

Avalanche Creek Elk Herd E-15
Data Analysis Unit Plan
Game Management Units 43 and 471



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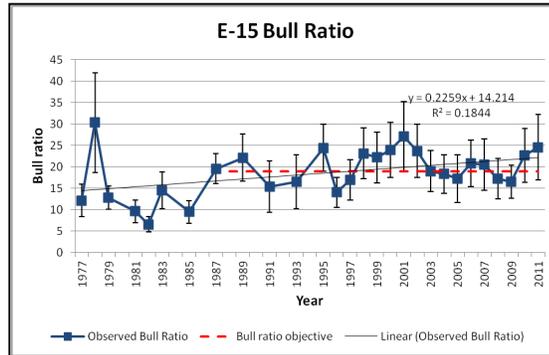
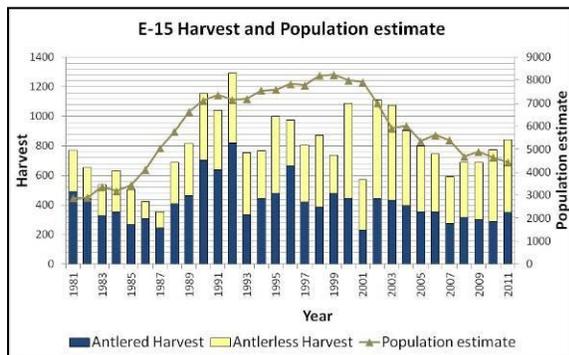
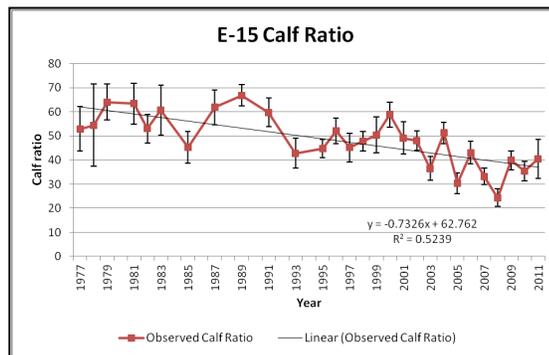
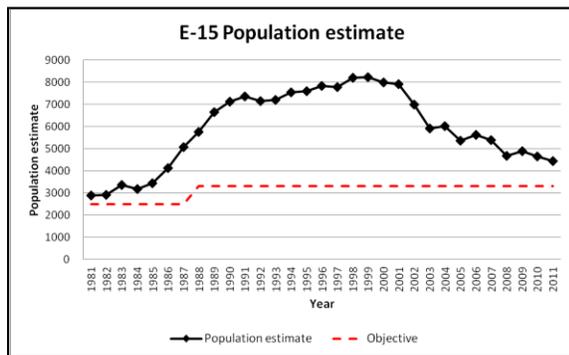
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Executive Summary

DAU: E-15 Avalanche Creek
 GMUs: 43 and 471

Previous (1988) Population Objective: 3,300 elk
 Current Population Estimate (post-hunt 2011): 4,500 elk
New Population Objective Range: 3,600 – 5,400 elk

Previous (1988) Sex Ratio Objective: 19 bulls/100 cows
 Current Sex Ratio (3-year average 2009-2011): 21 bulls:100 cows
Expected sex ratio range: 17-27 bulls:100 cows



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.

Since 1988, the elk in E-15 have been managed for a population objective of 3,300 elk. Through the 1990s and early 2000s, the herd numbered between approximately 7,000-8,000 elk. To reduce the population toward the herd management objective, liberal antlerless licenses were provided to achieve increased cow elk harvest. The population has been gradually reduced and is currently estimated at 4,500 elk.

The 1988 DAU plan set a sex ratio objective for E-15 of 19 bulls:100 cows. However, as an over-the-counter (OTC) DAU with 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 hunting opportunities. Antler-point restrictions have been effective at improving the quality of bulls and increasing the bull ratio without requiring totally limited licenses. Thus, despite being an OTC unit, the bull ratio has averaged above the established objective. The current (2009-2011) 3-year average and the long-term average since 2000 both are 21 bulls:100 cows.

Significant issues

Outdoor recreation and other human disturbance, habitat loss and fragmentation due to land development, and continued lack of large-scale habitat improvement projects have been the major issues for this elk herd. Increased predator populations could also be affecting the elk population.

The human population in this area has grown rapidly in the past 20-30 years, as many people are drawn to the area by the ski areas, wildlife, open space, public lands, scenery and lifestyle. As a result, recreation and habitat conversion have become major impacts on wildlife. Land development has led to the direct loss of habitat quantity and quality in the form of conversion of habitat into houses, other buildings, and infrastructure; conversion of native shrublands to grassland agricultural fields; and fragmentation of habitat due to roads, recreational trails, and structures. Outdoor recreation has become a year-round presence on the landscape, particularly on public lands, and is the largest indirect impact to the area's wildlife populations. There is increasing demand for more recreational trails to be established, as well as frequent use and expansion of unofficial trails, all of which fragment and diminish the quality of remaining wildlife habitat and create disturbances to wildlife on a year-round basis. Human disturbances during critical periods for wildlife can reduce calf recruitment and increase stress on wintering wildlife. There is now human disturbance also during the summer in areas previously used by wildlife for seclusion. More roads and vehicle traffic, along with increased driving speeds, have resulted in more roadkill of elk other wildlife. Dogs, both on- and 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 developments are now unlikely to be allowed to burn due to potential damage to property. The cumulative effect is that both quantity and quality of habitat has declined for elk in E-15. Unfortunately, elk winter range continues to disappear to development. Without large scale habitat improvements, and probably even with improvements there are certain portions of this DAU that may need to focus on the continued reduction of the elk population to try and balance the amount of habitat that is available with the number of elk this habitat can support. Notably, the White River National Forest has begun a 10-year, large scale series of habitat projects to rejuvenate shrublands, grasslands, and aspen habitat for the benefit of wildlife. About 16,000 acres across 8 treatment blocks on winter and transitional range in E-15 will be mechanically treated or burned. This work should enhance the existing native habitat that is available to elk and deer.

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. Whether predation has a population-level effect on the elk herd depends on how close the elk population is to carrying capacity, i.e., whether predation is additive or compensatory to other causes of elk mortality (such as malnutrition, disease, and human-caused mortality).

Alternatives for Population Objective Range

E-15's current population objective of 3,300 elk was established in 1988 and is long overdue for an update. Many changes have occurred since then in land use, human population growth, recreation pressure, habitat condition, elk population size, predator population sizes, and population modeling methods. For the past decade or more, the goal has been to decrease the elk population toward the objective of 3,300. Public input indicates that the most (61% of 99) respondents prefer to maintain the current population size (~4,500 elk) rather than to further decrease or to increase the population. Most hunters' primary interest in E-15 is in harvesting an elk for meat rather than as a trophy.

Colorado Parks and Wildlife considered three alternatives for the new population objective range. The alternative of 3,600-5,400 elk was selected as the new population objective because it will balance the public's desire to have enough elk on the landscape for hunting and wildlife viewing opportunities, while still keeping the elk population at a moderate density (i.e., below ecological carrying capacity at a number of animals the habitat can support in healthy body condition).

Alternative 1: 4,500-6,300 elk

This alternative would increase the current population size by about 20% (range 0% to +40% change). Because elk have a high natural survival rate, reducing hunter harvest to achieve elk population growth may allow elk numbers to take off when weather conditions are favorable for survival. At a higher population density, elk will compete more intensely with each other as well as with mule deer for forage and space, particularly during hard winters. The health of individual elk may be compromised due to this heightened competition, and disease may spread through the population more easily. Mortality by predation, harvest, disease, and malnutrition would be more compensatory to each other at this higher elk density. Overall, calf recruitment rate would be lower. Winter range habitat - which has already been diminished by land development, lack of regeneration, and over-use by past high densities of ungulates - could be further degraded. Agricultural crop damage may become an issue, and damage to residential trees, shrubs, and gardens may increase. More elk-vehicle collisions may occur. Catastrophic weather, such as a very severe winter restricting access to forage and requiring animals to use more of their body fat to stay alive, could result in large numbers of elk dying.

Antlerless license numbers would need to be reduced, at least for the first several years, to achieve population growth. There would be less opportunity to draw a cow license and hunters might not be able to draw a license every year. However, those who do successfully draw would experience less crowding and would likely have a better chance of harvesting an elk because there would be more elk on the landscape. As the herd reaches the higher population objective, more antlerless licenses could be issued to stabilize the herd at the new population objective. Also at a higher population, there would be more bulls available, so bull hunters could have higher success rates. However, because bull licenses for 2nd and 3rd rifle season are unlimited, hunter crowding and success rates during these seasons would depend also on how many bull hunters choose to hunt in these units.

Economic benefits to the local community could be reduced due to having fewer antlerless licenses available and therefore fewer hunters contributing to local establishments during hunting season. This effect could be offset if more hunters purchase over-the-counter bull licenses, but is unlikely, given current declining trends in hunter participation overall.

Alternative 2: 3,600-5,400 elk (Selected)

This alternative would maintain the current population size (+/-20%). There would be less competition for forage and habitat among elk than in the past. Calf recruitment might remain relatively low given current conditions (i.e., high recreation pressure, reduced habitat availability and condition, increased predator densities), but because adult elk have high natural survival rates, the population can be maintained at this size with low recruitment rates and continued moderate harvest.

To achieve this population objective, antlerless licenses would either remain the same or initially be reduced slightly to stabilize the population at the current size. As population size is evaluated over the subsequent years, license quotas could resume thereafter back to quotas similar to current levels. Hunting opportunity, harvest success rates, and economic impact would be intermediate compared to Alternatives 1 and 3, and would be similar to those of today.

Alternative 3: 2,700-4,500 elk

This alternative would continue to reduce the population size by around 20% (range 0% to -40% change). At a lower population density, individual elk would experience less competition and overall better health. Survival rates could improve, and therefore, the herd would be more resilient to extreme

weather events. However, at lower elk population density, the effects of predation could become more pronounced.

To achieve this population objective, it could take many years and would depend on harvesting enough cow elk to continue to drive the population down. Increasing antlerless quotas would not be useful because even at the current license quotas, many licenses go unsold. Therefore, antlerless license quotas would remain the same as current quotas. As the population continues to decline, harvest success rates would likely decline because of having relatively fewer animals available, and hunter crowding may be an issue. Eventually as the lower population objective is reached, antlerless licenses would need to be reduced to stabilize the herd at the new population size. Initially, economic benefits from hunting and wildlife watching would be similar to those of today; later, there would be fewer economic and recreational benefits as the elk population declines.

Expected Sex Ratio Range

For DAUs that have unlimited over-the-counter (OTC) bull elk licenses in 2nd and 3rd rifle seasons, CPW does not manage for a particular sex ratio. Instead, bull:cow ratio in these OTC units is determined by a combination of harvest factors (e.g., hunter participation, hunter success), biological factors (e.g., differential survival rates of bulls vs. cows, sex ratio of calves when born), and abiotic factors (primarily weather). Therefore, we report an expected sex ratio, rather than a sex ratio objective.

The expected sex ratio range for E-15 is 17-27 bulls:100 cows, based on the post-hunt bull ratios observed over the last decade since the antler-point restriction was extended to all seasons.

This plan was approved by the Colorado Parks and Wildlife Commission on July 12, 2013.

Introduction and Purpose

Data Analysis Unit (DAU) plans

Colorado Parks and Wildlife (CPW) manages wildlife for the use, benefit and enjoyment of the people of the state in accordance with the CPW's Strategic Plan and mandates from the Parks and Wildlife Commission and the Colorado Legislature. Colorado's wildlife resources require careful and increasingly intensive management to accommodate the many and varied public demands and growing impacts from people. To manage the state's big game populations, the CPW uses a "management by objective" approach (Figure 1). Big game populations are managed to achieve population objective ranges and sex ratio ranges established for data analysis units (DAUs).

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

A Data Analysis Unit or DAU is the geographic area that represents the year-round range of a big game herd. It delineates the seasonal ranges of a specific herd while keeping interchange with adjacent herds to a minimum. A DAU includes the area where the majority of the animals in a herd are born and raised, as well as where they die either as a result of hunter harvest or natural causes. Each DAU usually is composed of several game management units (GMUs), but in some cases only one GMU makes up a DAU.

The primary decisions needed for an individual herd management plan are (1) how many animals should exist in the DAU and (2) the desired sex ratio for the population of big game animals, i.e., the number of males per 100 females. These numbers are referred to as the population and sex ratio objectives, respectively. Secondly, the strategies and techniques needed to reach the population size and herd composition objectives also need to be decided. The selection of population and sex ratio objectives drive important decisions in the big game season setting process, namely, how many animals need to be harvested to maintain or move toward the objectives, and what types of hunting seasons are required to achieve the harvest objective.

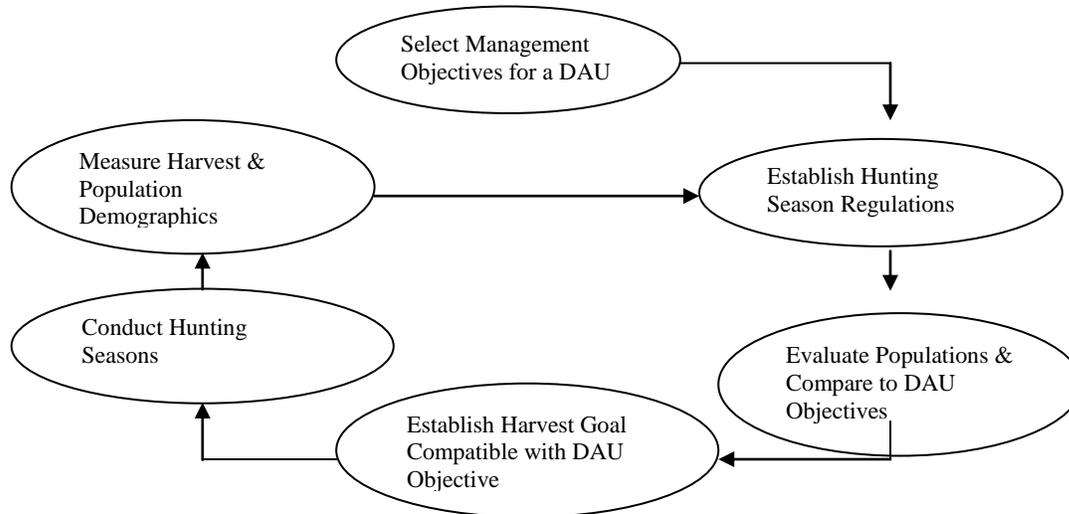


Figure 1. Management by objectives process used by the CPW to manage big game populations on a DAU basis.

Population Dynamics, Maximum Sustained Yield, and Density Dependence

Numerous studies of animal populations, including such species as bacteria, mice, rabbits, and white-tailed deer have shown that the populations grow in a mathematical relationship referred to as the "sigmoid growth curve" (Figure 2). There are three distinct phases to this cycle. The first phase occurs while the population level is still very low and is characterized by a slow growth rate and a high mortality rate. This pattern occurs because the populations may have too few animals and the loss of even a few of them to predation or accidents can significantly hinder population growth.

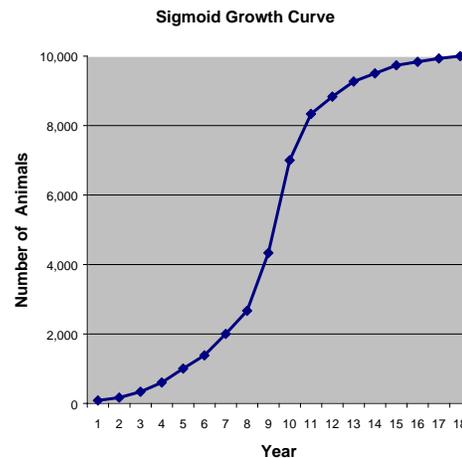


Figure 2. Sigmoid growth curve.

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

The final or third phase occurs when the habitat becomes too crowded or habitat conditions become less favorable. The quantity and quality of food, water, cover, and space become scarce due to the competition with other members of the population. These types of factors that increasingly limit productivity and survival at higher population densities are known as density-dependent effects. If the population continues to grow it will eventually reach a point

called the carrying capacity. At this point, the population growth rate slows to zero and the population reaches an equilibrium with its environment. The number of births each year equals the number of deaths; therefore, to maintain the population at this level would not allow for any "hunnable surplus." The animals in the population would be in relatively poor body condition, habitat condition would be degraded from over-use, and when a severe winter or other catastrophic event occurs, a large die-off is inevitable.

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

A graph of a hypothetical elk population showing sustained yield (harvest) potential vs. population size is shown (Figure 3). Notice that as the population increases from 0 to 5,000 animals, the harvest to sustain the population at this size also increases. However, when the herd reaches maximum sustained yield at a population size of 5,000 elk, resources become scarcer; survival rates begin to decline; and the harvest potential decreases. Finally, when the population reaches the maximum carrying capacity (10,000 elk in this example), the harvest potential will be reduced to zero. Also, notice that it is possible to harvest exactly the same number of elk each year with, for example, 3,000 or 7,000 elk in the population. This phenomenon occurs because the population of 3,000 elk has much higher survival rates and/or reproductive rates (e.g., pregnancy rate, age at first reproduction) compared to the population of 7,000 elk, so there is proportionally more harvestable surplus.

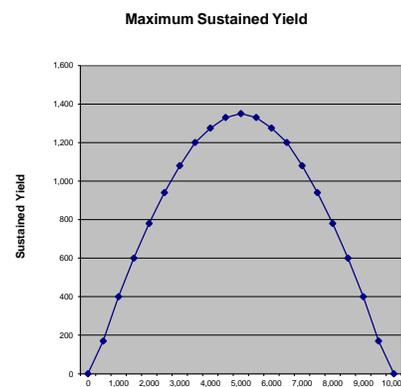


Figure 3. Maximum sustained yield occurs at moderate population size.

