continued to grow over the past decade, albeit at a slower pace than in the 1990s and 2000s. Land development and recreation continue to be the major impacts on wildlife. Land development has led to loss of habitat quantity and quality in the form of conversion of habitat into houses, other buildings, and infrastructure; and fragmentation of habitat due to roads, trails, and structures. As more people have moved into the area, motorized and non-motorized outdoor recreation activities of all kinds have become a year-round presence on the landscape, particularly on public lands close to the I-70 corridor and Muddy Pass. For example, the winter range habitat north of Vail now rarely holds elk, likely due to increased backcountry winter recreation, in addition to the previous loss and fragmentation of habitat due to land development. There is unending demand from user groups to establish more recreational trails, as well as frequent use and expansion of unofficial trails, all of which fragment and diminish the quality of remaining wildlife habitat. Human disturbances during critical periods for wildlife can reduce calf recruitment and increase stress on wintering wildlife. More roads and vehicle traffic, along

with increased driving speeds, have resulted in more roadkill of elk and other wildlife. Dogs, especially when off-leash, also present another stressor on wildlife and a potential source of mortality.

Existing undeveloped habitat has been degraded not only by human recreational impacts, but also due to long-term fire suppression and lack of habitat management which has led to older-aged, less productive forage. Areas close to human developments are rarely allowed to burn at a large landscape scale due to potential damage to human property. The cumulative effect is that both quantity and quality of habitat has declined for elk in E-12. At a more localized scale, BLM, USFS, and other local land management entities have conducted habitat treatment projects including pinyon-juniper removal and prescribed fire in aspen/mountain shrub habitats to improve winter range and calving areas for elk.

Some portions of the DAU further north of the I-70 corridor are currently less developed and recreated upon, including some large parcels of private land. These private lands now serve as important refuges for wildlife from human disturbance, but unless conservation easements or similar habitat protection measures can be arranged with the private landowners, there is the risk of future subdivision and development of these lands.

Bear, mountain lion, and coyote populations are believed to have increased over the past several decades, and their predation on calves (as well as adult elk mortality by lions) could potentially limit the elk population. With wolf reintroduction having started in December 2023, an additional carnivore species on the landscape could affect elk survival and recruitment. The effect of predation by each carnivore species can be additive or compensatory to other causes of elk mortality (such as malnutrition, disease, human-caused mortality, and predation by the other carnivore species). Whether predation has population-level effects on the elk herd depends on how close the elk population is to carrying capacity.

Chronic wasting disease (CWD) is currently not an issue for elk in E-12. There were no detections of CWD in E-12 elk among the 35 samples submitted in the years 2018-2023.

Management Objective Recommendations

We propose to make a minor adjustment to the E-12 population objective range for the next 10 years, keeping the lower end of the objective range at 3,000 and raising the upper end to 5,000 elk. Currently the population estimate is in the middle of this population objective range. Maintaining the population at the current level of license quotas and expected harvest is an achievable goal. A wider objective range of 3,000-5,000 elk with the upper end of the range slightly higher will allow for potential growth of the elk herd within that range if habitat conditions can be improved and disturbance impacts by recreationists can be minimized. Also a wider objective range could better accommodate population fluctuations that could result from a severe winter and/or increased predation effects.

Because E-12 has OTC bull licenses, there will continue to not be an actual sex ratio *objective*. But the *expected* sex ratio range, based on observed values over the previous 10 years, is 15-43 bulls:100 cows.

Strategies to Address Issues and Management Concerns and to Achieve Herd Management Objectives

CPW will continue to work collaboratively with our partners in the federal land management agencies, private landowners, county governments, local municipalities and NGOs to protect and enhance the remaining elk habitat. Important habitat conservation methods include habitat treatments, conservation easements or land acquisitions, maintaining landscape connectivity and movement corridors, and adhering to seasonal recreation closures on winter range areas. Conservation easements are difficult to establish in this area due to the extremely high real estate values in this area, but would still be worthwhile pursuing with interested landowners with the assistance from NGOs and local governments.

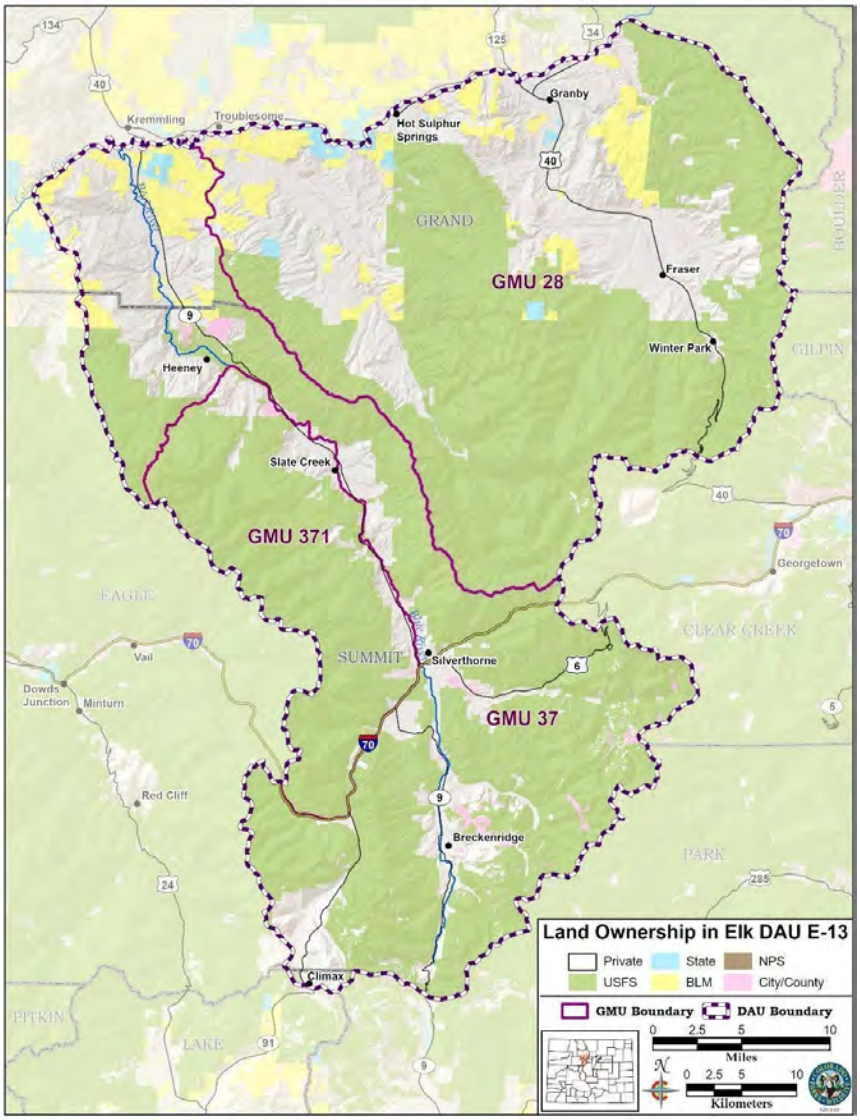
To achieve the updated population objective, CPW will continue to monitor the population size and set licenses annually to provide sufficient hunting opportunities. We also plan to seek funding to radio collar adult cow elk in the DAU to better understand seasonal distribution, home ranges, movements, and survival rates. Collaring calves and bulls could be a potential additional study requiring more funds and staffing, which could be pursued further in the future.

WILLIAMS FORK Elk HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-13

Elissa Slezak, Wildlife Biologist, Hot Sulphur Springs

Williams Fork Elk Herd (DAU E-13) Approval Year for last HMP: 2010	**GMUs: 28, 37 & 371**
Post-hunt population:	
Current (2010 plan) Population Objective:	4,700 to 5,500 elk
Post-hunt 2022 Population Estimate:	2,887 elk
Preferred Population Objective:	**4,000 – 5,000 elk**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2010 plan) Sex Ratio Objective:	24-31 bulls per 100 cows
Post-hunt 2022 Sex Ratio:	observed: 22; modeled: 41
Preferred Expected Sex Ratio Objective:	**23-29 bulls per 100 cows**



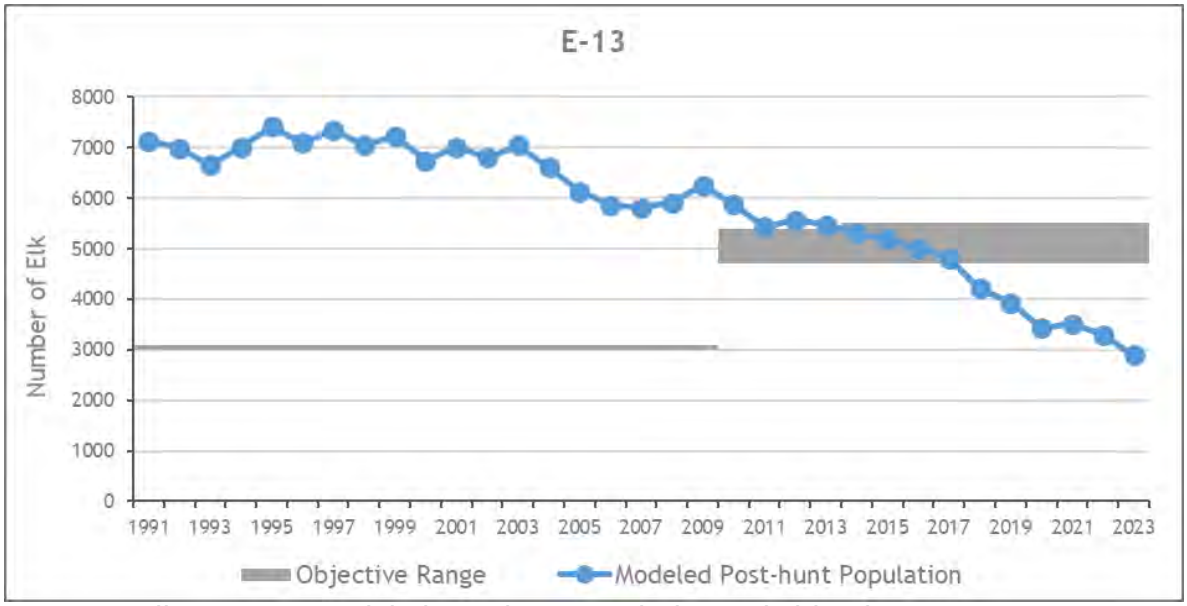


Figure 13-1. Elk DAU E-13 modeled post-hunt population and objective range, years 1991-2023.

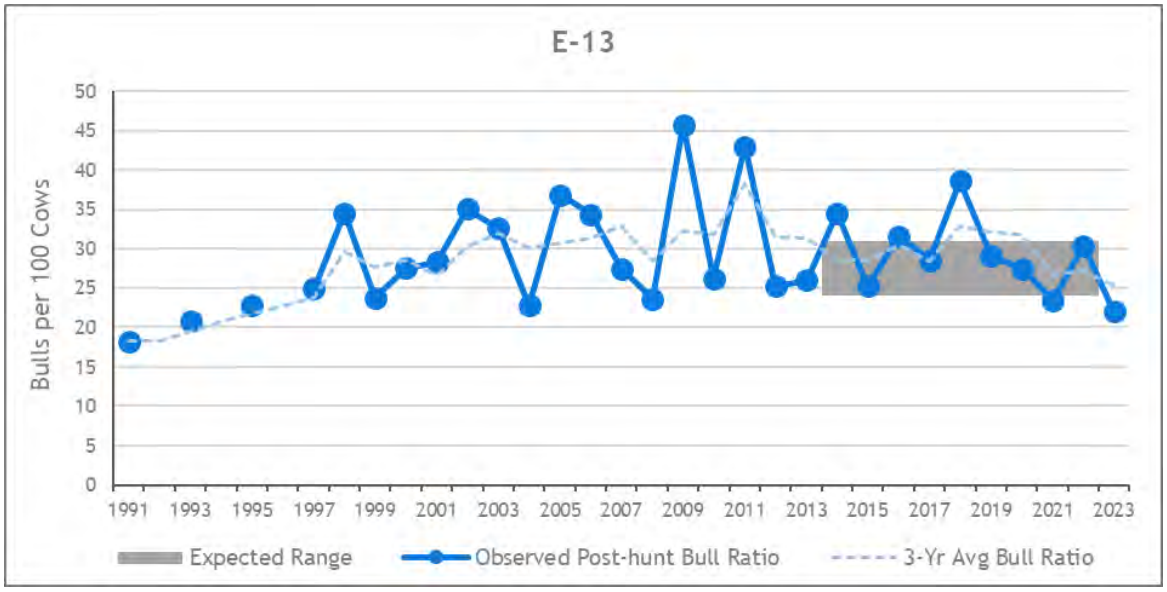


Figure 13-2. Elk DAU E-13 observed post-hunt sex ratio (bulls:100 cows), years 1991-2023.

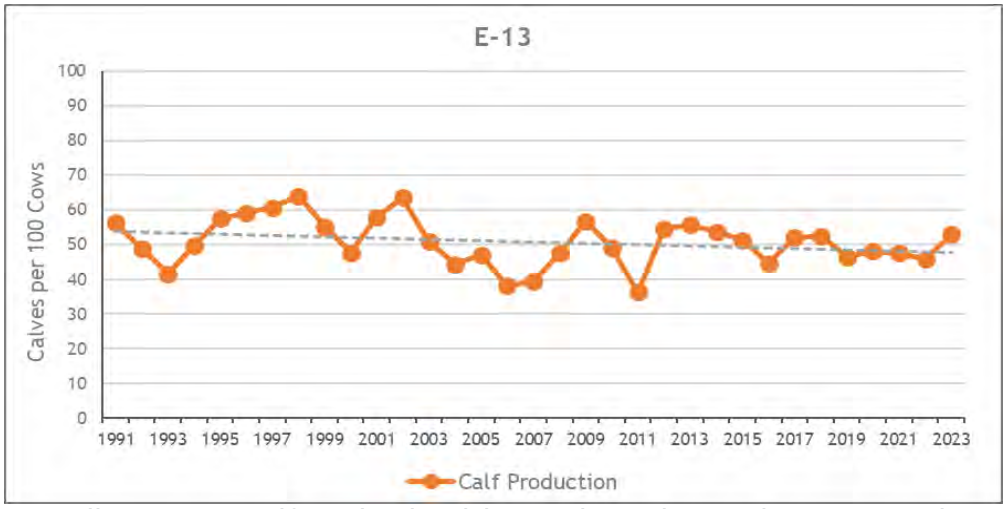


Figure 13-3. Elk DAU E-13 calf production (observed post-hunt calves:100 cows), 1991-2023.

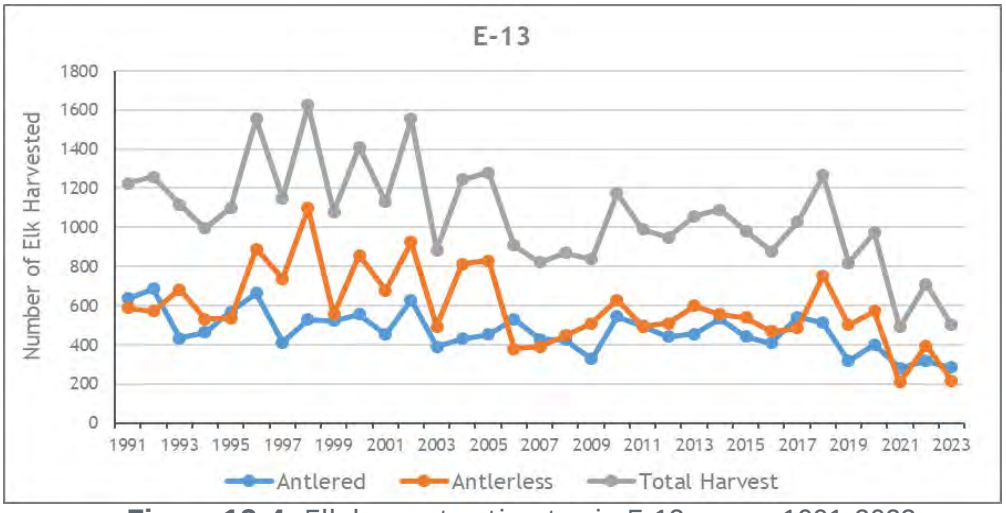


Figure 13-4. Elk harvest estimates in E-13, years 1991-2023.

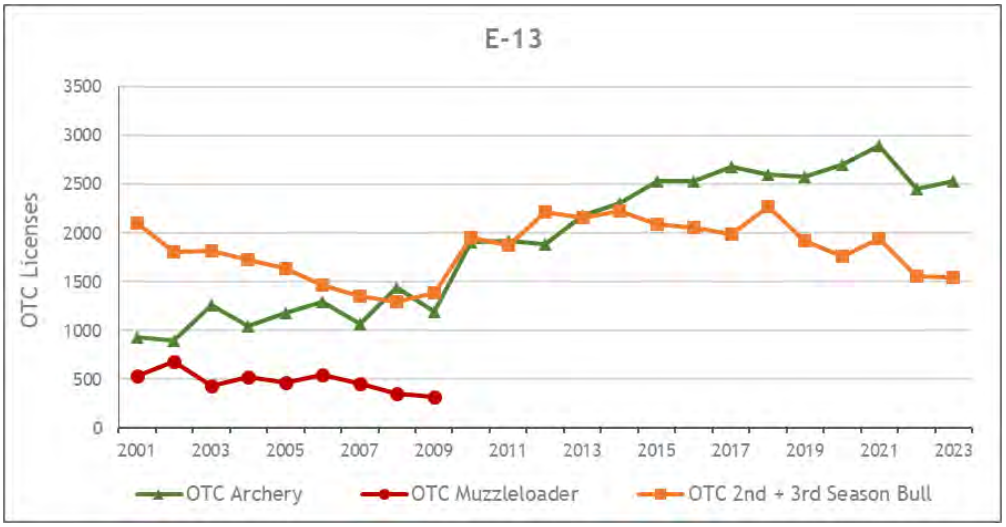


Figure 13-5. Over-the-counter (OTC) license numbers in E-13, years 1991-2023.

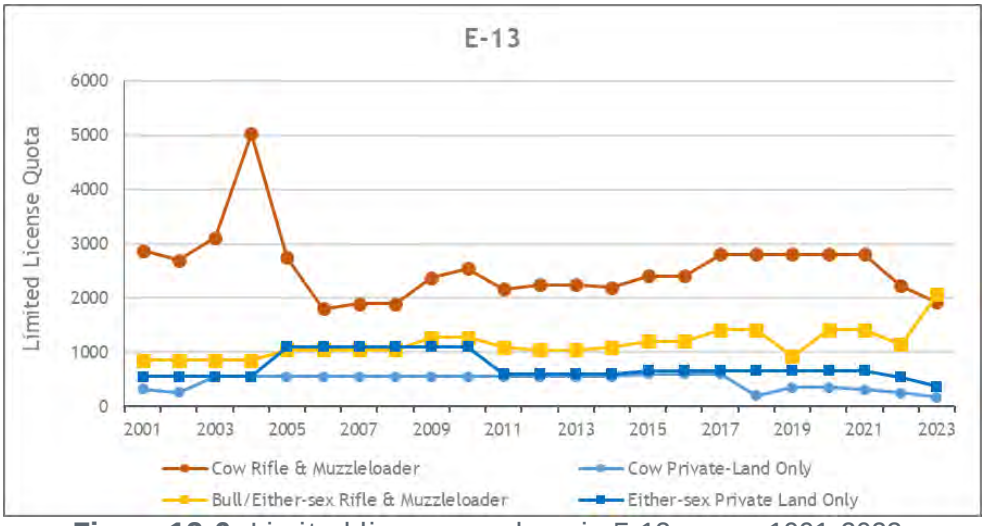


Figure 13-6. Limited license numbers in E-13, years 1991-2023.

Description

The Williams Fork Elk DAU (E-13) is located west of the Continental Divide in north-central Colorado and consists of GMUs 38, 37 and 371. It is bounded on the north by the Colorado River, Lake Granby and Arapaho Creek, on the east and south by the Continental Divide, and on the west by the Gore Range/Eagles Nest Wilderness Divide and the northern Mosquito Range. This DAU takes in the southern half of Middle Park, encompassing all of Summit County and slightly less than half of Grand County. Towns include Breckenridge, Frisco, Dillon, Keystone, Silverthorne, Heeney, Parshall, Tabernash, Fraser and Winter Park, and the southern portions of Kremmling, Hot Sulphur Springs and Granby.

The elevation in E-13 ranges from 7,300 feet along the Colorado River near the town of Kremmling, to over 14,200 feet in the Tenmile Range (Quandary Peak 14,272 ft) and along the Continental Divide (Grays Peak 14,278 feet; Torreys Peak 14,272 feet). Interstate 70 transverses the central part of the DAU between the Eisenhower-Johnson Tunnels to the east and Vail Pass to the west. The DAU is bounded on three sides by mountain highway passes including Berthoud Pass, Loveland Pass, Boreas Pass, Hoosier Pass, Fremont Pass and Vail Pass, in addition to multiple 4-wheel drive mountain passes. The headwaters of the Blue River, Williams Fork River, and Fraser River all originate in E-13. These drainages and all of their tributaries are contained entirely within the DAU and flow downstream into the Colorado River. E-13 covers approximately 872,349 acres (1,363 square miles) and land ownership is 65% USFS, 27% Private, 5% BLM, 2% NGO, 0.5% State (CPW and SLB) and 0.5% Municipal (City/County).

Climate

The Middle Park is a high elevation inter-mountain park surrounded by high mountain ranges. The climate is generally dry and cold; however, persistent drought conditions have contributed to significant wildfires in recent years. The most notable in E-13 was the Williams Fork Fire that burned nearly 15,000 acres over 2 ½ months in 2020. Extreme winter temperature inversions with average nighttime low temperatures between -20º to -30ºF are common, with records as low as -64º F. The growing season is extremely short and variable.

Summer daytime temperatures at lower elevations can reach into the 90º F range; however, valleys become significantly cooler than uplands during the night as colder air settles.

Precipitation

Middle Park typically gets between 11 inches of moisture per year in Kremmling to 20 inches per year in Grand Lake, with the majority falling as snow between October and April. Winter snow accumulations of 30" are typical at 9,000 to 10,000 feet, and at higher elevations more than 20 feet of snow can fall over the course of winter.

Vegetation

Vegetation in Middle Park can be categorized into five broad types: cropland; wetland/riparian; rangeland (sagebrush steppe and mountain shrub); forestland (piñon-juniper, lodgepole pine, aspen, and spruce-fir); and alpine tundra.

Grazing

The BLM Kremmling Field Office administers 48 grazing allotments on public land within E-13 totaling almost 54,000 acres; currently all except one of the allotments are currently active. The USFS Sulphur Ranger District administers seven livestock grazing allotments on public land within E-13, totaling approximately 60,500 acres. Currently, only three USFS cattle grazing allotments are active on approximately 30,000 acres.

Seasonal Ranges

Elk select high quality forage habitat adjacent to cover and water for calving in the spring, typically from mid-May through early July. Less than 12% of the DAU is considered suitable production habitat for elk to birth and rear their calves. During the summer months, elk are generally at higher elevations and concentrate in areas of high quality forage and low disturbance, avoiding areas of high human activity, including trail networks and dense human developments. Approximately 36% of the DAU is considered to be intact elk summer concentration habitat. Suitable, undisturbed calving and summer habitats have become more limiting factors for elk in this DAU over the past decade, with increased human presence in the backcountry throughout all seasons.