Realistically managing elk populations for maximum sustained yield is difficult, if not impossible, due to the amount of detailed biological information about habitat and population size required. Additionally, carrying capacity is not static; the complex and dynamic nature of the environment cause carrying capacity to vary seasonally and annually, and can also change as environmental conditions change. In most cases we would not want true maximum sustained yield management even if possible because of the potential for overharvest. Also there would be fewer mature of bulls because maximized harvest reduces the survival of individuals to reaching older age classes. However, the concept of maximum sustained yield is useful for understanding how reducing population densities can stimulate productivity and increase harvest yields. Knowing the exact point of maximum sustained yield is not necessary if the goal is to

conservatively reduce population size to increase yield. Long-term harvest data can be used to gauge the effectiveness of reduced population size on harvest yield.

Besides density-dependent factors that *regulate* populations, extrinsic factors that are independent of population density can also *limit* populations. These density-independent factors include weather, predator species, competitor species, and human activities. To further complicate matters, density-dependent and density-independent factors can interact with each other to either amplify or mitigate their overall effects on a population.

Description of Data Analysis Unit

Location

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 (Figure 4). It is bounded on the north by the Colorado and Frying Pan Rivers and Ivanhoe Creek, on the east by the Continental Divide, on the south by the divide between the Roaring Fork-Crystal River drainages and the East River-Muddy Creek drainages and McClure Pass; on the west by the following divides: Muddy Creek-Crystal River, Roaring Fork-Crystal River drainages, and the Divide Creek-Baldy Creek drainages; and by South Canyon Creek. Major towns include Aspen, Snowmass Village, Glenwood Springs, Carbondale, and Basalt. Interstate-70 follows the northern tip of the unit. State highways 82 and 133 provide access to the area. This unit lies in Pitkin, Gunnison, Eagle, and Garfield Counties. E-15 makes up about 60% Roaring Fork River Watershed.

Climate and Precipitation

The climate varies with altitude. Low elevations have moderate winters and warm summers, and high elevations have long, cold winters and short, mild summers. Precipitation varies from 17 inches annually at 6,000 feet elevation to 30-40 inches at 14,000 feet elevation. Prevailing winds are out of the west and southwest. Temperature generally ranges from a low of -20 degrees F to a high of 95 degrees F. Deep snow at higher elevations forces the elk to winter at the lower elevations, on wind-swept ridges, or warmer south- and west-facing aspects where more snowmelt occurs. Moisture comes throughout the year, although winter and spring months have more precipitation than summer and fall months.

Topography

DAU E-15 is dominated by the Elk Mountains. Twenty peaks are higher than 13,000 feet above sea level, while six peaks are above 14,000 feet. This area consists of a series of parallel mountain ranges running mostly NW-SE connected transversely by low saddles. These mountain ranges are divided by the Crystal River. The landscape slopes down to the north to the Roaring Fork and Colorado River Valley floors (around 6,000 to 7,000 ft.) Elevations range from a low of around 5,740 feet at the NW corner of the unit (Colorado River at South Canyon Creek) to the high of 14,265 feet at Castle Peak.

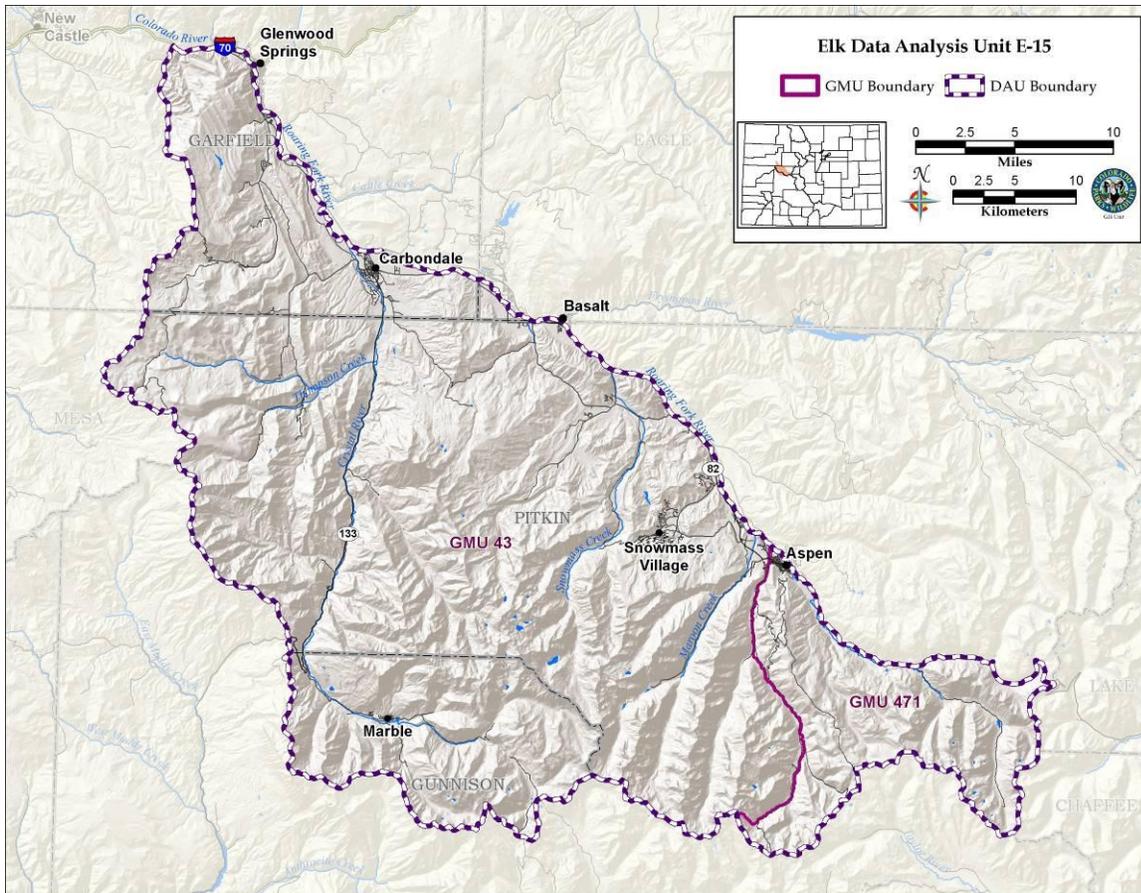


Figure 4. Location of elk DAU E-15.

All natural surface water in this area drains into the Colorado River, mostly through the Roaring Fork. The DAU contains the part or all of the Colorado River, Roaring Fork, Castle Creek, Maroon Creek, Crystal River, Snowmass Creek, South Canyon, and Paradise Creek.

Vegetation

Vegetation types in this unit are largely determined by elevation and aspect (Figure 5). The mountain peaks above approximately 11,600 feet contain mostly bare rock or alpine communities. Spruce-fir grows mostly between the elevations of 8,000 and 11,600 ft. Aspen and aspen-conifer mixes dominate the slopes from 7,000 to 8,500 feet. Mountain shrubs show up on lower slopes near 7,000 feet. Pinyon-juniper covers the lower foothills, and sagebrush parks appear on the more level sites as elevation drops. Riparian vegetation runs along the creeks and rivers. Elk prefer a diversity of vegetation types in close proximity cover and forage.

The vegetation in this DAU can be categorized into five main groups: cropland, riparian, rangeland, forest land, and alpine.

Cropland is found in the valleys at the low elevations and is mostly hay grounds of timothy, orchard grass, wheatgrasses, and alfalfa.

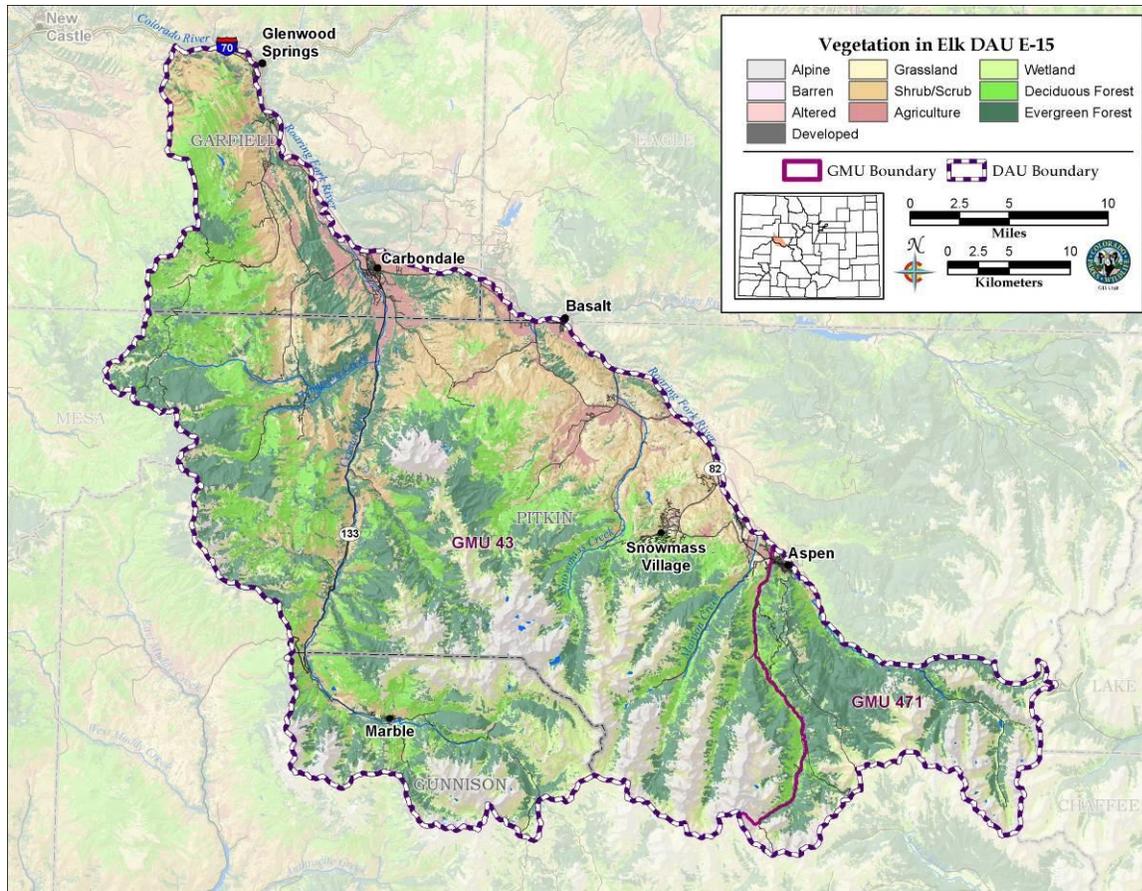


Figure 5. Vegetation types in elk DAU E-15.

Riparian vegetation is found along the major creeks and rivers. This community supports the greatest number of plant and animal species. Cover types range from spruce-fir to blue spruce, douglas fir, ponderosa pine, aspen, narrowleaf cottonwood, and willow as you go from high to low elevations.

Rangelands consist of sagebrush, mountain shrubs, Gambel oak, and grassland communities. Sagebrush is the most common land cover at the lower elevations. Rabbitbrush, western and slender wheatgrass, and native clovers commonly grow with the sagebrush. Mountain shrubs include serviceberry, snowberry, mountain mahogany, and Gambel oak. There are also homogeneous stands of Gambel oak. The shrublands' grasses and forbs provide forage for elk and deer in the spring months. Grasslands occur on the more level sites in forested areas (large bunchgrasses such as Thurber fescue, wildrye, needlegrass, and broome) and in the alpine areas (Idaho and Thurber fescues, sandberg bluegrass, blue bunch wheat grass mixed with forbs).

Forest lands fall into 5 major groups: pinyon-juniper, aspen and aspen-conifer mix, douglas fir, lodgepole pine, and spruce-fir. Pinyon-juniper covers the foothills. They provide good thermal cover but poor forage. Aspen and aspen-conifer mixes occupy the middle elevations. The understory consists of emerging conifers (where aspen is not the climax species), lush grasses and forbs, and some shrubs. This community provides important cover and forage for elk. Douglas fir shares the middle elevation zone on the moister sites usually on

north facing aspects, but is much less represented than the aspen ecosystems. It is a long-lived species valued for wildlife habitat diversity, scenic value, and big game cover. Lodgepole pine grows in even-aged stands east of the Maroon Bells generally above the aspen and below the spruce-fir. In mature stands, the dense overstory limits the growth of understory forage, but provides good cover. In recent years, localized pine bark beetle infestations have affected some lodgepole pine forests, but is not widespread at this point. Spruce-fir (Engelmann Spruce, Subalpine Fir) dominates the higher elevations up to tree line. This habitat provides excellent summer cover for elk.

Alpine sites occur on mountain peaks and basins. Grasses, sedges, and numerous forbs are present. Short willows grow in moister areas. These sites provide summer forage and cover.

Habitat Resource and Capabilities

Land Status

The Avalanche Creek DAU E-15 covers 2,201 km² of land area. Approximately three-fourths of the DAU is public land, and one-fourth is private (Table 1 and Figure 6). Wilderness areas make up 39% of the DAU including most of the Maroon Bells-Snowmass and parts of the Collegiate Peaks and Raggeds Wilderness Areas.

Table 1. Area (square kilometers) by GMU and land status in elk DAU E-15. 1 km² = 0.386 mi² = 247 acres. “Other” includes city, county, land trust, and non-governmental organization lands.

Land Manager	GMU 43	GMU 471	DAU E-15 total	% of DAU
BLM	160	0	160	7%
USFS	1235	242	1476	67%
CPW	11	0	11	0.5%
Private	511	26	537	24%
Other	14	2	16	0.7%
Total area (km²)	1931	269	2201	100%
% of DAU	88%	12%	100%	

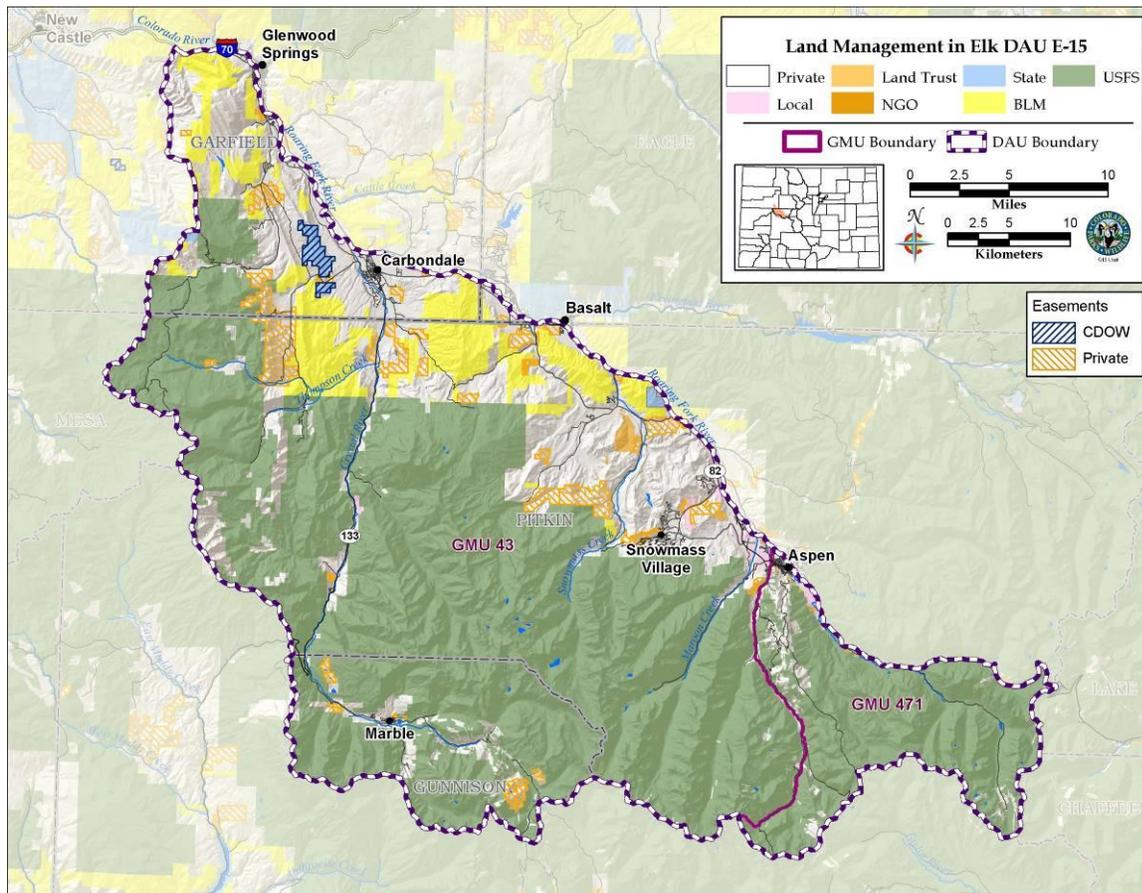


Figure 6. Land management status in elk DAU E-15.

E-15 contains 543 km² of elk winter range (Figure 7). Roughly half of winter range is private land and half is public land (Table 2). Compared to their summer range, the lower elevations where elk spend winter are areas of greater human population and land development. Winter range dates for this area are from December 1 to March 31.

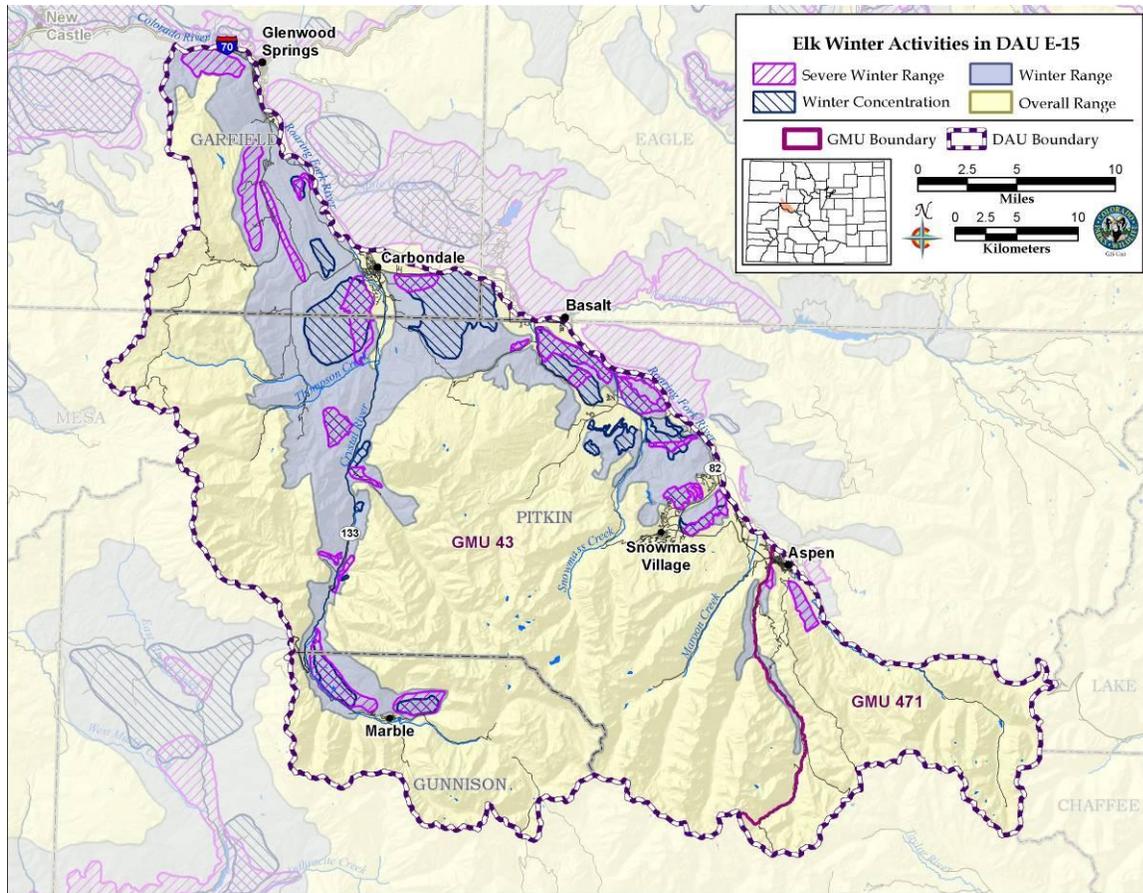


Figure 7. Elk winter range in DAU E-15.

Table 2. Elk winter range area (square kilometers) by land manager in elk DAU E-15. 1 km² = 0.386 mi² = 247 acres. “Other” includes city, county, land trust, and non-governmental organization lands.

Land Manager	Area	% of DAU
BLM	135	25%
USFS	133	24%
CPW	9	2%
Private	259	48%
Other	6	1%
Grand Total	543	100%

E-15 contains 92 km² of severe winter range (Figure 7). Severe winter range is defined as that part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten. There are 126 km² of winter concentration areas (Figure 7). Winter concentration areas

are defined as areas on the winter range that have a density of at least 200% more elk than the surrounding winter range density in the average five winters out of ten.

Land Use

The largest industry in the area is tourism. Tourism is based on the scenic beauty of the land and the recreational opportunities it provides. The Hot Springs Pool and the Vapor Caves are adjacent to this DAU. This area contains four major, destination ski areas (Aspen, Aspen Highlands, Buttermilk, and Snowmass) and one smaller family ski area (Sunlight).

Hunting and fishing generate substantial economic revenue (BBC Research & Consulting 2008). Big game hunting draws hunters from all over the country to the DAU. Backpackers, day hikers, and mountain climbers use the three wilderness areas in the unit. Anglers fish the “Gold Medal”-status Roaring Fork River and the many high lakes. Hikers, campers, mountain bikers, wildlife watchers, four wheelers, snowmobilers, and cross country skiers enjoy the scenic beauty of the mountains. Commercial rafters operate on the Roaring Fork and Colorado River. Motels, restaurants, gift shops, gas stations, and all the local businesses benefit from these visitors. In the past decade, however, the tremendous increase in recreational activity has become a source of disturbance and competition with wildlife for public lands. (See “Current Management Status” section for further discussion on recreation impacts.)

Construction and real estate development and sales is the second largest industry in the area. Many visitors and the people who serve them have decided to build homes in this area. Unfortunately many of the new developments are in elk and mule deer winter range. Forty-eight percent of the elk winter range is privately owned, much of which has already been or may be subject in the future to land development. In the past 20 years, large areas of private lands in the DAU have been subdivided and developed, including: the lower Roaring Fork River (Cardiff Glen, Park West, Sopris Park, Rose Ranch/Ironbridge/West Bank); Dry Park/Four Mile Creek (Spring Ridge, Four Mile Creek Ranch); lands around Carbondale (Aspen Glen, Coryell Ranch, Midland Point, River Valley Ranch, Prince Creek Estates, Stark Mesa); near Old Snowmass (Sopris Mountain Ranch; Shield-O Mesa; Watson Divide); and areas around Aspen (Wildcat). Amount of development varies from dense suburban housing to larger ranchettes. The human population in counties in and near E-15 has grown by 1.4 to 2.4 times from 1990 to 2010, with Garfield County having among the largest growth (Appendix 1).

Logging contributes only a very small part to the local economy, but some timber harvesting in the area has been ongoing since the 1900s. In the past, spruce/fir stands were logged using even-aged methods such as shelterwood cuts, but more recently pine bark beetle infestations have led to sanitation/salvage methods of timber harvest. In the Fourmile Park-Twin Peaks area, Park Creek, Mancon Park, and Elk Creek Timber Sales were logged in the 1980s and 1990s. A 3,000-acre blowdown of beetle-killed spruce and fir in the Baylor Park-Elk Creek area occurred in August 1999. Over the past decade, approximately 400 acres of the blowdown have been removed as salvage. An additional 1,500 acres of spruce/fir in the Fourmile Park-Twin Peaks area is scheduled for salvage or group selection thinning between 2012-2017. Historically, logging also occurred around Aspen and East Sopris Creek from the 1890s to the 1960s.

Natural gas wells in the Fourmile Park-Twin Peaks-Thompson Creek area no longer produce gas, although the mining rights have been leased and there is potential for future gas drilling. There is a geological feature used as underground natural gas storage (Wolf Creek Field). Gas from Colbran and Silt area is piped there and pumped down into the ground. In the winter, natural gas is pumped back to towns in the area. There are several old coal mines that are now shut down and have been rehabilitated. This includes the huge Mid-Continent Coal Mine in Coal Basin. There is a small, working alabaster mine in Avalanche Creek that is being considered for increased production.

Some public land in the DAU is used for livestock grazing, although this use has declined with the general decline in agriculture in the DAU. The main areas used for public land grazing include Thompson Creek, Four-mile Creek, Dinkle Lake, Hay Park, Capitol Creek, and Marble/Gallo Hill. Domestic livestock can compete with elk and mule deer for herbaceous forage, although moderate levels of grazing can also help promote shrub growth by limiting grasses. Grazing practices have changed greatly since the 1960s, such that impacts of livestock on the land are much less than earlier in the late 19th and early 20th centuries.

Some private lands are irrigated for hay production or are kept as dry land pasture. These private ranches are very beneficial to elk and deer because it preserves open space in their winter range. However, as discussed in the “Current Management Issues” section below, if un hunted, these properties become refuges for elk and deer from hunting pressure, making management of local sub-populations of elk difficult, and these areas may experience game damage issues.

Habitat Condition and Capability

Elk winter range in E-15 is in poor condition due to maturation and succession of plant communities, as well as habitat loss due to land development. As a result of long-term fire suppression and lack of large-scale habitat improvement projects, pinyon and juniper woodlands have encroached upon sagebrush shrublands and converted them to much less productive sites. Pinyon and juniper stands tend to be mature with a closed canopy that severely reduces understory vegetation. Also, many of the mixed mountain and sagebrush shrublands are over-mature, decadent, and less productive. Browse seedlings and young plants are not abundant, and in many areas the grass/forb understory is sparse and lacks diversity. Some native shrublands have been converted to agricultural grasslands, such as in Dry Park, Holgate Mesa, and lower Crystal River.

Heavy livestock grazing, in combination with drought, occurred on many rangeland areas in western Colorado from the late 1800s to the 1960s. Since the late 1960s the BLM and USFS have developed improved grazing management approaches that have addressed many of the historic livestock problems. Also, due to the general decline in agriculture in the area, there is much less public land grazing today compared to 40+ years ago.

Higher elk populations in the 1990s and 2000s combined with loss of winter range on private lands to land development resulted in higher elk densities on public land winter range, which probably contributed to heavy browsing of shrubs. Heavily browsed shrubs are evident on winter range areas throughout the DAU (Figure 8). However, in the past decade, warmer, drier winters have allowed elk to use mid-elevation areas that were historically traditional range



Figure 8. Heavily browsed shrubs on elk winter range in DAU E-15.

during early and late winter. This distributional shift, along with the reduced elk population, has reduced some of the elk grazing/browsing intensity on traditional winter range.

Some key areas of elk winter range, including the lower Four-mile Creek/Dry Park area, Prince Creek/Stark Mesa, and West Sopris Creek, have been degraded by intense urban development. While elk still might winter in these areas, the land is not as productive due to loss of habitat to roads, structures, fences, and vegetation alterations. Also, dogs off-leash may chase elk and reduce their vital fat reserves, and dogs may kill elk calves especially neonates. Land development has also resulted in concern about the use of prescribed burns on the adjacent public lands for fear of fire getting out of control and destroying private property.

Invasive weeds that diminish native habitat quality include various thistle, knapweed, and toadflax species. In E-15, of particular concern is a yellow toadflax infestation in Carbonate Creek near Marble. The USFS has used chemical treatment and biological control with insects to attempt to contain the infestation (W. Ives, USFS, pers.comm. 2010).

Various habitat improvement projects, including prescribed burns, removal of pinyon-juniper encroachments, and improvement of sagebrush, oak, and mountain shrub habitats, have been conducted or are on-going (Table 3). Notably, in 2011 the USFS began a 10-year, >45,600-acre wildlife habitat improvement project on the Aspen-Sopris District involving prescribed fire and mechanical treatments of pinyon-juniper, shrublands, and aspen habitats (USDA Forest

Service 2011). These projects include ~16,000 acres of elk winter and transitional range in GMUs 43. Due to the loss of important elk and deer winter range throughout Colorado, the continued conservation and rejuvenation of existing habitat is paramount.

Table 3. Habitat projects in DAU E-15.

<u>Dates</u>	<u>Location</u>	<u>Acres</u>	<u>Treatment Type</u>	<u>Agency or Organization</u>	<u>Cost</u>
Past and ongoing projects:					
5/07-present	East Sopris Project (Light Hill) (GMU 43)	561	Hydro-Axe oak and serviceberry	BLM/CDOW	\$135,000
5/07-present	East Sopris Project (Light Hill) (GMU 43)	40	Hand cut/pile P-J	BLM	\$40,000
6/05-8/05	Light Hill (GMU 43)	20	Hand cut oak	BLM	\$10,000
6/05-8/05	Light Hill (GMU 43)	10	Chemical spray oak	BLM	\$2,500
2/07-6/09	Prince Creek Subdivision (GMU 43)	187	Roller chop oak, then broadcast burn slash	BLM	\$125,000 (mechanical) \$20,000 (fire)
2/07-6/09	Prince Creek Subdivision (GMU 43)	8	Chemical spray oak	BLM	\$3,000
9/1/08-9/15/08	Oak Meadows 4 Mile Rd (GMU 43)	71	Hydro-axe	BLM	\$52,824
8/1/09-9/15/09	Oak Meadows 4 Mile Rd (GMU 43)	10	Hand cut/Pile oak	BLM	\$15,000
5/1/10-5/30/10	Crown Mtn Communications Site (The Crown) (GMU 43)	15	Hand cut/Pile oak	BLM	\$12,000
2010-2011	East Sopris (GMU 43)	100	Prescribed Burn	BLM	\$20,000
2010-2012	East Sopris (GMU 43)	20	Hand cut/Pile P/J	BLM	\$30,000
2010-2012	Mountain Springs Ranch (GMU 43)	50	Forest Health Treatment (Timber and Aspen Management with some hydro axe in brush)	BLM	\$75,000
Future scheduled projects:					
2011-2021	White River National Forest within E-15	15,919	Mechanical and prescribed fire – oak, aspen, P/J	USFS	\$12 million

Conservation Easements

Conservation easements or similar protection comprise 84 km² (16%) of private lands in E-15 (Figure 6), 63% of which is on elk winter range. Twenty percent of private land elk winter range is held in conservation easements. Because winter range is highly limited in this DAU and because of the high monetary incentive for land development in this area, conservation of any remaining winter range habitat, as well as calving areas, is imperative.

Agricultural Conflicts

Game damage due to elk is no longer a major problem in the DAU compared to in the 1980s and early 1990s due to the general decline in livestock and agricultural uses, as well as

fencing of most stackyards. Since 1995, 4 claims totaling \$2,025 in elk-related damages have been paid.

Herd Management History

Overview of Procedures to Estimate Population Size

Estimating population size of wild animals over large geographic areas is a difficult and inexact exercise. In several research projects, attempts have been made to accurately count all the known number of animals in large fenced areas. All of these efforts have failed to consistently count all of the animals. In most cases fewer than 30% of the animals can be observed and counted.

Biologists estimate the elk population size in the DAU using a computer modeling process. Starting in the early 1970s, Colorado Division of Wildlife (CDOW) used a computer modeling program called ONE POP. In the early 1980s, CDOW switched to a personal computer program based program called POP II. After 1999, CDOW has used a computer spreadsheet model to predict population size.

In 2008, these spreadsheet models were standardized statewide based upon population modeling methods developed by White and Lubow (2002) which integrate multiple biological factors, including mortality rates, hunter harvest, wounding loss and annual production. These models are aligned on post-hunting season age and sex ratios measured during winter classification flights, and for some units, density estimates derived from line transect and quadrat surveys. At present, these population modeling methods represent CPW's best estimate of populations. It is recommended that the population estimates presented in this document be used as an index or as trend data and not as an absolute estimate of the elk population in the DAU. As better information become available, such as new estimates of age-specific or sex-specific survival rates, wounding loss, sex ratio at birth, density estimates, or modeling techniques, better population estimates may be derived in the future.

Post-Hunt Population Size

This area was historically a good elk area for a long time. However, by the early 1900s, market hunters supplying miners and railroad crews had depleted the elk herds. Between 1905 and 1913, there were no elk sightings reported. Elk were reintroduced into the Roaring Fork Valley from transplants from Yellowstone National Park: 16 elk were released on Smuggler Mountain (now in GMU 47, E-16) in 1913; 22 more elk were released on Smuggler in 1914; and 24 elk were released near Meredith (now in GMU 444, DAU E-16) in 1915. Since these reintroductions, the elk herds in the area slowly increased over the 20th century.

In recent decades, the population of the herd increased through the 1980s and 1990s, peaking in 1999 at an estimated 8,200 elk (Figure 9). During most of the 1980s the population objective was 2,500 elk. In 1988, the population objective was raised to 3,300 elk. With increased cow harvest in the late 1990s/early 2000s and declining calf:cow ratios over the past 3 decades, the population was reduced toward the previous objective established in the 1988 DAU plan. The 2011 post-hunt population estimate for E-15 was an approximated 4,500 elk.

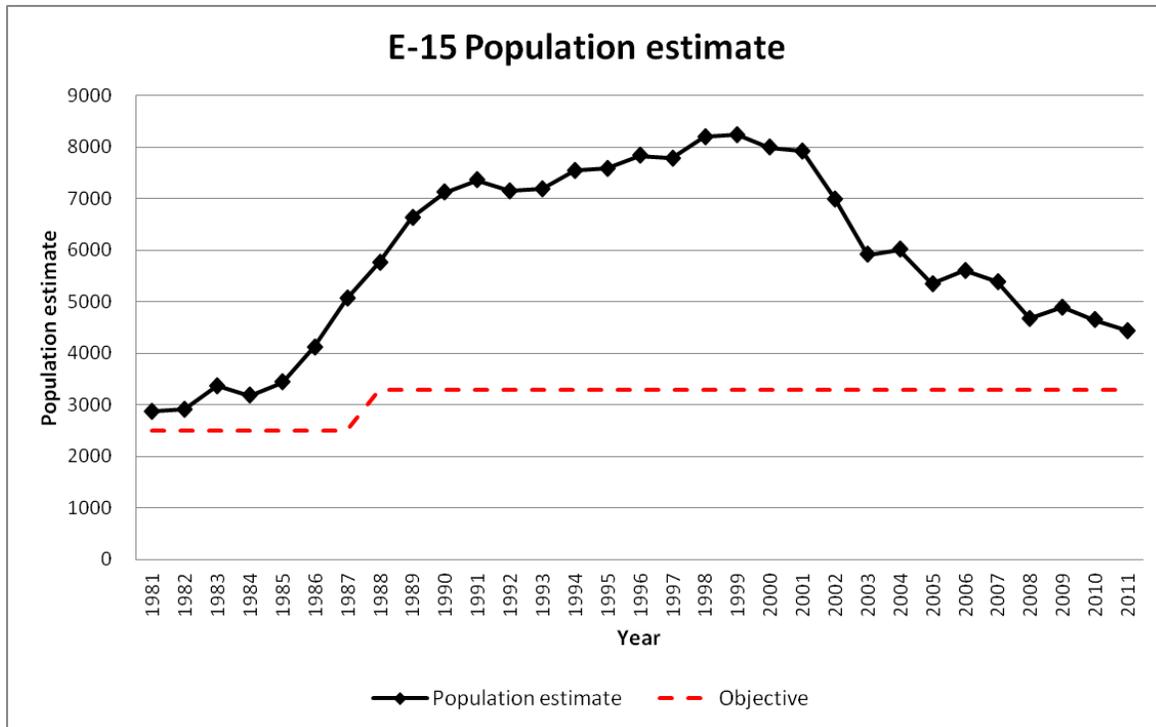


Figure 9. Post-hunt population estimate for elk DAU E-15, 1981-2011.