In the fall, elk migrate down to lower elevations as snow accumulates, seeking south facing slopes or wind-blown ridges where the snow dissipates more quickly. Winter habitats are the most limited habitats for elk within this DAU, which presents challenges as winter habitat continues to be converted to housing and associated development, or becomes increasingly fragmented by trails and winter recreation. Much of the available winter range in E-13 occurs on private lands, BLM and USFS lands. While there are some relatively large contiguous blocks of suitable winter habitat in E-13, many of these areas are in poor condition due to ongoing drought, human development, and senescence of plant communities. While approximately 30% of the DAU has historically been classified as overall winter range for elk, only 12% of the DAU provides winter concentration habitat, and less than 8% of the DAU is classified as severe winter range. These habitats are critical to elk survival during average to severe winters, when snow depth is higher and temperatures are lower than on average. During recorded severe winters over the past forty years including 1983-84, 1992-1993, 2007-2008, 2013-14, 2015-16, 2021-2022, & 2022-2023, estimated winter calf survival was significantly lower than

average. It is notable that 4 of the 7 most severe winters since 1980 have occurred within the past 10 years.

History

Since 1981, the average population of E-13 has fluctuated between 6,000-7,000 animals. The highest estimated post-hunt population was 8,960 elk in 1990. Over the last ten years (2013-2022), the population has averaged 4,400 animals; prior to 2016 the average was 5,600 animals. The modeled population estimate in E-13 began declining rapidly in 2017, and has leveled out between 3,000 and 4,000 animals since 2020. The 2022 post-hunt population estimate is approximately 3,292 elk (Figure 1).

The first E-13 management plans in 1990 and 1999 set a population objective of 3,000, at a time when elk numbers were significantly higher and underestimated. Starting in 2000, new modeling techniques, consistent aerial classifications, and more accurate survival rate estimation from research projects provided improved data, and the most recent 2010 management plan adjusted the population objective to 4,700 to 5,500 elk, closer to the estimated population size at the time. For the past two decades, management goals in E-13 have been to bring this productive elk herd size down within the objective range and maintain it using liberal cow elk harvest, including a late season and extended Private-Land Only (PLO) season (which generally have higher harvest success rates than the regular rifle seasons).

Limited license quotas peaked in E-13 in 2017, and in 2018 the estimated population began to drop towards the lower end of the objective range. Regular season limited licenses were held at status quo for a few years while PLO licenses were decreased to stabilize the population, which in the past had rebounded quickly with reduced hunting pressure. However, the population continued to show declining elk numbers and more significant license reductions have been made over the past three years, not only for PLO seasons but across late cow, regular rifle and muzzleloader seasons as well (Figure 6).

E-13 is over-the-counter (OTC) for either-sex and antlerless archery, as well as 2nd and 3rd rifle season bulls. The DAU has seen a steady increase in OTC hunting pressure over the past decade, primarily from an increase in numbers of archery hunters. In 2010 when the previous DAU plan was approved, the 10-year average number of archery hunters per year in E-13 was approximately 1140 hunters. In 2020, the 10-year average number of archery hunters per year more than doubled to 2360 hunters. The current 10-year average (2013-2022) is even higher, at 2450 hunters per year (Figure 6); it peaked at nearly 3,000 archery hunters in E-13 in the fall of 2021.

E-13 is also OTC for 2nd and 3rd season antlered (bull) licenses, and has been since 1947. From 1986 to present, CPW has implemented the four-point antler restriction to protect yearling bulls from harvest. In 2010, the 10-year average number of OTC bull hunters was 1,650 per year. Since then, it has fluctuated between 1,500 to 2,300 hunters annually, and the current 10-year average is approximately 2,000 OTC bull hunters per year. Since 2013, the total number of OTC archery hunters has exceeded the total number of OTC rifle bull hunters every year.

Sex Ratios

Since 1991, CPW has conducted aerial classifications in E-13 for post-hunt sex and age ratios. The current (2010) plan has a sex ratio objective range of 24-31 bulls:100 cows; the previous 1991 and 1999 plans had a sex ratio objective of 24 bulls:100 cows. For the past three years, observed sex ratios have averaged 27 bulls:100 cows, which is also the long-term average from 1991 to 2022. Implementation of antler point restrictions, limiting 1st and 4th rifle seasons, and liberal antlerless harvest have maintained strong ratios over time, providing a balance between opportunity and quality in this DAU. The proposed sex ratio objective of 23-29 bulls:100 cows captures the current 3, 5 and 10-year averages in E-13, and aligns with the proposed objective for E-8, the other Middle Park elk DAU. Decreasing antlerless licenses to boost the overall population, while maintaining bull OTC archery and rifle seasons, may result in a slight decrease in bull:cow ratios in E-13. Due to plentiful refuge areas and difficult hunting terrain throughout the DAU, there is minimal concern for overharvest of bulls in E-13.

Age Ratios (Production)

Post-hunt age ratios are also collected during winter aerial classifications. Calf:cow ratios reflect production and survival of elk calves up to 6 months in age. Elk production in E-13 has ranged between a low of 36 calves:100 cows over the winter of 2011-2012, and a high of 64 in 1998. Production has remained consistently above 50 calves:100 cows on average in E-13 until 2015. From 2016-2022 the average has dropped to 48, and 5 of the past 10 years have been below 50. Post-hunt observed calf:cow ratios in 2022 were 45 calves:100 cows (Figure 3).

Harvest

Elk harvest is estimated annually through hunter harvest surveys. Elk harvest in E-13 has fluctuated somewhat over time, varying annually with population levels, license allocations and weather conditions. Historically, total average annual harvest was 125 elk per year in the 1950s, and increased every decade until the 1990s when it reached a high average of 1,200 elk per year, peaking at 1,600 elk in 1998. Average harvest over the past two decades has been approximately 1,000 elk per year, with the lowest annual harvest at 490 elk in 2021.

The 30-year average for bull harvest in E-13 is approximately 475 bulls harvested annually; this has decreased slightly to a current 3-year average of 330 bulls per year. Bull harvest peaked at 685 in 1992 and was lowest at 281 in 2021. The 30-year average for antlerless harvest in E-13 is approximately 600 cows and calves harvested annually; this has decreased to a current 3-year average of 400 cows and calves per year. Antlerless harvest peaked at approximately 1100 cows and calves in 1998 and was lowest at 210, also in 2021. Antlerless harvest has exceeded bull harvest 7 of the past 10 years.

Significant Management Issues

Loss of habitat due to human residential development.

-From 1990 to 2023, the human population in Grand Counties have more than doubled, growing from approximately 13,000 to over 30,000 residents in Summit County, and from 8,000 to over 16,000 residents in Grand County. The combined population of both counties is projected to grow to over 50,000 in the next ten years (Appendix C). Habitat continues to be converted to housing and associated development (roads, utilities, commercial infrastructure).

Recreation and Trails.

-80% of E-8 is public land, managed by the USFS, BLM or NPS. Increasing trail development and associated use by hikers, bikers, ATVs, people with dogs, backcountry skiers and snowmobiles continue to have cumulative impacts on elk populations by causing disturbance during critical time periods (winter, spring, summer). Elk are re-distributed into less suitable habitats, lowering the overall carrying capacity.

-Both Summit and Grand Counties are popular destinations for year-round recreation users, with extensive trail networks, campgrounds, guest ranches and six major ski resorts.

-The USFS Dillon Ranger District administers the Eagle's Nest Wilderness, Ptarmigan Peak Wilderness; and the Sulphur Ranger District administers the Byer's Peak Wilderness and Vasquez Peak Wilderness, all popular summer recreation destinations.
Dillon Reservoir, Green Mountain Reservoir and Williams Peak Reservoir and associated developed recreation sites are popular summer destinations.

Decline in habitat quality due to climate (drought, wildfire, severe winters)

-Climate: Temperatures across Colorado have warmed over the last century. Weather extremes are more frequent, less precipitation is falling as snow; annual snowpack is decreasing, snowmelt occurs earlier, evaporation is increasing, and less water flows into the Colorado River

-Drought: persistent high temperatures and drought across the region have dried out soils; enabled the mountain pine beetle epidemic, and increased the severity, frequency, and extent of wildfires.

-Wildfire: Before the twenty-first century, Colorado had not seen a fire grow beyond 100,000 acres. Since 2000, however, there have been six, and three of them occurred in 2020, including the Williams Fork Fire. Fire suppression has led to exclusion of fires where it historically played an important role on landscape, leading to overly dense stands of trees that provide abundant fuels for wildfire and extreme wildfire conditions. As summers and droughts last longer and winter snow melts off earlier, bigger, later fires at higher altitudes are more likely to occur.

-Mountain Pine Beetle: Since 1998, mountain pine beetle infestation has significantly altered the vegetation type in this DAU, leading to massive stands of dead lodgepole pine trees. These dead stands initially provided more ground forage, resulting in increased use by elk and contributing to a reduction in game damage conflicts. However, increased blowdown in recent years has created impassable areas to elk, and re-distribution of elk (due to multiple factors) has resulted in increased game damage and winter competition with livestock for hay on private lands. Post-fire recolonization of plant species may lead to improved ground forage in some areas depending on future drought conditions.

-Range Conditions: In addition to the ongoing drought and pine beetle infestation, a reduction in livestock grazing and fire suppression have degraded overall range health, leading to senescent climax plant communities and ultimately lower quality forage for elk.
Severe Winters: Weather extremes are more frequent, leading to increased weather severity and snow crusting events. The Middle Park Winter Severity Index (snow depth and

temperature) has been above average 4 of the past 10 years, contributing to below average over-winter calf (and likely adult) survival during those years.

Calf Recruitment/Declining elk population.

Over-winter calf survival has been lower than average in recent years, leading to fewer calves being recruited into the adult population.
Low recruitment in recent years is likely due to a combination of factors including loss of quality winter habitat to development, disturbance from human recreation, winter severity, and poor winter range habitat conditions.

Predation

Predation on elk, primarily by mountain lions, accounts for a significant portion of non-hunting mortality in Middle Park radio-collared elk for cows and calves.
Approximately 20% of cow and calf mortalities during year 1 of the Middle Park Elk Survival Monitoring Study were attributed to predation.

Roadkills- Highways/Trains

-Roadkill (highway and train) accounts for a significant portion of non-hunting mortality in Middle Park radio-collared elk
-Approximately 10% of cow elk mortalities during year 1 of the Middle Park Elk Survival Monitoring Study were attributed to highway and train roadkill.
-The Highway 9 wildlife crossing project (completed in 2016), with 7 crossing structures, fencing and escape ramps between milepost 127 and 138, has resulted in a 90 percent reduction in wildlife-vehicle collisions along this stretch.

Fencing (Entanglements/Barriers).

-Old fencing on the landscape causes entanglement and mortality for elk, and non-wildlife friendly fencing for horses, livestock, pets or private land present movement barriers for elk. Fencing entanglement accounted for approximately 3.5% of calf mortalities and 8% of cow elk mortalities during year 1 of the Middle Park Elk Survival Monitoring Study.

Agricultural- Game Damage/Livestock Competition

Re-distribution of elk due to human development, forest degradation and other factors has resulted in increased game damage/winter competition with livestock for hay on private lands. A majority of this competition in E-13 occurs in Game Management Unit 28.

Ingress/Egress

-DAUs are delineated on the assumption that there is very limited interchange with adjoining areas. Elk numbers may be fluctuating in this DAU due to movements of elk to and from adjacent DAUs including E-8, E-12, E-18 and E-38. Influx or departure of animals greatly increases the difficulty of maintaining the elk population at the predetermined number.
-Recent GPS collar data has shown that there is some movement across the DAU boundaries, but a majority of the elk in E-13 spend most of their life cycle within the DAU. The ongoing Middle Park Elk Monitoring Study will continue to evaluate movements and seasonal distribution of elk in E-13.

Chronic Wasting Disease

-The first positive detection of CWD in E-13 was in 2007. Since then, 4 additional elk in E-13 have tested positive for CWD. Between the years 2002-2022, 1914 samples were submitted with 5 total positive samples (2 cows and 3 bulls). The current prevalence is 2.9% (CI 0.1%-15.3%).

Strategies for Addressing Management Issues and Achieving Objectives

E-13 is managed through limited licenses for antlerless and either-sex harvest for all muzzleloader and rifle seasons. Currently, antlerless and either-sex archery licenses, and antlered 2nd and 3rd rifle season licenses are available over-the-counter. Limited antlerless late rifle season licenses provide additional hunting opportunities to help achieve desired antlerless harvest. Private land only (PLO) licenses are available to help address game damage issues and disperse elk. The current management strategy has been historically effective at maintaining a productive herd with intermediate calf:cow ratios (45-55 calves:100 cows), offering plentiful hunting opportunities and consistent bull:cow ratios. However, recent declines in production, survival and overall herd size have led to decreased numbers of antlerless licenses, primarily during the late season and PLO seasons but also during the regular seasons.

The preferred management alternative is to increase the E-13 elk population from the current estimate of approximately 3,300 elk, to a target of 4,500 elk, expanding the objective range to 4,000-5,000 elk in order to allow for more management flexibility. The previous management range of 4,700-5,500 elk may not be attainable in E-13 due to loss of habitats, human development, and disturbance, which have effectively reduced the carrying capacity of this herd over the past decade. The slightly lower proposed objective range would guide management to allow the herd to grow larger than the current population and continue to provide opportunity for both antlerless and bull elk hunters; however, harvest may be more restricted until the population level reaches the target range. The expanded objective range would allow for management flexibility in adjusting licenses to address population fluctuations (i.e. low winter survival years), game damage issues, crowding and hunter satisfaction.

In the winter of 2022-2023, CPW initiated a long-term elk survival monitoring study in Middle Park (DAUs E-8 and E-13) to gather data on elk survival, movement, and cause specific mortality. CPW plans to maintain GPS collars on adult cows and 6-month old calves annually to collect adult cow and winter calf survival rates and cause specific mortality rates. This data will improve modeled elk population estimates, which rely on annual survival rates of adults and winter calf survival rates to estimate population size. Additionally, marked GPS collars allow for mark-resight population estimation to directly assess elk abundance. This study was implemented one year prior to the December 2023 wolf reintroduction deadline, in order to aid in estimating the effects of wolves in addition to the impacts of other predators, human disturbance, recreation, development, highways and disease on the elk populations in Middle Park, and evaluate the behavioral responses of elk by monitoring distribution, movements, and migration.

CPW works with federal, county, state and municipal land management agencies to avoid, minimize and mitigate the impacts of residential and recreational developments in important wildlife habitats and migration corridors. Increased disturbance and loss of these crucial habitat areas have contributed to the elk herd decline in E-13, and will continue to do so

without partnerships and cooperation from other land managers. CPW works to collaborate with these agencies to implement seasonal closures on trails and open space areas to protect winter range and calving ranges during critical times of the year for elk. CPW, CDOT and other partners are continuously working to identify and prioritize locations for highway crossing projects (fencing, crossing structures) to minimize roadkill impacts in elk movement and migration areas. CPW also supports implementation of conservation easements to protect wildlife habitat in perpetuity. Currently, three conservation easements exist within E-13, protecting approximately 39,950 acres.

Stakeholder Outreach and Input

In 2021 & 2022, hunters were randomly selected to complete the Elk Hunter Attitude Survey after the completion of their hunting seasons. In 2022, overall responses were higher and between 1,369 and 1,665 hunters from E-13 answered each of the opt-in survey questions. 57-60% of hunters were dissatisfied with the total number of elk and number of bulls seen in 2022, while 22-28% were satisfied. More than half (58%) would prefer to hunt more often, versus hunting bigger bulls less often (42%), including a majority of resident respondents. Nearly 75% of respondents wished to see an increase in the E-13 elk population over the next 10 years; only 20% wished for the population to stay the same. 75% of respondents also felt slightly-to-very crowded by other hunters during their hunt, and residents felt much more crowded than non-residents. More than half (56%) of residents also felt crowded by non-hunters. Satisfaction was similar to 2021 with 42% of respondents satisfied with their hunt, 40% were dissatisfied and 18% were neutral; among residents 20% were neutral and the remaining 80% were equally satisfied and dissatisfied. Hunters that harvested elk in 2022 expressed higher satisfaction than those that did not harvest.

In August 2023, CPW held a public meeting in Kremmling to share information and obtain public input on the E-13 elk population. Sixteen people attended the meeting, and fifteen people commented on E-13. 93% of the respondents indicated that they would like to see a greater number of elk than currently in E-13; 7% would prefer to see the same number maintained. Respondents identified the following issues, in order of importance, as impacting the elk herd in E-13: residential development, recreation & trails, habitat quality/loss of habitat, calf recruitment/declining population, roadkill (highway/train), climate (drought/fire/severe winter conditions), predation, overhunting, fencing (barrier, entanglement), agriculture (game damage, livestock competition) and chronic wasting disease (CWD).

Management Alternatives

Preferred Alternative: 4,000 – 5,000 elk and 23 – 29 bulls per 100 cows.

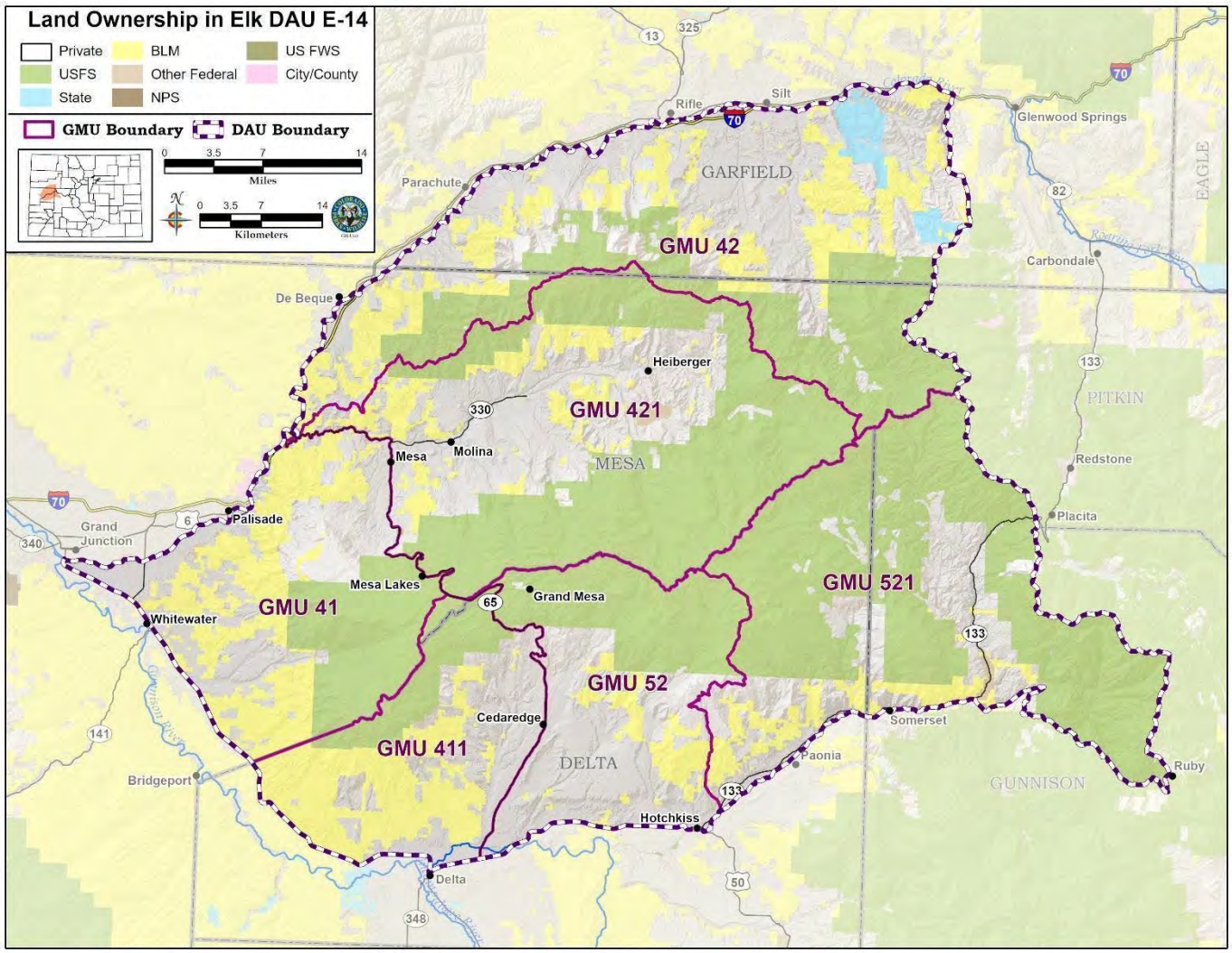
Status Quo: 4,700 to 5,500 elk and 24 – 31 bulls per 100 cows.

GRAND MESA HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-14

Genevieve Fuller, Wildlife Biologist, Grand Junction

Grand Mesa Elk Herd (DAU E-14) **Approval Year for last HMP: 2010**	**GMUs: 41, 42, 52, 411, 421, and 521**
Post-hunt population:	
Current (2010 plan) Population Objective:	15,000 – 19,000 elk
Post-hunt 2023 Population Estimate:	15,600 elk
Preferred Population Objective:	**15,000 – 19,000 elk (status quo)**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2010 plan) Sex Ratio Objective:	18-22 bulls per 100 cows
Post-hunt 2023 Sex Ratio:	observed: 22.6; modeled: 30.7
Preferred Expected Sex Ratio Objective:	**18-25 bulls per 100 cows**



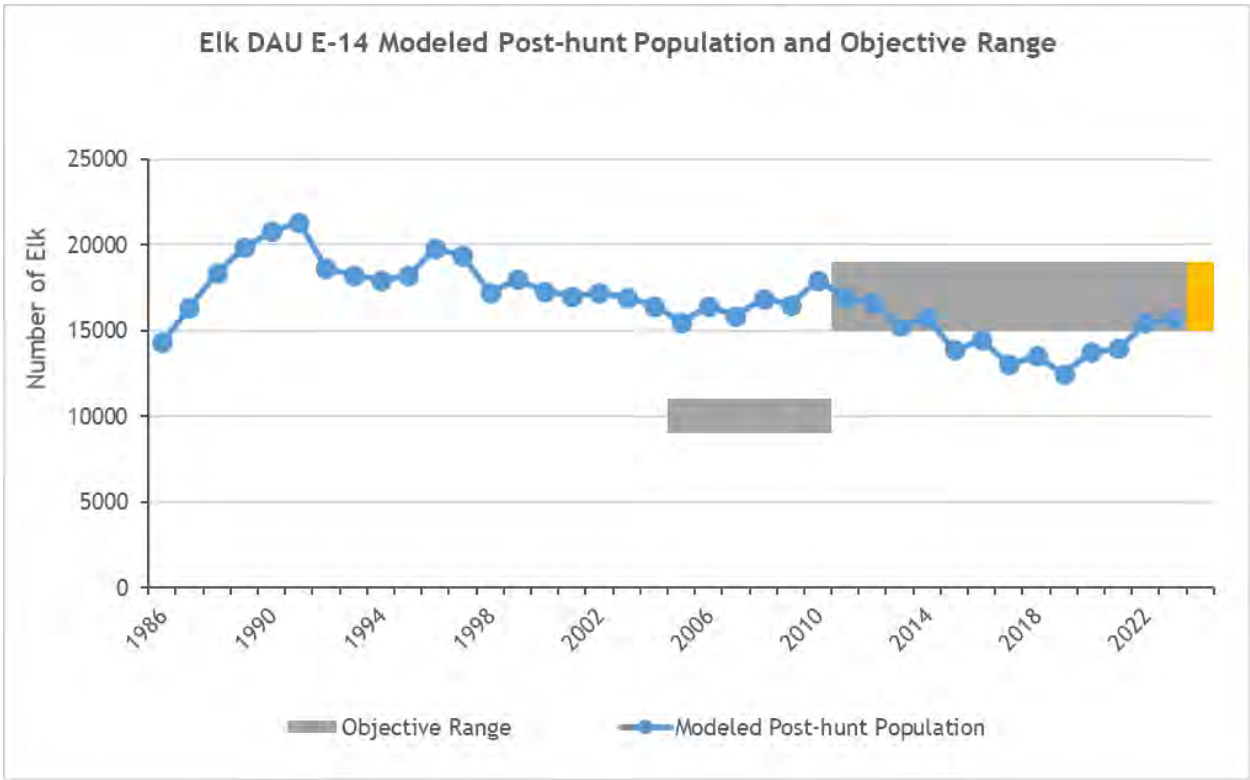


Figure 14-1. Elk DAU E-14 modeled post-hunt population and objective range, years 1986-2023 (Preferred Alternative Range in Yellow).