Post-Hunt Herd Composition

Age and sex classification surveys using a helicopter have been conducted in the DAU since 1977. These surveys are flown “post-hunt” in December/early January. During the early years, the surveys were conducted in alternate years, with a few exceptions. Since 1995, surveys have been conducted every year. The timing of these surveys in early winter is necessary before the bulls and bucks start to shed their antlers. Loss of calves due to starvation and predation typically occurs after this time. During severe winters, the number of calves surviving through the whole winter could be significantly lower than this early winter estimate.

Calf ratio

The post-hunt calf:cow ratio, expressed as calves per 100 cows, is used as an index of herd productivity. This index grossly reflects the combined summer natality and summer-to-early winter survival rate of calves relative to cows.

In E-15, the post-hunt calf:cow ratio has been in an overall decline for the past 3 decades (Figure 10). In the 1980s, the calf ratio averaged 59 calves:100 cows; in the 1990s, the average was 49; and in the 2000s, the average was 41. The current 3-year average (2009-2011) is 39.

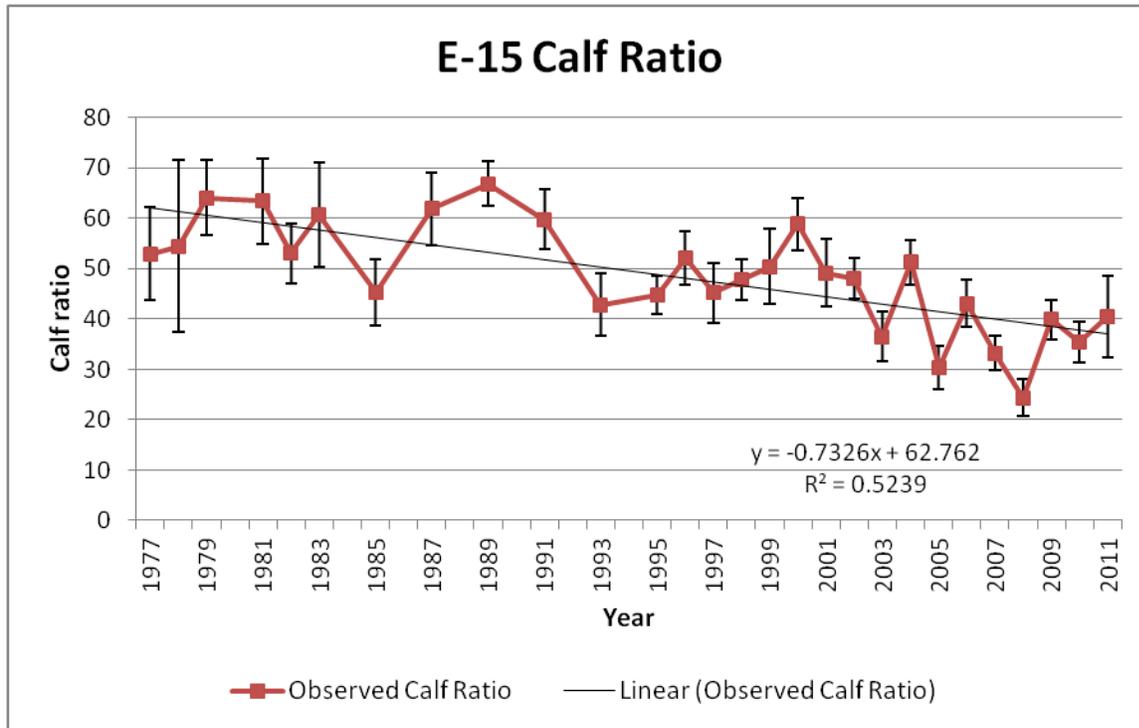


Figure 10. Calf ratio (calves per 100 cows) observed in elk DAU E-15, 1977-2011. Error bars indicate the 95% confidence intervals.

Bull Ratio

The post-hunt bull:cow ratio is used as an index of bull quality of the herd. Bull ratio (bulls per 100 cows) in E-15 has increased since antler-point restrictions were enacted starting in 1986. From 1986-1999, only 4-point or larger bulls were legal in 1st and 2nd rifle seasons in efforts to increase the bull ratio. From 2000-present, this antler-point restriction was expanded to all seasons. Bull ratio has increased over this timespan (Figure 11). The average bull ratio from 1977-1985 was 14 bulls:100 cows; the average from 1987 through 1999 (no survey was done in 1986) was 19 bulls:100 cows; and the average from 2000-present is 21 bulls:100 cows. In most years, the bull ratio objective of 19, set in the 1988 DAU plan, has been met or exceeded under the current harvest management.

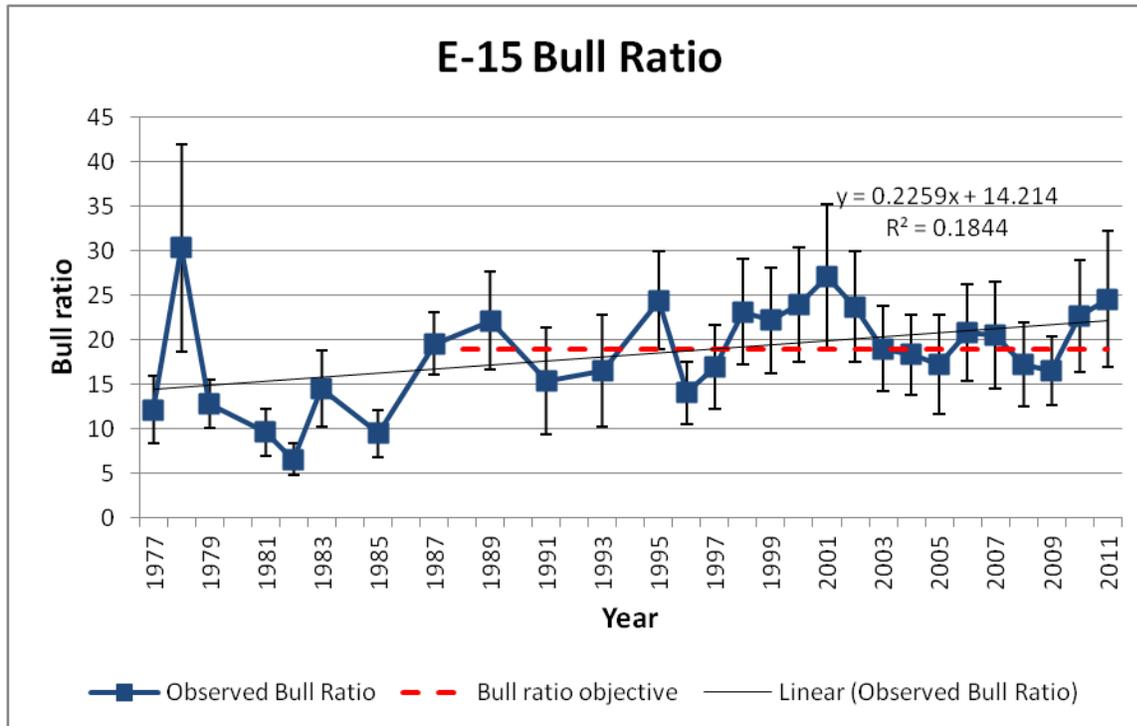


Figure 11. Bull ratio (bulls per 100 cows) observed in elk DAU E-15, 1977-2011. Error bars indicate the 95% confidence intervals.

Harvest History and Seasons

Over the last 30 years, annual elk hunting seasons in E-15 have generally included an either-sex archery season, a limited muzzleloading season and unlimited bull and limited cow rifle seasons. The Wildlife Commission approved three combined deer and elk rifle seasons to spread hunter pressure in 1986 after hunter crowding became an issue. Low bull ratios in the 1970s and early 1980s prompted the Wildlife Commission to approve bull antler point restrictions (APR) in 1986 for the first and second combined seasons. If a DAU had been able to maintain reasonable bull ratios of at least 12 to 15 bulls per 100 cows in the past, spike elk were legal to harvest in the archery, muzzleloading and third rifle seasons. DAU E-15 met this qualification. In E-15, APR followed this seasonal pattern until 2000 at which time most of the bull elk hunting in the state, including in E-15, was restricted to four points or better.

Favorable weather through most of the 1980s and 1990s, combined with limited public access and increased developments resulting in less harvest than desired, contributed to the elk population growing well above the DAU's population objective.

To reduce the population toward the objective, antlerless license quotas were raised in the early 2000s (Figure 12). Antlerless harvest did increase initially, but in part because of large private lands that function as refuges for elk, there is a limit to the amount of harvest possible. As license quotas were raised, success rate dropped off and many licenses went unsold. Antlerless license quotas were reduced somewhat in the mid-2000s to match demand for licenses with a realistically achievable amount of antlerless harvest.

In other attempts to enable antlerless harvest, since 2002 antlerless licenses in E-15 have been “List B” licenses, i.e., they can be purchased as a 2nd license. Also, to focus some harvest on private lands and redistribute elk onto public lands, private-land-only (PLO) antlerless licenses have been available in the DAU since 1993. Under the current season structure, PLO antlerless licenses in E-15 are valid from mid-August to mid-January.

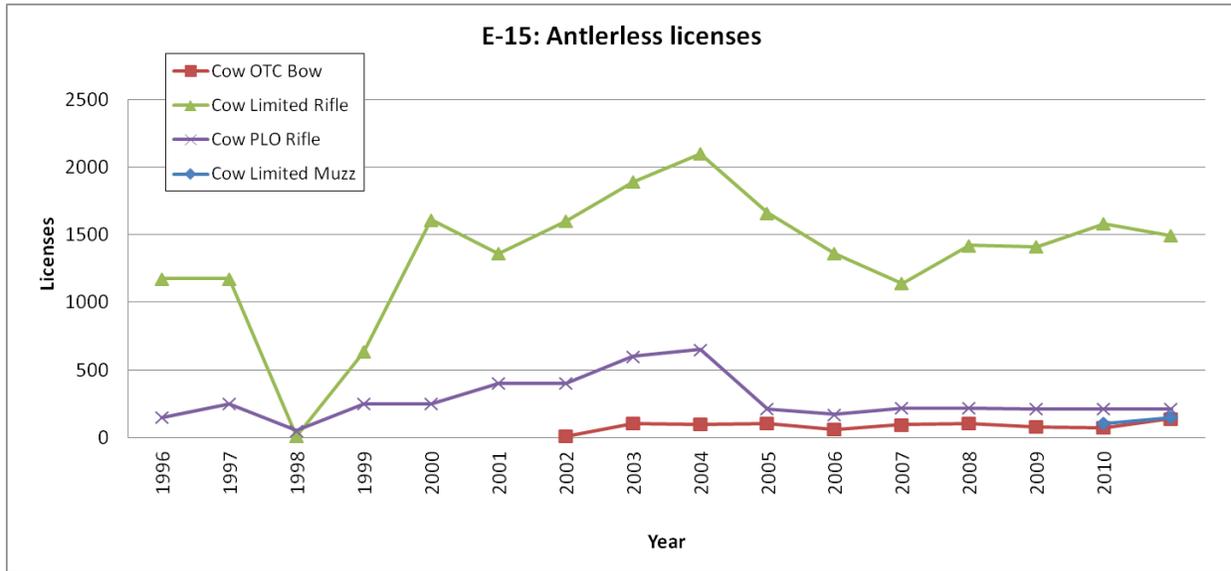


Figure 12. Antlerless license quotas for limited rifle, muzzleloader, and private-land-only (PLO) rifle seasons, and estimated number of licenses used in unlimited/over-the-counter (OTC) antlerless archery season in elk DAU E-15, 1996-2011. In 1998 only, 2nd and 3rd season antlerless and bull rifle licenses were replaced with OTC either-sex licenses. Estimates for number of antlerless OTC muzzleloader licenses in the DAU prior to 2010 were not available at time of publication.

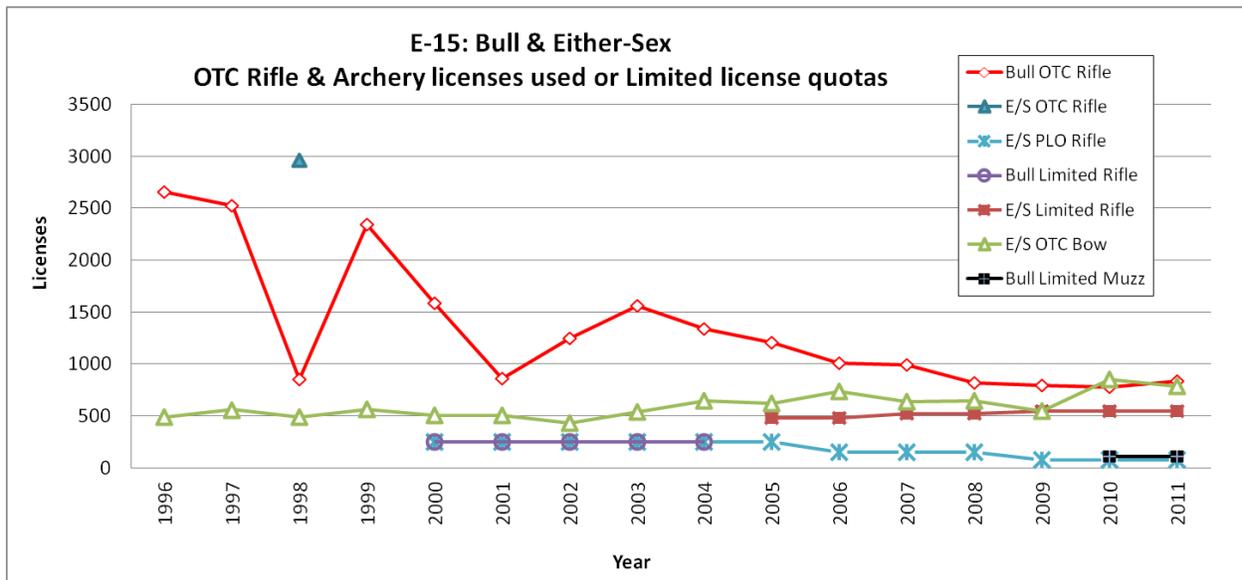


Figure 13. Estimated number of bull and either-sex (E/S) licenses used in unlimited/over-the-counter (OTC) rifle and archery seasons, and license quotas for limited muzzleloader, 1st, 4th, and private-land-only seasons in elk DAU E-15, 1996-2011. Estimates for number of bull OTC muzzleloader licenses in the DAU prior to 2010 were not available at time of publication.

License Demand

For unlimited OTC bull licenses in 2nd and 3rd rifle seasons, the number of hunters who reported hunting in E-15 has dropped substantially since the mid-1990s and has leveled off recently at approximately 800 hunters annually (Figure 13). The number of archery hunters for has been growing over the past decade (Figure 12 and Figure 13). In fact, in the past 2 years, either-sex archery hunters have been as numerous as OTC bull hunters.

For most of the limited license seasons, there currently ample quota available to fulfill license demand (Appendix 2). Most of the antlerless licenses (all 4 regular rifle seasons and cow muzzleloader), as well as the either-sex 1st season PLO and 4th rifle, either never sell out or they sell out as leftover licenses. However, the late private-land-only (PLO) cow license, which generally was available as a leftover, has grown in popularity in recent years and sold out in the 2012 draw. Either-sex 1st rifle licenses and the new (as of 2010) DAU-specific limited bull muzzleloader license have been selling out as 1st or 2nd choices in the draw.

Annual Harvest

The number of elk harvested annually increased from 1953 to the early 1990s. Harvest has been roughly stable since then, with some fluctuations due to license numbers, hunter participation, and weather conditions during hunting seasons (Figure 14). The highest total annual harvest (1,291 elk) occurred in 1992, which was also the year that had the highest bull harvest (819 bulls). The highest antlerless harvest was 667 which occurred in 2002. The lowest total annual harvest was 70 elk in 1954, which also had no antlerless harvest. The lowest bull harvest season was in 1956 when 63 bulls were taken.

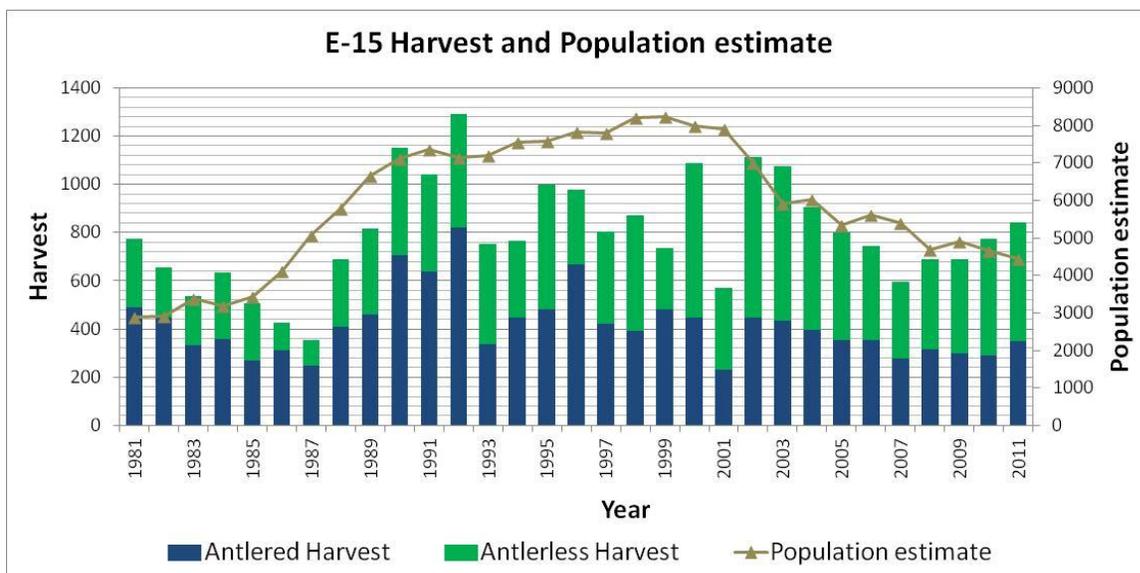


Figure 14. Annual harvest and population estimate in elk DAU E-15, 1981-2011.

Hunter Success

Hunter numbers and success rates have varied through the years (Figure 15). The average over the past 30 years has been approximately 3,800 hunters per year with 21% success rate.

Over the past 10 years, there have been an average of 3,900 hunters per year, and the average success rate has remained 21%.

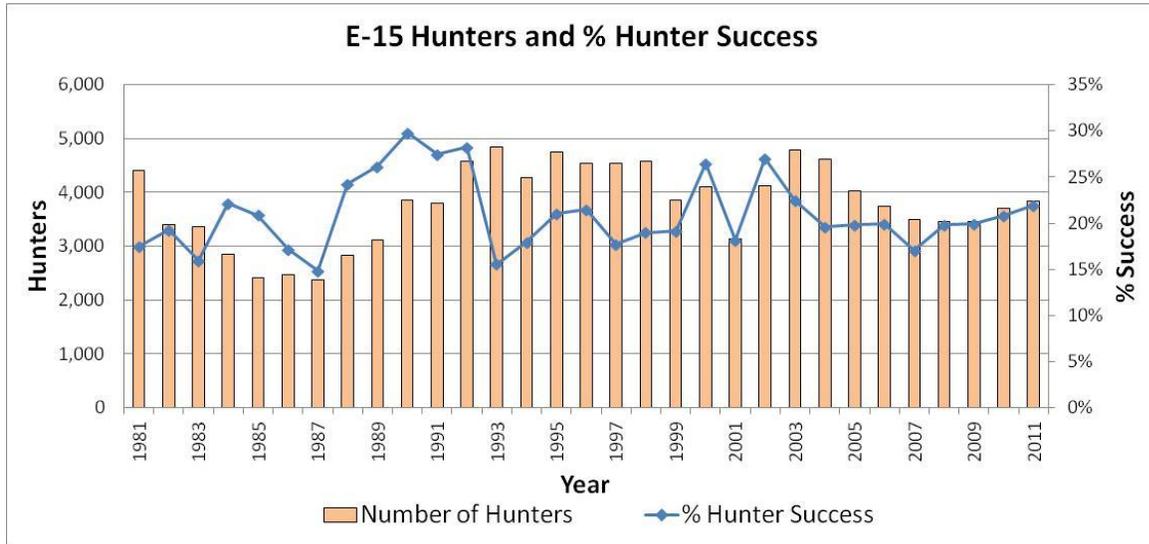


Figure 15. Number of hunters and harvest success rate in elk DAU E-15, 1981-2011.

Current Management Status

Previous (1988 DAU plan) Objectives

Population Size Objective = 3,300 elk

Sex Ratio Objective = 19 bulls:100 cows

Current Population (post-hunt 2011)

Population Size Estimate = 4,500 elk

3-year Average Sex Ratio = 21 bulls:100 cows

Current Management Issues

1. Human disturbance

- a) *Recreation impacts* – Outdoor recreation, including hiking, dog-walking, cross-country skiing, mountain biking, dirt-biking, 4-wheeling/ATV riding, snowmobiling, and antler shed hunting, has increased tremendously in the past 15-20 years. The Crown, south of Carbondale, in particular has seen a significant increase in mountain biking and hiking activities just in the past 10 years. Altogether, these recreational activities are occurring throughout all elk seasonal ranges, particularly on winter and transitional ranges and during critical periods of winter and calving. Recreational use has expanded into year-round and even nighttime activities. Recent mild winters have also meant that areas without timing restrictions have opened up to biking, hiking, etc. earlier in the spring and later into fall. Even where restrictions are in place, they are often disregarded and go unenforced.

This heightened level of human activity on the landscape is a major disturbance to elk and other wildlife that can ultimately lead to reduced fitness, lower survival rates, and reduced reproductive success. For example, elk increased their travel time and decreased their foraging time in response to off-road recreation activity, with ATV riding producing the most change in behavior, followed by mountain biking, hiking, and horseback riding (Naylor et al. 2009). Summer calf ratios declined in response to experimental disturbance in the form of recreational hiking (Phillips and Alldredge 2000), but recovered to control levels in subsequent years when human disturbance was experimentally removed (Shively et al. 2005). Dogs both on- and off-leash also contribute to the harassment and mortality of wildlife (e.g., Miller et al. 2001 for mule deer). These behavioral stressors and additional mortality can reduce recruitment of calves into the population directly by limiting calf survival, as well as indirectly by pushing elk off of preferred feeding and bedding areas.

There is increasing demand for more recreational trails to be established, as well as frequent use and expansion of unofficial trails, all of which will impinge upon wildlife habitat. With human and wildlife activities now competing for the same lands, if wildlife are to be adequately protected, then wildlife conservation must be a primary value and consideration when planning land use. Measures such as timing regulations and restrictions on human recreational activities need to be enforced, especially during key seasons for elk and deer survival (wintertime through calving/fawning), to help reduce the detrimental impacts of recreation on these species.

Recreation pressure has also led to competition among ATV riders, mountain bikers, dirt bikers, and hunters in the fall for use of public lands. Complaints are becoming more common from hunters about other recreationists scaring elk and deer due to noise and the overall numbers and expansion of people using the landscape.

- b) *Land development* – Substantial land development in the Roaring Fork Valley has occurred in the past 15-20 years, including on elk winter range areas such as lower Four-mile Creek/Dry Park area, Prince Creek/Stark Mesa, East and West Sopris Creek, Wildcat, and Brush Creek. Because of the high monetary value of land in the DAU, along with a decline in the livestock industry, there is great financial incentive for large ranches to subdivide and develop into residential housing. Conservation easements are difficult to secure because of the high cost of land. With approximately half of elk winter range existing on private lands, the need for conservation of existing habitat on private lands is critical.
- c) *Potential natural gas extraction* – At present, there is no active natural gas drilling in the Thompson Creek/Four-mile area, but there is potential for future gas development as gas extraction technology advances and extraction becomes more cost-effective. Mineral rights have been leased already and many leases are soon to be considered for renewal. Gas development in this area could be detrimental to elk, mule deer, and other wildlife. Potential negative impacts include habitat fragmentation; habitat loss; increased vehicle traffic; and noise, sound, and light pollution. These impacts could lead to displacement of elk from traditional calving grounds and summering areas, as well as direct mortalities due to vehicle strikes.

2. **Habitat availability and condition**

- a) *Limited winter range* - Winter snow forces elk down out of the higher elevations of the DAU to limited lower-elevation areas of 6,500-9,000 feet, such as Dry Park, Holgate Mesa, the Crown, Assignment Ridge, Avalanche Creek, Light Hill, Williams Hill, Shield-O Mesa, Wildcat Ranch, Brush Creek, and Castle Creek. Winter range is considered the most limiting factor for elk in Colorado and in this DAU. Only 25% of the land area in E-15 serves as elk winter range. About half of the elk winter range is on public lands and much of it has declined in quality due to long-term fire suppression resulting in habitat succession and also an increase in year-round recreation over the past 15-20 years. The other half of elk winter range is privately owned and much of it has been or may eventually be developed.
- b) *Unfavorable range conditions* - As discussed in the Habitat Resource section, big game habitat condition on winter ranges has declined throughout the DAU. The causes of most range problems include plant successional movement towards later seral stage or climax communities, lack of regeneration, and localized excessive big game use (a possible result of loss of traditional winter ranges to development, displacing and concentrating elk and deer on the remaining available habitat). Much of the landscape is composed of uniform-aged, old-growth shrubs that provide marginal nutritional value. Land

development in this DAU has limited the use of prescribed burns on the adjacent public lands because of concerns about the risk of fire damaging personal property.

- Predation** – Large and medium-sized carnivores (black bears, mountain lions, coyotes) are frequently thought to be the cause of ungulate population declines and poor recruitment of young. Indeed, predation is often a major proximate cause of mortality for elk calves (e.g., Singer et al. 1997, Smith et al. 2006, Barber-Meyer et al. 2008, White et al. 2010). The effects of predation on prey populations are complex and vary with predator and prey densities and species composition, habitat cover and forage conditions, weather, body condition, and other biological and ecological factors (Singer et al. 1997, Smith et al. 2006, White et al. 2010, Griffin et al. 2011). When an ungulate population is close to its habitat carrying capacity, the various sources of mortality (predation, harvest, disease, winter kill/malnutrition, etc.) are generally compensatory to each other. Compensatory mortality may span multiple seasons within a year, such that animals (usually young of the year) that are preyed upon in the summer might have otherwise died in the fall harvest or in the winter due to malnutrition or disease (Boyce et al. 1999).

Predator control is often suggested by the public to improve ungulate populations. Predator control may be effective when prey density is low relative to carrying capacity. For example, in an Idaho elk population thought to be below its carrying capacity, reducing black bear and mountain lion densities boosted summer calf survival (White et al. 2010) and calf ratios going into winter (C. G. White, Idaho Department of Fish and Game, *pers. comm.* 2012). However, predator control may be ineffective when prey populations are close to carrying capacity and when predation is compensatory to other sources of mortality (Bartmann et al. 1992, Ballard et al. 2001, Zager and Beecham 2006, Hurley et al. 2011).

Black bear, mountain lion, and coyote populations have likely increased in Colorado over the past several decades with the decline of sheep herding-associated kills and ban of poisons, and the readily available human foods (trash) for bears during years of berry failures. Locally, bear licenses in bear DAU B-11 have been increased up to 5-fold since 2009 and lion quotas in lion DAU L-6 were increased in 2011 to achieve higher harvest. Whether predator reduction has an effect on elk survival rates and recruitment depends on how close the elk population is to carrying capacity and how much impact other major factors, namely recreation and other human impacts, are also contributing to limiting the elk population.

- Low and declining calf ratio** - The calf ratio in E-15 declined over the past 15-20 years, paralleling trends across the western U.S. This decline in calf recruitment is thought to be due to a suite of factors: intraspecific competition for forage, decrease in quality of forage, increase in predator populations, weather conditions, hunting, and human activity (Johnson et al. 2005). Nutrition is the ultimate determinant of a population's productivity, and the magnitude of the effects that other factors have on an elk population depend on the population's nutritional status (Johnson et al. 2005). Winter forage is often thought to be the most limiting factor, but summer and fall forage also determine nutritional status of elk going into winter, which in turn affects winter survival rates, pregnancy rates, and timing of breeding (Cook et al. 2004).

Despite managing E-15 purposefully for population reduction in efforts to reduce population density and improve the population's productivity, calf ratio has not rebounded as would be expected under density-dependent population dynamics. Continued declining calf ratio could be due to a combination of the impacts discussed above (#1-3).

5. **Private land refuges** – Large private ranches that do not allow public hunting create areas where elk may seek refuge, both for forage and for fewer disturbances from human activity. While these areas can serve as important habitat for wildlife, they are often unavailable for the public hunter. Many ranchers in the area are considered non-traditional ranchers in the sense that they purchased the land for their private recreation and use and are not attempting to make a profit from agriculture or hunting (and thus are unconcerned about crop damage by elk and deer). The effect is that elk groups will seek out these private lands to avoid hunting pressure, cumulatively resulting in a less than desired amount of cow harvest in the DAU. Some large ranches in the area do allow hunters on their properties, which has helped to redistribute elk and to obtain some cow harvest on these private lands. To solve the elk distribution problem, CPW and the hunting public must continue to work cooperatively with private landowners to enable adequate harvest on these large parcels.
6. **Competition with deer** - As the elk population grew in the 1970s and 1980s, they expanded their historic winter ranges and moved to lower elevations where they compete with deer on the limited winter ranges. Elk and deer overlap in both diet and habitat types, but elk have more versatile food habits and aggregate in larger groups than deer. On a small spatial and temporal scale, deer and elk partition their resource use (Stewart et al. 2002), with deer likely avoiding elk (Johnson et al. 2000). High elk numbers may have competitively displaced deer, especially during severe winters when forage and space are particularly limited.

Public Involvement

CPW held a public meeting and also conducted a questionnaire to gauge public opinion on elk management in E-15. The public meeting for both E-15 and E-16 took place in Carbondale, Colorado, on July 24, 2012. Seven people attended this meeting.

The questionnaire was available online from July 11-Aug 11, 2012. Postcards with the questionnaire's website address were sent to a random sample of 750 people who either purchased or applied for E-15 licenses in 2010 and 2011. The questionnaire was also announced on CPW's website and publicized in a press release. Those without internet access could request paper copies of the questionnaire. Ninety-nine online and 9 paper responses were received (Appendix 3). Most respondents identified their interests primarily as hunters and supported maintaining the current elk population size. Most ranked obtaining game meat as their highest priority when hunting elk in E-15, and generally rated opportunity for meat as "good," and opportunity to harvest a high quality bull as "fair." Many complained of lack of hunting access to private lands where elk aggregate to escape hunting pressure. Some wanted bull licenses to be limited or to cut back on the existing limited either-sex and bull licenses. Some experienced conflicts with motorized recreationists and mountain bikers. Some felt that predator numbers

were high and predator control was needed. Generally, respondents commented that elk numbers were either adequate or low, but none thought that there were too many elk.

Meetings were also held with the Lower Colorado Habitat Partnership Program (HPP) committee and Garfield and Pitkin County Commissioners. Comments were solicited from these entities, as well as from the USFS and BLM. Written comments from HPP, Garfield County and USFS were received and are attached in Appendix 4.

A draft plan was posted on the CPW website from mid-December 2012 to mid-January 2013 for a 30-day public review period.

Alternatives for Population Management Objectives

Previous (1988) population objective:	3,300 elk
Current sex ratio objective:	19 bulls:100 cows

Current (post-hunt 2011) population estimate:	4,500 elk
3-year (2009-2011) average observed sex ratio:	21 bulls:100 cows

New population objective alternatives considered:

Alternative 1	4,500-6,300 elk
Alternative 2	3,600-5,400 elk
Alternative 3	2,700-4,500 elk

New expected sex ratio:	17-27 bulls:100 cows
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Population objective alternatives

Elk DAU E-15 has been managed for the past decade or more to decrease the elk population in order to match the available habitat and, in some areas, to reduce game damage. Antlerless license quotas have generally been liberal in efforts to reduce the population. Bull licenses are over-the-counter/unlimited for 2nd and 3rd rifle seasons. This herd is still above the population objective of 3,300 set in 1988. The latest estimate for this herd is 4,500 elk. Many changes have occurred in land use, human population growth, recreation pressure, habitat condition, elk population size, predator population sizes, and population modeling methods, all of which warrant updating the population objective for this herd.

Colorado Parks and Wildlife considered three alternatives for the new population objective range. The objectives for the DAU provide guidance for the general management of the entire elk population. There will still be flexibility that will allow for management at the GMU scale to address smaller scale issues such as localized elk concentrations and landowner concerns.

Alternative 1:

4,500-6,300 elk

This alternative would increase the current population size by about 20% (range 0% to +40% change). Because elk have a high natural survival rate (examples from Colorado: Lubow et al. 2002, Freddy 2000, Freddy 2003, Webb et al. 2011), reducing hunter harvest to achieve elk population growth may allow elk numbers to take off when weather conditions are favorable for survival. At a higher population density, elk will compete more intensely with each other as well as with mule deer for forage and space, particularly during hard winters. The health of individual elk may be compromised due to this heightened competition, and disease may spread through the population more easily. Mortality by predation, harvest, disease, and malnutrition would be more compensatory to each other at this higher elk density. Overall, calf recruitment rates would be lower. Winter range habitat, which has already been diminished by land development and over-utilized by past high densities of ungulates, could be further degraded. Agricultural crop damage may become an issue, and damage to residential trees, shrubs, and gardens may increase. More elk-vehicle collisions may occur. Catastrophic weather, such as a very severe winter restricting access to forage and requiring animals to use more of their body fat to stay alive, could result in large numbers of elk dying.

Antlerless license numbers would need to be reduced, at least for the first several years, to achieve population growth. There would be less opportunity to draw a cow license and hunters might not be able to draw a license every year. However, those who do successfully draw would experience less crowding and would likely have a better chance of harvesting an elk because there would be more elk on the landscape. As the herd reaches the higher population objective, more antlerless licenses could be issued to stabilize the herd at the new population objective. Also at a higher population, there would be more bulls available, so bull hunters could have higher success rates. However, because bull licenses for 2nd and 3rd rifle season are unlimited, hunter crowding and success rates during these seasons would depend also on how many bull hunters choose to hunt in these units.

Economic benefits to the local community could be reduced due to having fewer antlerless licenses available and therefore fewer hunters contributing to local establishments during hunting season. This effect could be offset if more hunters purchase over-the-counter bull licenses, but is unlikely, given current declining trends in hunter participation overall.

Alternative 2:

3,600-5,400 elk (Selected)

This alternative would maintain the current population size (+/-20%). There would be less competition for forage and habitat among elk than in the past. Calf recruitment may remain relatively low, given current conditions (i.e., high recreation pressure, reduced habitat availability and condition, increased predator densities), but because adult elk have high natural survival rates, the population can be maintained at this size with low recruitment rates and continued moderate harvest.

To achieve this population objective, antlerless licenses would either remain the same or initially be reduced slightly to stabilize the population at the current size. As population size is evaluated over the subsequent years, license quotas could resume thereafter back to quotas

similar to current levels. Hunting opportunity, harvest success rates, and economic impact would be intermediate compared to Alternatives 1 and 3, and would be similar to those of today.

Alternative 3:

2,700-4,500 elk

This alternative would continue to reduce the population size by around 20% (range 0% to -40% change). At a lower population density, individual elk would experience less competition and overall better health. Survival rates could improve, and therefore, the herd would be more resilient to extreme weather events. However, at lower elk population density, the effects of predation could become more pronounced.

To achieve this population objective, it could take many years and would depend on harvesting enough cow elk to continue to drive the population down. Increasing antlerless quotas would not be useful because even at the current license quotas, many licenses go unsold. Therefore, antlerless license quotas would remain the same as current quotas. As the population continues to decline, harvest success rates would likely decline because of having relatively fewer animals available, and hunter crowding may be an issue. Eventually as the lower population objective is reached, antlerless licenses would need to be reduced to stabilize the herd at the new population size. Initially, economic benefits from hunting and wildlife watching would be similar to those of today; later, there would be fewer economic and recreational benefits as the elk population declines.