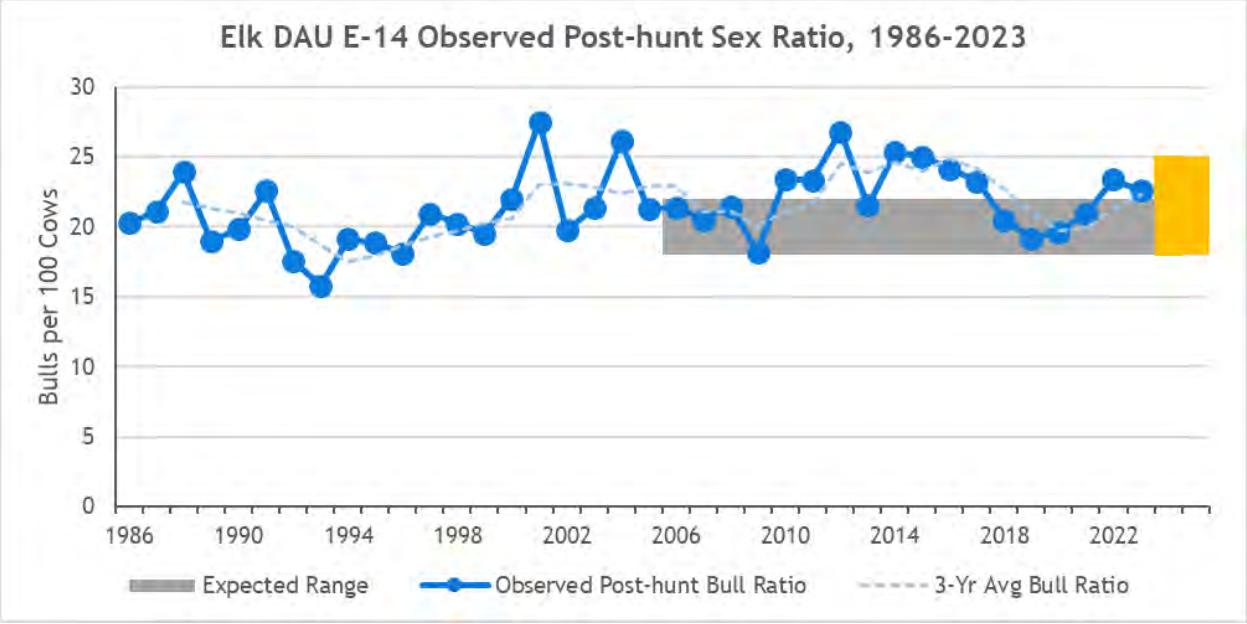


Figure 14-2. Elk DAU E-14 observed and modeled post-hunt sex ratio (bulls:100 cows), years 1986-2023 (Preferred Alternative Range in Yellow).

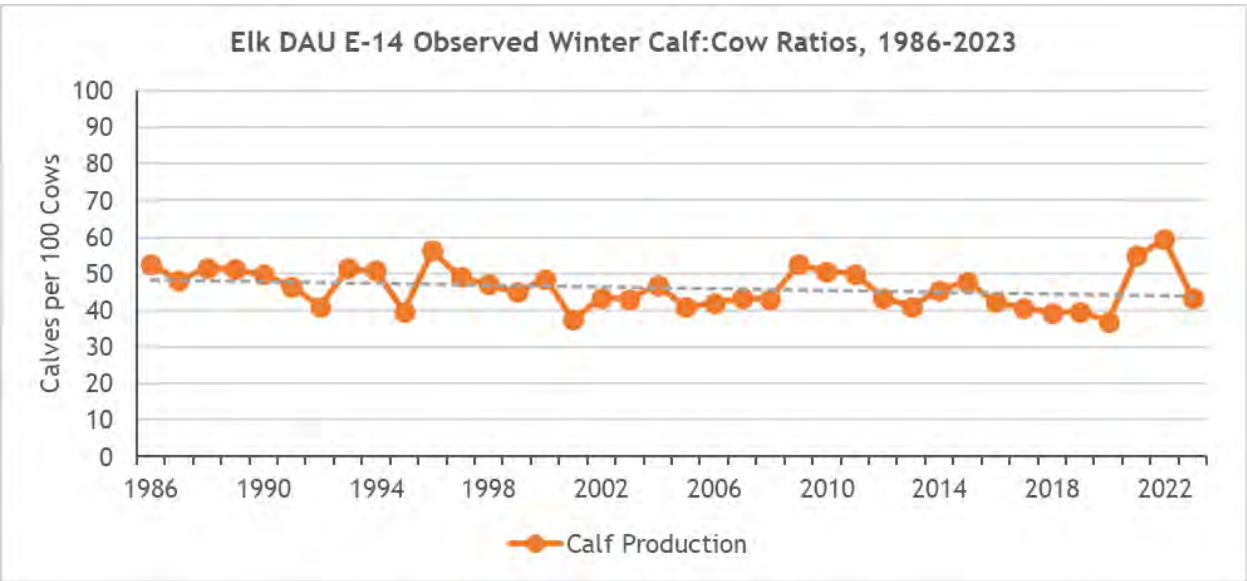


Figure 14-3. Elk DAU E-14 calf production (observed post-hunt calves:100 cows ratio, years 1986-2023)

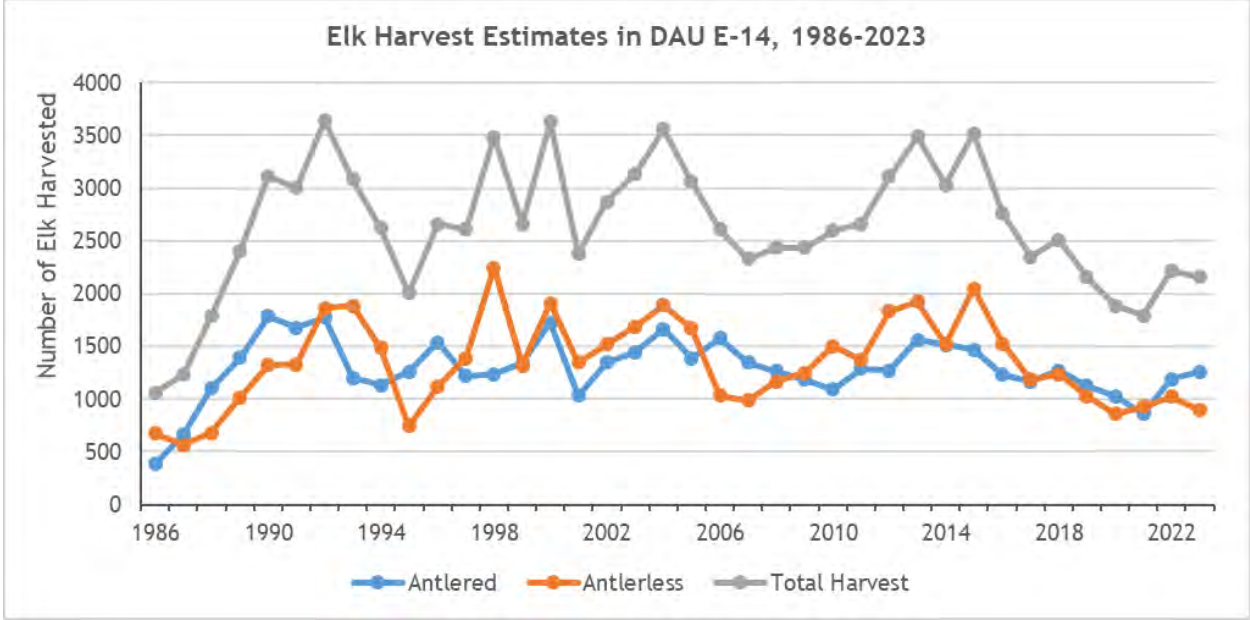
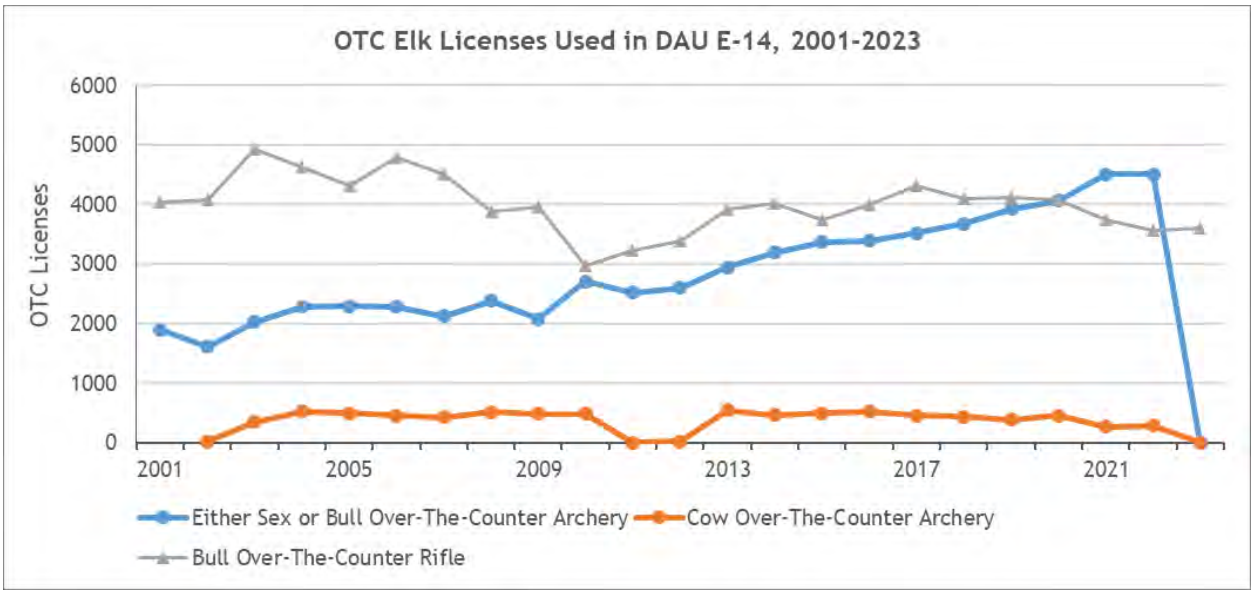


Figure 14-4. Elk harvest estimates in E-14, years 1986-2023.



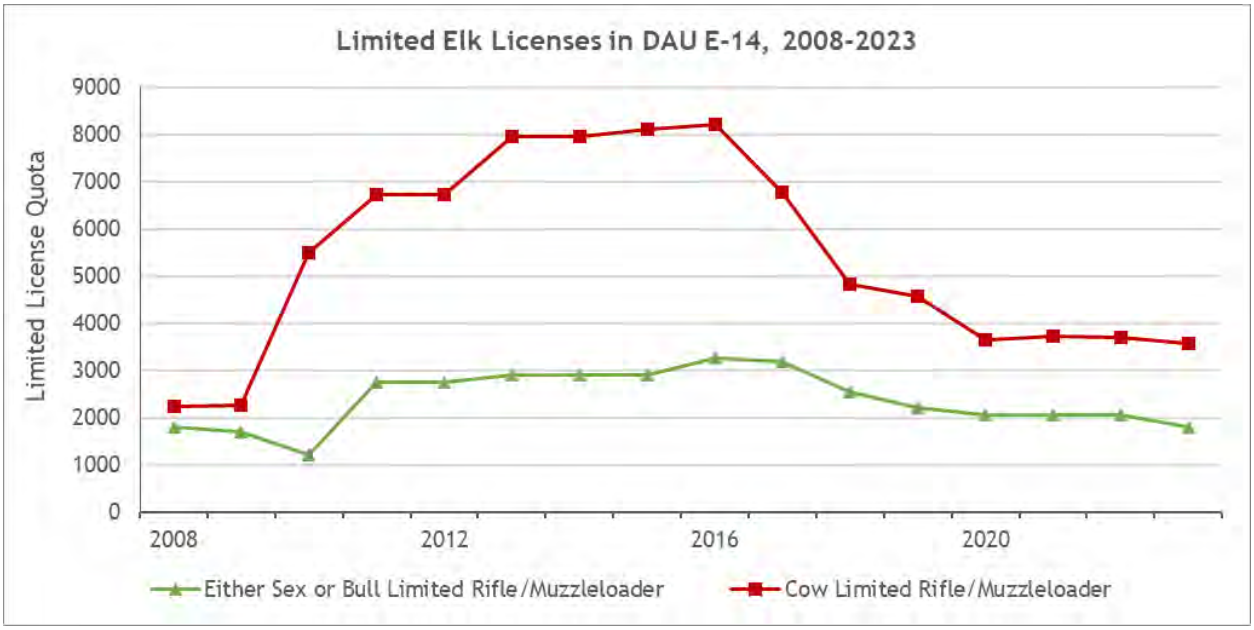


Figure 14-5. Elk Limited and Over-The-Counter License Quotas in E-14, years 2001-2023.

Background

The Grand Mesa E-14 DAU is located in west-central Colorado and encompasses the Grand Mesa, directly east of Grand Junction and includes Game Management Units (GMUs) 41, 42, 52, 411, 421, and 521. This unit spans parts of Mesa, Garfield, Pitkin, Delta and Gunnison counties. Elevations range from the flat top mountains on the Grand Mesa at around 11,000 feet to approximately 4,600 feet down at the Colorado River. Approximately 63% of this DAU is public property with 43% managed by the United States Forest Service, 19% managed by the Bureau of Land Management and a small percentage managed by the state of Colorado.

Since the 2010 E-14 herd management plan, the population objective for the Grand Mesa elk herd has been 15,000 to 19,000 animals. The elk population for many years remained fairly stable, hovering above the objective range. In the 2010s cow licenses were increased and stabilized the population. The population declined to below objective and cow licenses were reduced. The last three years have seen an increase in population under reduced cow licenses and a break in drought conditions, mirroring increases in calf:cow ratios. The post-hunt population estimate in 2023 was 15,683 elk.
Winter calf: cow ratios, which represent a measure of calf recruitment and the herd's productivity, have been largely stable in E-14.
The current sex ratio objective range for elk is 18 - 22 bulls: 100 cows. For the life of the 2010 herd management plan, this herd has been managed to maximize hunting opportunity. With over the counter licenses available for both archery and rifle, the sex ratio range has fluctuated between 18.2 and 26.8 bulls per 100 cows in the last decade.
Historically, this herd has had both Over-The-Counter (OTC) either-sex and cow archery tags, but almost exponential growth in the number of hunters heading to the Grand Mesa to hunt elk in archery season changed the distribution of elk and affected harvest success. Due to steep decreases in hunter satisfaction, declines in harvest rates and changes in elk distribution due to hunting pressure, OTC archery tags were removed for E-14 and replaced with limited licenses.

Significant Issues

The ongoing issues for the Grand Mesa elk herd are primarily around elk winter ranges. Elk winter ranges on the Grand Mesa have been affected by range habitat quality declines due to years of drought, reduction of overall habitat due to development and exclusionary fencing and habitat fragmentation. Additionally, there are game damage issues and concerns about predation rates from a large bear population. Hunting opportunities within elk winter ranges are fewer than within summer ranges due to large tracts of private land and public access issues.

In the E-14 2010 Herd Management Plan, declining habitat quality on winter ranges was mentioned as a major issue for this herd. It continues to be a concern. Habitat quality within summer ranges on the Grand Mesa are considered quite good and have positive impacts on calf production. However, due to a combination of drought, invasive plants, fire suppression and various forms of development, the quality of the winter ranges in lower elevations has continued to decline. Recreational development has increased on the Grand Mesa as well. Proposals for new mountain biking and hiking trails have increased as more people move to the western slope.

The fragmentation and reduction of available habitat for elk on the Grand Mesa has declined as well. Increases in housing development and sub-division of large private properties along I-70 and the North Fork Valleys have resulted in a loss of quality winter range. Exclusionary fencing for orchards and other agricultural lands have blocked migration routes and access for elk to some of their range. This is compounded by elk game damage issues that occur on both the North and South sides of the Mesa.

Oil and gas has, historically, been a contributing factor in the reduction of elk range, but new green energies are also contributing. Interest in solar development has increased dramatically in the last couple of years in the area as well as across the state of Colorado. Much of the proposed and ongoing development for solar occurs within quality elk and deer winter ranges.

These solar projects exclude all large wildlife species from utilizing habitat and often destroy that habitat in the development process.

Despite attempts to reduce the bear population on the Grand Mesa, there are still high bear conflicts and large numbers of bears spotted every year. There is a concern that the predation that these bears incur on elk calves may be affecting our calf: cow ratios during hard weather years.

Additionally, of the approximately 1,220 square miles of winter range in E-14, 49% is on public lands and 51% is privately held. This low degree of accessible public land in late seasons leads to hunter crowding and lower harvest success rates of public land hunters. Elk refuge on private land during the late-fall and winter hunting seasons and increases in private land tags have not changed elk distribution much.

Stakeholder Outreach and Input

In 2022, hunters were randomly selected to complete the 2022 Elk Hunter Attitude Survey after the completion of their hunting seasons, and 3,174 respondents answered the opt-in questions for E-14. Over 50% of hunters were dissatisfied with the total number of elk and number of bulls seen in 2022. Nearly all respondents wished to see an increase in the elk population over the next 10 years. Approximately 60% of respondents felt not at all crowded or only slightly crowded during their hunt, and over half of the respondents were satisfied with their hunt overall.

In the summer of 2023, the proposed objectives were presented in El Jebel to 22 members of the public, in Grand Junction to five and in Hotchkiss to three. They were asked to submit written feedback through both an online survey and in-person. We received five written responses and two online. Many expressed their concerns about declining elk populations and the accessibility of those elk to the public. Growing concerns about increases in OTC non-resident hunters, increases in recreational and new energy development (solar/wind) and preference point creep.

In the fall of 2023, these objectives were presented to the North and South Grand Mesa Habitat Partnership Program Committees. The plan will also be open to public comment for a 30-day period before heading to the Colorado Parks and Wildlife Commission for approval.

Management Alternatives

The preferred alternatives of 15,000 to 19,000 elk and 18 – 25 bulls:100 cows.

Post-hunt Population

15,000 – 19,000 elk (status quo)
The hunting public has indicated a desire to see population increase, but due to many of the issues identified for this herd, there are limits to what can be achieved through harvest management. Concerns about the amount of game damage issues, quality and quantity of available winter range and other pending changes to the landscape may prove raising the population objective unfeasible. At this stage in the process, CPW personnel recommend

status quo in an effort to balance the hunter desires to see the herd grow with the other issues on the ground that may make a large herd increase challenging in E-14. The herd is currently at the low end of the population objective range which allows management towards growth in population without increasing the objective range. Good precipitation in the last two years have led to increases in calf:cow ratios and resulted in an increase in population and increases in the herd are possible under the current management scheme.

Post-hunt bull ratio

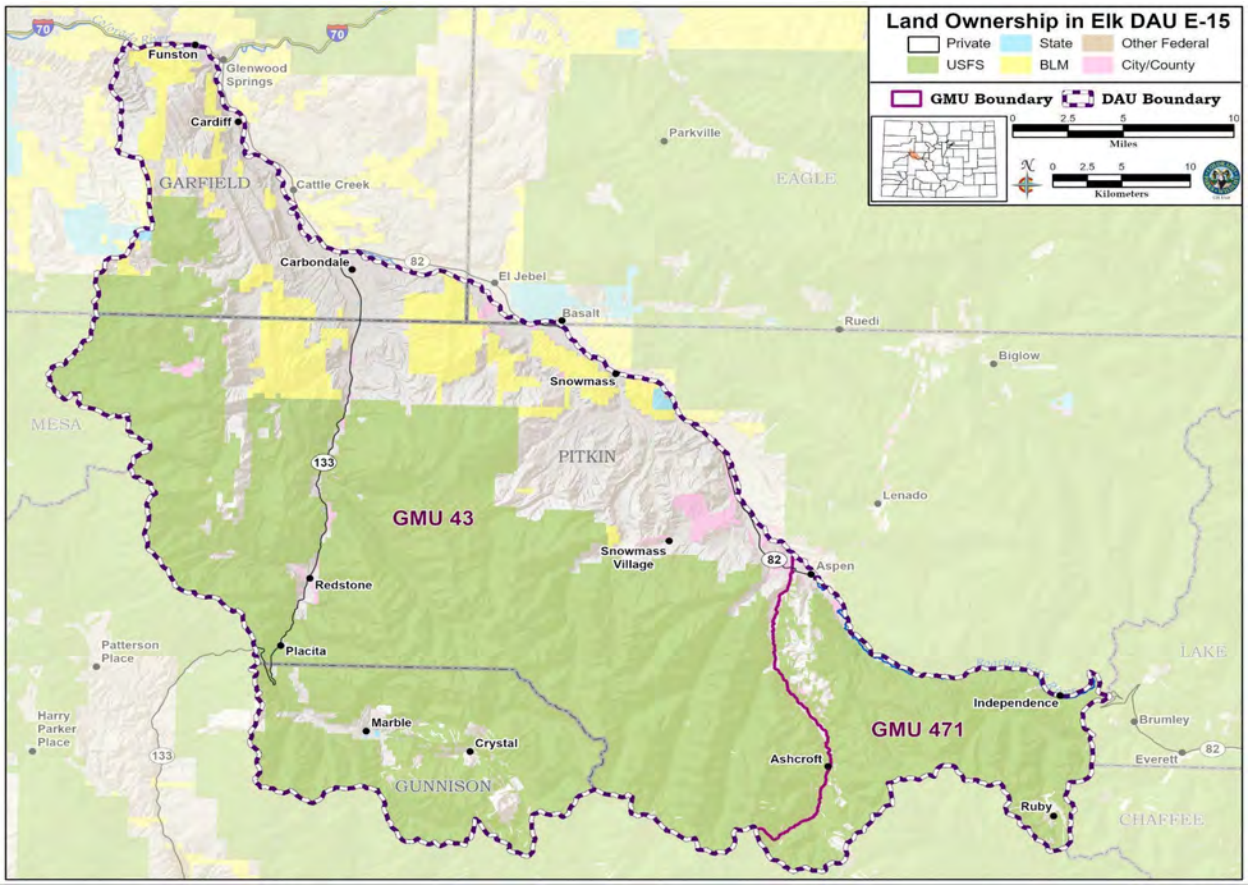
18 – 25 bulls per 100 cows (wider range)
Since the 2010 Herd Management Plan revision, the range of sex ratios that have been observed during winter surveys is 18.2 to 26.8 bulls per 100 cows. CPW personnel recommend increasing the sex ratio objective range to 18 - 25 bulls per 100 cows from 18 – 22 bulls per 100 cows to include this variation. This increased management flexibility would address hunter desires to see more bulls on the landscape, but allow continued management of the Grand Mesa elk herd for hunter opportunity, which was also an indicated preference of many hunters. This also addresses the challenges of management through limited license setting with open OTC rifle seasons.