Expected Sex Ratio Range

For DAUs that have unlimited over-the-counter (OTC) bull elk licenses in 2nd and 3rd rifle seasons, CPW does not manage for a particular sex ratio. Instead, bull:cow ratio in these OTC units is determined by a combination of harvest factors (e.g., hunter participation, hunter success), biological factors (e.g., differential survival rates of bulls vs. cows, sex ratio of calves when born), and abiotic factors (primarily weather). Therefore, we report an expected sex ratio, rather than a sex ratio objective.

The expected sex ratio range for E-15 is 17-27 bulls:100 cows, based on observed post-hunt bull ratios since 2000 (when the antler-point restriction was extended to all seasons). The average observed bull ratio during that time period is 21 bulls:100 cows.

Selected Alternative and New Objectives

The alternative of 3,600-5,400 elk was selected as the new population objective because it will balance the public's desire to have enough elk on the landscape to provide hunting and wildlife viewing opportunities, while still keeping the elk population at a moderate density within carrying capacity. Responses from the public questionnaire (see Appendix 3) indicated that the majority (61%) prefer to maintain the current population (i.e., Alternative 2).

The expected sex ratio range is 17-27 bulls:100 cows, assuming continued over-the-counter bull licenses and 4-point antler restrictions.

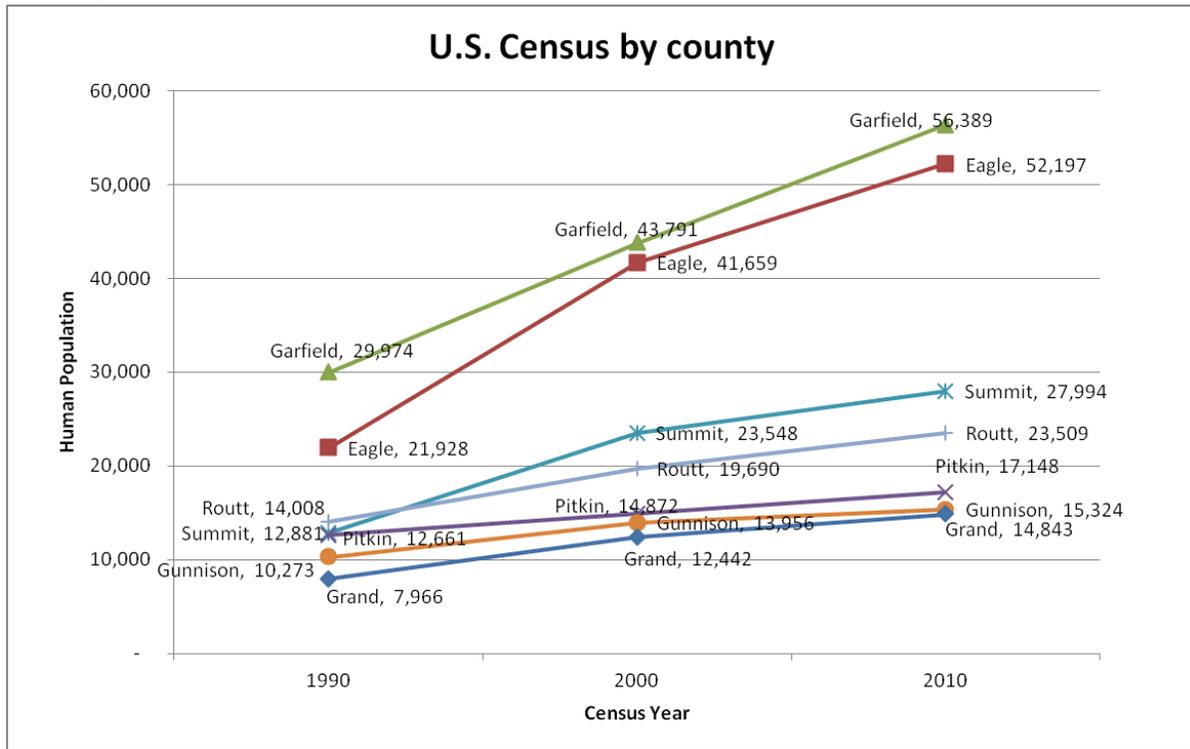
Literature Cited

- Ballard, W.B., D. Lutz, T.W. Keegan, L.H. Carpenter, and J.C. deVos, Jr. 2001. Deer-predator relationships: a review of recent North American studies with emphasis on mule and black-tailed deer. *Wildlife Society Bulletin* 29:99-115.
- Barber-Meyer, S.M., L.D. Mech, P.J. White. 2008. Elk calf survival and mortality following wolf restoration to Yellowstone National Park. *Wildlife Monographs* No. 169. 30 pp.
- Bartmann, R.M., G.C. White, L.H. Carpenter. 1992. Compensatory mortality in a Colorado mule deer population. *Wildlife Monographs* No. 121. 39 pp.
- BBC Research & Consulting. 2008. *The Economic Impacts of Hunting, Fishing and Wildlife Watching in Colorado*. 24 pp.
- Cook, J. G., B. K. Johnson, R. C. Cook, R. A. Riggs, T. Delcurto, L. D. Bryant, and L. L. Irwin. 2004. Effects of summer-autumn nutrition and parturition date on reproduction and survival of elk. *Wildlife Monographs* No. 155.
- Freddy, D. J. 2000. Estimating survival rates of elk and developing techniques to estimate population size. *Colorado Division of Wildlife Research Report*. July: 239-258.
- Freddy, D. J. 2003. Estimating calf and adult survival rates and pregnancy rates of Gunnison Basin elk. *Colorado Division of Wildlife Research Report*. July:71-132.
- Hurley, M. A., J. W. Unsworth, P. Zager, M. Hebblewhite, E. O. Garton, D. M. Montgomery, J. R. Skalski, and C. L. Maycock. 2011. Demographic response of mule deer to experimental reduction of coyotes and mountain lions in southeastern Idaho. *Wildlife Monographs* 178. 33 pp.
- Johnson, B. K., J. W. Kern, M. J. Wisdom, S. L. Findholt, and J. G. Kie. 2000. Resource selection and spatial separation of mule deer and elk during spring. *Journal of Wildlife Management* 64:685-697.
- Johnson, B. K., M. J. Wisdom, and J. G. Cook. 2005. Issues of elk productivity for research and management. Pages 81-93 *in* Wisdom, M. J., technical editor, *The Starkey Project: a synthesis of long-term studies of elk and mule deer*. Reprinted from the 2004 *Transactions of the North American Wildlife and Natural Resources Conference*, Alliance Communications Group, Lawrence, Kansas, USA.
- Lubow, B. C., F. J. Singer, T. L. Johnson, and D. C. Bowden. 2002. Dynamics of interacting elk populations within and adjacent to Rocky Mountain National Park. *Journal of Wildlife Management* 66:757-775.
- Miller, S. G., R. L. Knight, and C. K. Miller. 2001. Wildlife responses to pedestrians and dogs. *Wildlife Society Bulletin* 29:124-132.

- 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.
- 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.
- Singer, F. J., A. Harting, K. K. Symonds, and M. B. Coughenour. 1997. Density dependence, compensation, and environmental effects on elk calf mortality in Yellowstone National Park. *Journal of Wildlife Management* 61:12-25.
- 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.
- Smith, B. L. E. S. Williams, K. C. McFarland, T. L. McDonald, G. Want, and T. D. Moore. 2006. Neonatal mortality of elk in Wyoming: environmental, population, and predator effects. U.S. Department of Interior; U.S. Fish and Wildlife Service, Biological Technical Publication, BTP-R6007-2006, Washington, D.C.
- Stewart, K. M., N. J. Cimon, B. K. Johnson, K. Bruce, J. G. Kie, and R. T. Bowyer. 2002. Temporo-spatial distributions of elk, mule deer and cattle: resource partitioning and competitive displacement. *Journal of Mammalogy* 83:229-244.
- Webb, S. L., M. R. Dzialak, J. J. Wondzell, S. M. Harju, L. D. Hayden-Wing, and J. B. Winstead. 2011. Survival and cause-specific mortality of female Rocky Mountain elk exposed to human activity. *Population Ecology* 53:483-493.
- White, C. G., P. Zager, and M. W. Gratson. 2010. Influence of predator harvest, biological factors, and landscape on elk calf survival in Idaho. *Journal of Wildlife Management* 74:355-369.
- White, G. C., and B. C. Lubow. 2002. Fitting population models to multiple sources of observed data. *Journal of Wildlife Management* 66:300-309.
- USDA Forest Service. 2011. Environmental Assessment – Aspen-Sopris Wildlife Habitat Improvement Project: Aspen, Sopris, Eagle and Rifle Ranger Districts; Eagle, Garfield, Pitkin, and Gunnison Counties, Colorado. 125 pp.
- Zager, P. and J. Beecham. 2006. The role of American black bears and brown bears as predators on ungulates in North America. *Ursus* 17:95-108.

Appendix 1. Human population in counties in and near elk DAU E-15, 1990-2010.

Source: U.S. Census Bureau



Appendix 2. License quota and demand in elk DAU E-15, 2007-2011. “Quota” is the maximum number of licenses CPW could issue; “Sold out” is the stage at which the hunt code sold out; “1st choice demand” is the number of 1st choice applicants as a percentage of the license quota.

Year	Season	Quota	Sold Out	Number of 1st choice applicants	1st choice demand relative to quota
2007	Cow 1st rifle	300	Never	41	14%
2008		300	Never	26	9%
2009		250	Never	32	13%
2010		250	Never	30	12%
2011		250	Never	28	11%
2007	Cow 2nd, 3rd, & 4th rifle, GMU 43	760	Leftovers	300	39%
2008		1010	Leftovers	240	24%
2009		1070	Leftovers	272	25%
2010		1230	Never	218	18%
2011		1170	Never	202	17%
2007	Cow 2nd, 3rd, & 4th rifle, GMU 471	80	Never	5	6%
2008		110	Never	6	5%
2009		90	Never	4	4%
2010		100	Never	3	3%
2011		75	Never	1	1%
2007	Cow late PLO, GMU 43	200	Leftovers	98	49%
2008		200	Leftovers	80	40%
2009		200	At Choice 5	80	40%
2010		200	Leftovers	120	60%
2011		200	Leftovers	138	69%
2007	Cow late PLO, GMU 471	20	Never	0	0%
2008		20	Never	1	5%
2009		10	Leftovers	0	0%
2010		10	Never	0	0%
2011		10	Leftovers	2	20%
2010	Cow Muzz	105	Leftovers	36	34%
2011		150	Never	48	32%
2007	E/S 1st rifle	250	At Choice 2	243	97%
2008		250	At Choice 2	237	95%
2009		250	At Choice 1	256	102%
2010		250	At Choice 1	251	100%
2011		250	At Choice 1	280	112%
2007	E/S 4th rifle, GMU 43	250	Leftovers	88	35%
2008		250	Leftovers	98	39%
2009		250	Leftovers	76	30%
2010		250	Leftovers	63	25%
2011		250	Leftovers	61	24%
2007	E/S, 4th rifle, GMU 471	20	Leftovers	0	0%
2008		20	Leftovers	0	0%
2009		50	Never	1	2%
2010		50	Never	1	2%
2011		50	Never	0	0%

2007	E/S, PLO, 1st season	150	Never	6	4%
2008		150	Never	6	4%
2009		75	Never	8	11%
2010		75	Never	5	7%
2011		75	Never	5	7%
2010	Bull Muzzleloader	110	At Choice 1	187	170%
2011		110	At Choice 1	164	149%

Appendix 3. Summary of public questionnaire for elk DAU E-15.

1. What is your CID number? You can find your CID number listed above your name on the postcard you were mailed inviting you to participate in this survey or on your Colorado hunting or fishing license. If you do not have a CID number, please leave this box blank.

75 responses, 33 skipped this question

2. Are you a resident of Colorado?

82 (75.9%) Yes

26 (24.1%) No

3. Do you live in any of the following GMUs: 43 or 471? Please see the map on page 1.

31 (29.0%) Yes

76 (71.0%) No

4. In which of the following GMUs do you live?

28 (90.3%) GMU 43

3 (9.7%) GMU 471

5. For how many years have you lived in GMU 43 or 471?

Average 21 years (31 responses) Years

6. Do you own or lease any land in the following GMUs: 43 or 471?

25 (23.8%) Yes

80 (76.2%) No

7. In which of the following GMUs do you own or lease property?

22 (95.7%) GMU 43

1 (4.3%) GMU 471

8. For how many years have you owned or leased land in GMUs 43 or 471?

Average 19 years (25 responses) Years

9. During the last 12 months, have you participated in any outdoor recreation other than hunting (such as camping, backpacking, snowmobiling, etc.) in GMUs 43 or 471?

63 (62.4%) Yes

38 (37.6%) No

10. Which of the following groups represent your interests in elk management in GMUs 43 or 471? (Please check all that apply.)

8 (7.8%) (A) Rancher or farmer

4 (3.9%) (B) Business owner

13 (12.6%) (C) Landowner

5 (4.9%) (D) Guide or outfitter

100 (97.1%) (E) Hunter or sportsperson

12 (11.7%) (F) Member of an environmental or conservation group

3 (2.9%) (G) Other (please specify)

Me and some friends hunted this unit together one time.

Wildlife watching

General public

11. If you checked **more than one** response in question 10, write the letter corresponding to the interest group which **most** represents your opinions: Rancher or farmer: 1 (1.8%)

Hunter or sportsperson: 54 (94.7%)

Member of an environmental or conservation group: 2 (3.5%)

12. How interested are you in each of the following activities related to elk? (Circle only one number for each item.)

	No interest	Slight interest	Moderate interest	High interest	I am not sure
Watching or photographing elk	5 (5.1%)	9 (9.2%)	33 (33.7%)	51 (52.0%)	0 (0.0%)
Hunting trophy elk	13 (12.9%)	10 (9.9%)	25 (24.8%)	53 (52.5%)	0 (0.0%)
Hunting elk for meat	2 (2.0%)	0 (0.0%)	10 (10.1%)	87 (87.9%)	0 (0.0%)
Learning more about elk management	0 (0.0%)	10 (10.2%)	39 (39.8%)	47 (48.0%)	2 (2.0%)
Providing input for decisions regarding elk management	2 (2.0%)	8 (8.1%)	34 (34.3%)	53 (53.5%)	2 (2.0%)

13. How concerned are you about the following items? (Circle only one number for each item.)

	Very concerned	Somewhat concerned	Not at all concerned	I am not sure
Elk-vehicle collisions	28 (27.7%)	43 (42.6%)	29 (28.7%)	1 (1.0%)
Damage caused by elk to ranchers' and farmers' rangeland, crops, or fences	17 (16.8%)	59 (58.4%)	24 (23.8%)	1 (1.0%)
Damage caused by elk to homeowners' trees, shrubs, and gardens	6 (5.9%)	33 (32.7%)	59 (58.4%)	3 (3.0%)
Loss of elk habitat due to increased human population growth and land development	77 (77.0%)	18 (18.0%)	5 (5.0%)	0 (0.0%)
Potential for elk to starve during the winter	65 (65.0%)	27 (27.0%)	8 (8.0%)	0 (0.0%)
Potential for elk to spread diseases to pets, livestock, or humans	31 (30.7%)	34 (33.7%)	35 (34.7%)	1 (1.0%)
Competition for forage between elk and livestock	30 (30.3%)	36 (36.4%)	31 (31.3%)	2 (2.0%)
Competition for forage between elk and mule deer	17 (17%)	42 (42%)	37 (37%)	4 (4.0%)
Revenue earned by local businesses as a result of elk hunting	28 (27.7%)	43 (42.6%)	25 (24.8%)	5 (5.0%)

14. Have you personally experienced any of the following events related to elk? (Please check all that apply.)

15 (55.6%)

7(25.9%)

3(11.1%)

0 (0.0%)

Elk-vehicle collision

Economic losses because of elk damage to range, crops, or fences

Economic losses because of elk damage to residential trees, shrubs, and gardens

Elk spreading disease to pets, livestock, or humans

10 (37.0%) Competition for forage between elk and livestock

15. Which of the following best describes your general attitude about elk in the Avalanche Creek area? (Please check one.)

- 0 (0.0%) I do not enjoy elk in the Avalanche Creek area and regard them as a nuisance.
13 (12.7%) I enjoy elk in the Avalanche Creek area, but worry about problems they may cause.
75 (73.5%) I enjoy elk in the Avalanche Creek area and do not worry about the problems they may cause.
14 (13.7%) I do not have particular feelings about elk in the Avalanche Creek area.

16. The Avalanche Creek elk herd has been managed to decrease the elk population, and this herd is now approaching the population objective set in 1988. We are considering several alternatives for a new population objective for the next 10 years. Increasing, maintaining, or decreasing the population size will have consequences on the health of the herd and its habitat, the number of antlerless licenses issued, and the number of elk available for harvest.

Please read the descriptions below and mark the option you would most prefer to guide management of the Avalanche Creek elk herd. (Please check *only one* response.)

15 (15.2%) 20% increase from current elk population size. Antlerless licenses would be reduced temporarily to allow the population to grow, but could increase later when the higher population objective is reached. Elk would be seen more often, but individual elk may be less healthy because of diseases and competition. A higher elk population could also further degrade winter habitat and compete more with mule deer for food and space.

60 (60.5%) Maintain the elk herd at the current population size. Antlerless license quotas would decrease initially to allow the herd to stabilize, but might resume to current quotas later. Harvest success rates would likely stay the same. Elk will be seen as often as they are now and would experience similar levels of competition for food and space as they do currently.

13 (13.1%) 20% reduction from the current elk population size. Antlerless licenses would stay the same to continue to reduce the population. Harvest success rates may decrease as fewer elk would be available for harvest and hunters may feel more crowded. Elk would experience less competition, calf recruitment might increase, and the population would have greater ability to rebound from severe winters.

11 (11.1%) I am not sure.

17. How important to you is the change in the size of the elk population you indicated in question 16? (Please check one.)

- 36 (36.0%)** Very important
35 (35.0%) Somewhat important
14 (14.0%) Neither important, nor unimportant
2 (2.0%) Somewhat unimportant
1 (1.0%) Very unimportant
12 (12.0%) I am not sure

18. The following are 2 options that Colorado Parks and Wildlife may use to **decrease** elk populations in GMUs 43 and 471. How acceptable are these methods to you? (Please check one for each item.)