AVALANCHE CREEK ELK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-15

Julie Mao, Wildlife Biologist, Glenwood Springs

Avalanche Creek Elk Herd (DAU E-15)	**GMUs: 43, 471**
Post-hunt population:	
Current (2013 plan) Population Objective:	3,800-5,400 elk
Post-hunt 2023 Population Estimate:	4,250 elk
Proposed New Population Objective:	**status quo (3,800-5,400 elk)**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2013 plan) Expected Sex Ratio:	17-27 bulls:100 cows
Most Recent 3-year Average of Observed Sex Ratio:	22 bulls:100 cows
New Expected Sex Ratio Objective:	**19-30 bulls:100 cows**



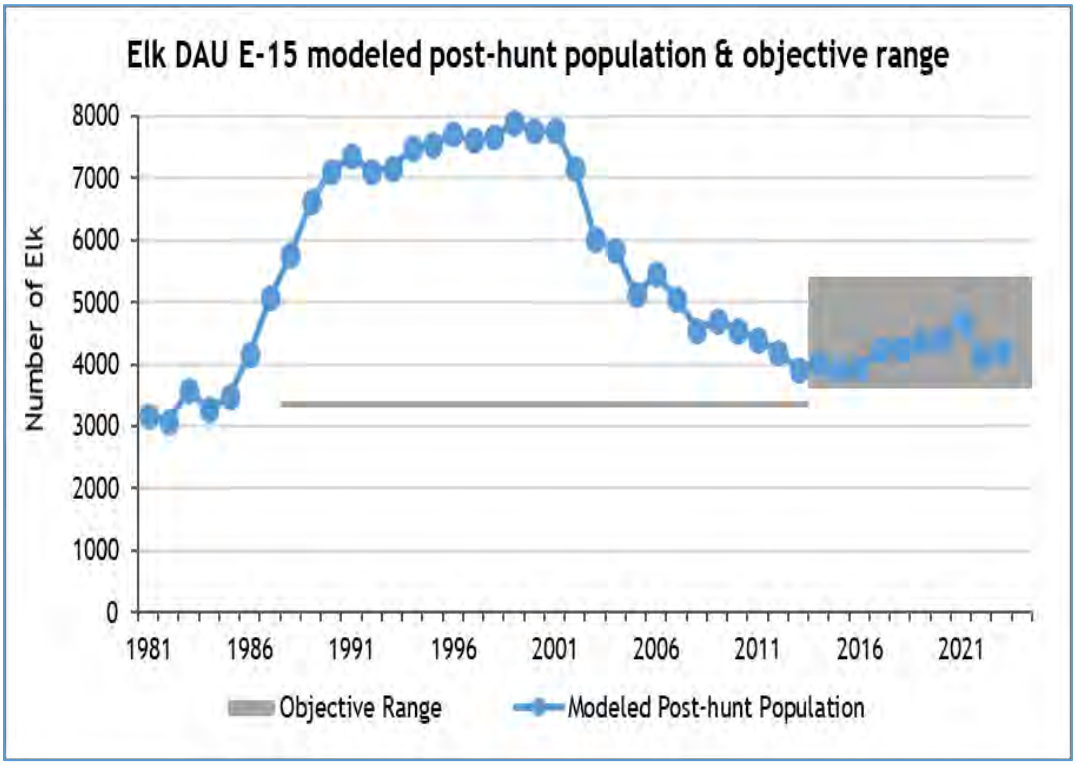


Figure 15-1. Elk DAU E-15 modeled post-hunt population and objective range, years 1981 - 2023.

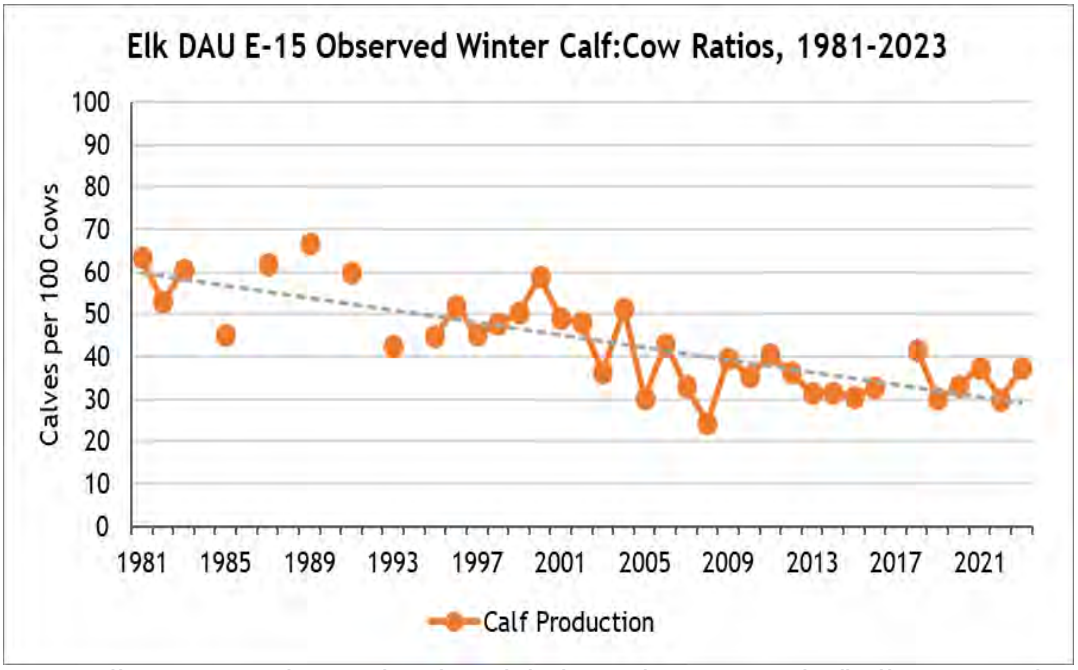


Figure 15-2. Elk DAU E-15 observed and modeled post-hunt sex ratio (bulls:100 cows), years 1981 - 2023.

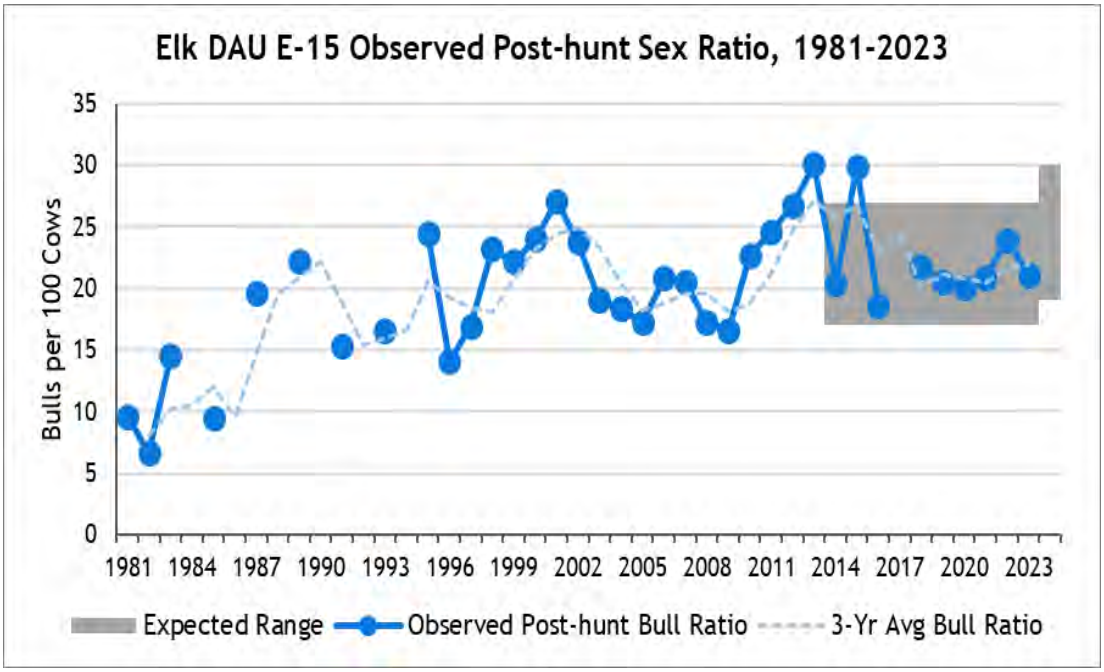


Figure 15-3. Elk DAU E-15 calf production (observed post-hunt calves:100 cows ratio, years 1981-2023)

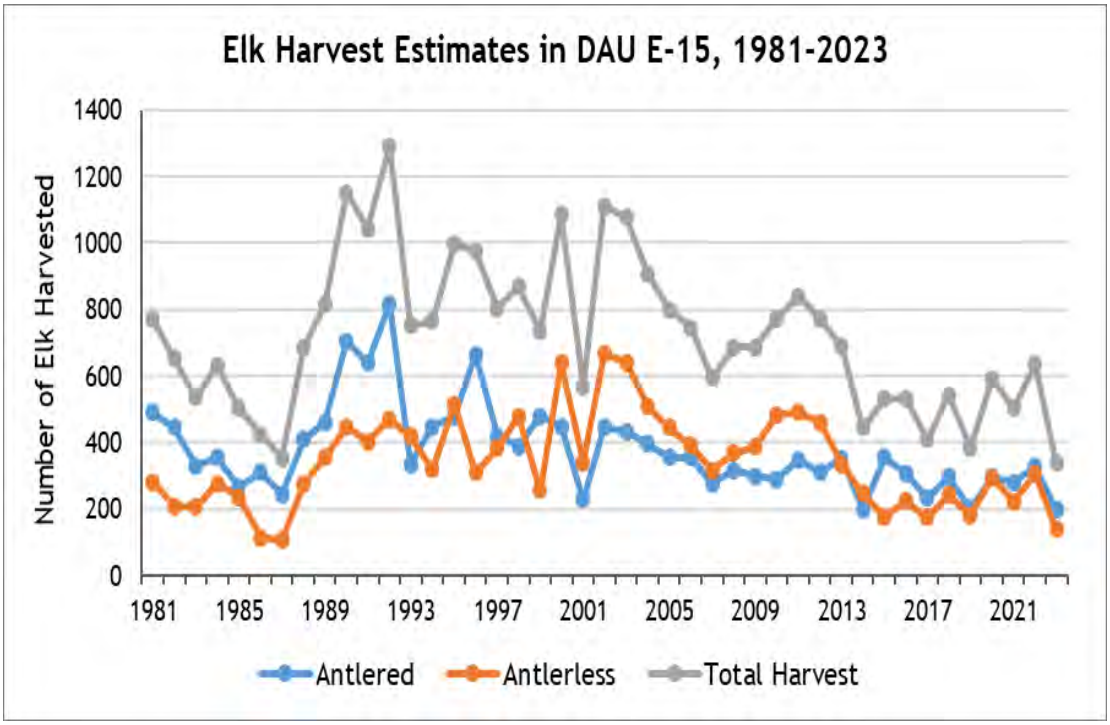


Figure 15-4. Elk harvest estimates in E-15, years 1981-2023.

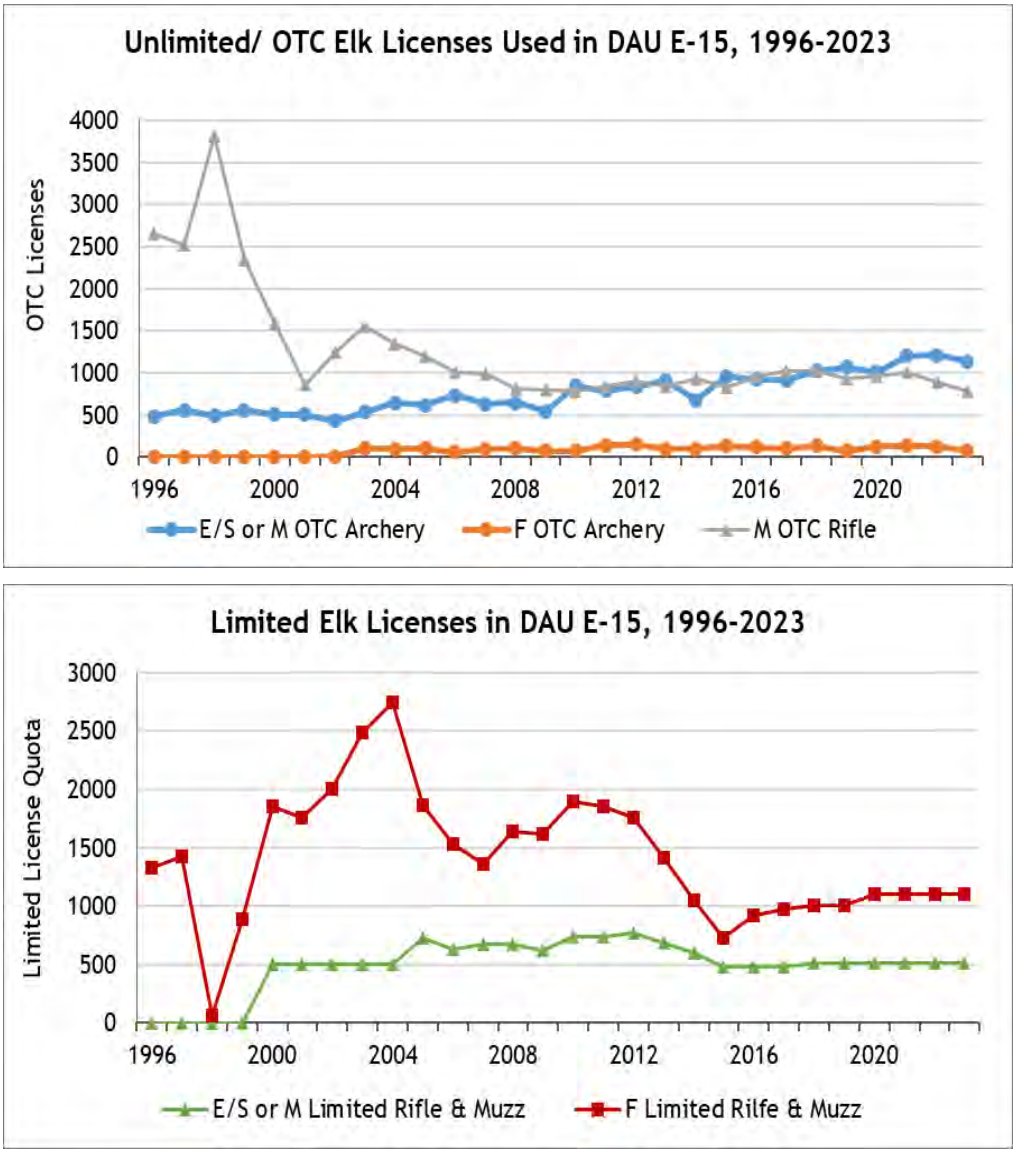


Figure 15-5. Elk Limited and Over-The-Counter License Quotas in E-15, years 1996-2023.

Background

The Avalanche Creek Elk Data Analysis Unit (DAU) E-15 is located in northwest Colorado and consists of Game Management Units (GMU) 43 and 471. This DAU lies in Pitkin, Gunnison, Eagle, and Garfield Counties. Major towns include Aspen, Snowmass Village, Basalt, Carbondale, Glenwood Springs. E-15 covers 2,201 km2 (~544,000 acres) of land area. Approximately three-fourths of the DAU is public land, and one-fourth is private. Wilderness areas make up 39% of the DAU including most of the Maroon Bells-Snowmass and parts of the Collegiate Peaks and Ragged Wilderness Areas. The DAU makes up about 60% of the Roaring Fork River Watershed.

The 2013 herd management plan for E-15 updated the population objective to a range of 3,600-5,400 elk. Cow licenses were reduced moderately over several successive years from

2013-2015 in order to stabilize the population within the new objective, and then cow quotas were increased slightly in 2016 and have been held fairly stable since then. The population has been stable to slightly increasing within objective range over the past 10 years. E-15's population estimate as of post-hunt 2023 was ~4,250 elk.

Winter calf:cow ratios, which represent a measure of calf recruitment and the herd's productivity, have declined by 7.3% each decade over the past 40+ years, meaning that the herd's potential for population growth and its resilience to environmental and ecological stressors have steadily diminished as the landscape of the Roaring Fork Valley has changed. Over the past 10 years (2014-2023), winter calf:cow ratios have averaged 34 calves:100 cows, compared to 59 calves:100 cows in the 1980s. Because of concerns about declining calf:cow ratios in this herd as well as other herds around the state, CPW's Mammals Research section began an elk calf survival study in 2019 in several elk DAUs including E-15. The project is in progress through 2026, after which the researchers will publish their findings.

As an over-the-counter (OTC) DAU with unlimited either-sex archery and unlimited bull licenses in 2nd and 3rd rifle seasons, E-15 is not specifically managed for a sex ratio objective, but rather to provide ample bull hunting opportunities. In the 2013 herd management plan, the expected sex ratio range based on the minimum and maximum observed ratios in the preceding 10 years was 17-27 bulls:100 cows. Over the past 10 years, the observed bull:cow ratios remained within that expected range. The current (2021-2023) 3-year average is 22 bulls:100 cows, and the observed values over the past 10 years have ranged from 19 to 30 bulls:100 cows.

Harvest over the past 10 years has been slightly lower than in previous decades. Lower antlerless harvest has been primarily due to the reduction in cow licenses. Bull harvest is only marginally lower in the past 10 years compared to previous decades. Archery season participation in E-15, as in many other DAUs, has slowly but steadily climbed, and now exceeds the number of OTC rifle bull hunters.

Significant issues

All of the management issues involving habitat loss and fragmentation that were discussed in the 2013 E-15 herd management plan are still relevant today and may be even more significant as the number of people residing, visiting, and recreating in this area continues to increase and to impact elk and other wildlife and their habitat.

The human population in the Roaring Fork Valley has continued to grow over the past decade, albeit at a slower pace than in the 1990s and 2000s. Land development and recreation continue to be the major impacts on wildlife. Land development has led to loss of habitat quantity and quality in the form of conversion of habitat into houses, other buildings, and infrastructure; and fragmentation of habitat due to roads, trails, and structures. As more people have moved into the area, motorized and non-motorized outdoor recreation activities of all kinds have become a year-round presence on the landscape. Summer range areas on public lands are now used heavily by recreationists, to the extent that some elk groups are no longer migrating up to higher elevations in the summer and instead remain on private agricultural lands throughout the year. There is unending demand from user groups to establish more recreational trails, as well as frequent use and expansion of unofficial trails, all of which fragment and diminish the quality of remaining wildlife habitat. Human

disturbances during critical periods for wildlife can reduce calf recruitment and increase stress on wintering wildlife. Dogs, especially when off-leash, also present another stressor on wildlife and a potential source of mortality. More vehicle traffic, along with increased driving speeds, have resulted in roadkill of elk and other wildlife in places without wildlife fencing along highways. Colorado Department of Transportation (CDOT) has installed wildlife fencing along most portions of Highway 82, which has significantly reduced roadkills along those stretches, but also limits animal movements in the valley bottom.

Existing undeveloped habitat has been degraded not only by human recreational impacts, but also due to long-term fire suppression and lack of habitat management which has led to older-aged, less productive forage. Areas close to human developments are rarely allowed to burn at a large landscape scale due to potential damage to human property. The cumulative effect is that both quantity and quality of habitat has declined for elk in E-15. At a more localized scale, BLM, USFS, and other local land management entities have conducted habitat projects including prescribed fire and mechanical treatments in aspen/mountain shrub/oak brush habitats to improve winter range and calving areas for elk.

Bear, mountain lion, and coyote populations are believed to have increased over the past several decades, and their predation on calves (as well as adult elk mortality by lions) could potentially limit the elk population. Predation by each carnivore species can be additive or compensatory to other causes of elk mortality (such as malnutrition, disease, human-caused mortality, and predation by the other carnivore species). Whether predation has population-level effects on the elk herd depends on how close the elk population is to carrying capacity.

Chronic wasting disease (CWD) is currently not an issue for elk in E-15. There were no detections of CWD in E-15 elk among the 33 samples submitted in the years 2018-2023.

Management Objective Recommendations

We recommend maintaining E-15's population objective range of **3,600-5,400** elk for the next 10 years. The population has been within this objective range over the past 10+ years with moderate availability of cow licenses. With the herd's low calf:cow ratios, increasing the population size back to levels in the 1990s is unlikely to be possible, nor desirable given the loss of winter range habitat. However, it is realistically achievable to maintain the current population size, especially if efforts are taken to not further worsen the impacts of recreation activity, land development and fragmentation, habitat degradation, and predation described above.

Because E-15 has OTC bull licenses, there will continue to not be an actual sex ratio *objective*. But the *expected* sex ratio range, based on observed values over the previous 10 years, is **19-30 bulls:100 cows.**

Strategies to Address Issues and Management Concerns and to Achieve Herd Management Objectives

CPW will continue to work collaboratively with our partners in the federal land management agencies, private landowners, county governments, local municipalities and NGOs to protect and enhance the remaining elk habitat. Important habitat conservation methods include

habitat treatments, conservation easements or land acquisitions, maintaining landscape connectivity and movement corridors, and adhering to seasonal recreation closures on winter range areas. Conservation easements are difficult to establish in this area due to the extremely high real estate values in this area, but would still be worthwhile pursuing with interested landowners with the assistance from NGOs and local governments.

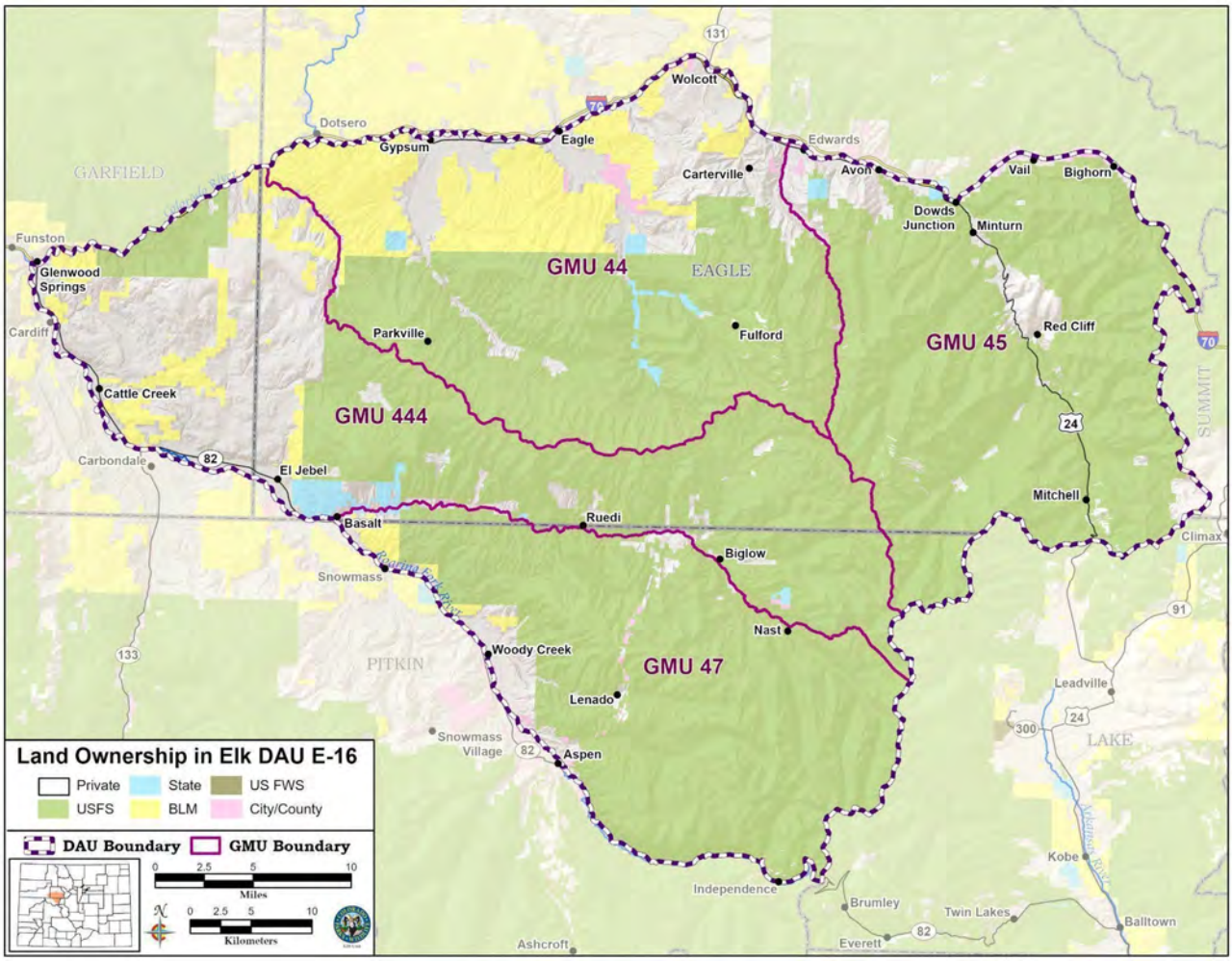
To achieve the updated population objective, CPW will continue to monitor the population size and set licenses annually to provide sufficient hunting opportunities. We expect that quotas for antlerless, antlered, and either-sex licenses will remain stable.

FRYING PAN RIVER ELK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-16

Julie Mao, Wildlife Biologist, Glenwood Springs

Frying Pan River Elk Herd (DAU E-16)	**GMUs: 44, 45, 47, 444**
Post-hunt population:	
Current (2013 plan) Population Objective:	5,500-8,500 elk
Post-hunt 2023 Population Estimate:	9,820 elk
Proposed New Population Objective:	**status quo (5,500-8,500 elk)**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2013 plan) Expected Sex Ratio:	18-30 bulls:100 cows
Most Recent 3-year Average of Observed Sex Ratio:	22 bulls:100 cows
Proposed New Expected Sex Ratio Objective:	**17-29 bulls:100 cows**



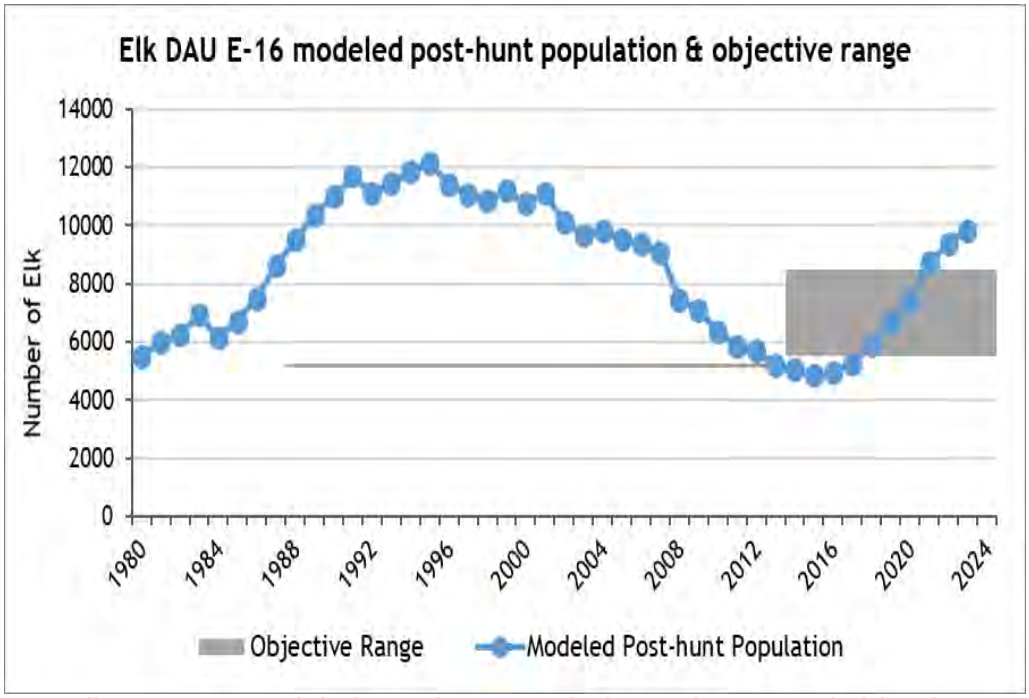


Figure 15-1. Elk DAU E-16 modeled post-hunt population estimates and objective range, years 1980-2023.

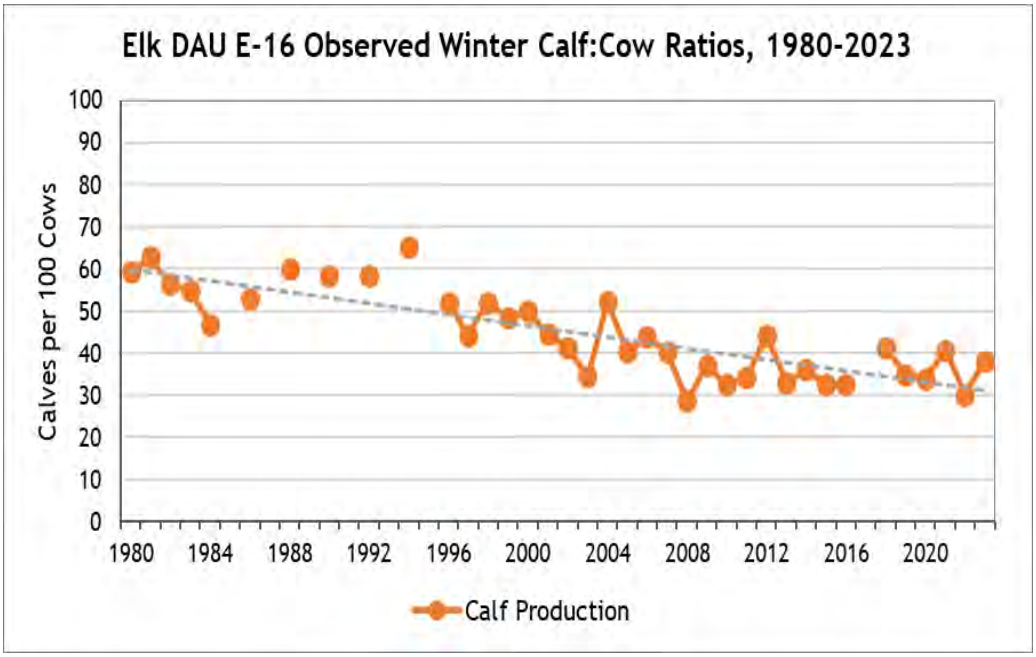


Figure 15-2. Elk DAU E-15 observed and modeled post-hunt sex ratio (bulls:100 cows), years 1981 - 2023.

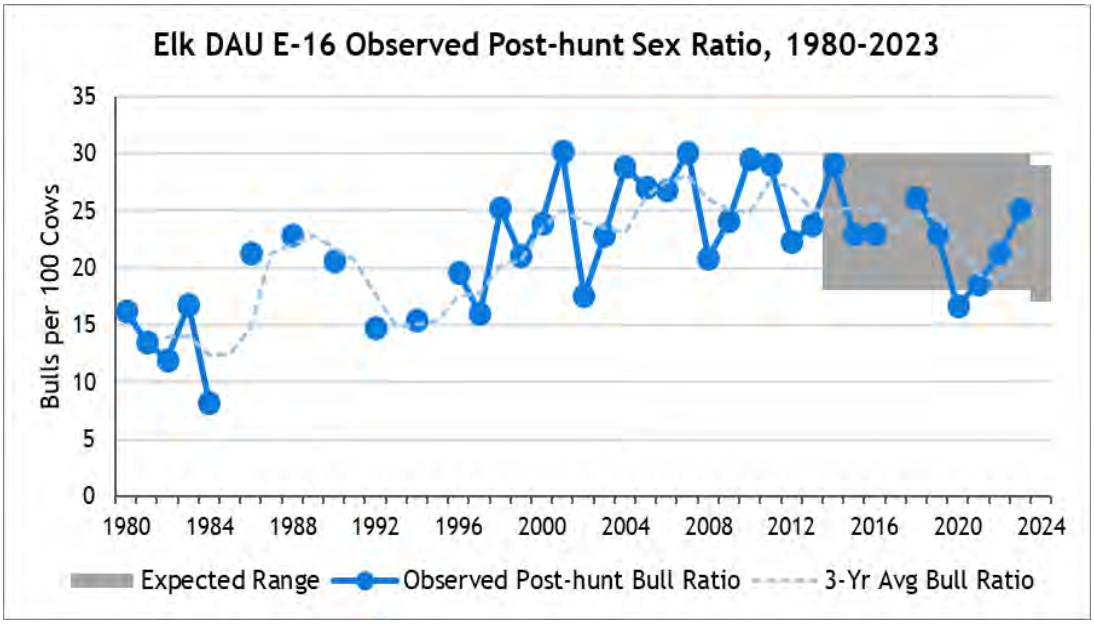


Figure 15-3. Elk DAU E-15 calf production (observed post-hunt calves:100 cows ratio, years 1981-2023)

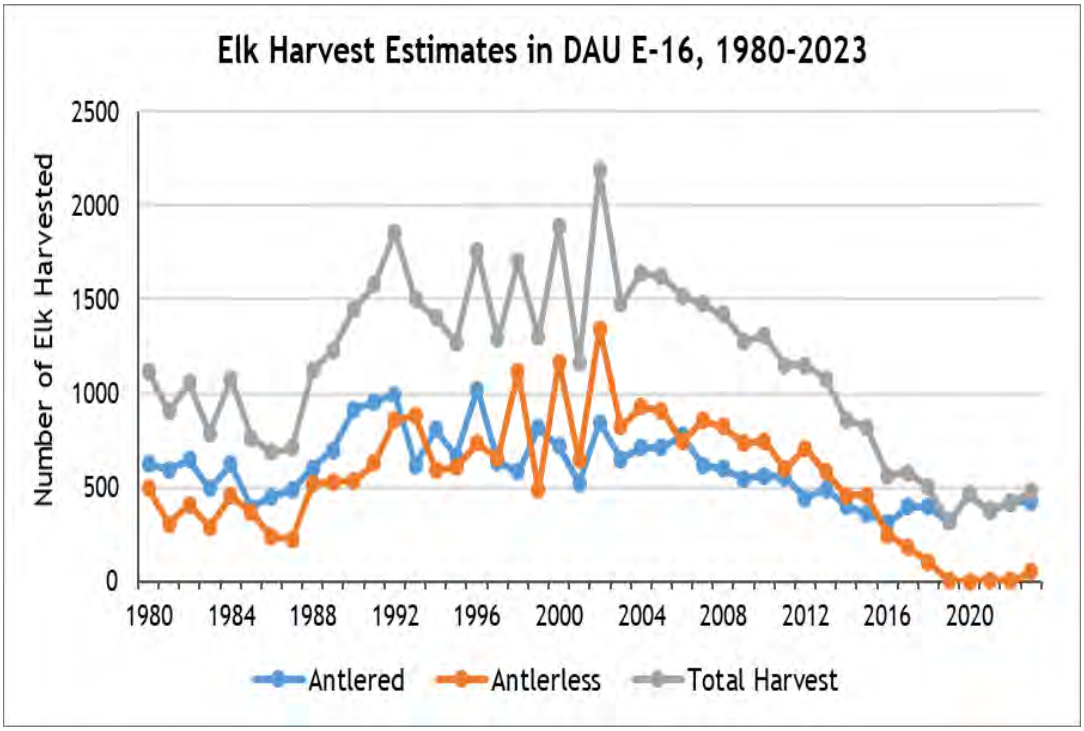
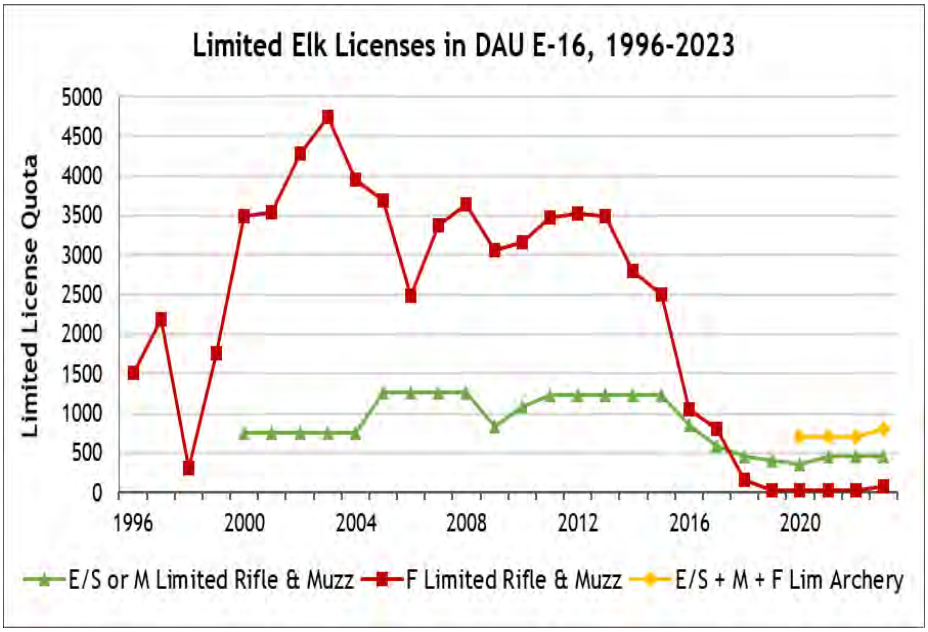


Figure 15-4. Elk harvest estimates in E-15, years 1981-2023.



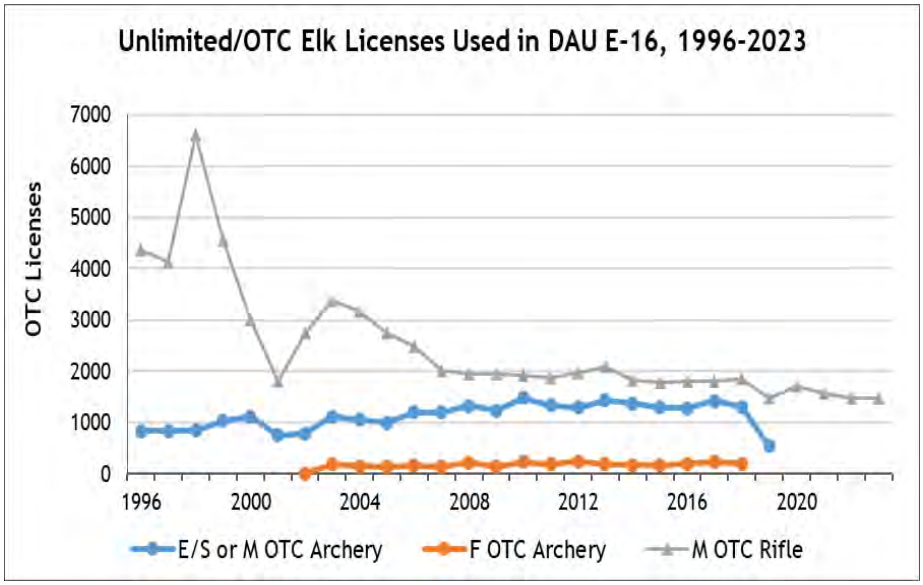


Figure 15-5. Elk Limited and Over-The-Counter License Quotas in E-15, years 1996-2023.

Background

The Frying Pan River Elk Data Analysis Unit (DAU) E-16 is located in northwest Colorado and consists of Game Management Units (GMUs) 44, 45, 47, and 444. This DAU lies in Pitkin, Gunnison, Eagle, and Garfield Counties. Major towns include Aspen, Basalt, Glenwood Springs, Gypsum, Eagle, Edwards, Avon, and Vail. E-16 covers 3,500 km^2 (~865,000 acres) of land area. Eighty percent of the DAU is public land, and 20% is private. Elk winter range is 63% public and 37% private land. E-16 includes the Holy Cross and Hunter-Fryingpan Wilderness Areas.

The 2013 herd management plan for E-16 updated the population objective to a range of 5,500-8,500 elk. The estimated population was at the lower end of this objective range and continued to decline, so starting in 2014, cow licenses were reduced over the course of several years. In 2018, the population dropped below the objective range, so cow licenses were further cut down to 10 licenses per antlerless hunt code.

In 2019, significant hunt code changes were made in E-16 to even further limit cow harvest: (1) GMU-specific cow rifle licenses were condensed into DAU-wide hunt codes with a single quota floating among all 4 seasons, (b) E-16's GMUs were removed as valid units from the statewide over-the-counter (OTC) cow archery hunt code, (c) E-16's GMUs were also removed from the statewide OTC either-sex archery hunt code and replaced with a new E-16 DAU-specific bull-only OTC hunt code (then in 2020, this hunt code was changed from OTC to a limited bull archery license), (d) either-sex 1st and 4th rifle hunt codes were changed to bull-only, (e) private-land-only (PLO) hunt codes were eliminated, and (f) all cow hunt codes in E-16 were changed to List A. These changes brought the total number of E-16 cow licenses down to 10 muzzleloader and 10 rifle tags, resulting in negligible cow harvest in the DAU. By holding cow harvest to nearly 0 for 4 years, the population increased back into the objective range. The distribution of this population growth appears to be uneven though: wintering groups on the Roaring Fork Valley side of the DAU increased faster than those on the Eagle River side. And as some elk groups grew, particularly in Missouri Heights and Spring Valley in the western portion of GMU 444, they have become less migratory, occupying lower-elevation agricultural lands year-round.

As of the most recent (post-hunt 2023) population estimate of 9,820 elk, E-16 is now above the upper end of the population objective. Notably, however, the rapid increase in the elk population was achieved artificially, in a sense, by reducing cow harvest to near-zero from 2019-2022. CPW's goal though is not to eliminate cow harvest perpetually, but rather to offer sufficient opportunities to the public to harvest both cow and/or bull elk by managing for a population size slightly below ecological and social carrying capacity. In 2023, several hunt codes were restored in order to allow for more localized management of cow harvest within the DAU. GMU-specific cow rifle hunt codes were brought back; antlerless quotas were un-floated, allowing separate quotas in each of the 4 rifle seasons; and the PLO cow hunt code for GMU 444 was restored to help address concerns about big game-agricultural conflict. Antlerless license quotas have been increased in 2023 and 2024 and will be adjusted annually to steer the population back into objective range.

Winter calf:cow ratios, which represent a measure of calf recruitment and the herd's productivity, have declined by 6.6% each decade over the past 40+ years, meaning that E-16's potential for population growth and its resilience to environmental and ecological stressors have steadily diminished as the landscapes of the Eagle River Valley and Roaring Fork Valley have changed. Over the past 10 years (2014-2023), winter calf:cow ratios in E-16 have averaged 36 calves:100 cows, compared to 56 calves:100 cows in the 1980s.

As an over-the-counter (OTC) DAU with unlimited bull licenses in 2nd and 3rd rifle seasons, E-16 is not specifically managed for a sex ratio objective, but rather to provide ample bull hunting opportunities. In the 2013 herd management plan, the expected sex ratio range based on the minimum and maximum observed ratios in the preceding 10 years was 18-30 bulls:100 cows. Over the past 10 years, the observed bull:cow ratios remained within that expected range. The downward trend of observed bull:cow ratio (although still within expected range) is likely due to the relative increase in the cow segment of the herd, an

artifact of the intentional reduction of cow harvest. The current (2021-2023) 3-year average is 22 bulls:100 cows, and the observed values over the past 10 years have ranged from 17 to 29 bulls:100 cows.

Harvest over the past 10 years has been much lower than in previous decades, driven by the significant reduction in cow rifle licenses and the various hunt code changes, as discussed above. Bull harvest is lower than in previous decades, but has been stable over the past 10 years, averaging close to 400 bulls annually. Hunter participation in E-16 during the statewide OTC rifle seasons has also been slightly lower than in the past but has been stable, averaging ~1,550 OTC hunters since 2019.

Significant issues

All of the management issues involving habitat loss and fragmentation that were discussed in the 2013 E-16 herd management plan are still relevant today and may be even more significant as the number of people residing, visiting, and recreating in this area continues to increase and to impact elk and other wildlife and their habitat.

The human population in the Eagle and Roaring Fork Valleys has continued to grow over the past decade, albeit at a slower pace than in the 1990s and 2000s. Land development and recreation continue to be the major impacts on wildlife. Land development has led to loss of habitat quantity and quality in the form of conversion of habitat into houses, other buildings, and infrastructure; and fragmentation of habitat due to roads, trails, and structures. As more people have moved into the area, motorized and non-motorized outdoor recreation activities of all kinds have become a year-round presence on the landscape. Summer range areas on public lands are now used heavily by recreationists, to the extent that some elk groups are no longer migrating up to higher elevations in the summer and instead remain on private agricultural lands throughout the year. There is unending demand from user groups to establish more recreational trails, as well as frequent use and expansion of unofficial trails, all of which fragment and diminish the quality of remaining wildlife habitat. Human disturbances during critical periods for wildlife can reduce calf recruitment and increase stress on wintering wildlife. Dogs, especially when off-leash, also present another stressor on wildlife and a potential source of mortality. More vehicle traffic, along with increased driving speeds, have resulted in roadkill of elk and other wildlife in places without wildlife fencing along highways. Colorado Department of Transportation (CDOT) has installed wildlife fencing along most portions of I-70 and Highway 82, which has significantly reduced roadkills along those stretches, but also limits animal movements in the valley bottoms.

Existing undeveloped habitat has been degraded not only by human recreational impacts, but also due to long-term fire suppression and lack of habitat management which has led to older-aged, less productive forage. Areas close to human developments are rarely allowed to burn at a large landscape scale due to potential damage to human property. The cumulative effect is that both quantity and quality of habitat has declined for elk in E-16. At a more localized scale, BLM, USFS, and other local land management entities have conducted habitat projects including prescribed fire and mechanical treatments in aspen/mountain shrub/oak brush habitats to improve winter range and calving areas for elk.

Bear, mountain lion, and coyote populations are believed to have increased over the past several decades, and their predation on calves (as well as adult elk mortality by lions) could potentially limit the elk population. Predation by each carnivore species can be additive or

compensatory to other causes of elk mortality (such as malnutrition, disease, human-caused mortality, and predation by the other carnivore species). Whether predation has population-level effects on the elk herd depends on how close the elk population is to carrying capacity.

Chronic wasting disease (CWD) is currently not an issue for elk in E-16. There were no detections of CWD in E-16 elk among the 23 samples submitted in the years 2018-2023.

Management Objective Recommendations

We recommend maintaining E-16's population objective range of **5,500-8,500** elk for the next 10 years.
Although the population estimate currently sits above the upper end of this range, it was achieved by severely limiting cow harvest for 4+ years. With the herd's low calf:cow ratios, increasing the population size back to levels in the 1990s is unlikely to be possible, nor desirable given the loss of winter range habitat and potential for game damage issues on the remaining agricultural lands. Now that the population is no longer below objective, cow licenses should be brought back to a moderate level to manage the herd within objective.

Because E-16 has OTC bull licenses, there will continue to not be an actual sex ratio *objective*. But the *expected* sex ratio range, based on observed values over the previous 10 years, is **17-29 bulls:100** cows. As opportunities for cow harvest are brought back, the bull:cow ratio may increase somewhat but will likely still be within this expected range.

Strategies to Address Issues and Management Concerns and to Achieve Herd Management Objectives

CPW will continue to work collaboratively with our partners in the federal land management agencies, private landowners, county governments, local municipalities and NGOs to protect and enhance the remaining elk habitat. Important habitat conservation methods include habitat treatments, conservation easements or land acquisitions, maintaining landscape connectivity and movement corridors, and adhering to seasonal recreation closures on winter range areas. Conservation easements are difficult to establish in this area due to the extremely high real estate values in this area, but would still be worthwhile pursuing with interested landowners with the assistance from NGOs and local governments.