Responses for Question 18 have been subdivided based on how the respondents answered Question 16:

	Responses from those who prefer a population increase	Responses from those who prefer maintaining current population size	Responses from those who prefer a population reduction	Responses from those who did not have a preferred population size	Overall responses	
Increase cow licenses	Very acceptable	3 (21.4%)	21 (36.2%)	8 (61.5%)	6 (60.0%)	38 (40.0%)
	Somewhat acceptable	3 (21.4%)	19 (32.8%)	5 (38.5%)	2 (20.0%)	29 (30.5%)
	Neither acceptable nor unacceptable	2 (14.3%)	3 (5.2%)	0 (0.0%)	2 (20.0%)	7 (7.4%)
	Somewhat unacceptable	2 (14.3%)	8 (13.8%)	0 (0.0%)	0 (0.0%)	10 (10.5%)
	Very unacceptable	4 (28.6%)	4 (6.9%)	0 (0.0%)	0 (0.0%)	8 (8.4%)
	I am not sure.	0 (0.0%)	3 (5.2%)	0 (0.0%)	0 (0.0%)	3 (3.2%)

	Responses from those who prefer a population increase	Responses from those who prefer maintaining current population size	Responses from those who prefer a population reduction	Responses from those who did not have a preferred population size	Overall responses	
Increase either-sex licenses	Very acceptable	5 (35.7%)	20 (33.9%)	6 (54.5%)	6 (54.5%)	37 (38.9%)
	Somewhat acceptable	2 (14.3%)	18 (30.5%)	5 (45.5%)	5 (45.5%)	30 (31.6%)
	Neither acceptable nor unacceptable	0 (0.0%)	4 (6.8%)	0 (0.0%)	0 (0.0%)	4 (4.2%)
	Somewhat unacceptable	1 (7.1%)	9 (15.3%)	0 (0.0%)	0 (0.0%)	10 (10.5%)
	Very unacceptable	6 (42.9%)	5 (8.5%)	0 (0.0%)	0 (0.0%)	11 (11.6%)
	I am not sure.	0 (0.0%)	3 (5.1%)	0 (0.0%)	0 (0.0%)	3 (3.2%)

19. The following are 2 options that CPW may use to **increase** elk populations in GMUs 43 and 471. How acceptable are these methods to you? (Please check one for each item.)

Responses for Question 19 have been subdivided based on how the respondents answered Question 16:

	Responses from those who prefer a population increase	Reponses from those who prefer maintaining current population size	Responses from those who prefer a population reduction	Responses from those who did not have a preferred population size	Overall responses	
Reduce cow elk licenses	Very acceptable	7 (46.7%)	12 (21.1%)	1 (10.0%)	1 (10.0%)	21 (22.8%)
	Somewhat acceptable	4 (26.7%)	22 (38.6%)	2 (20.0%)	3 (30.0%)	31 (33.7%)
	Neutral	0 (0.0%)	7 (12.3%)	1 (10.0%)	2 (20.0%)	10 (10.9%)
	Somewhat unacceptable	4 (26.7%)	9 (15.8%)	2 (20.0%)	3 (30.0%)	18 (19.6%)
	Very unacceptable	0 (0.0%)	5 (8.8%)	4 (40.0%)	0 (0.0%)	9 (9.8%)
	I am not sure	0 (0.0%)	2 (3.5%)	0 (0.0%)	1 (10.0%)	3 (3.3%)

	Responses from those who prefer a population increase	Reponses from those who prefer maintaining current population size	Responses from those who prefer a population reduction	Responses from those who did not have a preferred population size	Overall responses	
Reduce either-sex licenses	Very acceptable	5 (33.3%)	12 (20.3%)	2 (22.2%)	1 (10.0%)	20 (21.5%)
	Somewhat acceptable	3 (20.0%)	26 (44.1%)	1 (11.1%)	3 (30.0%)	33 (35.5%)
	Neutral	3 (20.0%)	6 (10.2%)	1 (11.1%)	2 (20.0%)	12 (12.9%)
	Somewhat unacceptable	3 (20.0%)	9 (15.3%)	1 (11.1%)	3 (30.0%)	16 (17.2%)
	Very unacceptable	1 (6.7%)	4 (6.8%)	4 (44.4%)	0 (0.0%)	9 (9.7%)
	I am not sure	0 (0.0%)	2 (3.4%)	0 (0.0%)	1 (10.0%)	3 (3.2%)

	Responses from those who prefer a population increase	Reponses from those who prefer maintaining current population size	Responses from those who prefer a population reduction	Responses from those who did not have a preferred population size	Overall responses	
Eliminate List B and C cow licenses	Very acceptable	5 33.3%)	10 17.9%)	1 11.1%)	1 9.1%)	17 18.7%)
	Somewhat acceptable	3 20.0%)	10 17.9%)	1 11.1%)	2 18.2%)	16 17.6%)
	Neutral	1 6.7%)	10 17.9%)	0 0.0%)	3 27.3%)	14 15.4%)
	Somewhat unacceptable	1 6.7%)	10 17.9%)	1 11.1%)	0 0.0%)	12 13.2%)
	Very unacceptable	2 13.3%)	8 14.3%)	3 33.3%)	1 9.1%)	14 15.4%)
	I am not sure	3 20.0%)	8 14.3%)	3 33.3%)	4 36.4%)	18 19.8%)

20. Have you ever hunted elk in Colorado? (Please check one.)

98 (98.0%) Yes
2 (2.0%) No

21. For how many years have you hunted elk in Colorado?

Average 19 years (92 responses) Years

22. Have you ever hunted elk in GMU 43 and 471? (Please check one.)

96 (98.0%) Yes
2 (2.0%) No

23. Overall, how satisfied were you with your elk hunting experience(s) in GMUs 43 and 471 in the last 3 years? (Please check one.)

33 (34.4%) Very satisfied
39 (40.6%) Somewhat satisfied
4 (4.2%) Neither satisfied, nor unsatisfied
14 (14.6%) Somewhat unsatisfied
5 (5.2%) Very unsatisfied
1 (1.0%) I am not sure

24. How would you describe the crowding you felt while hunting elk in GMUs 43 and 471? (Please check one.)

- 29 (30.2%) Not at all crowded
- 40 (41.7%)** Slightly crowded
- 22 (22.9%) Moderately crowded
- 5 (5.2%) Very crowded

25. Please rank (1-5) the following items based on how you feel they would improve the quality of your elk hunting experience in Colorado. Rank the item you feel would **most** improve your hunt as #1, and do not use any number more than once.

	Response (N=94)					Average
	1	2	3	4	5	
Seeing more elk of all ages and sexes	23 (24.5%)	24 (25.5%)	15 (16.0%)	16 (17.0%)	16 (17.0%)	2.77
Seeing more mature bulls	24 (25.5%)	18 (19.1%)	16 (17.0%)	19 (20.2%)	17 (18.1%)	2.86
Fewer hunters and less crowding	18 (19.1%)	24 (25.5%)	14 (14.9%)	28 (29.8%)	10 (10.6%)	2.87
Higher hunter success rates	17 (18.1%)	15 (16.0%)	27 (28.7%)	18 (19.1%)	17 (18.1%)	3.03
Less access for motorized vehicles	12 (12.8%)	13 (3.8%)	22 (23.4%)	13 (13.8%)	34 (36.2%)	3.47

26. How would you rate your opportunity to hunt to obtain game meat in GMUs 43 and 471? (Please check one.)

- 17 (17.7%) Excellent
- 19 (19.8%) Very good
- 30 (31.3%)** Good
- 18 (18.8%) Fair
- 6 (6.3%) Poor
- 6 (6.3%) I am not sure

27. How would you rate your opportunity to harvest a high quality bull in the GMUs 43 and 471? (Please check one.)

- 5 (5.2%) Excellent
- 6 (6.3%) Very good
- 17 (17.7%) Good
- 33 (34.4%)** Fair
- 25 (26.0%) Poor
- 10 (10.4%) I am not sure

28. Which of the following is MOST important to you when elk hunting in GMUs 43 and 471? (Please check only one.)

- 15 (15.8%) Not seeing other hunters
- 61 (64.2%)** Obtaining game meat
- 19 (20.0%) Harvesting a high quality bull

29. Please use the space below to share any additional comments you have about the management of the elk herd in GMUs 43 and 471. *Note: the comments below have not been edited or verified for accuracy.*

<p>I'm more concerned with the overall health of the elk herds than with the number of animals in the herd. If CPW believes the overall health of the herd is not as good as it should or could be and can be improved with a reduction in herd size, then I favor reducing the herd size. I worry, though, that population growth/development in the Roaring Fork Valley will eventually push the elk out of the area and so herd size and health is important to me to maintain their viability. Thank you for the survey.</p>
<p>1. I want to see more either-sex tags for elk. 2. Allow local hunters to hunt 3 elk seasons in order to allow the devoted meat hunters and avid sportsmen more time in the field. Currently, I only get to hunt 3rd Rifle and then purchase one Leftover elk tag in 1st Rifle or Muzzleloader. I would prefer to keep hunting 4th season if I have been unsuccessful in the first two seasons. For dedicated elk hunters a 3rd tag would provide more field time, since many of us don't hunt birds, ducks or deer.</p>
<p>I have been hunting these two Units now for 18 years. I believe the current elk population is good and the number of tags issued and elk harvested each year is very acceptable. I do like to hunt for a trophy bulls but my number one objective is to put meat on the table. The fact that I can buy a bull license and an additional cow tag is very important to me. I would very much like to see that continue in the future. I strongly endorse staying with the current system for managing the elk populations in Units 43 and 471. Thanks you for allowing me and my fellow hunters the opportunity to voice our opinions!</p>
<p>I am a minority owner of Out West Guides in Marble. The opinions here are my own, and don't necessarily reflect those of the guides or the majority owner. I am sure that the other owners and guides would be very happy to help in any way we can as you consider the game management plan. Please feel free to contact any of us if needed.</p>
<p>More elk. Less humans, cars and development please.</p>
<p>I have hunted in the Avalanche creek basin for over 20 years. I do not feel there are too many elk or that the numbers are currently too high to support elk on the winter range. There are lots of areas for winter habitat in the lower elevations. It seem so tme that there is currently less elk up in Avalanche basin then there was 20 years ago. It has been in the last 5-8 years that we have finally started seeing some better bulls. I don't necessarily feel I need to kill a big bull every 5 years but it is sure great to see at least some during that time period. I have gotten only one nice bull out of Avalanche in that 20+ year history. All the rest were rag horn bulls. We hunt up high and hard near tree line in at least 5-8 miles from the trailhead at the bottom of Avalanche.</p>
<p>I think unit 43 should be divided into two different units with the half south of Sopris managed to increase populations and the half north of Sopris managed to decrease populations. I think that the number of Lion tags available in 43 should be quadrupled, bring back the spring bear hunt and work to increase access via pedestrian and equine easement to public lands.</p>
<p>why does question 7 come before q. 10, and why does q. 13 come before q. 16??? are you just checking our manual dexterity??? intelligence test??? if you want to reduce herd size, just sell some of us residents a license that's valid til we fill it!!!</p>
<p>Tired of so many outfitters every Season in every drainage It Sometimes seems More Private Tags less outfitters and some areas free of outfitters Seems more Fair</p>
<p>Living in gmu 43,I enjoy hunting close to home, and would not feel good about not being able to hunt in my "backyard". I feel that the DOW should know if the herd needs increased or decreased, your the experts. Save the draw only units for wilderness and hard to access areas</p>
<p>I'm a Difficult Creek homie. I've taken several elk there without crowding. Don't fuck it up please.</p>
<p>I have hunted eik with bow and rifle in primaraly unit 471 over the past ten or so years and have enjoyed them all. I would appreciate it very much if nothing was changed as far as public hunting oppurtunity is concerned! As for the property owners I feel they should work with the biologists for their answer. Thank you very much for asking my opinion!</p>
<p>I do not believe there are as many Elk as you think in this area.</p>
<p>I personally have spoken with a landowner in this area who complained about elk damage to his property but would not permit hunting. I think opportunities should be pursued to permit limited hunting on private property. Landowners should not be reimbursed for game damage if they will not permit hunting on their property.</p>
<p>Hard one to quantify... while I like the idea of a large herd, potentially giving me and other hunters higher success rates, I do NOT like the fact that it puts the overall herd in more jeopardy in a really harsh winter, with winter kill rates that decimate the herd. I feel that certain of the areas I hunt (Huntsmans Ridge, Coal Basin) suffer from over subscription, with, in the case of Huntsman, too much ATV access. During the 2011 season, I found ATV tracks WAY off the legal routes, headed into Hays Creek Basin. And the elk sign showed the elk were headed out of there as fast as they could. It is kind of frustrating for us old fashioned hunters who think hunting is something done on foot.</p>
<p>I additionally will come up and camp in these areas in the summers, the inconsistency of seeing elk where I hunt is odd, some years I see many elk the next year I will see none</p>
<p>I feel you are doing a very good job at this time. Only concern woud be less cattle grazing</p>

<p>I had a Colorado resident shoot at an elk that I had already shot. The guy shot from the road above me and I did report it to the game warden that was in the area. He and his group beat me to the elk and claimed it. I argued but there were 10 guys in two trucks and 2 four wheelers. It was the only opportunity I had to get a shot at an elk. I had an either sex tag and this was a 5 x 5 bull. That was in 2010. We saw so many hunters and the elk were scattered across private lands. The day before the season, the elk were on the public lands. There are plenty of elk but too many hunters.</p>
<p>Need for wildlife refuge, stricter laws for wildlife harassment in winter range including antler hunting. Overpass for deer and elk to get across major highways to migrate. More predator control. I quit hunting two areas because it is over run with mountain bikers.</p>
<p>If it is not known why the herd remains overpopulated, then the objective # is set too low. ADDITIONAL cow licenses aren't going to help the numbers go down, there seems to be a surplus in leftover cow tags in 2nd and the 3rd seasons.</p>
<p>Have hunted the area for 25 years. Have seen an increase in quality bulls over the past 5-8 years. Not running into a lot of cow elk in the area and our success has been below the state average for our group.</p>
<p>In my experiences in game unit 43 over the last 30 plus years the weather seems to be the most prominent factor in determining the success or failure of any given hunting season. All the other possible reasons that may come into play are still ultimately tied to the weather, whether good or bad weather. Management of ELK should be to a minimum except when certain conditions arise to warrant fewer licenses or more licenses, (possible emergency licenses) because of mother nature, regarding the elk (game) numbers and the amount of habitat that is prevalent at the time. With this said I am very aware of the large population increase from Glenwood Springs to Aspen that has caused great harm to the game population as a whole, some view it as good others as very bad. If you as a governing body don't avidly and forcefully maintain game laws pertaining to local citizenry (ranches and home owners etc.) ultimately there is nothing you can do but try to appease the local citizenry which is basically bad for the management of all game animals. Only when the CPW represents the hunters, the only real game management tool needed in most cases, will a fair and balanced program be achieved. There has been large ranches bought in the last few years that now don't allow HUNTING on them, this can create a big problem in the ultimate management of wildlife for the area. THERE has to be some strong argument to these property owners by the CPW to allow some kind of hunting so that it will benefit them in the long run. Ultimately the balance has to go to the hunters and wildlife or in the long haul all else will fail. Thank You</p>
<p>never hunted there so I do not know</p>
<p>I have seen Bow hunting pressure the elk more and resulted in large bull harvests as a result of newer equipment. Calling in bow season has damaged the quality of hunting for early gun season as big bulls are fewer and spooky when there. I believe 43 is too big and should be broken up to manage properly. Bow tags should be on a draw basis to improve bull quality for gun hunters. I have hunted since 1980 here exclusively and put in over 500 miles in scouting and hunting some years during early seasons and have seen it all.</p>
<p>While I have only been able to harvest one animal, I have always been able to see them. This is not an "easy" area to hunt but I have always enjoyed myself. My group has considered trying a different unit or possibly a different state due to the fact that we are getting older and unit 43 is accessed by either hiking or on horse back. We all live out of state and do not bring horses with us. With the warm weather the last few years we have had to hike higher up the mountains to see elk.</p>
<p>with drought years keeping the herd at the current level or maybe a little lower would be a good idea. The number of bulls in some areas of the unit are not good. In the last 3 years I have only seen 1 legal bull. Please manage for more and bigger bulls.</p>
<p>Last season my partner and I did not harvest any meat in 43. We did not see any elk tracks but did see deer, which was very unusual. The warm winter kept the elk too high in the mountains for foot access. Thank You,</p>
<p>While hunting in this area I've noticed many out-of-state hunters who are careless and demonstrate little concern for sportsmanship and fairplay. On several occasions I've heard gunshots before legal shooting hours, have found trash left by hunters and even came across a still-smouldering campfire left by a group of elk hunters. I think the overall quality of elk hunting, in this area, could be improved by limiting OTC access.</p>
<p>Consider more ways to keep elk from congregating on private land during hunting season. Perhaps more incentives to encourage private land owners to allow some hunting, would reduce the amount of elk taking refuge in private land.</p>
<p>As you know, GMU 43 has some very steep terrain and is very physically demanding. I have bow hunted this unit for 5 years and do so because of the high quality bulls available in a public access area. I live in Illinois and cannot scout the area before my week of hunting. I have learned my area very well and can expect to find elk when I get there. If the population was lowered for any reason, this area would become too physically demanding to justify spending the amount of money I do on tags, if the animals could not be located. In my 5-6 days of hunting, I can expect to encounter 1 or 2 bulls. I work hard to keep in shape to hunt this unit but only due to the fact that I know the elk are there, with the potential for a trophy quality bull. I realize that elk can and do cause damage, but if we as human beings cannot allow elk to live in this steep country, what is left for them? The journals of Lewis and Clark have proven that elk did not historically live in these steep areas. Humankind has not allowed them to live on the prairies anymore. Now we complain because they are causing damage to our automobiles and crops in the mountains! Remember when we point fingers, we have 3 fingers pointing back at us!</p>
<p>The animals (ELK) do not come down to public hunting area until later in the season when first and second general elk season is over. This is important to an older hunter like me. the elk bunch up in private ranches and don't leave until very cold season occurs. allowing older or younger new hunters take female elk for specific season could both increase the revenue, enhance hunting tradition and activities for the future and accomplish reducing the elk population to a healthy acceptable level.</p>