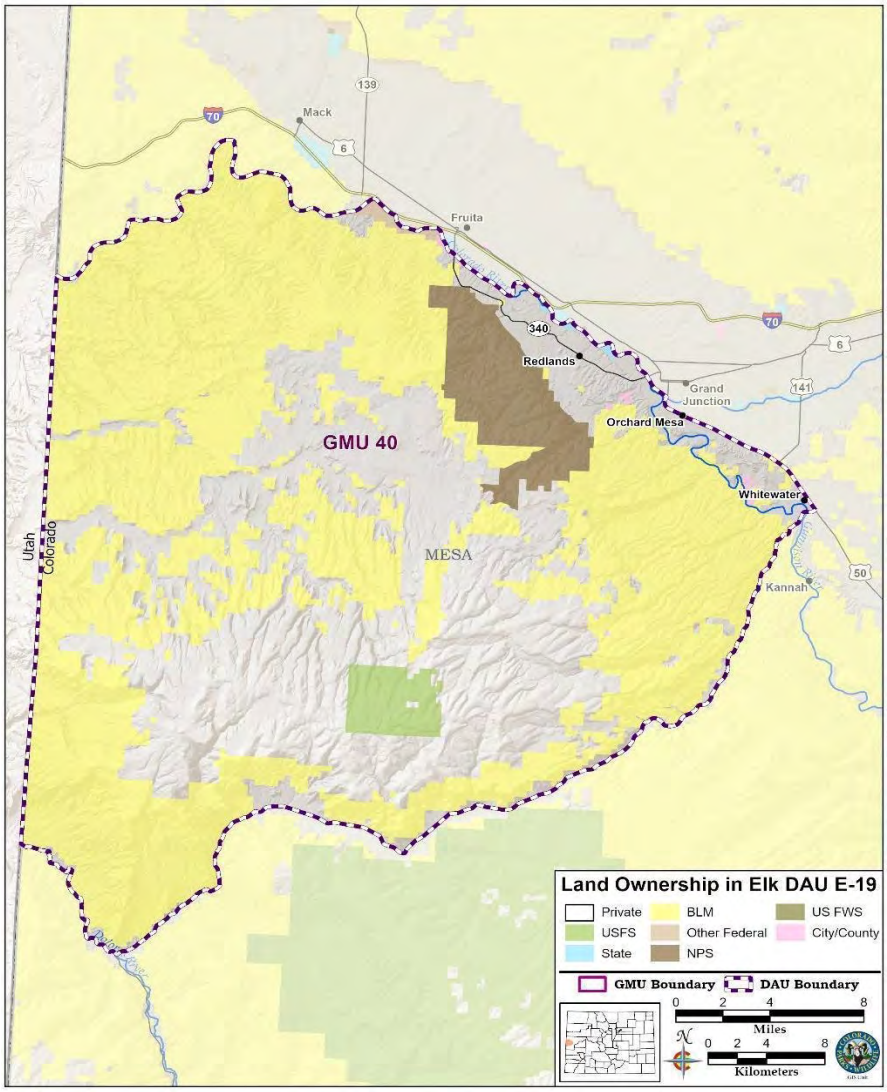
To achieve the updated population objective, CPW will continue to monitor the population size and set licenses annually to provide sufficient hunting opportunities. There will be opportunity to restore cow license quotas to moderate levels from their lowest values in the early 2020s. If needed, additional PLO cow hunt codes could also be restored in the other GMUs within E-16 if there are future game damage issues.

GLADE PARK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-19

Genevieve Fuller, Wildlife Biologist, Grand Junction

Glade Park Elk Herd (DAU E-19) **Approval Year for last HMP: 2010**	**GMU: 40**
Post-hunt population:	
Current (2010 plan) Population Objective:	2,800 – 3,800 elk
Post-hunt 2023 Population Estimate:	5,554 elk
Preferred Population Objective:	**2,800 - 3,800 elk (status quo)**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (2010 plan) Sex Ratio Objective:	30 - 35 bulls per 100 cows
Post-hunt 2023 Sex Ratio:	observed: 26.5; modeled: 30.2
Preferred Sex Ratio Objective:	**30 - 40 bulls per 100 cows**



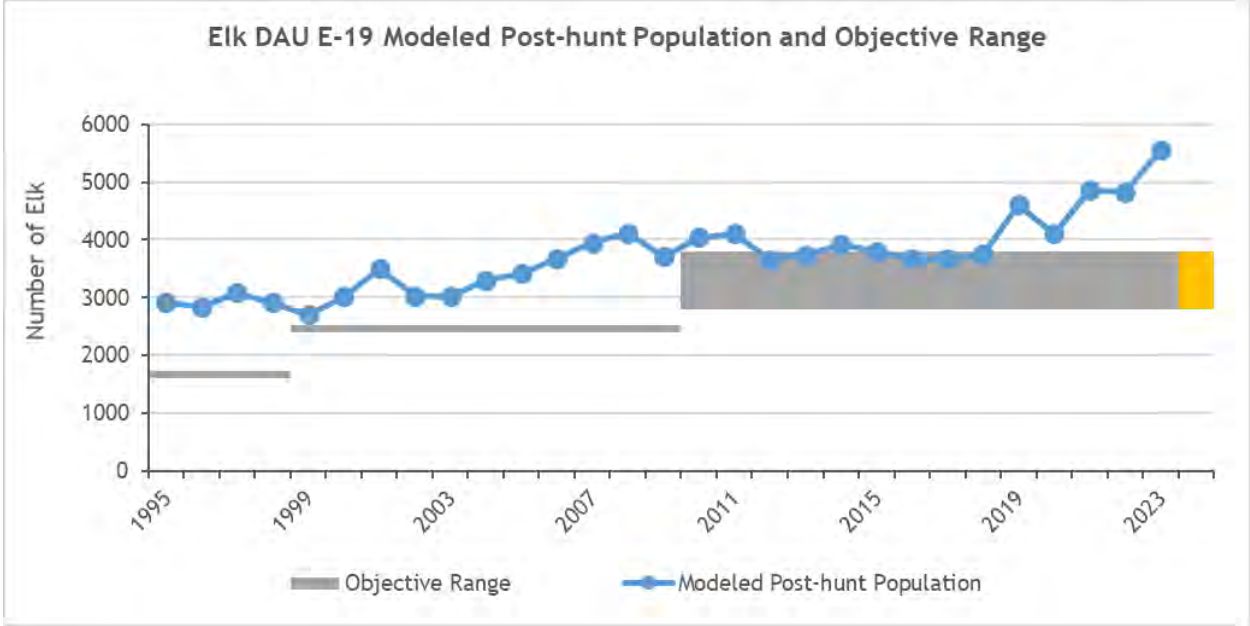


Figure 19-1. Elk DAU E-19 modeled post-hunt population and objective range, years 1995 - 2023 (Preferred Alternative Range in Yellow).

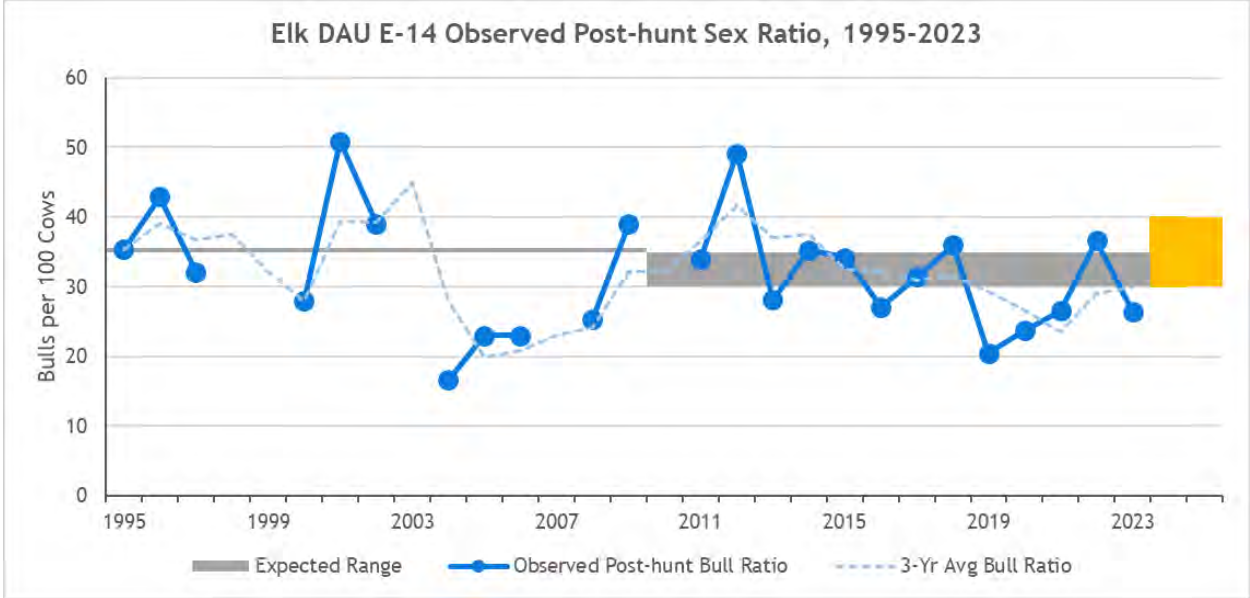


Figure 19-2. Elk DAU E-19 observed and modeled post-hunt sex ratio (bulls:100 cows), years 1995 – 2023 (Preferred Alternative Range in Yellow).

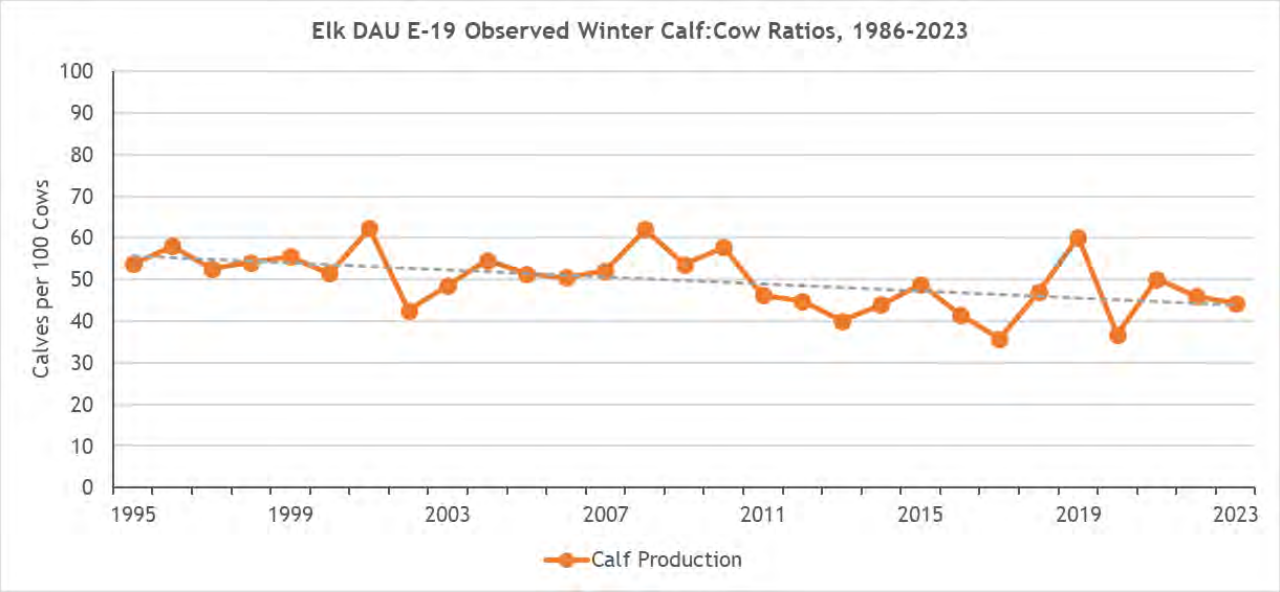


Figure 19-3. Elk DAU E-19 calf production (observed post-hunt calves:100 cows ratio, years 1995 - 2023)

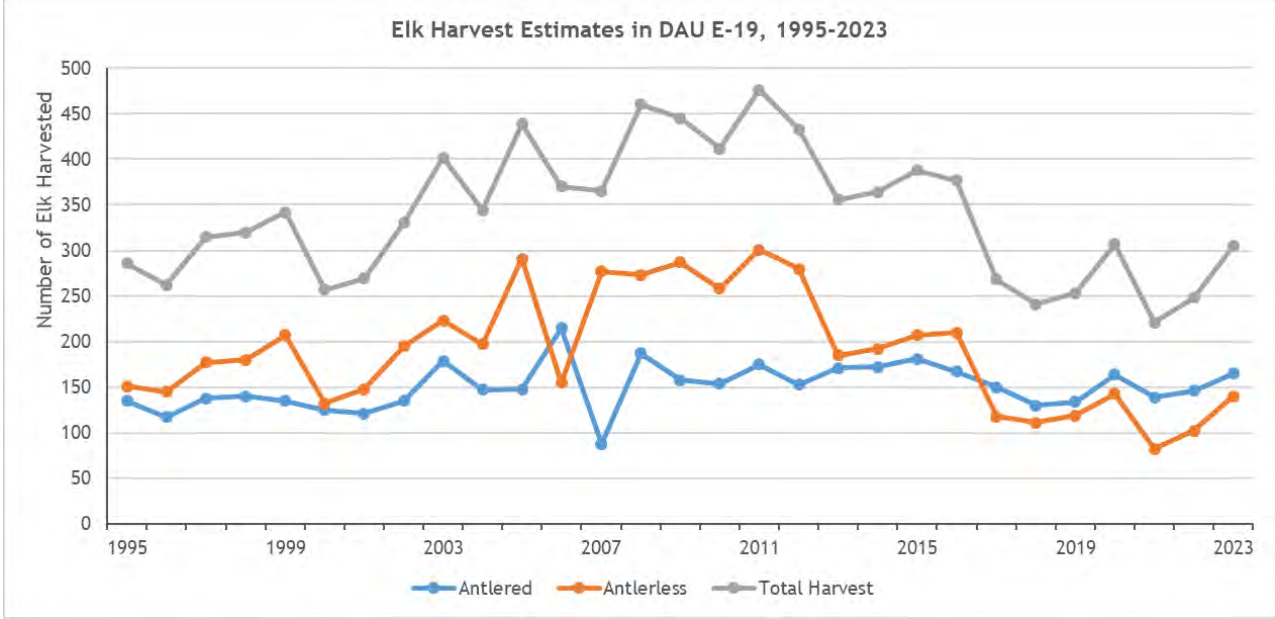


Figure 19-4. Elk harvest estimates in E-19, years 1995 - 2023.

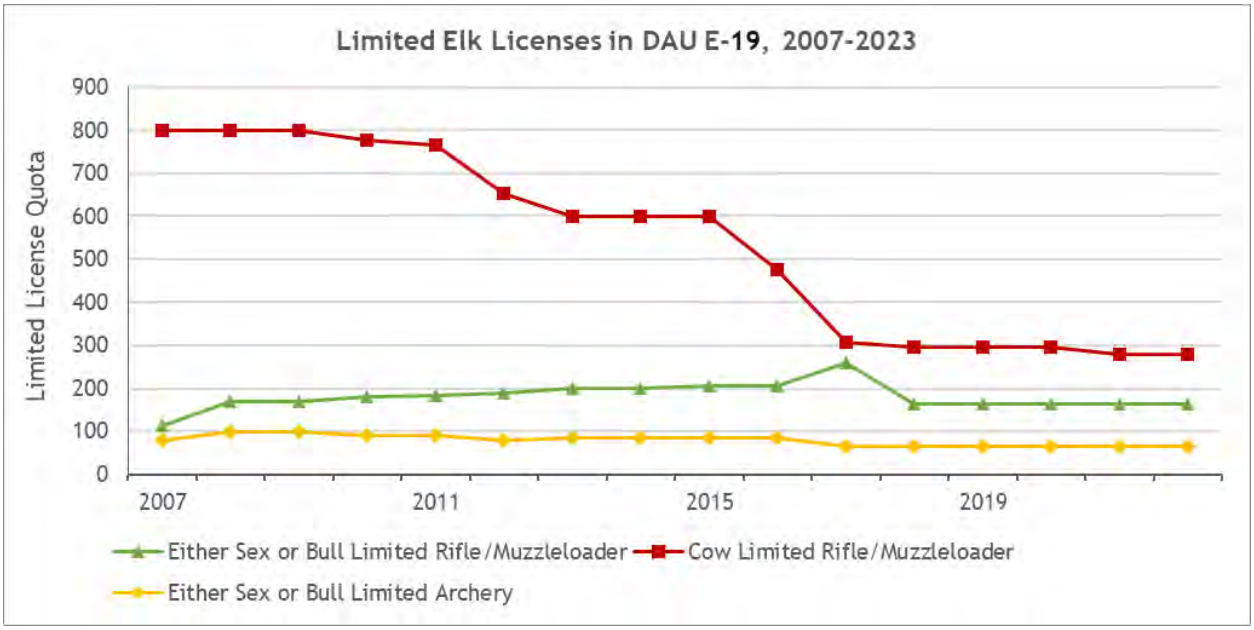


Figure 19-5. Elk Limited License Quotas in E-19, years 2007-2023.

Background

The Glade Park E-19 DAU is located in west-central Colorado within Mesa County and includes both Glade Park and Pinon Mesa, southwest of Grand Junction, Colorado. The highest point is approximately 9,700 feet at the south-center of the DAU. The lowest point is where the Colorado River meets the UT state line at approximately 4,600 feet. Approximately 62% of the lands within this DAU are public property. Of the overall area, 4% is managed by the United States Forest Service (USFS) and about 56% by the Bureau of Land Management (BLM). The National Park Service owns 4%. This is a small elk DAU containing only Game Management Unit (GMU) 40.

The elk population in this area has increased steadily for the last two decades. A short dip occurred during the process of writing the 2010 Herd Management Plan where the population was at the low end of objective range. Cow licenses were reduced and a late cow season was removed to address it. Since 2010 the population estimate has been on the high end of the objective range or above. The 2023 post-hunt population estimate was 5,554 elk.

Winter calf:cow ratios, which represent a measure of calf recruitment and the herd's productivity, have declined slightly over the years, but have remained more stable than many other elk herds in other parts of Colorado. The 2023 post-hunt production rate was 44.3 calves per 100 cows.
The elk in E-19 migrate between summer and winter ranges. A significant portion of the elk winter range for E-19 elk spans the border of Colorado and Utah. At certain times of year, large bull elk are plentiful, but bull groups often move across the Utah border. When winter classification surveys occur, large bull groups may or may not be in Colorado and observable for the count. This has resulted in large fluctuations in our observed sex ratios. Distribution of elk in this way also determines what may be available to hunters in various seasons. However, the density of mature bulls on Glade Park has historically been high, in part due to a management strategy that maximizes hunter opportunities on mature bulls by limiting the

number of bull tags. This unit only has limited elk license opportunities. The 2023 post-hunt observed sex ratio was 26.5 bulls per 100 cows.

Bull licenses have been maintained low to manage for higher quality mature bull hunting and harvest rates reflect that stability. Cow harvest has declined over the past several years in part due to a reduction in cow licenses that attempted to boost what was, at the time, a declining elk population as per the 2010 Herd Management Plan.

Significant Issues

The primary issues for E-19 elk involve habitat aridification due to drought, access to hunt-able lands, deer and elk competition, and license availability.

Years of drought and a trend towards long-term aridification of the area has led to a shift in habitat. Quality of habitat within the unit is largely high in summer ranges and low utilization sections of winter ranges, but invasive species have increased in drier portions of the unit.

An ongoing problem in the DAU is access to huntable lands by non-landowning hunters. With nearly 40% of the land owned by private entities, access is difficult, particularly during hunting seasons. Large tracts of privately-owned and inaccessible property create huge preserves, concentrating the elk, and reducing harvest opportunity. The problem is most critical in the highest elevations, during early seasons.

For over a decade, the increasing elk population has been followed by a decrease in the deer population. Elk and deer have been known to compete for resources and management between the two species is always a balance.

The DAU has had substantial development in areas that were once part of the elk winter range, particularly in the areas surrounding Glade Park. The Unaweep Canyon is also experiencing increasing development, although to a lesser extent. Ranches have been subdivided and natural habitat quality is significantly reduced by fragmentation. However, many of the remaining landowners have increased private land stewardship on their properties involving large habitat improvement projects, reduction of livestock usage and conservation easements.

Stakeholder Outreach and Input

In 2022, hunters were randomly selected to complete the 2022 Elk Hunter Attitude Survey after the completion of their hunting seasons, and 171 respondents answered the opt-in questions for E-19. A majority of hunters were satisfied with the total number of elk and number of bulls seen in 2022. Nearly all respondents wished to see an increase in the elk population over the next 10 years. Approximately 80% of respondents felt not at all crowded or only slightly crowded during their hunt, and a majority of the respondents were satisfied with their hunt overall.

In the summer of 2023, the proposed objectives were presented in Grand Junction to five members of the public. They were asked to submit written feedback through both an online survey and in-person. We received only one written response.

The plan will also be open to public comment for a 30-day period before heading to the Colorado Parks and Wildlife Commission for approval.

Management Alternatives

The preferred alternatives of 2,800 to 3,800 elk and 30 – 40 bulls:100 cows.
Post-hunt Population

2,800 to 3,800 elk (status quo)
The hunter attitude survey indicated a satisfaction of hunters in the number of elk, bulls and overall hunt experience. Considering movement of elk between public and private and across the Utah border, CPW personnel recommend the status quo for the population objective. This herd has been steadily climbing above objective and a small reduction in elk would address some of the concerns with competition with deer while maintaining current hunting opportunities.

Post-hunt bull ratio

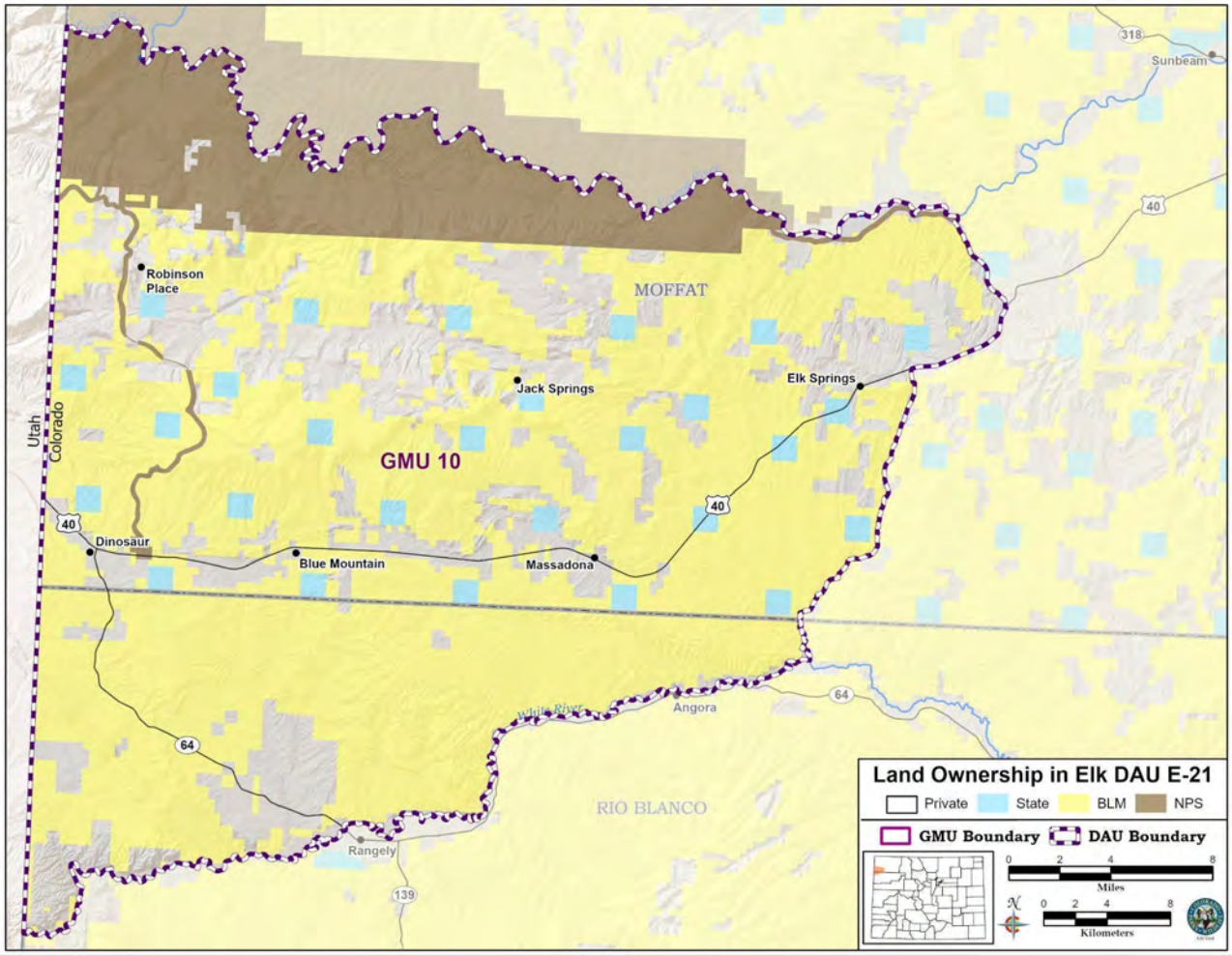
30 – 40 bulls: 100 cows (wider range)
Bull hunter satisfaction has been high in this unit and the range of observed sex ratio since the last HMP revision in 2010 is 20.5 to 49.2 bulls per 100 cows with a median of 32.7 and an average of 32.1. The sex ratio has jumped above and below the objective range throughout the last decade with only one year landing within the range since 2010. Due to this, CPW personnel recommend expanding the objective range to 30 - 40 bulls per 100 cows from 30 – 35 bulls per 100 cows. This unit is managed for quality, mature bull hunting opportunities and so expanding the range upward to accommodate the intermittent spikes in sex ratios aligns with the current management strategy.

RANGELY/BLUE MOUNTAIN ELK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-21

Darby Finley, Wildlife Biologist, Meeker

Rangely/Blue Mountain (DAU E-21) Approval Year for last HMP: No Plan	**GMU: 10**
Post-hunt population:	
Current (No plan) Population Objective:	1200 elk
Post-hunt 2023 Minimum Count:	2600 elk
Proposed Population Objective:	**Minimum count 1,000 – 2,000 elk**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (No plan) Sex Ratio Objective:	40 bulls per 100 cows
Post-hunt 2023 Sex Ratio:	observed: 29; modeled: NA
Proposed Sex Ratio Objective:	**>40 bulls per 100 cows (status quo)**



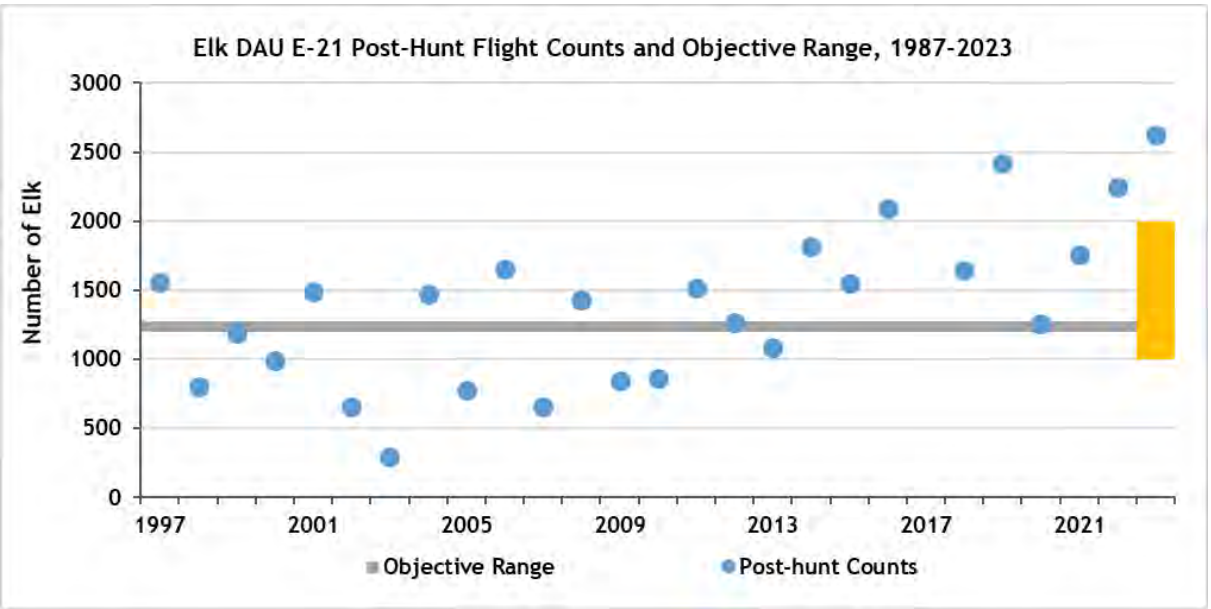


Figure 21-1. Elk DAU E-21 post-hunt minimum counts and objective range, years 1988-2023.

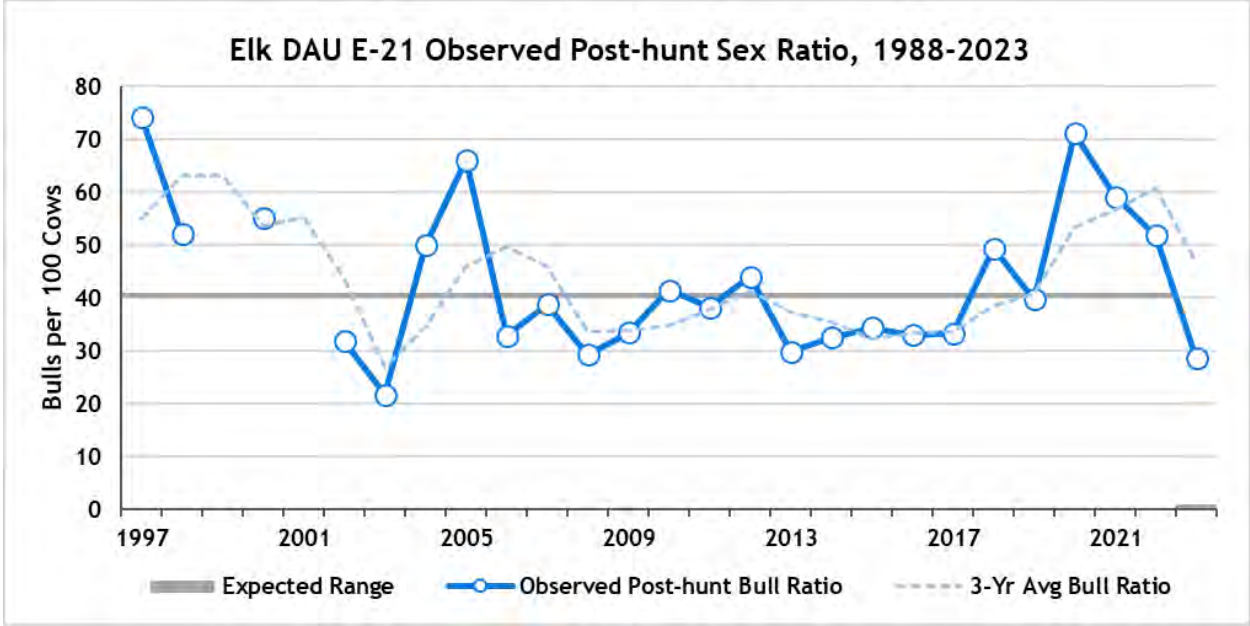


Figure 21-2. Elk DAU E-21 observed post-hunt sex ratio (bulls:100 cows), years 1988-2023.

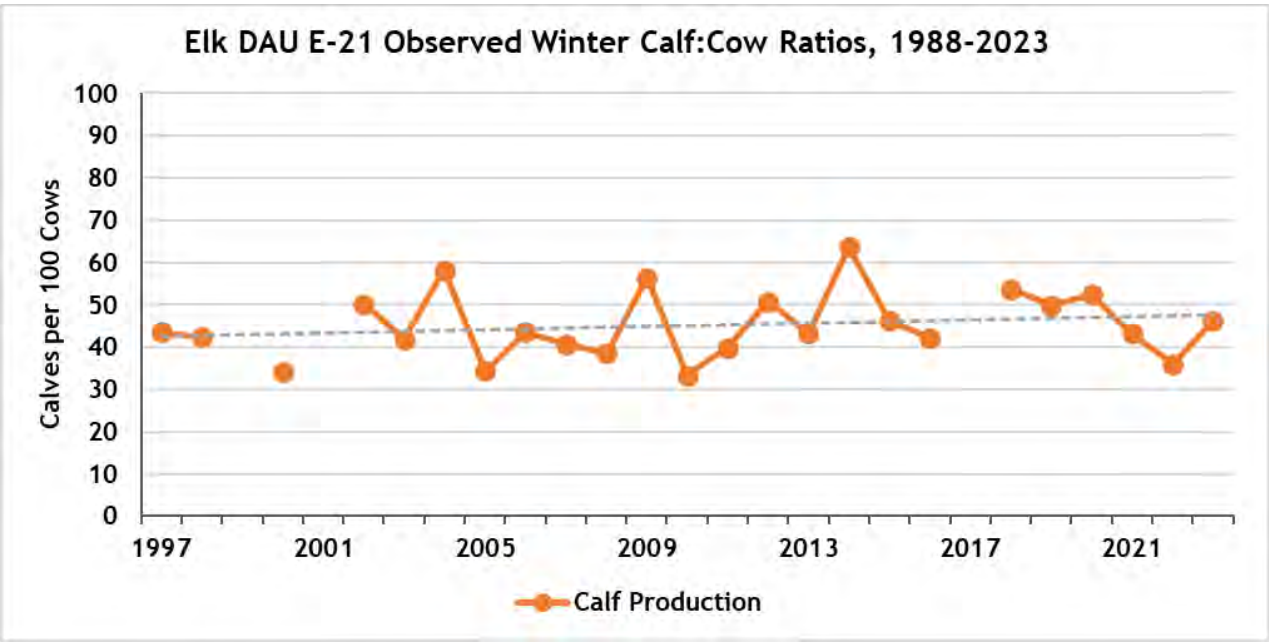


Figure 21-3. Elk DAU E-21 calf production (observed post-hunt calves:100 cows), 1988-2022.

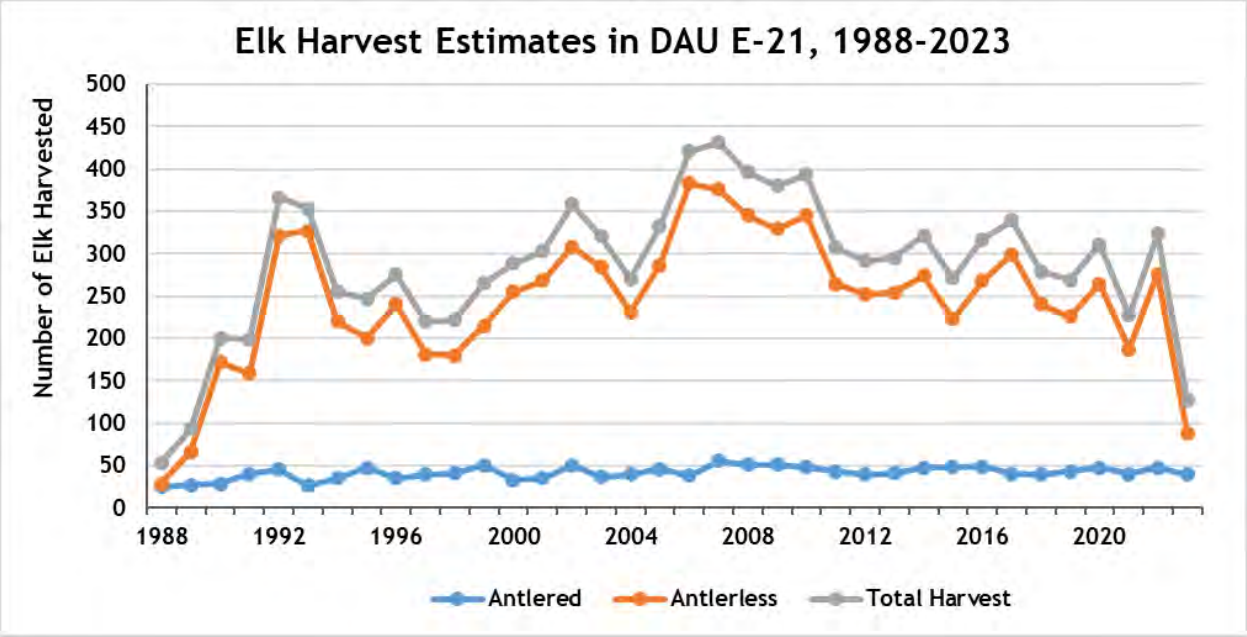


Figure 21-4. Elk harvest estimates in E-21, years 1988-2023.

Background

The Blue Mountain elk DAU, E-21, is located in northwest Colorado and includes portions of Moffat and Rio Blanco counties. The DAU includes a single Game Management Unit (GMU): 10. The towns of Rangely and Dinosaur are located on the periphery of the DAU.

The Blue Mountain elk DAU covers 832 square miles. Of this, 21% (178 mi^2) is private property, 62% (513 mi^2) is Bureau of Land Management (BLM) land, 3% (27 mi^2) is State Land Board land, and 14% (114 mi^2) of the DAU includes Dinosaur National Monument administered by the National Park Service. Ownership patterns vary across mule deer seasonal ranges within the DAU comprising private, state and federal lands.

Resident elk within E-21 will migrate short distances from summer ranges at higher elevations on Blue Mountain to lower elevations surrounding the high mountain plateau. Migratory elk from adjacent DAUs E-2 and E-6 will also move into the eastern portions of the DAU in winter.

The current population objective for DAU E-21 is 1200 elk. The population objective was set in 1994, however, no herd management plan was written. The 5-year average post-hunt elk population minimum count for E21 has been ~2000 elk. The management objective for the E-21 elk herd has been to maintain the sex ratio at 40 bulls:100 cows. E-21 is one of the premier DAUs in the state, managed for high bull ratios. To manage for these high bull ratios, antlered license numbers are extremely limited to allow for higher rates of recruitment of bulls to older age classes. Long-term bull ratios have averaged 41 bulls:100 cows. Over the past five years, the average observed sex ratio has been 50 bulls:100 cows. The long-term post-hunt age ratio (calves:100 cows) has averaged 47 since 1988. The highest age ratio was 64 calves:100 cows in 1992 and the lowest was 33 calves:100 cows in 2010. The average age ratio from 2019-2023 has been 46 calves:100 cows. The long-term trend for the cow:calf ratios shows a stable to slightly increasing trend. Observed sex and age ratios can fluctuate within the DAU based on timing of flights and winter conditions. Radio collar location data has shown significant inter-DAU immigration into E-21 from adjacent DAUs E-2 and E-6 when winter conditions are severe. This can result in lower observed bull ratios due to the increased number of cow/calf groups observed within E-21.

Significant Issues

The management issues identified in these DAUs are primarily associated with elk distribution, winter range habitat capability, and early spring elk use on public lands as elk migrate back to summer ranges. Online survey results identified high bull:cow ratios, low cow numbers, bull quality, shed antler hunting, and preference point creep affecting hunter opportunity as the most common issues with elk hunter satisfaction.

Elk distribution is the biggest challenge in achieving annual cow harvest objectives in the DAU. Hunter pressure and elk distribution are an annual management concern when setting license numbers for the DAU. Elk seek refuge within Dinosaur National Monument to avoid hunting pressure in GMU 10. In addition, more of an emphasis has been placed on late season hunts to achieve antlerless harvest objectives. It is important for the CPW to work cooperatively with private landowners, federal land management agencies, and Dinosaur National Monument to manage this population to the long-term DAU objective.
In addition to elk distribution, changes in elk behavior have resulted in range expansion and, in some cases, year-round elk use on winter ranges. Elk movement across the Dinosaur

National Monument boundary can create refuge situations that make achieving harvest objectives difficult. The arid climate that characterizes this DAU, and cyclical drought conditions also create challenges in managing elk populations within nutritional carrying capacities of the range. Mild winter conditions and summer drought cycles prevailed across the DAU during the early 2000's causing concern about range conditions and the sustainability of elk numbers which were at peak population levels during this time. Concerns regarding drought-stressed range conditions amongst management agencies and livestock operators resulted in a concerted effort to reduce elk numbers across the DAU. Management efforts implemented to reduce elk numbers to allow for range rest and recovery included designating additional cow licenses and implementing a late cow elk season in the DAU. These efforts proved successful in reducing elk numbers across the DAU.

Major concerns regarding historical and current elk population levels in DAU E-21 are centered on competition between elk and livestock. Federal land management agencies and livestock operators support the quality management strategy for elk, but have expressed concern about overall numbers of elk in the DAU. These concerns are focused on spring and summer grazing competition between elk and cattle. In contrast, sportsmen, outfitters, and some landowners are in support of current or slight increases to population levels.

Stakeholder Outreach and Input

Public meetings were held on October 9th and 11th, 2023 in Hayden, CO and Meeker, CO, respectively. Forty-four people attended these meetings. Public comment forms were available for attendees to fill out at the meeting. No one submitted a comment form after the meeting pertaining to E-21. A QR code was also provided to people that attended the meeting as a way to comment electronically. One person commented using the QR code. The one individual was a Colorado resident.

In addition to the comment forms available through the local public meetings, opt-in big game hunter attitude surveys have been conducted the past two years while conducting the big game harvest survey. These surveys have allowed CPW to gather input from hunters on an annual basis. Based on survey results, the majority of respondents were satisfied or very satisfied with their overall hunting experience in E-21. Seventy percent of hunters were satisfied or very satisfied with the overall number of elk they saw while hunting. Results were the same from respondents when it comes to the total number of bulls they saw while hunting in E-21. More hunters responded that they would prefer to hunt mature bulls than they would to hunt more often however the margin between the two choices was close to being split. Additionally, more than half of the respondents preferred to see the elk population stay the same over the next 10 years.

Overall, the majority of hunters responded to not feeling crowded by other hunters when hunting in E-21 and an overwhelming majority responded to not feeling crowded by non-hunters.

Management Alternatives

There are three basic management strategies that CPW is currently using for elk DAUs. Ideally, all units within a DAU are managed using the same strategy. These basic management strategies consider various types of hunting opportunities including ease of

participation, quality of hunting experience, level of success rates, and opportunity to harvest a quality male animal.

Methods to achieve these various opportunities include offering readily available licenses, spatial and temporal distribution of hunters and license limitations. These different management strategies afford various types of hunting opportunities and are often mutually exclusive and therefore must be balanced among the desires of hunters, landowners, and economic interests.

The DAU management strategy recommendation by the CPW is essentially status quo. Currently, E-21 is totally specified for all seasons and managed for quality bull elk hunting. Season structures within DAU E-21 include limited archery and muzzleloader seasons, an early rifle bull elk season, and 4 limited regular season antlerless hunts. In addition, late season antlerless hunts are being used as a management tool to maintain elk populations within the objective range. Hunter success in the DAU will remain relatively high under this strategy. The management recommendation is to maintain this DAU as a quality bull elk hunting unit with limited bull license quotas.

Post-hunt Population

Minimum count 1,000 - 2,000 elk

This objective range seeks to maintain the E-21 elk herd within the stated population objective range which will be assessed through minimum counts observed during post-hunt sex and age classification flights. The population objective range is consistent with public desires and allows the herd to be managed at a population level in-line with carrying capacities given variable range conditions.

Post-hunt bull ratio

>40 bulls per 100 cows

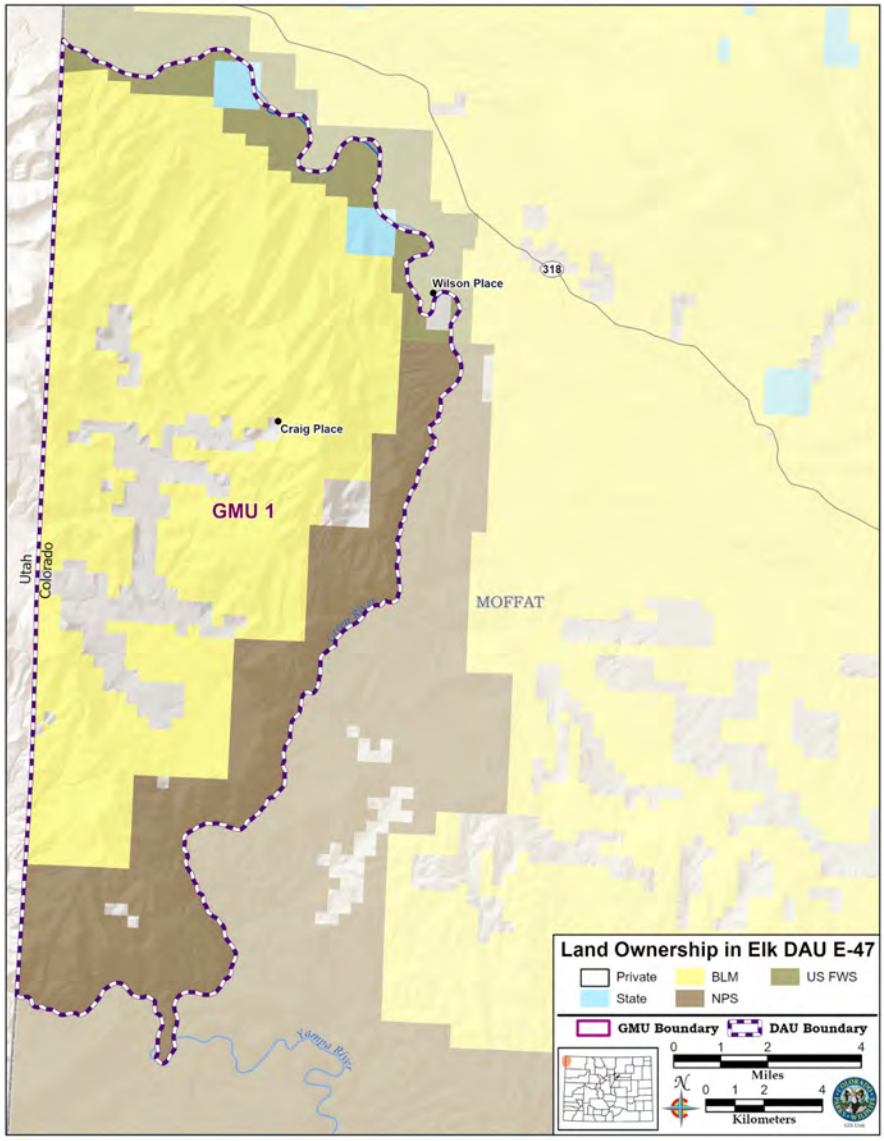
The CPW recommendation is to manage the sex ratio to maintain >40 bulls:100 cows. During the past 5 years (2019 - 2023), the herd has averaged 50 bulls:100 cows with a range of 29 – 71 bulls:100 cows. Bull ratios can vary widely from year to year based on the number and composition of elk classified. Since bulls traditionally occupy the same winter ranges every year, observers generally get a representative sample of bulls. However, bull ratios can fluctuate annually due to inter-DAU movement of cow-calf groups. For example, if a representative sample of cow-calf groups is not obtained due to emigration out of the DAU or an influx of cow-calf groups immigrate into the DAU it can influence post-hunt observed bull ratios. Managing for >40 bulls:100 cows will allow for continued recruitment of older age class bull elk within this DAU.