I would love to see Over the Counter bull tags go away. I know this wont happen since DOW is almost broke. Please cut bull tags in first and forth. fewer bull tags in muzzle would help also.
I am disappointed in my overall experience due to the willful waste of habitat by a logging operation from Idaho and I feel that I should have been notified of this before I applied for a license in this area. In my opinion, all of the activity from the loggers scared away the elk and prevented me from seeing any let alone firing a shot.
The B.L.M. two shoes parcle in the Wexner's private Ranch is very impotent to my Elk harvest success rate! The Elk in the region hide out on private ranches and this publice BLM parcle in the middle of a private ranch allows the area hunters to go in and hunt and harvest one and thus moves the herd out to the many other hunters on the easyer accessed public lands i.e. the crown. This has been the pattern I witnessed and took part in for the last 24 years! Its important to get the Elk moving off the private property and out onto the public areas were the vast majority of hunters hunt..
First of all, I had a grand time in unit 43. Although there were 8 of us hunting, none of us seen one single elk. We seen plenty of deer though. No one seen elk though. When talking with other hunters, they to were not seeing elk. We did though see a lot of cows. In my personal opinion, cows do way more damage than elk, and eat way more. It's not the deer that the elk compete with, it's the cows. Way to many cows grazeing in my book in unit 43. I had to move from Colorado a month ago and I will return to live and die in Co. I will hunt unit 43 again. It's a great unit and a fun place to camp in the summer. I don't know the circumstances of the herd in unit 43, but we did not see any elk. We seen more cows than any thing. I did though see some really nice mule deer bucks.
The area that I hunted was very challenging from a physical standpoint which I enjoy.The elk heard I feel is sufficient for the area. I do not feel that it is a high percentage trophy bull area, but that is not my objective. It is more the experience rather than the harvest.
The amount of private property, especially in the 4-mile/Thompson Creek area severly limits what is available to the public. The elk know where they are safe. More or less animals won't change the success rate for those hunting on public land.
As a landowner and resident of Shield "O" Mesa in Old Snowmass during the hunting season and winter the herd on the mesa averages from 30 to 50 elk which also is a calving area. The biggest problem for the herd has been the increase of home owners and hikers with uncontrolled dogs on the mesa. Pitkin County is planning a trail on the mesa. This will devistate the elk population on Shield "O" Mesa.
I understand we must respect private property. However large ranches – Crystal River for example have effectively turned into preserves where elk can and do retreat until the seasons are over. I do wish we could offer something to these property owners that would allow a method of driving those elk back onto public property - where is Soloman when you need him? If we have a hard winter we stand a chance of a major die off due to disease - I wish I had the answer to this problem.
Off-road usage by motorcycles has ruined the hunt for me in unit 44. I bought land in unit 43 and now hunt most of the time in that area, on private land. For public land hunters, motorcycles are a growing nuisance. I know of out-of-state hunters who stopped coming to Colorado for that reason. Quality of the hunting experience is more important than the relative size of the elk herd.
I have hunted U 43 about 15 years. About question #28 most hunters wont a chace to kill a good bull but will be happy with meat, takes both. U #43 heard numbers low, hunting poor, most of our group hunt elsewhere or have quit. No elk no hunters. To many bears.
1) Spring bear hunting 2) What is the mortality rate of calf elk do to bear & mountain lion & coyotes rate 3) Why is it more more excess to private ranches claiming damage do to elk - I have seen herds of elk on private land also private aircraft moving elk herds onto private land during elk (archery) season and prior to season opening of the rifle season ??- Capitol Creek drainage
It seems to me that unit 43 encompasses too much different habitat and too much area to be managed as one unit. What happens near Glenwood and Carbondale is completely different from what happens near Marble, Snowmass, and Aspen. I am concerned about crop depredation on ranchers lands in unit 43 but could care less about property damage to trophy homes in 471 owned but people who know nothing of game management, are anti-hunting, and do everything in their power to restrict access to theirs and public lands. That said, here is what 16 years 100's of miles of field research has produced, please take this for whatever it is worth. I have been hunting from the Castle Creek Valley to Bruin Creek for the past 16 years, archery and rifle seasons. I also hunt the unit 471 side of Independence Pass. We hunt on foot and horse and cover a lot of remote area. I have noticed a significant decrease in both elk and deer populations in that particular area over the past 6-7 years. I have also noticed an increase in hunter populations and a sharp increase in the mountain lion populations. It used to be we would see elk in groups of 30-40 animals in different areas. In some years there were so many cows that juvenile bulls would be running 3-4 cows themselves during the rut. Lately we are lucky to see groups of 4-8 elk. There are hardly any deer at all left. For the past two years we have foregone deer tags in the area because there are so few we don't feel right harvesting one. Three years ago I hunted the Sandy Creek drainage to Sawyer Creek. I saw 3 different lions and came across 12+ lion kills. I've come across more cats in the past 5 years then in my 21 years as a Colorado resident. Access to public land in the area has also become increasingly difficult as the human population covers the valley floor. As it stands right now there are only 2 public access points for the backside of Highlands between Highway 82 and Conundrum, making it impossible for anyone to hunt any significant portion of that vast rugged country. Highlands does not allow motorized access from the Ski area side. There is no valley floor access to 471 (that a human can navigate) from Hwy 82 all the way to Express Creek. Further up the valley from Conundrum to Ashcroft, landowners are posting illegal no trespassing signs at access points on both sides of the road. The forest service blocked the only area one could park a horse trailer to access the Sawyer Creek drainage two years ago. Based on counts I have done in calving areas near Bruin Creek, Columbia Basin, and Difficult Drainage, I would say at present there are not more than 400 elk and probably less than 100 deer between the Castle Valley and Bruin Creek. We also have not seen the numbers of Elk moving into Montezuma from the Gunnison area that we used to see in the mid 90's. This year we are exploring different areas and will likely be taking our revenues outside of the Roaring Fork Valley.

I would like to comment on E-15 DAU . I have hunted unit 43 for over 30 years . Up until the past five years the elk hunting was outstanding with excellent trophy bull opportunities. Our group of two - four had success from 80 to 100 percent every year. We hunted early archery season in the Snowmass Wilderness, and other than a few locals we never saw any other hunters. The past five years we have seen a steady decrease in elk numbers and size of bulls and a steady increase in bears. We went from never seeing a bear to seeing 9 this year. Two of the bears were very aggressive and all of the bears had no fear of humans. Someone is going to get seriously injured or killed by these bears. I think you need to give a bear tag with every elk or deer license. Not enough people want to pay 354 dollars to hunt a bear. I also think that making this a draw unit would be a mistake. Only the outfitters and a few locals would benefit from this. The Wilderness areas will never be crowded because of simple logistic reasons. Not many people have the resources and physical conditioning to hunt these areas. The only way it can be crowded is if the outfitters bring too many in. The people who think E-15is crowded are the ones hunting out by the roads. These easy access areas are the only places that need to be considered for draw tags. If you make the wilderness areas draw only you essentially give millions of acres of public land to the outfitters. I also feel that your public meetings are a joke. The only people who can attend are outfitters and locals. This is fine for State or private lands but not fair for National forest lands. I hope you consider the input from nonresidents just as much as someone that attends the meetings. I think the herd numbers from ten years ago when they were at their highest was not too high. There was a lot of huge bulls then too. What is the drawback to that? Some elk will die in bad winters but loosing 50 percent of a herd of 10000 will still give you more elk and better hunting than not losing any out a herd of 4000. And the years that don't lose elk due to bad winters would be outstanding hunting rather than less than average hunting every year.

Appendix 4. Input from Habitat Partnership Program (HPP) committees, county commissions, and federal land management agencies.



Lower Colorado River HPP Committee
6274 County Road 301
Parachute, CO 81635

Julie Mao, Terrestrial Biologist
Colorado Division of Parks and Wildlife
0088 Wildlife Way
Glenwood Springs, CO 81601

August 10, 2012

RE: DAU Plan E-12, E15 and E-16

Dear Julie,

After reviewing and discussing the information that was presented regarding the Elk DAUs E-12, E-15 and E-16 Management Plan, it is the consensus of the Lower Colorado HPP Committee we support Alternative 2, Status Quo for all three DAUs. We as a committee feel that the bull/cow ratios are where they need to be and that the population number is at a good objective. The problems the committee sees are more due to distribution than population numbers. We support Alternative 2 for E-12, E-15 and E-16.

If you have any further questions, please feel free to contact me by phone at (970) 260-0147 or by e-mail at danielles@willowwisp.net, I will be happy to help. Thank you.

Sincerely,

Danielle Lemon
Administrative Assistant
Lower CO River HPP
6274 County Road 301
Parachute, CO 81635



January 7, 2013

Julie Mao, Terrestrial Biologist
Colorado Division of Parks and Wildlife
0088 Wildlife Way
Glenwood Springs, Colorado 81601

RE: Elk Herd Management Plans for Data Analysis Units E-12 (Piney) and E-16 (Frying Pan)

Dear Julie:

Thank you for your presentation of the draft Elk Herd Management Plans for DAU's E-12 (Piney) and E-16 (Frying Pan) to the Board of County Commissioners on December 4, 2012.

Based on the recommendation of the Colorado Parks and Wildlife, it is the consensus of the Board of County Commissioners to support Alternative No. 2 for both DAU's and that the proposed bull/cow ratios and population numbers are the preferred objectives moving forward.

If Eagle County may be of further assistance regarding this matter, please contact me at (970) 328-8750 or by email at bob.narracci@eaglecounty.us.

Sincerely,



Bob Narracci, AICP
Planning Director

xc: file



January 14, 2013

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

RE: Elk Herd Management Plans for DAU E-15 (Avalanche Creek Herd) and E-16 (Frying Pan River Herd)

Dear Ms. Mao,

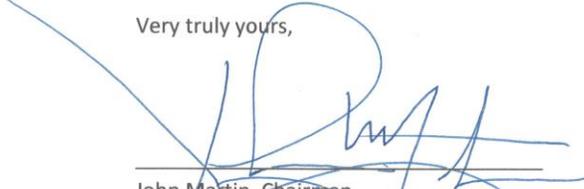
The Board of County Commissioners (the Commissioners) very much appreciates the presentation you made to us on December 18, 2012 where you described the work that Colorado Parks and Wildlife (CPW) is doing regarding the latest update to the Elk Herd Management Plans for DAU E-15 and DAU E-16 which include areas that specifically fall within the boundaries of southwest Garfield County.

We have reviewed the Elk Herd Management Plans for both of these areas and support Alternative 2 for the population objective range in which the current population would be maintained at its current size (+/-20%). We agree with CPW where Alternative 2 should be the **preferred alternative** as it adequately balances the public interest in preserving the herd for both hunting and viewing opportunities while managing the elk herds to levels that are consistent with the carrying capacity of the land. We also understand that this alternative will continue to allow more focused management at the GMU level (if needed) which allows even more flexibility in the herd management programs.

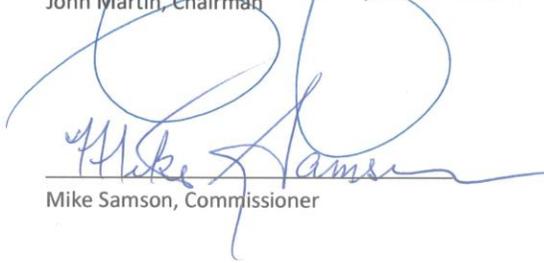
Without question, we fully support prudent management of the elk herds in Garfield County and surrounding areas. Please accept this letter as an endorsement by the Board of County

Commissioners of Alternative 2 as described in the Elk Herd Management Plans for DAU E-15 (Avalanche Creek Herd) and E-16 (Frying Pan River Herd). Should you have any questions, please do not hesitate to contact the Commission.

Very truly yours,



John Martin, Chairman



Mike Samson, Commissioner



Tom Jankovsky, Commissioner

Cc *Andrew Gorgey, Garfield County Manager*
Fred Jarman, Director, Garfield County Building & Planning Department



Forest
Service

White River
National Forest

Supervisor's Office
900 Grand Avenue
Glenwood Spgs., CO 81601-3602
(970)945-2521
FAX (970)945-3266

File Code: 2640

Date: January 25, 2013

Mr. Perry Will
Area 8 Wildlife Manager
Colorado Parks and Wildlife
0088 Wildlife Way
Glenwood Springs, CO 81601

Dear Perry,

Thank you for the opportunity to review and make comments on the draft Data Analysis Unit (DAU) plans for elk herd management units E-12 (Piney River) , E-15 (Avalanche Creek) , and E-16 (Fryingpan River). The plans are well written and include pertinent information relevant to setting elk herd population management objectives.

Attached you will find comments from the Eagle/Holy Cross and Aspen/Sopris Ranger Districts pertaining to the draft DAU plans for E-12, E-15, and E-16. Comments from district resource managers take into account continued discussions with your staff.

I understand and concur with the information and goals outlined in the DAU plans. I understand the publics' desire to keep elk numbers similar to current levels for hunting and viewing opportunities. In addition, I believe that herd population management objectives should be based primarily on habitat capability of winter ranges.

White River National Forest Plan goals, objectives, standards, and guidelines provide management direction to maintain healthy and available habitats to support populations of elk, deer and other wildlife populations on the National Forest. As land managers we strive to meet these goals, and consider habitat condition and improvement important components in program planning.

While these efforts continue, current conditions of winter range habitats are described in the DAU plans as poor and declining for E-15, and poor to fair and declining for E-12 and E-16. In addition to this, increasing human pressures on these same winter ranges (including development on private land and extensive recreation use on public lands) are acknowledged. I am concerned that an increase in elk herd population objectives could lead to increased conflict and negative consequences for elk, as well as for deer, sage grouse, and other wildlife that rely on these same winter ranges for survival.

I agree that warming and drying climate trends and the increased forage available to elk in lodgepole pine stands with high levels of mortality caused by the mountain pine beetle epidemic have resulted in changes to elk distributions and timing of their use of winter ranges. Although shortening the period of time that elk spend on winter ranges has positive implications for winter range health, when severe winters occur, I am concerned about whether the winter ranges in E-12, E-15, and E-16 are adequate to maintain elk herds at the proposed higher levels (there is no



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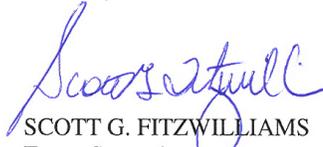


discussion in the DAU plans of supplemental winter feeding of elk under severe conditions, and I assume and agree that is not a desired scenario).

In summary, I believe elk herd population objectives for E-12, E15, and E-16 should be linked to the winter range habitat conditions and the ability to sustain increased numbers of elk along with other game and non-game species. I commend Colorado Parks and Wildlife in continuing to show reductions in elk herd population numbers through management, from their highs in the mid to late 1990s, getting ever closer to those 1988 population objectives. The White River National Forest will continue to implement the recent decisions for travel management, the sagebrush enhancement project on the Eagle/Holy Cross Ranger District, and the wildlife habitat improvement project on the Aspen/Sopris Ranger District so that elk winter and transitional ranges improve their condition to support elk, deer, sage grouse, and other wildlife species that depend on these habitats. I appreciate your help and support of these projects and look forward to our continued partnership.

If you have any questions or would like to discuss further, please contact Wendy Magwire at (970) 945-3244.

Sincerely,



SCOTT G. FITZWILLIAMS
Forest Supervisor

Enclosures

cc: Julie Mao

Comments on the draft Data Analysis Unit (DAU) plans for elk herd management units E-15 (Avalanche Creek), and E-16 (Fryingpan River).

Prepared by Phil Nyland, District Wildlife Biologist, Aspen/Sopris R.D., January 22, 2013

Objectives for elk herd population sizes in E-15 and E-16 should remain at the current 1988 levels. This means a continued reduction in current elk numbers. Antlerless licenses should stay the same or decrease to allow the herd to stabilize based on post-harvest counts that indicate improved calf recruitment and reduced competition for food and space.

Hunting in GMUs 43, 44, 47, 444, and 471 is moderately crowded, but relatively uncrowded compared to hunting in the Flattops DAU. Harvest rates as they currently are appear to provide adequate hunting opportunities in GMU 47, and 471; GMU 43, 44, and 444 can probably sustain additional antlerless hunting opportunities since parts of these GMUs have good access for most hunters and elk numbers are probably higher. Sustaining or increasing cow licenses would be very acceptable and sustaining or increasing either-sex licenses would be somewhat acceptable. Bull opportunities appear adequate in these DAUs, with the possible exception of 444.

Eliminating list B and C cow licenses would be somewhat unacceptable. This can be a good tool for reducing cows and additional bulls in remote areas of 47, 471, and 444, if hunters purchase additional tags and are able to fill them once they get into these areas.

Elk hunting in these DAUs would be improved with higher hunter success and less motor vehicle access. Seeing more mature bulls and more elk of all ages and sexes would not necessarily improve Elk hunting in these DAUs.

Winter range is the limiting factor for herd survival and juvenile recruitment for elk in these DAUs. A high percent of winter range is found on private land, in particular in GMU 444, and 47. Winter range on public land is susceptible to increasing disturbance impacts from growing levels of year-around recreation. Key areas at Avalanche Creek, the Crystal River Valley, Four Mile, Coal Creek, and South Thompson Creek that provide winter, transition, and calving areas for elk on USFS lands have been targeted for restoration over the next 5-10 years in E-15. Similarly, key areas in E-16 at Basalt Mt, Freeman Mesa, Cattle Creek, and the upper Fryingpan River valley on USFS lands have been targeted for restoration over the next 5-10 years. Maintaining reduced elk numbers would allow these areas to adequately revegetate to a point that they can sustain elk with good juvenile recruitment, and at the same time provide forage for mule deer, a species that appears in decline in these areas. Also, providing habitat for sustained elk numbers needs to be balanced with continued livestock grazing in parts of GMU 43, 47, 444, and 471