GREEN RIVER ELK HERD MANAGEMENT PLAN

DATA ANALYSIS UNIT E-47

Darby Finley, Wildlife Biologist, Meeker

Green River DAU E-47 **Approval Year for last HMP: No Plan**	**GMUs: 1**
Post-hunt population:	
Current (No plan) Population Objective:	170 elk
Post-hunt 2023 Minimum Count:	99 elk
Proposed Population Objective:	**Minimum count 150 - 250 elk**
Post-hunt Sex Ratio (Bulls:100 Cows):	
Current (No plan) Sex Ratio Objective:	40 bulls per 100 cows
Post-hunt 2023 Sex Ratio:	observed: 26; modeled: NA
Proposed Sex Ratio Objective:	**>40 bulls per 100 cows (status quo)**



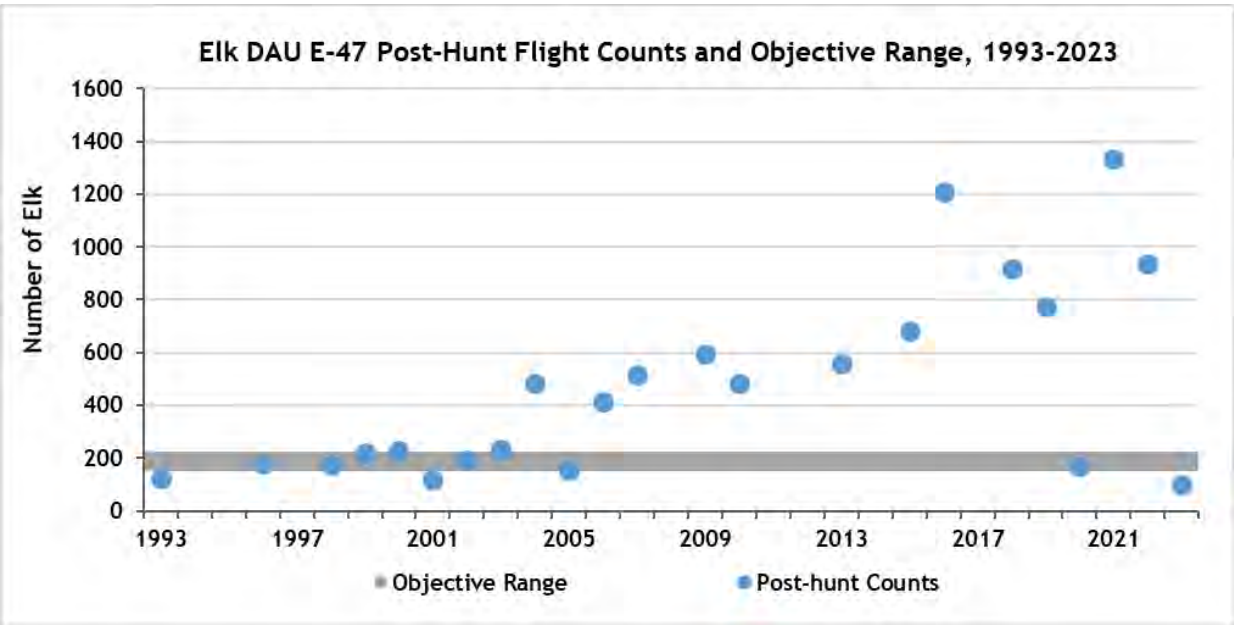


Figure 47-1. Elk DAU E-47 modeled post-hunt population and objective range, years 1993-2023.

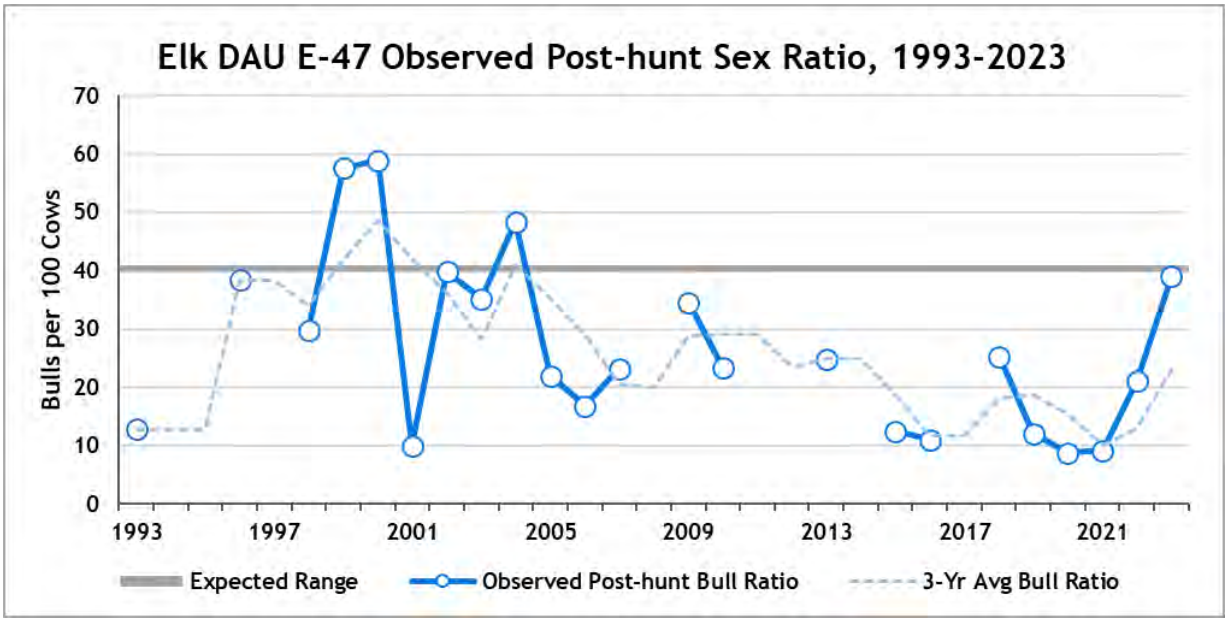


Figure 47-2. Elk DAU E-47 observed post-hunt sex ratio (bulls:100 cows), years 1993-2023.

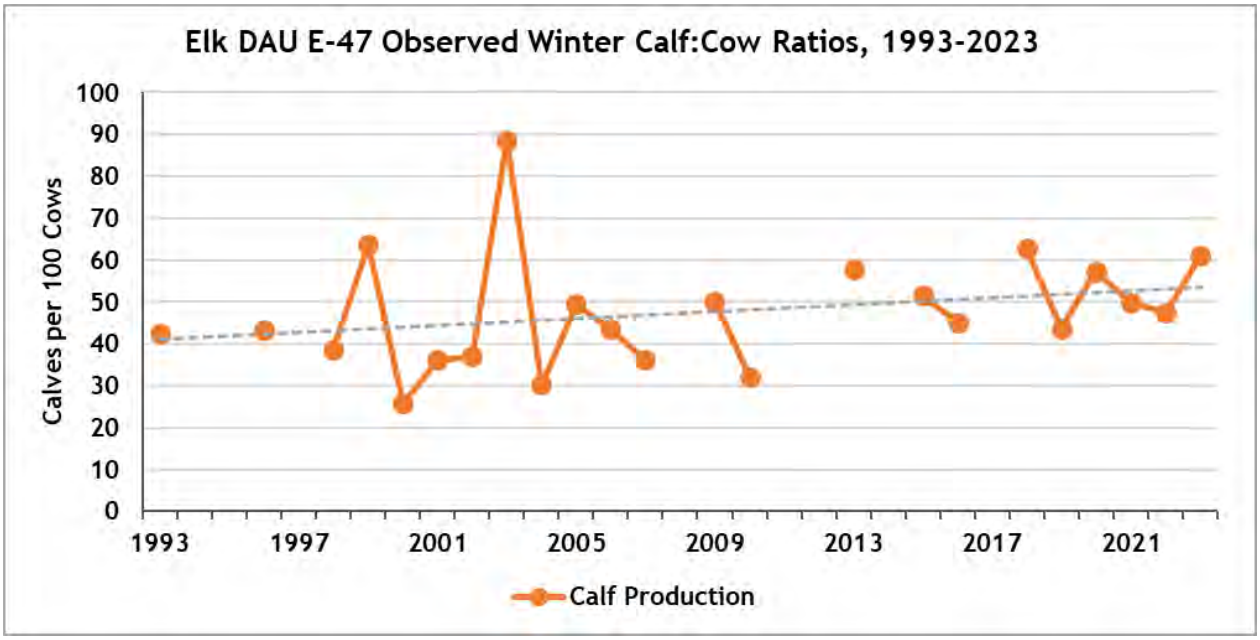


Figure 47-3. Elk DAU E-47 calf production (observed post-hunt calves:100 cows), 1993-2023.

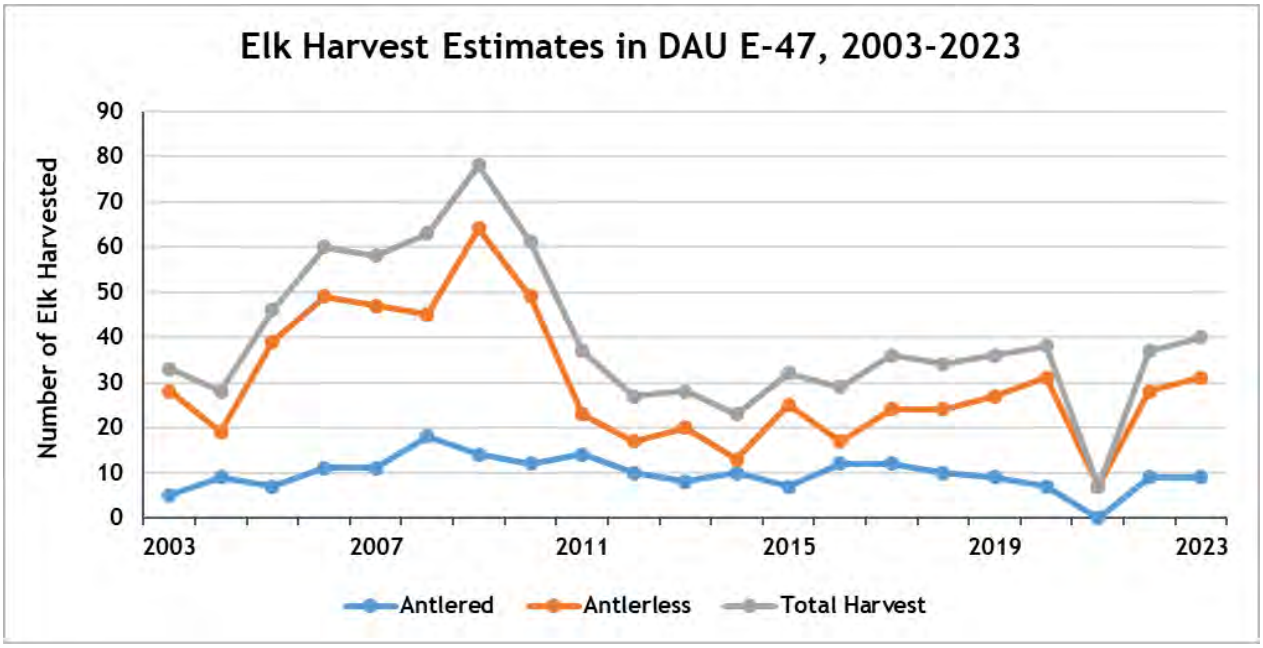


Figure 47-4. Elk harvest estimates in E-47, years 2003-2023.

Background

The Green River Elk Data Analysis Unit (DAU) E-47, is located in the northwest corner of Colorado and in Moffat County. DAU E-47 is a single Game Management Unit (GMU) 1. Land ownership within the DAU comprises 77 square miles that is 91% public land and 9% private

land. Public land includes Bureau of Land Management (BLM) (61%), Browns Park National Wildlife Refuge managed by the US Fish and Wildlife Service (5%), Dinosaur National Monument managed by the National Park Service (23%), and State Land Board (2%).

Elk can be found at all elevations within E-47 year-round but in general concentrate at higher elevations during summer months and move to lower elevations during the winter months.

The current population objective for DAU E-47 is 170 elk. This objective was set in 1994, however, a management plan was not written for E-47. Radio collar data shows there is significant seasonal inter-DAU and interstate movement within the DAU. Depending on winter conditions, the lower elevations on winter ranges within the DAU will be occupied by an immigration of elk from E-1 and Utah. During the summer months some of these elk will emigrate out of E-47 back to summer ranges in E-1 and Utah. This inter-DAU and interstate movement makes it challenging to manage elk within the DAU at such a small geographic scale. Thus, it is difficult to gather representative post-hunt elk population statistics for a herd with such dynamic interstate and inter-DAU seasonal movements.

Management Alternatives

There are three basic management strategies that CPW is currently using for elk DAUs. Ideally, all units within a DAU are managed using the same strategy. These basic management strategies consider various types of hunting opportunities including ease of participation, quality of hunting experience, level of success rates, and opportunity to harvest a quality male animal.

Methods to achieve these various opportunities include offering readily available licenses, spatial and temporal distribution of hunters and license limitations. These different management strategies afford various types of hunting opportunities and are often mutually exclusive and therefore must be balanced among the desires of hunters, landowners, and economic interests.

The DAU management strategy recommendation by the CPW is status quo. Currently, E-47 is totally specified for all seasons and managed for quality bull elk hunting. Season structures within DAU E-47 include limited archery and muzzleloader seasons, an early rifle bull elk season, and 4 limited regular season antlerless hunts. Hunter success in the DAU will remain relatively high under this strategy. The management recommendation is to maintain this DAU as a quality bull elk hunting unit with limited bull license quotas.

Stakeholder Outreach and Input

Public meetings were held on October 9th and 11th, 2023 in Hayden, CO and Meeker, CO, respectively. Forty-four people attended these meetings. Public comment forms were available for attendees to fill out at the meeting. No one submitted comment forms after the meeting pertaining to E-47. A QR code was also provided to people that attended the meeting as a way to comment electronically. Nobody commented using the QR code.

In addition to the comment forms available through the local public meetings, opt-in big game hunter attitude surveys have been conducted the past two years while conducting the big game harvest survey. These surveys have allowed CPW to gather input from hunters on an annual basis. Based on survey results, the majority of respondents were satisfied or very

satisfied with their overall hunting experience in E-47. Sixty percent of hunters were satisfied or very satisfied with the overall number of elk they saw while hunting. Results were similar from respondents when it comes to the total number of bulls they saw while hunting in E-47. More hunters responded that they would prefer to hunt mature bulls than they would to hunt more often. Additionally, almost half of the respondents preferred to see the elk population stay the same over the next 10 years.

Overall, the majority of hunters responded to not feeling crowded by other hunters when hunting in E-47 and an overwhelming majority responded to not feeling crowded by non-hunters.

Post-hunt Population

Minimum count 150-250 elk

This objective seeks to maintain the E-47 elk herd at the stated population objective range which will be assessed through the minimum counts observed during post-hunt sex and age classification flights. The population objective is consistent with public desires and allows the herd to be managed at a population level in-line with carrying capacities given variable range conditions.

Post-hunt bull ratio

>40 bulls per 100 cows

The CPW recommendation is to manage the sex ratio to maintain >40 bulls:100 cows. Bull ratios can vary widely from year to year based on the number and composition of elk classified. Since bulls traditionally occupy the same winter ranges every year, observers generally get a representative sample of bulls. However, bull ratios can fluctuate annually due to interstate and inter-DAU movement of cow-calf groups. For example, if a representative sample of cow-calf groups is not obtained due to emigration out of the DAU or an influx of cow-calf groups immigrate into the DAU it can influence post-hunt observed bull ratios. Managing for >40 bulls:100 cows will allow for continued recruitment of older age class bull elk within this DAU.

Literature Cited

Baur, L., M. D. Smith, K. A. Schoenecker, and P. Meiman. 2016. Effects of feral horse herds on plant communities across a precipitation gradient. Colorado State University.

Bender, L. C., J. G. Cook, R. C. Cook, and P. B. Hall. 2008. Relations between nutritional condition and survival of North American elk *Cervus elaphus*. Wildlife Biology 14:70–80.

Boyd, C. S., K. W. Davies, and G. H. Collins. 2017. Impacts of feral horse use on herbaceous riparian vegetation within a sagebrush-steppe ecosystem. Rangeland Ecology and Management 70:411–417.

Ciuti, S., J. M. Northrup, T. B. Muhly, S. Simi, M. Musiani, J. A. Pitt, and M. S. Boyce. 2012. Effects of humans on behaviour of wildlife exceed those of natural predators in a landscape of fear. PLoS ONE 7(11). doi:10.1371/journal.pone.0050611.

Colorado Parks and Wildlife. 2018. Chronic wasting disease response plan. Denver, Colorado, USA.

Conner, M. M., M. E. Wood, A. Hubbs, J. Binfet, A. Holland, L. R. Meduna, A. Roug, J. P. Runge, T. D. Nordeen, M. J. Pybus, and M. W. Miller. 2021. The relationship between harvest management and chronic wasting disease prevalence trends in western mule deer herds. Journal of Wildlife Diseases 57:831–843.

Creel, S., J. Winnie Jr, B. Maxwell, K. Hamlin, and M. Creel. 2005. Elk alter habitat selection as an antipredator response to wolves. Ecology 86:3387–3397.

Danvir, R. E. 2018. Multiple-use management of western U.S. rangelands: wild horses, wildlife, and livestock. Human-Wildlife Interactions 12:5–17.

Edge, W. D. 1982. Distribution habitat use and movements of elk in relation to roads and human disturbances in western Montana. Graduate Student Theses, Dissertations, & Professional Papers. 5683. https://scholarworks.umt.edu/etd/5683.

Hall, L. K., R. T. Larsen, C. C. Westover, R. N. Knight, and B. R. McMillan. 2016. Influence of exotic horses on the use of water by communities of native wildlife in a semi-arid environment. Journal of Arid Environments 127:100–105.

Harrington, J. L., and M. R. Conover. 2016. Characteristics of ungulate behavior and mortality associated with wire fences. Wildlife Society Bulletin 34:1295–1305.

Hebblewhite, M. 2008. A literature review of the effects of energy development on ungulates: implications for central and eastern Montana. Report prepared for Montana Fish, Wildlife and Parks, Miles City, MT.

Hebblewhite, M., and D. W. Smith. 2010. Wolf community ecology: ecosystem effects of recovering wolves in Banff and Yellowstone National Park. In: Musiani, M., L. Boitani, and P. C. Paquet, editors. The world of wolves: new perspectives on ecology, behaviour.

Johnson, B. K., M. J. Wisdom, and J. G. Cook. 2014. Issues of elk productivity for research and management. Transactions of the 69th North American Wildlife and Natural Resources Conference.

Johnson, H. E., J. R. Sushinsky, A. Holland, E. J. Bergman, T. Balzer, J. Garner, and S. E. Reed. 2016. Increases in residential and energy development are associated with reductions in recruitment for a large ungulate. Global Change Biology 23:578–590.

Jones, P. F., A. F. Jakes, A. C. Telander, H. Sawyer, B. H. Martin, and M. Hebblewhite. 2019. Fences reduce habitat for a partially migratory ungulate in the northern sagebrush steppe. Ecosphere 10(7). doi:10.1002/ecs2.2782.

Lendrum, P. E., C. R. Anderson, K. L. Monteith, J. A. Jenks, and R. T. Bowyer. 2013. Migrating mule deer: effects of anthropogenically altered landscapes. PLoS ONE 8(5).

Mech, L. D., R. E. McRoberts, R. O. Peterson, and R. E. Page. 2001. Winter severity and wolf predation on a formerly wolf-free elk herd. Journal of Wildlife Management 65:998–1003. doi:10.2307/3803048.

Miller, M. W., J. P. Runge, A. A. Holland, and M. D. Eckert. 2020. Hunting pressure modulates prion infection risk in mule deer herds. Journal of Wildlife Diseases 56:781–790.

Naylor, L. M., M. J. Wisdom, and R. G. Anthony. 2009. Behavioral responses of North American elk to recreational activity. Journal of Wildlife Management 73:328–338.

Olson, R. 1992. Mule deer habitat requirements and management in Wyoming. Department of Renewable Resources, College of Agriculture, University of Wyoming, Laramie, USA.

Peterson, R. O., J. A. Vucetich, J. M. Bump, and D. W. Smith. 2014. Trophic cascades in a multicausal world: Isle Royale and Yellowstone. Annual Review of Ecology, Evolution, and Systematics 45:325–345.

Phillips, G. E., and A. W. Alldredge. 2000. Reproductive success of elk following disturbance by humans during calving season. Journal of Wildlife Management 64:521–530.

Preisler, H. K., A. A. Ager, and M. J. Wisdom. 2013. Analyzing animal movement patterns using potential functions. Ecosphere 4(3):32. doi:10.1890/ES12-00286.1.

Ripple, W. J., and R. L. Beschta. 2004. Wolves and the ecology of fear: can predation risk structure ecosystems? BioScience 54:755–766.

Rogala, J. K., M. Hebblewhite, J. Whittington, C. A. White, J. Coleshill, and M. Musiani. 2011. Human activity differentially redistributes large mammals in the Canadian Rockies national parks. Ecology and Society 16(3):16.

Rowland, M. M., M. J. Wisdom, B. K. Johnson, and J. G. Kie. 2000. Elk distribution and modeling in relation to roads. Journal of Wildlife Management 64:672–684.

Sawyer, H., M. J. Kauffman, A. D. Middleton, T. A. Morrison, R. M. Nielson, and T. B. Wyckoff. 2012. A framework for understanding semi-permeable barrier effects on migratory ungulates. Journal of Applied Ecology 49:1–11.

Sawyer, H., N. M. Korfanta, R. M. Nielson, K. L. Monteith, and D. Strickland. 2017. Mule deer and energy development: long-term trends of habituation and abundance. Global Change Biology 23:1–9.

Segar, J., and A. Keane. 2020. Species and demographic responses to wildlife-friendly fencing on ungulate crossing success and behavior. Conservation Science and Practice 2. doi:10.1111/csp2.285.

Shively, K. J., A. W. Alldredge, and G. E. Phillips. 2005. Elk reproductive response to removal of calving season disturbance by humans. Journal of Wildlife Management 69:1073–1080.

Teddy Roosevelt Conservation Partnership. 2022. Outdoor recreation and elk: a Colorado case study. https://storymaps.arcgis.com/stories/a0a8b0e3d65d4156886cd7e0cc5cee7f.

Tollefson, T. N., L. A. Shipley, W. L. Myers, and N. Dasgupta. 2011. Forage quality's influence on mule deer fawns. Journal of Wildlife Management 75:919–928.

Trails with Wildlife in Mind Task Force. 2021. Colorado's guide to planning trails with wildlife in mind. Denver, Colorado, USA.

Trombulak, S. C., and C. A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14:18–30.

USDI Bureau of Land Management. 2023. Colorado wild horse and burro areas administered by the Bureau of Land Management, September 26, 2023. 2023 Wild Horse and Burro HA and HMA Statistics.https://www.blm.gov/sites/default/files/docs/2023-04/2023_HMA-HA_PopStats_4-3-2023_Final.pdf. Accessed 26 Sep 2023.

Wisdom, M. J., H. K. Preisler, L. M. Naylor, R. G. Anthony, B. K. Johnson, and M. M. Rowland. 2018. Elk response to trail-based recreation on public forests. Forest Ecology and Management 411:223–233.

Wisdom, M. J., A. A. Ager, H. K. Preisler, N. J. Cimon, and B. K. Johnson. 2004. Effects of off-road recreation on mule deer and elk. Transactions of the North American Wildlife and Natural Resources Conference 69:67–80.